



微處理機控制

IGBT 推動

變頻式馬達控速器

使用手冊

Microprocessor Controlled

IGBT Drive

Inverter Motor Speed Regulator

Operating Manual

N310 系列
N310 Series

220V

440V

0.4~2.2KW
(1.2~4.0KVA)

0.75~55KW
(1.7~110KVA)



N310

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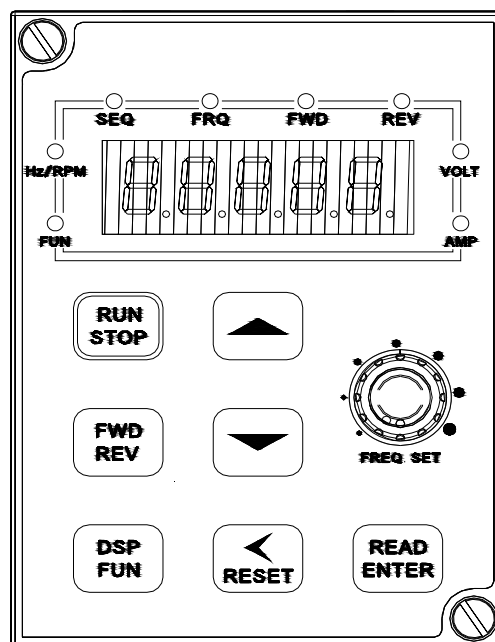
Quick Start Guide

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 N310 Instruction Manual supplied with your inverter.

Step 1 Before Starting the Inverter

Please review Preface and Safety Precautions (page 0-1 through 1-3) of the N310 Instruction Manual. Verify drive was installed in accordance with the procedures as described in N310 Ambient Environment and Installation on pages 3-1 through 3-8. If you feel this was abnormal, do not start the drive until qualified personnel have corrected the situation. (Failure to do so could result in serious injury.)

- **Check inverter and motor nameplates to determine that they have the same HP and voltage ratings. (Ensure that full load motor amps do not exceed that of the inverter.)**
- **Remove the terminal cover to expose the motor and power terminals.**
 - a. Verify that AC power is wired to L1, 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. **Four action of FUN, Hz/RPM, VOLT, AMP LED and display of five 7-segment displays, refer to operation description of the keypad.**
2. **SEQ LED:** 00-03(or 00-04) = 1/2/3, LED Lit.
3. **FRQ LED:** 00-05(or 00-06) = 1/2/3/4, LED Lit
4. **FWD LED:** Forward Direction, LED action (Flash in stop, Keep Lit in operation).
5. **REV LED:** Reverse Direction, LED action (Flash in stop, Keep Lit in operation).

Step 2 Apply Power to the Drive

- Apply AC power to the Drive and observe Operator. Five 7-segment Display should read Power Voltage for 2 seconds and then read Frequency/Speed, 5.00. Five 7-segment Display and FWD LED should be flashed all the time.

Step 3 Check Motor Rotations without Load

- Press RUN key (FWD LED should light); five 7-segment Display should run from 0.00 to 5.00.
- Check motor rotation.
If it is not correct:
Press STOP key. Remove AC power. Wait for LED “charge” lamp to extinguish. Reverse motor leads T1 and T2. Restart the drive and check new rotation.

Step 4 Check Full Speeds at 50Hz/60Hz

- Frequency/Speed can be changed by pressing the up or down Arrow keys. To move right or left for next digit, press “<” key.
Press the READ / ENTER key to set the speed.
- Set frequency up to 50Hz/60Hz in accordance with the last rule.
- Press RUN key. Check drives acceleration to full speed.
- Press STOP key to stop drive and check deceleration.

Step 5 Other Operations

Run command selection: 00-03(or 00-04)

Frequency command selection: 00-05(or 00-06)

For information, see N310 Instruction Manual.

Please refer to the following pages:

Set Control Mode (Vector, V/F)	p. 4-07
Set Motor Rated Current	p. 4-13
Set Accel	p. 4-08
Set Decel	p. 4-08
Set Max Speed	p. 4-08
Set Min Speed	p. 4-08

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 , L2 and L3 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 extraction means to keep the temperature below 40°C to avoid overheat or fire hazard.
- When removing or installing the operator keypad, turn OFF the power first, and secure the keypad correctly to avoid keypad operation or display failure.

Warning

- This product is sold subject to IEC 61800-3. In a domestic environment this product may cause radio interference in which case the user may be required to apply corrective measures.

Note: Do not install a drive equipped with EMC filter on IT (unearthed) systems.
EMC filter capacitors connect the supply network to earth potential which
May cause a danger or damage the unit.

- Motor over temperature protection is not provided.

1.1.2. During Power Up

Danger

- Do not insert or remove input connections to the inverter when powered up to avoid damage to the control board resulting from possible voltage surge due to contact bounce.
- When the momentary power loss is short, the inverter still has enough storage power to control the circuit. Therefore, when power is re-applied, the inverter will automatically restart depending on the setup of 04-03/04-04.
- When momentary power loss is longer than 2 seconds (the larger of horse power, the longer of time), the inverter does not have enough storage power to control the circuit; Therefore, when the power is re-applied, the operation of the inverter is based on the setup of 00-03(or00-04) /04-09 and the condition of external switch, this is considered to be 「restart」 in the following paragraphs.
- When **restarting** the inverter, the operation of the inverter is based on the setup of 00-03(or00-04) and 04-09 and the condition of external switch (FWD/REV button). Attention: the start operation will be regardless of 04-03/04-04/04-06/04-07.
 1. When 00-03(or00-04) =0, the inverter will not automatically run after restart.
 2. When 00-03(or00-04) =1 and the external switch (FWD/REV button) is OFF, the inverter will not run after restart.
 3. When 00-03(or00-04) =1, the external switch (FWD/REV button) is ON, and 04-09=0, the inverter will run automatically after restart.

Attention: To ensure safety, please turn off the external switch (FWD/REV button) after power loss, to protect machines from possible damage and potential injury to personnel on sudden resumption of power.
- If 4-09 is set to 0 (direct start up), please refer to the description and warnings for 04-09 to verify the safety of operator and machine.

1.1.3. Before Operation

Danger

Make sure the model and inverter capacity are the same as that set in parameter 12-00.

Caution

On power up the supply voltage set in parameter 05-03 will flash on display for 2 seconds.

1.1.4. During Operation

Danger

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

Danger

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

Caution

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

Caution

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

1.1.5. During Maintenance

Caution

The Inverter can be used in environment in temperature range from 14°-104°F (-10-40°C) and relative humidity of 95%.

Inverter Disposal

Caution

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

Chapter 2 Software Index

2.1 Keypad Description

2.1.1 Keypad Display and Operation Instruction

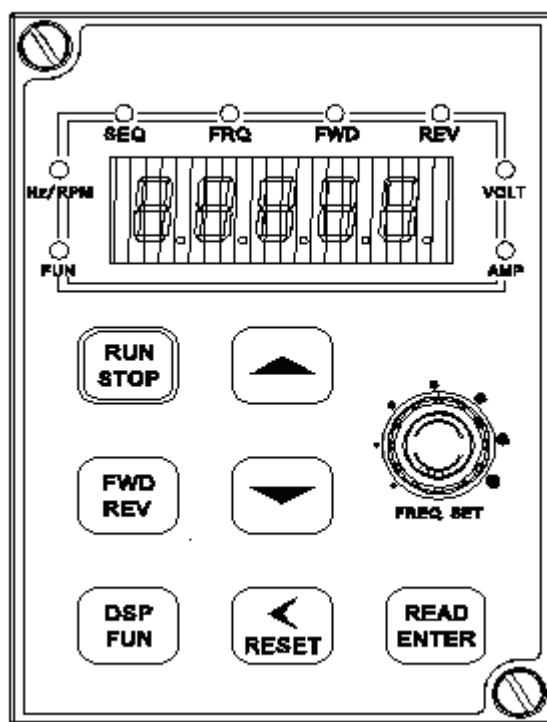


Figure 2-1 Keypad Layout

1. SEQ LED: Parameter 00-03(or00-04) = 1/2/3, LED Lit.
2. FRQ LED: Parameter 00-05(or00-06) = 1/2/3/4, LED Lit
3. FWD LED: Forward Direction, LED action (Flash while stopped, solid Lit during operation).
4. REV LED: Reverse Direction, LED action (Flash while stopped, solid Lit during operation).
5. Four actions of FUN mode: Hz/RPM, VOLT, AMP LED, and display of five 7-segment display.
(Refer to operation description of the keypad).

⚠ Caution

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

2.1.2 Operation Instruction of the keypad

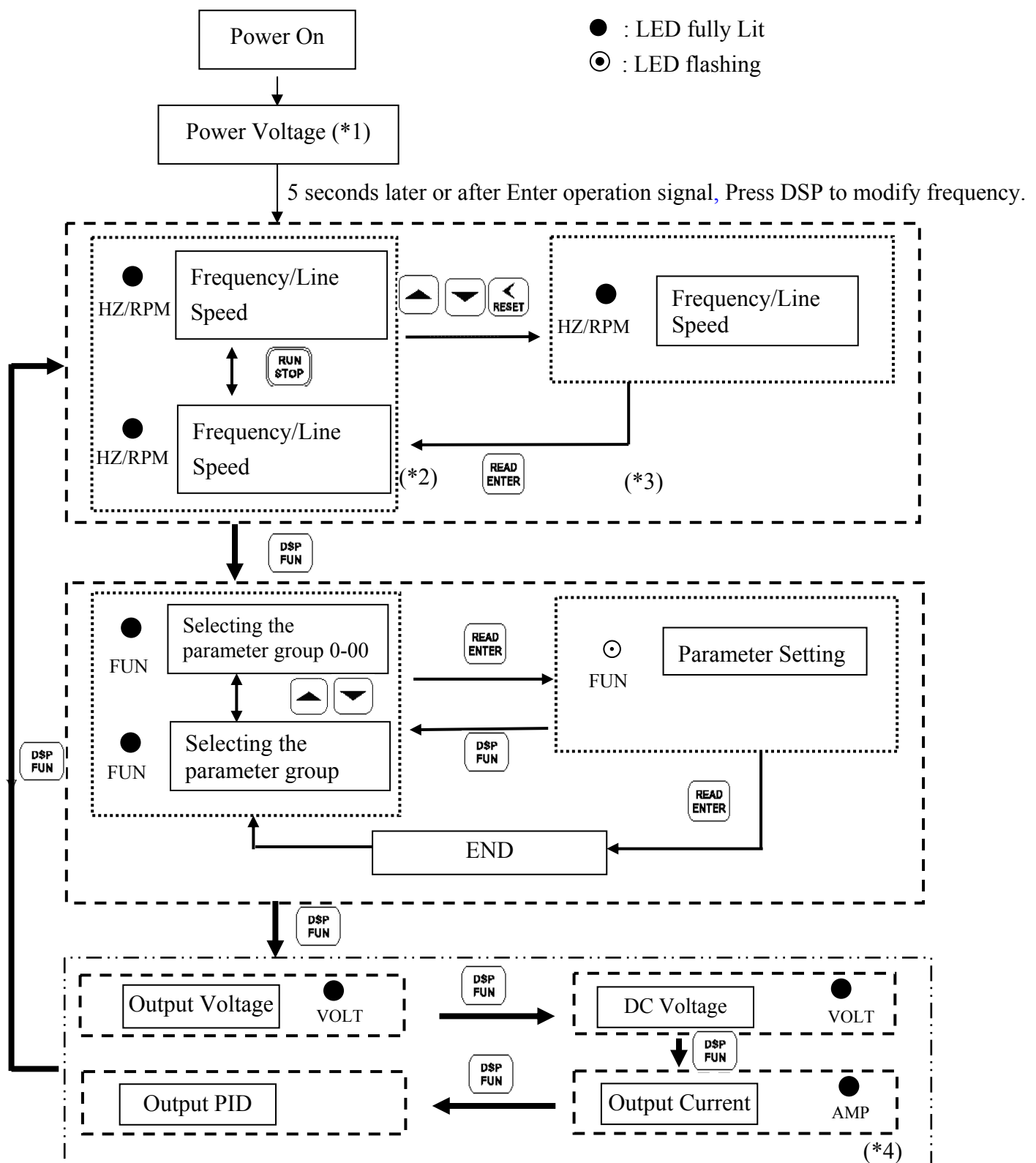


Figure 2-2 Keypad Operations Sequence

- *1: The inverter will flash the current setting of 05-03 (power supply voltage) after power up.
- *2: 11-01, 11-02 determines the displaying of frequency, 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 output PID is determined by 11-00 respectively.

2.1.3 Operation Instruction of the LED keypad

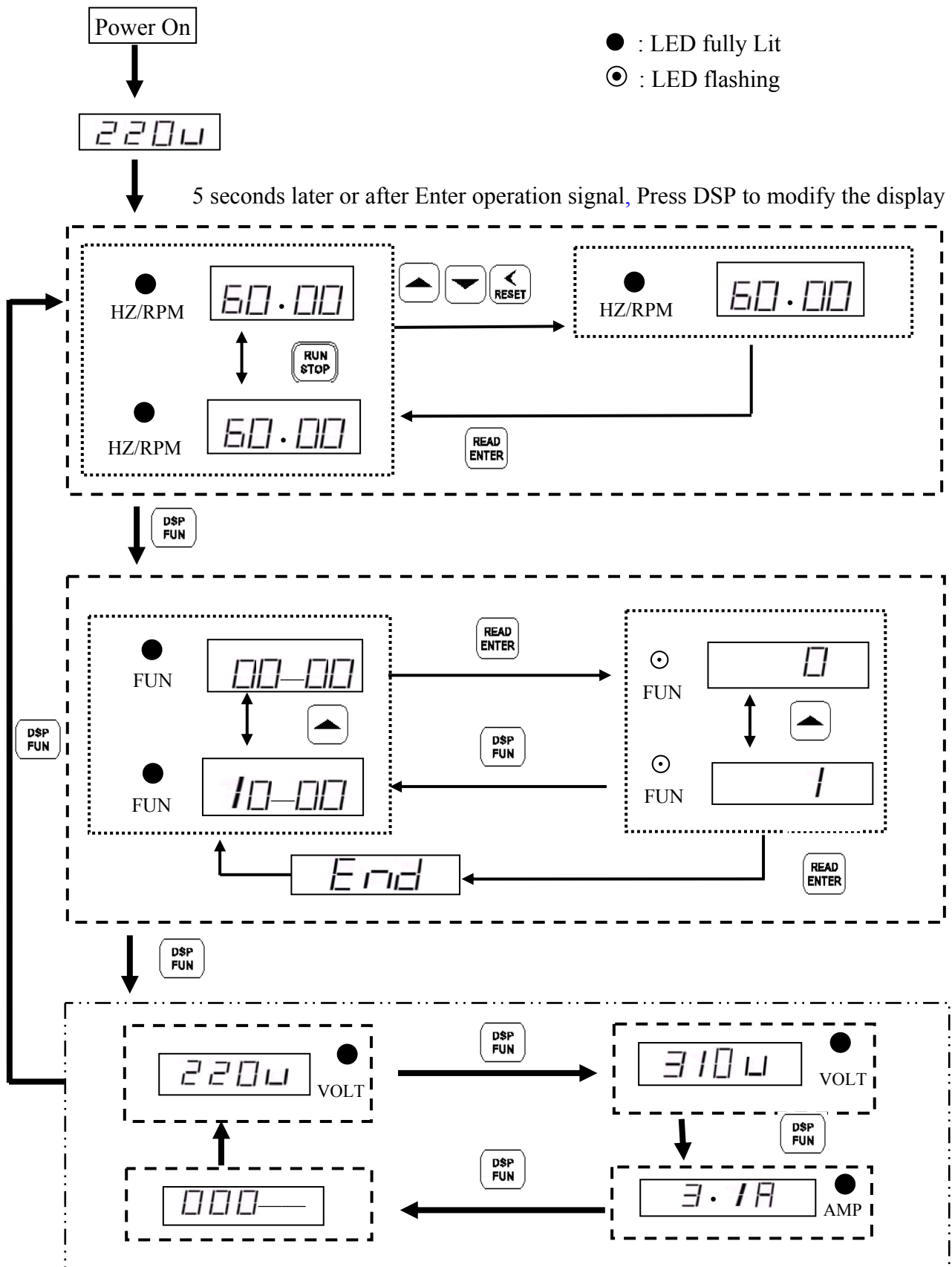
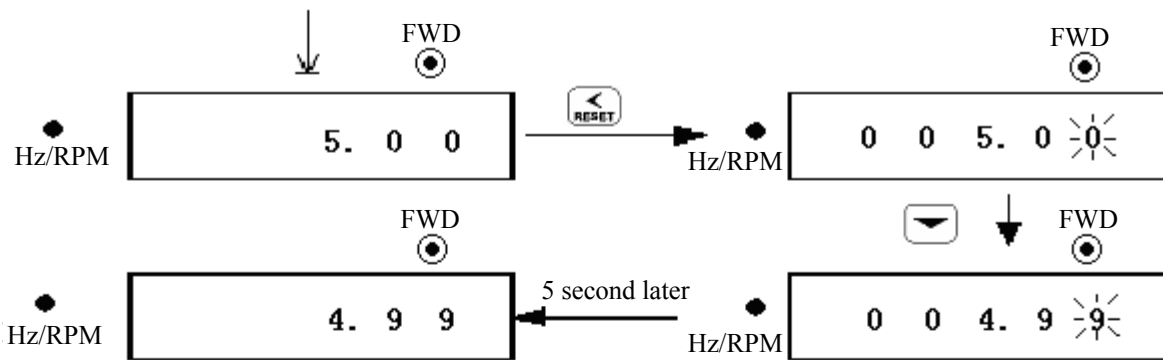


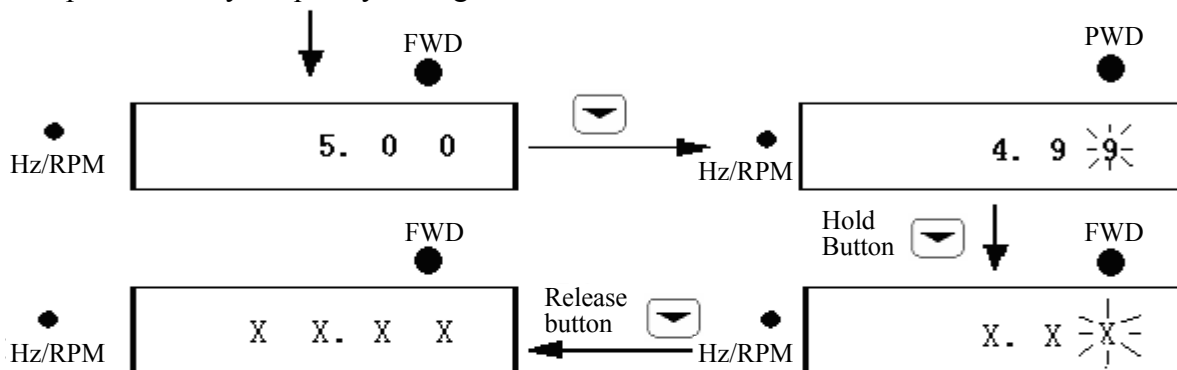
Figure 2-3 LED Keypad Operations Sequence

2.1.4 Keypad Operating Example

Example 1. Modify frequency while stopped

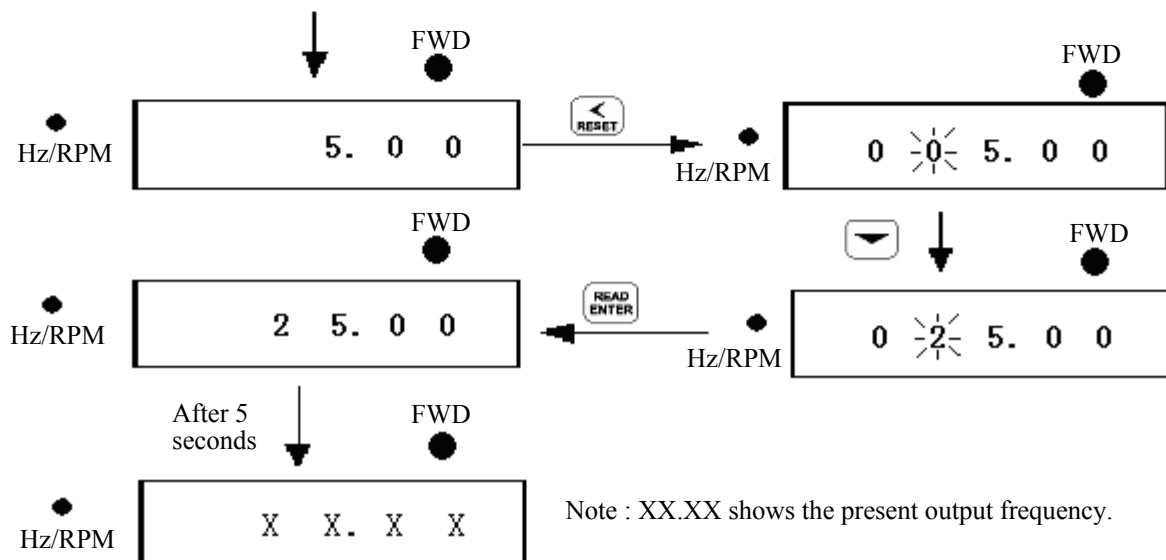


Example 2. Modify frequency during Run



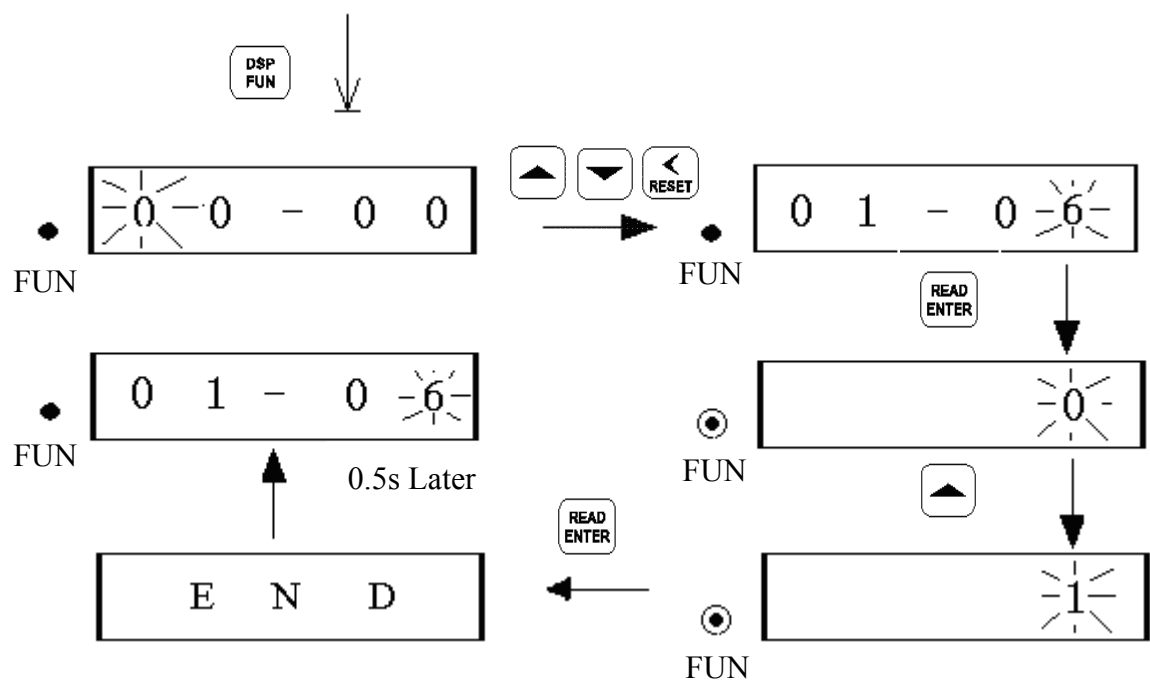
Note : XX.XX shows the present output frequency. The value ranges from 4.98 to 0 Hz, depending on the length of time the key ▼ pressed.

Example 3. Modify frequency in running

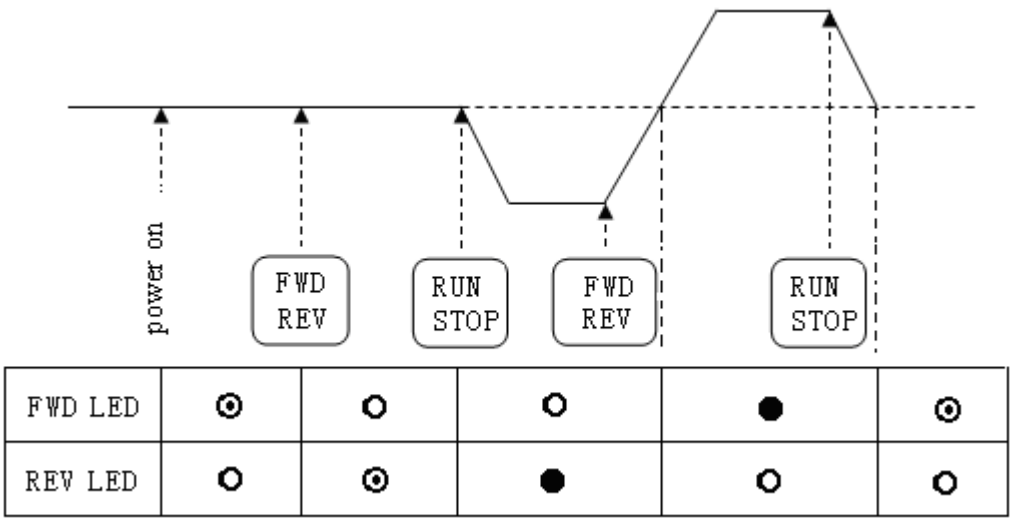


Note : XX.XX shows the present output frequency.

Example 4: Modifying the Value of Parameter



Example 5: Operation Control



●: LED Lit ○: LED Off

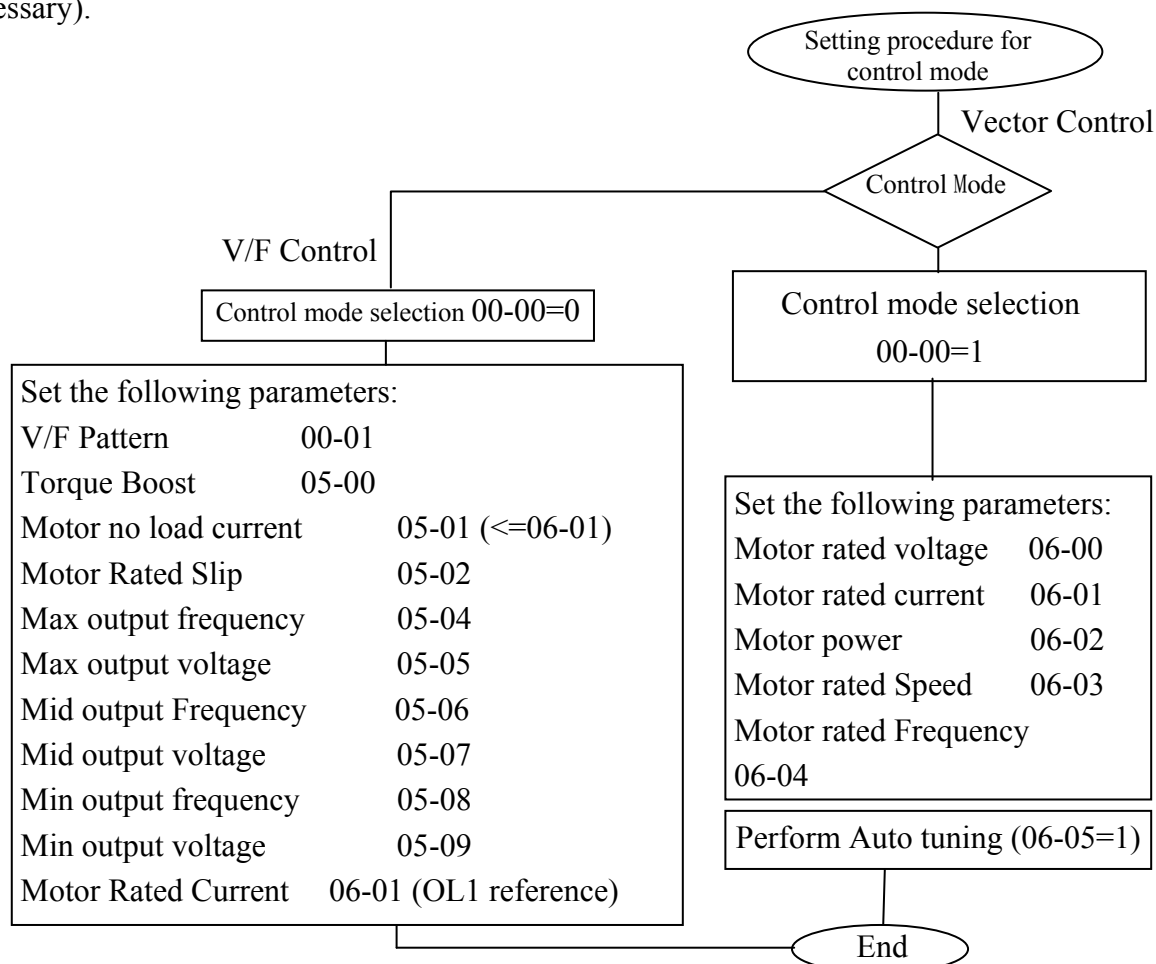
Figure 2-4 Keypad RUN Sequence

2.2 Control Mode Selection

The N310 Series inverter has two control modes:

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

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



※Note: Figure 2-5 Control Mode Selection Chart

1. Use V/F Control Mode:
 - (1) Use one inverter to drive several motors simultaneously
 - (2) Motor's nameplate is unknown or motor's specifications are too special, it will cause Auto-tuning fault.
 - (3) Specification of inverter and motor differs by more than 1 size.
2. One inverter drives several motors (Only in V/F mode), set the motor parameters according to the following rules:
 - (1). Sum the rated current of all motors for total inverter current.
 - (2). Input correct VF Pattern parameter (05-04~05-09).
3. When the nameplate of the motor is unknown, the inverter will be set by default to parameters according to the standard TECO motor.
4. When parameter 00-00=0, the keypad will display 'Err2' when performing Auto tuning.
5. In VECTOR MODE, the max. & min. value of 06-01~06-05 will be limited by one size higher or lower than TECO standard motor specification. In VF MODE control, there is no limitation.

2.3 N310 Programmable Functions List

Parameter Group No.	Description
00-	The basic parameters group
01-	External terminal digital signal input function group
02-	External terminal analog signal input function group
03-	Preset Frequency function group
04-	Start/Stop command group
05-	V/F command group
06-	Motor parameter group
07-	Protection function group
08-	Communication function group
09-	PID function group
10-	Assistant function group
11-	Keypad display group
12-	User parameter group
13-	Auto Run(Auto Sequencer) function group

0- The basic parameters group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
00-00	Control Mode	0: Volts/Hz 1: Vector (General Purpose)	0	
00-01	Volts/Hz Patterns (V/F)	0~18	0/9	*5
00-02	-----	-----	-----	Reserved
00-03	Main Run Command Source Selection	0: Keypad 1: External Run/Stop Control 2: Communication 3: Expansion card (Reserved)	0	
00-04	Subsidiary Run Command Source Selection	0: Keypad 1: External Run/Stop Control 2: Communication 3: Expansion card (Reserved)	0	
00-05	Main Frequency Command Source Selection	0: Keypad 1: Potentiometer on Keypad 2: External AI1 Analog Signal Input 3: External Up/Down Frequency Control 4: Communication setting Frequency	0	

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

1- External terminal digital signal input function group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
01-00	Multifunction Input Term. S1	0: Forward/Stop Command	0	
01-01	Multifunction Input Term. S2	1: Reverse/Stop Command	1	
01-02	Multifunction Input Term. S3	2: Preset Speed unit 0 (3-02)	2	
01-03	Multifunction Input Term. S4	3: Preset Speed unit 1 (3-03)	3	
01-04	Multifunction Input Term. S5	4: Preset Speed unit 2 (3-05)	4	
01-05	Multifunction Input Term. S6	5: Preset Speed unit 3 (3-09) 6: Jog Forward Command 7: Jog Reverse Command 8: Acc/Dec 2 9: Emergency Stop 10: Base Block 11: Speed Search 12: Energy Saving (V/F) 13: Main/Alt run Command select 14: Acc/Dec Disabled 15: Up Command 16: Down Command 17: Main/Alt Frequency Command select 18: PID Function Disabled 19: Integration Value Resets to Zero 20: Reset 21: KEB function 22: Auto _ Run Mode	20	
01-06	Multifunction terminal S1 ~ S6 confirm the scan times	1~ 200 (mSec X 2)	10	
01-07	Up/Down (Hz)	0.00~ 5.00	0.00	

Function Code No.	Description	Range/Code	Factory Setting	Remarks
01-08	Up/Down keep Frequency mode	0: When Up/Down is used, the preset frequency is held as the inverter stops, and the UP/Down function is disabled. 1: When Up/Down is used, the preset frequency is reset to 0 Hz as the inverter stops. 2: When Up/Down is used, the preset frequency is held as the inverter stops, and the UP/Down is available.	0	
01-09	Output Relay RY1 Operation Mode	0: Run	1	
01-10	Output Relay TR1 Operation Mode	1: Fault 2: Frequency Reached 3: Set Frequency 4: Frequency Threshold Level (> 1-11) - Frequency Reached 5: Frequency Threshold Level (< 1-11) - Frequency Reached 6: Auto Restart 7: Momentary AC Power Loss 8: Emergency Stop Mode 9: Base Block Stop Mode 10: Motor Overload Protection(OL1) 11: Drive Overload Protection(OL2) 12: Over torque Threshold Level(OL3) 13: PID Feedback Signal Loss	0	
01-11	Frequency Output Setting (Hz)	0.00 ~ 400.00	0.00	*1
01-12	Frequency Detection Range	0.00 ~ 30.00	2.00	*1
01-13	S1~ S5 switch type select	xxxx0: S1 NO xxx1: S1 NC xxx0x: S2 NO xxx1x: S2 NC xx0xx: S3 NO xx1xx: S3 NC x0xxx: S4 NO x1xxx: S4 NC 0xxxx: S5 NO 1xxxx: S5 NC	00000	
01-14	S6 switch type select	xxxx0: S6 NO xxxx1: S6 NC	00000	

※ “NO”: Normal open, “NC”: Normal close.

2- External terminal analog signal input function group

Function Code No.	Description	Range/Code			Factory Setting	Remarks
02-00	AI1/AI2 analog Input signal type select	setting	AI1	AI2	0	
		0	0~10V (or 0~20mA)	0~10V (or 0~20mA)		
		1	0~10V (or 0~20mA)	2~10V (or 4~20mA)		
		2	2~10V (or 4~20mA)	0~10V (or 0~20mA)		
		3	2~10V (or 4~20mA)	2~10V (or 4~20mA)		
02-01	AI1 Signal Verification Scan	1 ~ 200(mSec × 2)			100	
02-02	AI1 Gain (%)	0 ~ 1000			100	*1
02-03	AI1 Bias (%)	0.0 ~ 100.0			0.0	*1
02-04	AI1 Bias Selection	0: Positive 1: Negative			0	*1
02-05	AI1 Slope	0: Positive 1: Negative			0	*1

Function Code No.	Description	Range/Code	Factory Setting	Remarks
02-06	AI2 function Select	0: PID feedback signal 1: AI2 Bias signal input	0	
02-07	AI2 Signal Verification Scan	1 ~ 200(mSec × 2)	100	
02-08	AI2 Gain (%)	0 ~ 1000	100	*1
02-09	AI2 Bias (%)	0.0 ~ 100.0	0.0	*1
02-10	AI2 Bias Selection	0: Positive 1: Negative	0	*1
02-11	AI2 Slope	0: Positive 1: Negative	0	*1
02-12	Analog Output Mode(FM+)	0: Output Frequency 1: Frequency Setting 2: Output Voltage 3: DC Bus Voltage 4: Motor Current	0	*1
02-13	Analog Output FM+ Gain (%)	0 ~ 1000	100	*1
02-14	Analog Output FM+ Bias (%)	0.0 ~ 100.0	0.0	*1
02-15	FM+ Bias Selection	0: Positive 1: Negative	0	*1
02-16	FM+ Slope	0: Positive 1: Negative	0	*1

3-preset Frequency function group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
03-00	Preset Speed Control mode Selection	0: common (Is uniform time(Acc1/Dec1or Acc2/Dec2) 1: special (is single time Acc0/Dec0~ Acc15/Dec15)	0	
03-01	Preset Speed 0 (Hz)	0.00 ~ 400.00	5.00	Keypad Freq
03-02	Preset Speed1 (Hz)	0.00 ~ 400.00	5.00	*1
03-03	Preset Speed2 (Hz)	0.00 ~ 400.00	10.00	*1
03-04	Preset Speed3 (Hz)	0.00 ~ 400.00	15.00	*1
03-05	Preset Speed4 (Hz)	0.00 ~ 400.00	20.00	*1
03-06	Preset Speed5 (Hz)	0.00 ~ 400.00	25.00	*1
03-07	Preset Speed6 (Hz)	0.00 ~ 400.00	30.00	*1
03-08	Preset Speed7 (Hz)	0.00 ~ 400.00	35.00	*1
03-09	Preset Speed8 (Hz)	0.00 ~ 400.00	40.00	*1
03-10	Preset Speed9 (Hz)	0.00 ~ 400.00	45.00	*1
03-11	Preset Speed10 (Hz)	0.00 ~ 400.00	50.00	*1
03-12	Preset Speed11 (Hz)	0.00 ~ 400.00	0.00	*1
03-13	Preset Speed12 (Hz)	0.00 ~ 400.00	0.00	*1
03-14	Preset Speed13 (Hz)	0.00 ~ 400.00	0.00	*1
03-15	Preset Speed14 (Hz)	0.00 ~ 400.00	0.00	*1
03-16	Preset Speed15 (Hz)	0.00 ~ 400.00	0.00	*1
03-17	Preset Speed0-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-18	Preset Speed0-Decetime	0.1 ~ 3600.0 (second)	10.0	*1
03-19	Preset Speed1-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-20	Preset Speed1-Decetime	0.1 ~ 3600.0 (second)	10.0	*1
03-21	Preset Speed2-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-22	Preset Speed2-Decetime	0.1 ~ 3600.0 (second)	10.0	*1

Function Code No.	Description	Range/Code	Factory Setting	Remarks
03-23	Preset Speed3-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-24	Preset Speed3-Decctime	0.1 ~ 3600.0 (second)	10.0	*1
03-25	Preset Speed4-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-26	Preset Speed4-Decctime	0.1 ~ 3600.0 (second)	10.0	*1
03-27	Preset Speed5-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-28	Preset Speed5-Decctime	0.1 ~ 3600.0 (second)	10.0	*1
03-29	Preset Speed6-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-30	Preset Speed6-Decctime	0.1 ~ 3600.0 (second)	10.0	*1
03-31	Preset Speed7-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-32	Preset Speed7-Decctime	0.1 ~ 3600.0 (second)	10.0	*1
03-33	Preset Speed8-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-34	Preset Speed8-Decctime	0.1 ~ 3600.0 (second)	10.0	*1
03-35	Preset Speed9-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-36	Preset Speed9-Decctime	0.1 ~ 3600.0 (second)	10.0	*1
03-37	Preset Speed10-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-38	Preset Speed10-Decctime	0.1 ~ 3600.0 (second)	10.0	*1
03-39	Preset Speed11-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-40	Preset Speed11-Decctime	0.1 ~ 3600.0 (second)	10.0	*1
03-41	Preset Speed12-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-42	Preset Speed12-Decctime	0.1 ~ 3600.0 (second)	10.0	*1
03-43	Preset Speed13-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-44	Preset Speed13-Decctime	0.1 ~ 3600.0 (second)	10.0	*1
03-45	Preset Speed14-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-46	Preset Speed14-Decctime	0.1 ~ 3600.0 (second)	10.0	*1
03-47	Preset Speed15-Acctime	0.1 ~ 3600.0 (second)	10.0	*1
03-48	Preset Speed15-Decctime	0.1 ~ 3600.0 (second)	10.0	*1

04-start/stop command group

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

Function Code No.	Description	Range/Code	Factory Setting	Remarks
04-05	Auto Restart Method	0: Enable Speed Search 1: Normal Start	0	
04-06	Auto Restart Delay Time (Seconds)	0.0 - 800.0	0.0	
04-07	Number of Auto Restart Attempts	0-10	0	
04-08	Reset Mode Setting	0: Enable Reset Only when Run Command is Off 1: Enable Reset when Run Command is On or Off	0	
04-09	Direct Running After Power Up	0: Enable Direct running after power up 1: Disable Direct running after power up	1	
04-10	Delay-ON Timer (Seconds)	1.8 ~300.0	1.8	
04-11	Kinetic Energy Back-up Deceleration Time	0.0: Disable 0.1~25.0: KEB Deceleration Time	0.0	
04-12	Lower Limit of Power Voltage Detect	150.0~210.0 /300.0~420.0	190.0 /380.0	
04-13	DC Injection Brake Level (%) @start	0.0~150.0	50.0	
04-14	DC Injection Brake Time (Seconds) @start	0.0~25.5	0.5	
04-15	DC Injection Brake Start Frequency (Hz) @stopped	0.10~10.00	1.50	
04-16	DC Injection Brake Level (%) @Stopped	0.0~150.0	50.0	
04-17	DC Injection Brake Time (Seconds) @stopped	0.0~25.5	0.5	

05-V/F command group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
05-00	Volts/Hz Curve Modification (Torque Boost) (%)	0 ~ 30.0	10.0	*5
05-01	Motor No Load Current (Amps AC)	-----		*5
05-02	Motor rated Slip Compensation (%)	0.0 ~ 100.0	25.0	*5
05-03	v/f max voltage	220V series:170.0 ~ 264.0 440V series:323.0 ~528.0		*5
05-04	Maximum Frequency (Hz)	0. 20 ~ 400.00	50.00/60.00	*5
05-05	Maximum Frequency Voltage Ratio (%)	0.0 ~ 100.0	100.0	*5
05-06	Medium Frequency (Hz)	0. 10 ~ 400.00	25.00/30.00	*5
05-07	Medium Frequency Voltage Ratio (%)	0.0 ~ 100.0	50.0	*5
05-08	Minimum Frequency (Hz)	0. 10 ~ 400.00	0.50/0.60	*5
05-09	Minimum Frequency Voltage Ratio (%)	0.0 ~ 100.0	1.0	*5
05-10	V/F Energy Saving Mode	0: Disabled 1: Controlled by MFIT at Energy Saving	0	*5
05-11	V/F Energy Saving Gain (%)	0 ~ 100	80	*5
05-12	V/F start Frequency	0.00 ~ 10.00	0.00	*5

06-Motor parameter group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
06-00	Motor Rated Voltage (VAC)	-----		*4
06-01	Motor Rated Current (Amp AC)	-----		*4
06-02	Motor Rated Power (kW)	-----		*4
06-03	Motor Rated Speed (RPM)	-----		*4
06-04	Motor Rated Frequency (Hz)	-----		*4
06-05	Motor Parameter Auto Tuning	0: Invalid 1: Valid	0	
06-06	Stator Resistance (Ohms)	-----		*3*4
06-07	Rotor Resistance (Ohms)	-----		*3*4
06-08	Equivalent Inductance (mH)	-----		*3*4
06-09	Magnetizing Current (AmpsAC)	-----		*3*4
06-10	Ferrite Loss Conductance (gm)	-----		*3*4
06-11	Low-frequency compensation Gain	0 ~ 100	30	

07-Protection function group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
07-00	Trip Prevention Selection	xxxx0: Enable Trip Prevention During Acceleration xxxx1: Disable Trip Prevention During Acceleration xxx0x: Enable Trip Prevention During Deceleration xxx1x: Disable Trip Prevention During Deceleration xx0xx: Enable Trip Prevention in Run Mode xx1xx: Disable Trip Prevention in Run Mode x0xxx: Enable over voltage Prevention in Run Mode x1xxx: Disable over voltage Prevention in Run Mode	00000	
07-01	Trip Prevention Level During Acceleration (%)	50 ~ 200	200	Inverter Rated Current 200%
07-02	Trip Prevention Level During Deceleration (%)	50 ~ 200	200	Inverter Rated Current 200%
07-03	Trip Prevention Level In Run Mode (%)	50 ~ 200	200	Inverter Rated Current 200%
07-04	over voltage Prevention Level in Run Mode	350.0 VDC ~ 390.0 VDC 700.0 VDC ~ 780.0 VDC	380.0/760.0	

Function Code No.	Description	Range/Code	Factory Setting	Remarks
07-05	Electronic Motor Overload Protection Operation Mode	0: Enable Electronic Motor Overload Protection 1: Disable Electronic Motor Overload Protection	1	
07-06	Motor type Selection	0: Electronic Motor Overload Protection Set for Non-Inverter Duty Motor 1: Electronic Motor Overload Protection Set for Inverter Duty Motor	0	
07-07	Motor Overload Protection Curve Selection	0: Constant Torque (OL =103 %) (150 % for 1 Minute) 1: Variable Torque (OL = 113 %) (123 % for 1 Minute)	0	
07-08	Operation After Overload Protection is Activated	0: Coast-to-Stop After Overload Protection is Activated 1: Drive Will Not Trip when Overload Protection is Activated (OL1)	0	
07-09	Over torque Detection Selection (OL3)	0: Disable Over torque Operation 1: Enable Over torque Operation Only if at Set Frequency 2: Enable Over torque Operation while the Drive is in Run Mode	0	
07-10	Operation After Over torque Detection is Activated	0: Coast-to-Stop After Over torque is Activated 1: Drive will Continue to Operate After Over torque is Activated (OL3)	1	
07-11	Over torque Threshold Level (%)	30 ~ 300	160	
07-12	Over torque Activation Delay Time (Seconds)	0.0 ~ 25.0	0.1	
07-13	OH over heat Protection (cooling fan control)	0: Auto (Depends on temp.) 1: Operate while in RUN mode 2: Always Run 3: Disabled	1	

08-Communication function group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
08-00	Assigned Communication Station Number	0~ 32	1	*2*4
08-01	RTU code /ASCII code select	0:RTU code 1:ASCII code	0	*2*3
08-02	Baud Rate Setting (bps)	0:4800 1:9600 2:19200 3:38400	2	*2*3

Function Code No.	Description	Range/Code	Factory Setting	Remarks
08-03	Stop Bit Selection	0:1 Stop Bit 1:2 Stop Bits	0	*2*3
08-04	Parity Selection	0:Without Parity 1:With Even Parity 2:With Odd Parity	0	*2*3
08-05	Data Format Selection	0: 8-Bits Data 1: 7-Bits Data	0	*2*3
08-06	Communication time-out detection time	0.0 ~ 25.5	0.0	
08-07	Communication time-out operation selection	0:Deceleration to stop (00-10: Deceleration time 1) 1:Coast to stop 2: Deceleration to stop (10-06: Deceleration time 2) 3: continue operating	0	
08-08	Err6 fault tolerance times	1 ~ 20	3	
08-09	Drive Transmit Wait Time (ms)	5 ~ 65	5	

09-PID function group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
09-00	PID Mode Selection	0:Disabled 1:Bias D Control 2:Feedback D Control 3:Bias D Reversed Characteristics Control 4:Feedback D Reversed Characteristics Control 5:Frequency Command + Bias D Control 6:Frequency Command + Feedback D Control 7:Frequency Command + Bias D Reversed Characteristics Control 8:Frequency Command + Feedback D Reversed Characteristics Control	0	
09-01	Feedback Gain coefficient	0.00 ~ 10.00	1.00	*1
09-02	Proportional Gain (%)	0.0 ~ 10.0	1.0	*1
09-03	Integration Time (Seconds)	0.0 ~ 100.0	10.0	*1
09-04	Differentiation Time (Seconds)	0.00 ~ 10.00	0.00	*1
09-05	PID Offset	0: Positive 1: Negative	0	*1
09-06	PID Offset Adjust (%)	0 ~ 109	0	*1
09-07	PID Output Lag Filter Time (Seconds)	0.0 ~ 2.5	0.0	*1
09-08	Feedback Loss Detection Mode	0: Disabled 1: Enabled - Drive Continues to Operate After Feedback Loss 2: Enabled - Drive "STOPS" After Feedback Loss	0	
09-09	Feedback Loss Detection Level (%)	0 ~100	0	

Function Code No.	Description	Range/Code	Factory Setting	Remarks
09-10	Feedback Loss Detection Delay Time (Seconds)	0.0 ~ 25.0	1.0	
09-11	Integration Limit Value (%)	0 ~ 109	100	*1
09-12	Integration Value Resets to Zero when Feedback Signal Equals the Intended Value	0: Disabled 1: 1 Second 30: 30 Seconds 0 ~ 30	0	
09-13	Allowable Integration Error Margin (Units) (1 Unit = 1/8192)	0 ~ 100	0	
09-14	Sleep Frequency Level	0.00 ~ 400.00	0.00	
09-15	Sleep Function Delay Time	0.0 ~ 25.5	0.0	
09-16	Wake up frequency Level	0.00 ~ 400.00	0.00	
09-17	Wake up function Delay Time	0.0 ~ 25.5	0.0	

10-Assistant function group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
10-00	Expansion card type		Reserved	
10-01	Reverse operation control	0: Reverse command is enabled 1: Reverse command is disabled	0	
10-02	Keypad Operation with Up/Down Keys in Run Mode	0: 'Enter' must be pressed after Frequency change with Up/Down Keys on keypad. 1: Frequency will be changed directly when Up/Down Keys are Pressed	0	
10-03	Carrier Frequency (kHz)	1~ 15	5	
10-04	Carrier mode Selection	0: Carrier mode0 3-phase PW M modulation 1: Carrier mode1 2-phase PW M modulation 2: Carrier mode2 2-phase randomized PW M modulation 3: Carrier mode3 randomized PW M modulation 4: Carrier mode4 dual randomized PW M modulation	1	
10-05	Acceleration Time 2 (MFIT) (Seconds)	0.1 ~ 3600.0	10.0	*1
10-06	Deceleration Time 2 (MFIT) (Seconds)	0.1 ~ 3600.0	10.0	*1
10-07	S-Curve Acc/Dec 1 (Seconds)	0.0 ~ 4.0	0.2	
10-08	S-Curve Acc/Dec 2(Seconds)	0.0 ~ 4.0	0.2	
10-09	S-Curve Acc/Dec 3 (Seconds)	0.0 ~ 4.0	0.2	
10-10	S-Curve Acc/Dec 4 (Seconds)	0.0 ~ 4.0	0.2	
10-11	Skip Frequency 1 (Hz)	0.00 ~ 400.00	0.00	*1
10-12	Skip Frequency 2 (Hz)	0.00 ~ 400.00	0.00	*1
10-13	Skip Frequency 3 (Hz)	0.00 ~ 400.00	0.00	*1
10-14	Skip Frequency Bandwidth (±Hz)	0.00 ~ 30.00	0.00	*1

Function Code No.	Description	Range/Code	Factory Setting	Remarks
10-15	Carrier Frequency Reduction by temperature raising	0:disabled 1:enabled	0	

11-Keypad display group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
11-00	Display Mode	xxxx0: Disable Motor Current Display xxxx1: Enable Motor Current Display xxx0x: Disable Motor Voltage Display xxx1x: Enable Motor Voltage Display xx0xx: Disable Bus Voltage Display xx1xx: Enable Bus Voltage Display x0xxx: Disable temperature Display x1xxx: Enable temperature Display 0xxxx: Disable PID feedback Display 1xxxx: Enable PID feedback Display	00000	*1
11-01	Custom Units (Line Speed) Value	0~65535	1800	*1
11-02	Custom Units (Line Speed) Display Mode	0: Drive Output Frequency is Displayed 1: Line Speed is Displayed in Integer (xxxx) 2: Line Speed is Displayed with One Decimal Place (xxx.x) 3: Line Speed is Displayed with Two Decimal Places (xx.xx) 4: Line Speed is Displayed with Three Decimal Places (x.xxx)	0	*1
11-03	Max PID Feedback Setting	0~999	100	*1
11-04	Min PID Feedback Setting	0~999	0	*1
11-05	PID Feedback Display Mode	0:Displayed in Integer (xxx) 1:Displayed with One Decimal Place (xx.x) 2:Displayed with Two Decimal Places (x.xx)	0	*1
11-06	PID Feedback Display Unit Setting	0:xxx-- 1:xxxpb (pressure) 2:xxxfl (flow)	0	*1

12-User parameter group

Function Code No.	Description	Range/Code	Factory Setting	Remarks
12-00	Drive Horsepower Code		----	*3
12-01	Software Version	----	----	*3
12-02	Fault Log (Last 3 Faults)		----	*3
12-03	Accumulated Operation Time1 (Hours)	0~23	----	*3
12-04	Accumulated Operation Time2 (Days)	0~65535	----	*3
12-05	Accumulated Operation Time Mode	0: Time Under Power 1: Run Mode Time Only	0	*3

Function Code No.	Description	Range/Code	Factory Setting	Remarks
12-06	Reset Drive to Factory Settings	1150: Reset to the 50Hz factory setting 1160: Reset to the 60Hz factory setting	----	
12-07	Parameter Lock	0: Enable all Functions 1: 03-01~03-16 cannot be changed 2: All Functions cannot be changed Except 03-01~ 03-16 3: Disable All Function	0	
12-08	Parameter password	00000~65535	00000	
12-09	Copy Unit		Reserved	

13-Auto Run function group

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

Function Code No.	Description	Range/Code	Factory Setting	Remarks
13-16	Auto_ Run Mode Running Time Setting 0	0.0 ~ 3600.0 (second)	0.0	
13-17	Auto_ Run Mode Running Time Setting 1			
13-18	Auto_ Run Mode Running Time Setting 2			
13-19	Auto_ Run Mode Running Time Setting 3			
13-20	Auto_ Run Mode Running Time Setting 4			
13-21	Auto_ Run Mode Running Time Setting 5			
13-22	Auto_ Run Mode Running Time Setting 6			
13-23	Auto_ Run Mode Running Time Setting 7			
13-24	Auto_ Run Mode Running Time Setting 8			
13-25	Auto_ Run Mode Running Time Setting 9			
13-26	Auto_ Run Mode Running Time Setting 10			
13-27	Auto_ Run Mode Running Time Setting 11			
13-28	Auto_ Run Mode Running Time Setting 12			
13-29	Auto_ Run Mode Running Time Setting 13			
13-30	Auto_ Run Mode Running Time Setting 14			
13-31	Auto_ Run Mode Running Time Setting 15			
13-32	Auto_ Run Mode Running Direction 0	0: stop 1: forward 2: reverse	0	
13-33	Auto_ Run Mode Running Direction 1			
13-34	Auto_ Run Mode Running Direction 2			
13-35	Auto_ Run Mode Running Direction 3			
13-36	Auto_ Run Mode Running Direction 4			
13-37	Auto_ Run Mode Running Direction 5			
13-38	Auto_ Run Mode Running Direction 6			
13-39	Auto_ Run Mode Running Direction 7			
13-40	Auto_ Run Mode Running Direction 8			
13-41	Auto_ Run Mode Running Direction 9			
13-42	Auto_ Run Mode Running Direction 10			
13-43	Auto_ Run Mode Running Direction 11			
13-44	Auto_ Run Mode Running Direction 12			
13-45	Auto_ Run Mode Running Direction 13			
13-46	Auto_ Run Mode Running Direction 14			
13-47	Auto_ Run Mode Running Direction 15			

※Notes: *1 Can be modified during run

*2 cannot be modified while communication is active

*3 do not change while making factory setting

*4 the parameter will be changed by replacing model

*5 only available in V/F mode

2.4 Parameter Function Description

Group0- The basic parameters group

00-00:Control Mode 0: V/F mode 1: Vector mode (General Purpose)

To select the appropriate vector control mode or V/F mode according to the load characteristics.

1. If V/F mode is selected, please set parameters, group5 to comply with the load features.

Vector is best suited to control the general load or rapidly-changed torque load.

00-01 : Volts/Hz Patterns (V/F) = 0 ~ 18

1.00-01= 0~17, V / F Pattern. (Refer to group5)

2.00-01=18 , Flexiable V/F pattern, programmable according to parameters 05-04~05-09.

00-03: Main Run Command Source Select

- =0 : Keypad
- =1 : External Run/Stop Control
- =2 : Communication
- =3 : Expansion card (Reserved)

00-04: Alternative Run Command Source Select

- =0 : Keypad
- =1 : External Run/Stop Control
- =2 : Communication
- =3 : Expansion card (Reserved)

1. 00-03/00-04=0, the inverter is controlled by the keypad.

2. 00-03/00-04=1, the inverter is controlled by the external terminals, and the Stop key for emergency stop is operational. (Refer to 04-02 description)

※Note:00-03/00-04=1, please refer to parameter 04-03, 04-04, 04-06, 04-07 for detailed description in order to ensure safety of operators and machines.

3. 00-03/00-04=2, the inverter is controlled by Communication.

4. 00-03/00-04=3, the inverter is controlled by expansion card.(Reserved).

5. When 01-00 ~ 01-05 is set 13 (Main/Alt Control Signal Select), if the terminal is ON, the inverter is controlled by parameter 00-03, if the terminal is Off, the inverter is controlled by parameter 00-04.

00-05: Main Frequency Command Source Select

- =0 : UP/DOWN of Keypad
- =1 : Potentiometer on Keypad
- =2 : External AI1 Analog Signal Input
- =3 : External Up/Down Frequency Control
- =4 : Communication setting Frequency

00-06: Alternative Frequency Command Source Select

- =0 : UP/DOWN of Keypad
- =1 : Potentiometer on Keypad
- =2 : External AI1 Analog Signal Input
- =3 : External Up/Down Frequency Control
- =4 : Communication setting Frequency

1. Please refer to description of parameter group 01-00 ~ 01-05 (multifunction input terminals) for the function Up/Down terminal.
2. The priority in reading frequency is Jog> preset speed> ▲ ▼ on keypad or Up / Down or communication control.
3. When 01-00 ~ 01-05 is set 17(Main/Alt Frequency Command Select), if the terminal is ON, the inverter frequency command is set by parameter 00-05 , if the terminal is Off, the inverter frequency command is set by parameter 00-06.

00-07: Frequency Upper limit(Hz) 0.01 - 400.00

00-08: Frequency Lower limit(Hz) 0.01 - 400.00

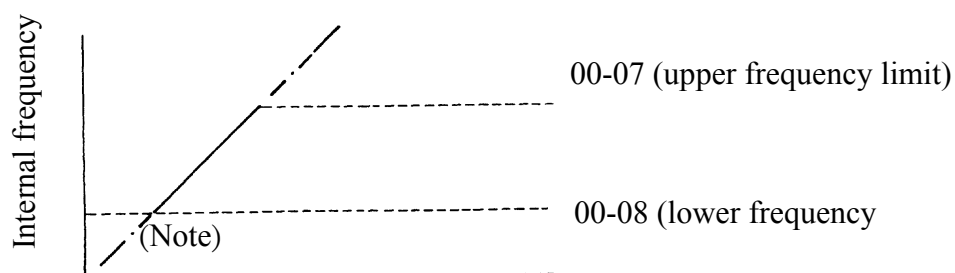


Figure 2-6 Frequency reference limits

※Note: When 00-08 = 0 Hz and frequency command is 0 Hz; the inverter will stop at 0 speed.
When 00-08 > 0 Hz and frequency command $\leq$ 00-08, the inverter will output the 00-08 preset value.

00-09: Acceleration time 1 (second) =0.1 – 3600.0

00-10: Deceleration time 1 (second) =0.1 – 3600.0

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

$$\text{acceleration time} = \frac{00-09(\text{ or } 10-05) \times \text{preset frequency}}{06-04}$$

$$\text{deceleration time} = \frac{00-10(\text{ or } 10-06) \times \text{preset frequency}}{06-04}$$

2. When 01-00 ~ 01-05 is set 08 (the second acceleration and deceleration time) , the first acceleration/ deceleration or the second acceleration/ deceleration/ will be set by OFF or ON the external input terminal.
3. When 01-00 ~ 01-05 is set 06/07 (Jog) , Jog run is controlled by external terminals. The acceleration and deceleration action will be at Jog acceleration and deceleration time.

The list setting:

Function preset value	Acc/ Dec time 1 (00-09/0-10)	Acc/ Dec time 2 (10- 05/10-06)	JOG Acc/Dec time (00- 13/00-14)
	00-05/00-06 determines the output frequency	00-05/00-06 determines the output frequency	Run at 00-12 Jog frequency
01-00~01-05=06/07 Jog command	Off	Off	On
01-00~01-05=08 Toggle Acc/Dec time	Off	On	Off

00-11 : Operation modes for external terminals**0:Forward/stop-reverse/stop****1:Run/stop-forward/reverse****2:3-wire control mode -run/stop**

- 1.) When operation command 00-03/00-04 = 0 (external terminal), 00-11 is valid.
 - 2.) When operation command 00-03/00-04 = 1 (external terminal control), the stop button for emergency is available. (Refer to 04-02 for detail description).
 - 3.) That both forward and reverse commands are ON will be treated as STOP.
1. 00-11 = 0, Control mode is as below:
 2. 00-11 = 1, Control mode is as below:

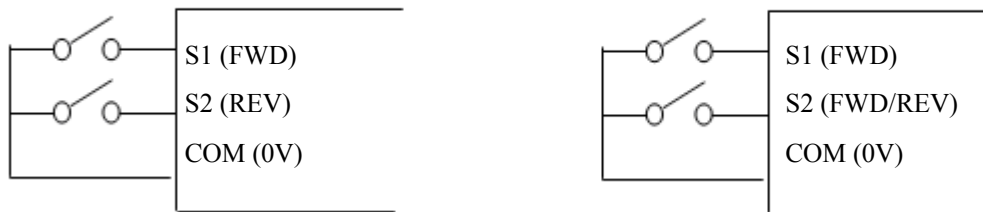


Figure 2-7 Terminal Board Drive Operation Modes

3. 00-11 = 2, Control mode is as below:

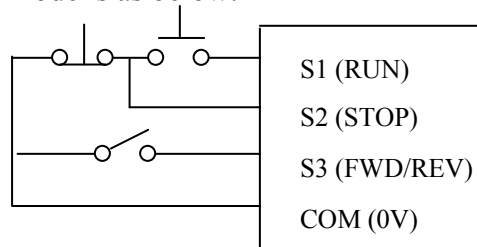


Figure 2-8 3-Wire start/stop wiring

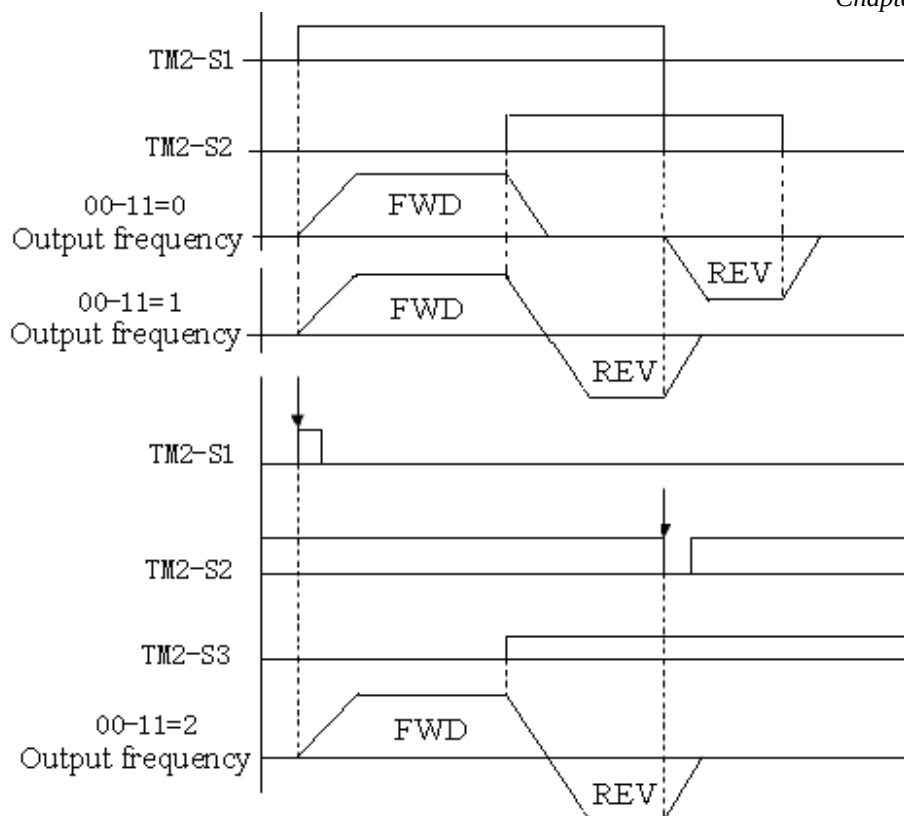


Figure 2-9 Drive start/stop operation sequences

※Note: 1.As 3 wire control mode is selected, the terminal S1, S2 and S3 is not controlled by 01-00, 01-01 and 01-02.

2. 10-01=1, the reverse command is unavailable.

00-12: Jog Frequency (Hz) =1.00 ~ 25.00

00-13: Jog Acceleration Time (MFIT) (Seconds) =0.1 ~25.5

00-14: Jog Deceleration Time (MFIT) (Seconds) =0.1 ~ 25.5

Example : When 1-00(S1)=6 , 1-01(S2)=7 (Jog), Jog run is controlled by external terminals, S1 on is Jog-forward, S2 on is Jog-reverse.

Group1- External terminal digital signal input function group

Multifunction input terminals (TM2 S1-S6) controlling:

- 01-00~05:**
 - 0:Forward/Stop Command**
 - 1:Reverse/Stop Command**
 - 2: Preset Speed unit 0 (3-02)**
 - 3: Preset Speed unit 1 (3-03)**
 - 4: Preset Speed unit 2 (3-05)**
 - 5: Preset Speed unit 3 (3-09)**
 - 6:JOG Forward Command**
 - 7:JOG Reverse Command**
 - 8:Acc/Dec time 2**
 - 9:Emergency Stop**
 - 10:Base Block**
 - 11:Speed Search**
 - 12:Energy Saving(V/F)**
 - 13:Main/sub Control Signal Select**

14:Acc/Dec Disabled
15:Up Command
16:Down Command
17:Main/sub Frequency Command Select
18:PID Function Disabled
19: Integration Value Resets to Zero
20:Reset
21: KEB function
22: Auto _ Run Mode

A. The terminals S1- S6 on terminal block (TM2) are multifunction input terminals. The 23 functions shown above can be set for these terminals.

B. Function Description for 1-00 ~ 05:

1. 01-00~05=0/1(Forward/Reverse/Stop)

As forward command is ON, the inverter runs and stops when the command is OFF. The 1-00 factory setting is forward.

As reverse command is ON, the inverter runs and stops when the command is OFF. The 1-01 factory setting is reverse.

2. 01-00~05=2/3/4/5 (Frequency Command 1/2/4/8 at 3-02/3-03/3-05/3-08)

When External multifunction input terminals are ON, the inverter is operates at the preset speed and the duration is determined by the time the input is ON. The corresponding preset frequency will be according to preset value of parameters 3-01 to 3-16 and in relation to the operation of input terminals 1 to 4. as shown in the table below:

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

3. 01-00~05=6/7(Forward/ Reverse JOG)

When Jog operation, is selected, the inverter operates at the Jog acceleration and deceleration times. The corresponding jog frequency parameter is shown below:

The priority order of frequency: Jog Speed→Preset Speed→Keypad frequency or external frequency signal

4. 01-00~05=8 (Acc/Dec time selection)

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

5. 01-00~05=9: External Emergency Stop.

The inverter will decelerate to stop by 10-06 setting and Flash E.S as the emergency stop signal is received regardless of 04-01 setting. After the emergency stop signal is removed, turn the RUN switch OFF and then ON again, or press the run key in keypad mode, the inverter will restart again up and ramps up to the command frequency.

If the emergency signal is released before the inverter stops completely, the inverter still carries out the emergency stop. The 01-09/01-10 determines the action of the error terminal. If 01-09/01-10=0: the fault is not enabled when the external emergency signal input. If 01-09/01-10=9, the fault is actuated when the emergency signal input.

6. 01-00~05=10: Base Block

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

7. 01-00~05=11: Speed Search Stop

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

8. 01-00~05=12: Energy-saving operation

FAN, PUMP or other high inertia loads need greater starting torque, but once the operational speed is reached they need much less torque. In this mode the output voltage to is reduced to match the required torque demand, hence providing a saving in energy.

The output voltage gradually declines as the input is ON. It will gradually increase (to the original voltage) as the input is OFF.

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

9. 01-00~05=13: Main/sub Control Signal Selection

When External multifunction input terminals are off, the inverter is operated by 00-03.

When External multifunction input terminals are on, the inverter is operated by 00-04.

10. 1-00~05=14: Disable acceleration and deceleration

The acceleration and deceleration action is unavailable until the disable signals are released.

The action is illustrated in the graph below:

Note: Operation Switch is OFF, the command of disable

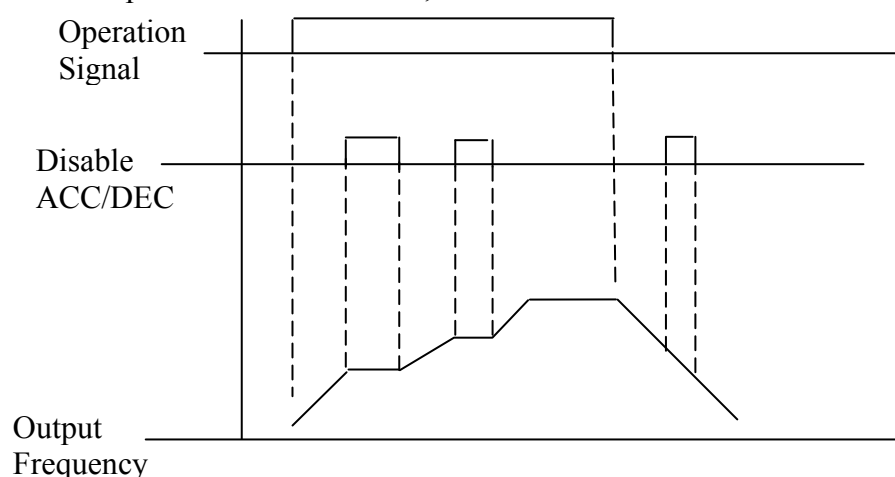


Figure 2-10 Acceleration and deceleration Prohibit

12. 1-00~05=15, 16: UP / DOWN Function (Actual ACC/DEC time is based on the setting):

- (1) 00-05/00-06 = 3 to use the UP/DOWN Function. The other frequency signals are ignored.
- (2) Set 01-07=0 and 01-08=0. The inverter accelerates to the preset value of 03-01 when in RUN, and then it maintains a constant speed. As the inverter receives either the UP/DOWN command, it will accelerate / decelerate until the command is released. The inverter runs at the speed setting at the time of release. The inverter will ramp stop or Free-Run stop which is determined by the 04-01 as long as the inverter receives the STOP command. The frequency at Stop time will be stored in 03-01. The UP/DOWN KEY is invalid when the inverter is stopped. It is necessary to use the Keypad to modify the preset parameters.
- (3) Set 01-08 = 1, the inverter will operate from 0Hz when the operation terminal is ON. The action of UP/DOWN is the same as above. The inverter will ramp stop or free-run stop as determined by 04-01 setting when it receives the Stop Command. The next operation will start at 0 Hz.
- (4) UP/Down Signals simultaneously pressed are invalid
- (5) 01-07≠ 0, the inverter accelerates to the setting of 03-01 and maintains speed. When the UP/Down terminal is on, setting frequency is the value $03-01 \pm 01-07$, and the inverter will accelerate/ decelerate to frequency 03-01. The upper frequency limit and lower frequency limit also restrict the operation. If the signal of UP/ DOWN is maintained over 2 seconds, the inverter will begin to accelerate/ decelerate. If 01-07=0, the operation is the same, until the UP/ DOWN signal is released. Please refer to the time diagram of 01-07.

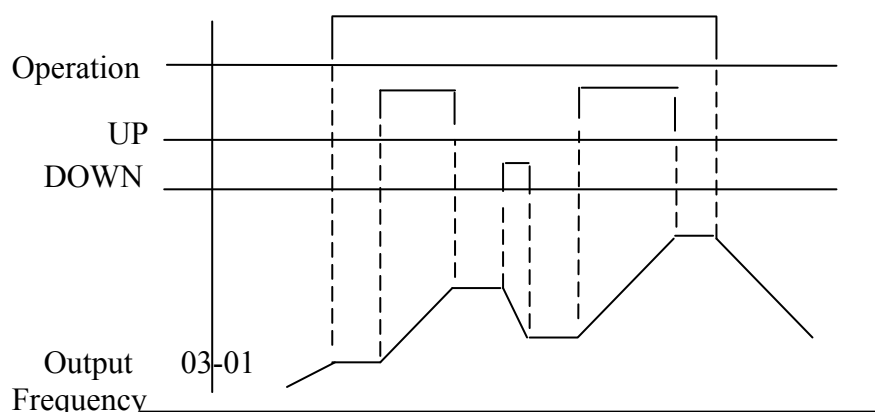


Figure 2-11 UP/DOWN key sequencing

13. 1-00~05=17 Main/sub Frequency Command Selection

When External multifunction input terminals are off, the inverter Frequency Command is operated by 00-05.

When External multifunction input terminals are on, the inverter Frequency Command is operated by 00-06.

14. 01-00~05=18(PID Function Disable)

When the PID Function Disable is ON, PID is not controlled by 09-00.

15. 01-00~05=19 (Integration Value Resets to Zero)

When the multifunction terminal 01-00~05 is set at 19 and the input terminal is on, the Integration Value of PID Resets to Zero.

16. 01-00~05=20(Reset Command)

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

17. 01-00~05=21 (Power Source Detect for KEB)

Refer to 04-11.

18. 01-00~05=22(Auto _ Run Mode)

AUTO_RUN function is simple built-in PLC function, set external terminals function as 22, turn it on, and set parameter in group 13, AUTO_RUN function is set completely, refer to group 13.

Digital /Analog input signal scan times:**01-06: Multifunction terminal S1 ~ S6 confirm the scan times (mSec X 2), 1~200 times**

1. TM2 terminal is used for scanning. If there are the same signals continuously input for N times, the inverter will treat the signal as normal. During the signal evaluation, if the scan times are less than N, the signal will be treated as noise.
2. Each scan period is 2ms.
3. The user can specify the scan times interval duration according to the noise environment. If the noise is serious, increase the value of 01-06, however the response will be slower.

Step of Up/Down Function (Hz):**01-07: Up/Down (Hz) 0.00~ 5.00**

There are two modes covered below:

1. 01-07 = 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).

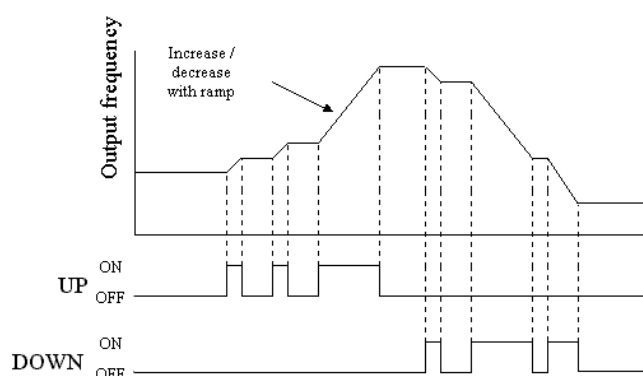


Figure 2-12 UP/DOWN original mode example

2. 01-07 = 0.01 to 5.00, and UP/ DOWN terminal ON, is equivalent to a step increase/ decrease at the increment frequency in 01-07. If UP/DOWN is pressed over 2 seconds, the original UP/DOWN mode is restored (Please refer to the following diagram)

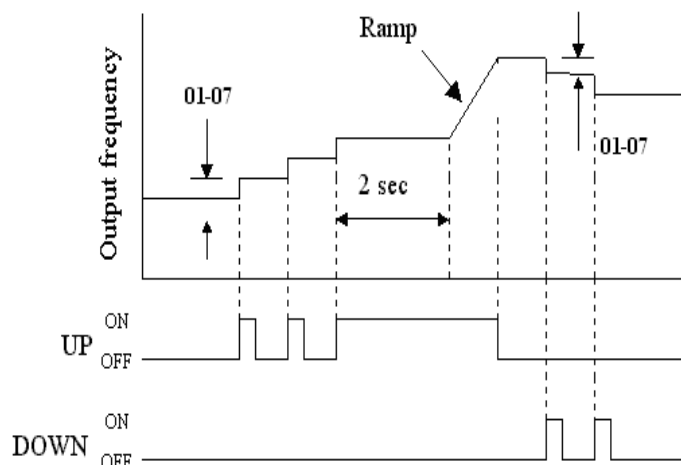


Figure 2-13 UP/DOWN with incremental steps

Stop Mode Using Up/Down:**01-08: Up/Down keep Frequency mode**

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

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

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

1. 01-08=0: the inverter will accelerate to the speed set in parameter 03- 01 as receiving the Run command and run at such certain speed. The inverter begins to accelerate (decelerate) as the UP (Down) terminal is energized. The inverter will hold the speed as the UP/DOWN command released. When the Run Signal releases, the inverter will ramp stop or stop which determined by the 04-01. It will store the frequency when the run signal is removed. UP/DOWN keys are idle when the inverter is stopped. The keypad is available to modify the preset frequency (03-01). If 1-08=2, the UP/Down is available as the inverter stops.
2. 01-08=1: as the Run terminal is energized, the inverter operates from 0 Hz, the Function of UP/DOWN is same as the above description. When the Run signal is released, the inverter will ramp stop or stop output (determined by 04-01) to 0 Hz. The next run command will always begin from 0 Hz.

Multifunction output terminals control:**01-09: Output Relay RY1 Operation Mode (R1C,R1B,R1A terminal)****01-10: Output Relay TR1 Operation Mode (SYN+, SYN- terminal)**

0: Run

1: Fault

2: Frequency Reached

3: Set Frequency (01-11 ±01-12)

4: Frequency Threshold Level (> 01-11) - Frequency Reached

5: Frequency Threshold Level (< 01-11) - Frequency Reached

6: Auto-restart

7: Momentary AC Power Loss

8: Emergency Stop Mode

9: Base Block Stop Mode

10: Motor Overload Protection

11: Drive Overload Protection

12: Over-torque Threshold Level

13: PID Feedback Signal Loss

01-11: Frequency Reached Output Setting =0.00 ~ 400.00Hz

01-12: Frequency Detection Range = 0.00 ~ 30.00Hz

01-09/10= 2:

The preset frequency is reached ($\pm 01-12$)

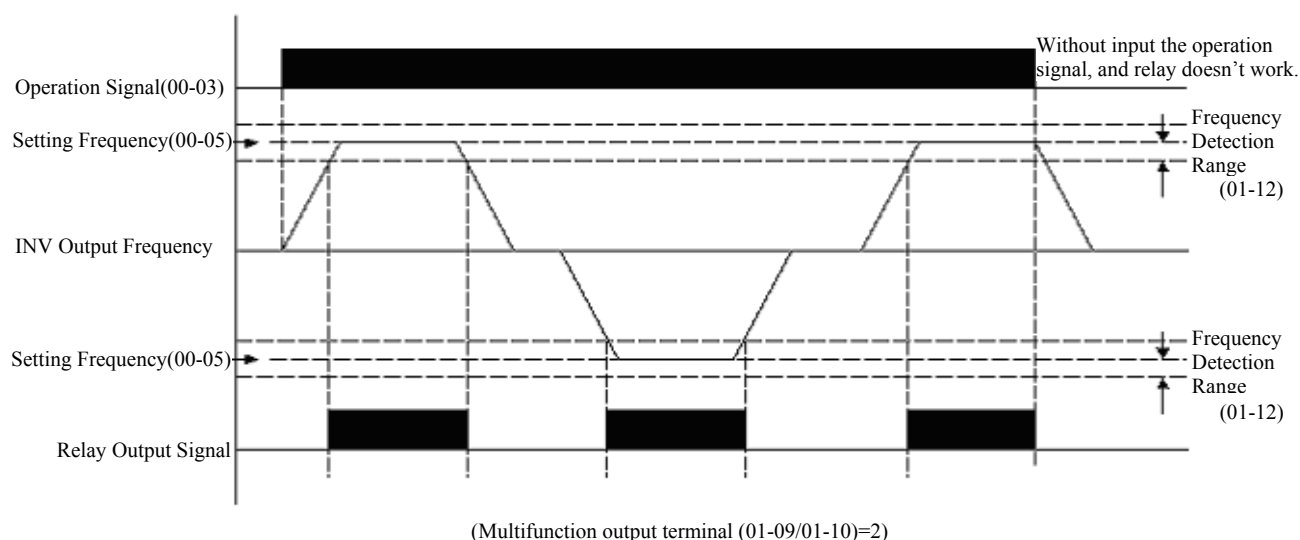


Figure 2-14 Frequency reached example

01-09/10= 3:

Arbitrary frequency consistency $F_{out} = 01-11 \pm 01-12$

Operation Frequency Reached Arbitrary Frequency ($01-11 \pm 01-12$)

Operation conditions:

- A. $|\text{Input Frequency-Frequency Command}(00-05)| < \text{Frequency Threshold Level}(01-12)$
- B. $|\text{Input Frequency-Detecting Level}(01-11)| < \text{Frequency Threshold Level}(01-12)$

Without input the operation signal or command frequency no consistency, and relay does not activate.

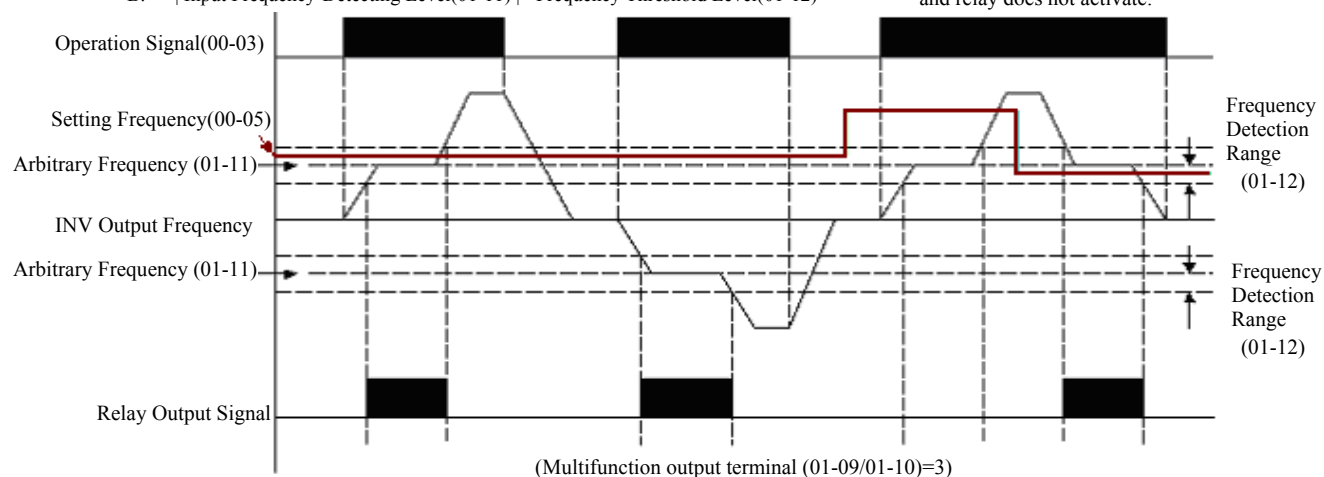


Figure 2-15 Frequency within specified range example

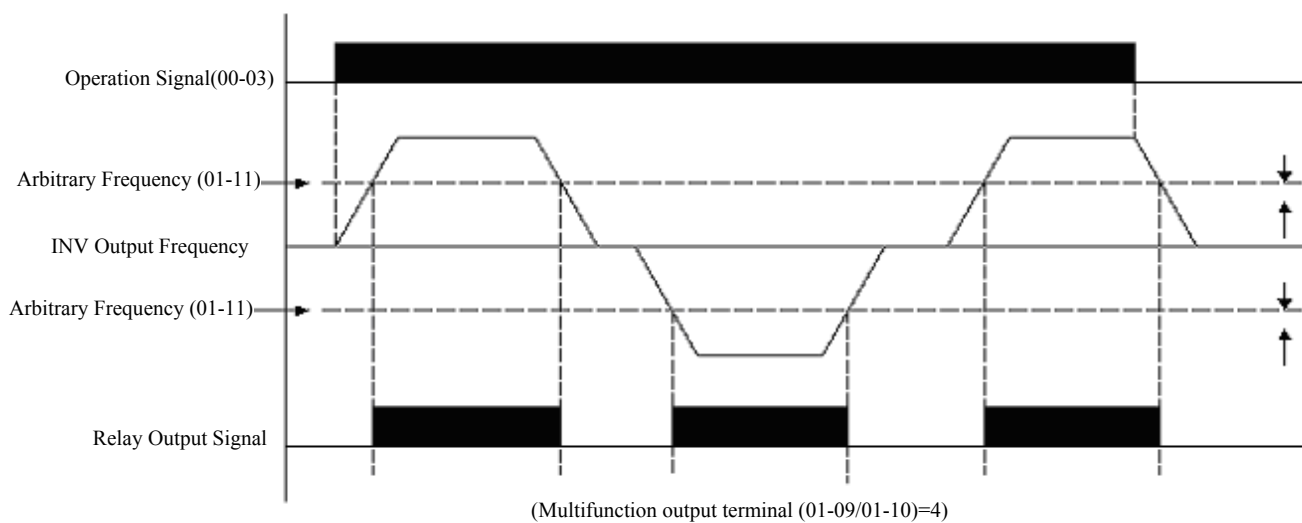
01-09/10= 4: Frequency detection $F_{out} > 01-11$ 

Figure 2-16 Frequency outside of range example

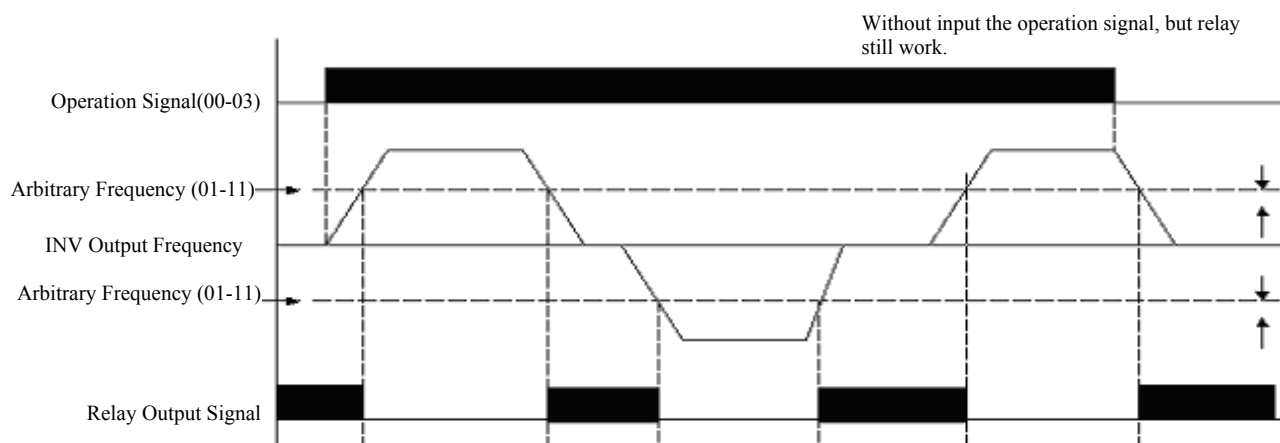
01-09/10= 5: Frequency detection $F_{out} < 01-11$ 

Figure 2-17 Frequency at or below specified range example

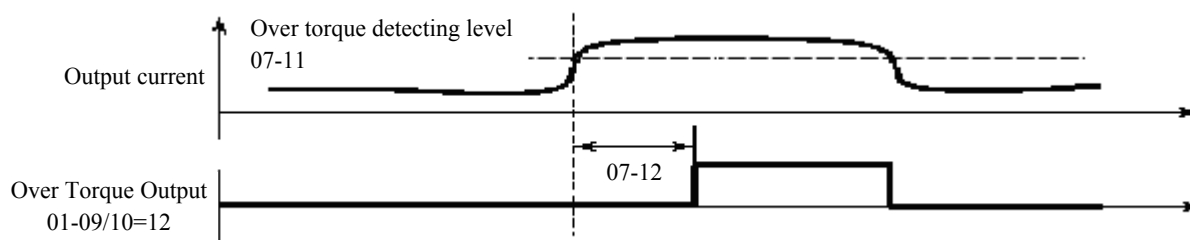
1-09/10=12: over torque detection

Figure 2-18 Over torque detection example

01-13: s1~s5 switch type select

xxxx0: S1 NO xxxx1: NC xxx0x: S2 NO xxx1x: NC

xx0xx: S3 NO xx1xx: NC x0xxx: S4 NO x1xxx: NC

0xxxx: S5 NO 1xxxx: NC

01-14: s6 switch type select

xxxx0: s6 NO xxxx1: s6 NC

※Note: “NO”: Normal open, “NC”: Normal close.

The switches type is decided by 01-13/01-14,

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

If set 01-13=0 0 0 0, means S1~S5 types of switches is Normal open, otherwise, if each bit of 01-13 is set to “1”, types of switches is Normal close.

Don't set 00-03/00-04=1 , before you set 01-13, 01-14 (external terminal controlled)

Group2- External terminal analog signal input function group

02-00: AI1/AI2 analog Input signal type select

- =0: AI1 0~10V (0~20mA), AI2 0~10V (0~20mA)
- =1: AI1 0~10V (0~20mA), AI2 2~10V (4~20mA)
- =2: AI1 2~10V (4~20mA), AI2 0~10V (0~20mA)
- =3: AI1 2~10V (4~20mA), AI2 2~10V (4~20mA)

02-00 : AI1/AI2 analog Input signal type select (refer to P3-14)

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

$$F(hz) = \frac{I(mA)}{20(mA)} \times (00 - 07), SW1 = I, \text{Input current}$$

$$F(hz) = \frac{V(v)}{10(v)} \times (00 - 07), SW1 = V, \text{Input voltage}$$

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

$$F(hz) = \frac{I-4(mA)}{20-4(mA)} \times (00 - 07), I \geq 4; SW2 = I, \text{Input current, or } F = 0, I < 4$$

$$F(hz) = \frac{V-2(v)}{10-2(v)} \times (00 - 07), V \geq 4; SW2 = V, \text{Input voltage, or } F = 0, V < 2$$

02-01: AI1 signal verification Scan Time 1~200 (×2mSec)

02-02: AI1 Gain(%) 0 - 1000

02-03: AI1 Bias(%) 0.0 - 100.0

02-04: AI1 Bias Selection 0:positive 1:Negative

02-05: AI1 Slope 0:positive 1:Negative

02-06: AI2 function Select

=0:PID feedback signal

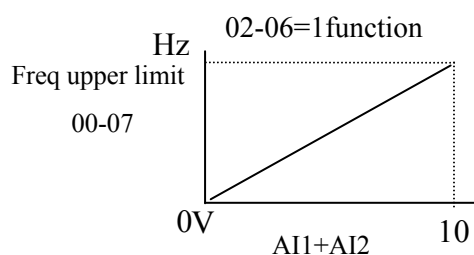
=1:AI2 Bias signal input

1. 02-06=0 (PID feedback input)

When 02-06 is set 0 means the PID feedback input terminal is controlled by the setting of 09-00.

2. 02-06=1 (Bias Input)

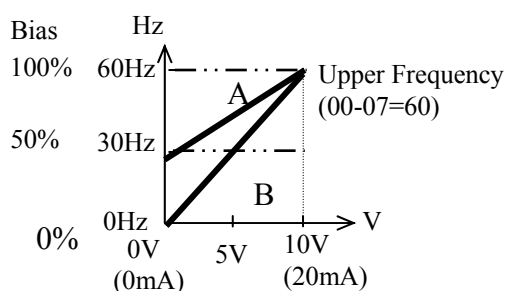
To regulate the Offset of the Keypad VR or AI1 analog input, only the signal of 0~10V (0~20mA) or 2~10V (4~20mA).



02-07: AI2 signal verification Scan Time 1–200 (× 2mSec)**02-08: AI2 Gain(%) 0 - 1000****02-09: AI2 Bias(%) 0.0– 100.0****02-10: AI2 Bias Selection 0:positive 1:Negative****02-11: AI2 Slope 0:positive 1:Negative****Note:** When 02-06 is set to 1 , settings of 02-07~02-11 will not be effective.**2.Example:**

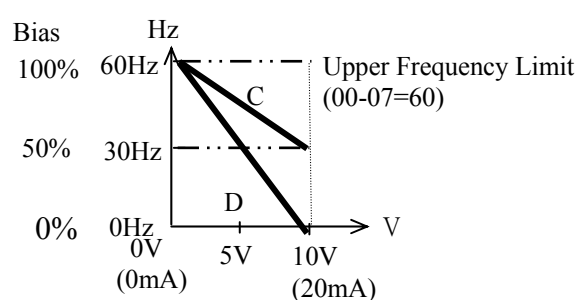
The setting of figure 2-18A:

	2-02 /2-08	2-03 /2-09	2-04 /2-10	2-05 /2-11	2-09
A	100%	50%	0	0	100%
B	100%	0%	0	0	100%



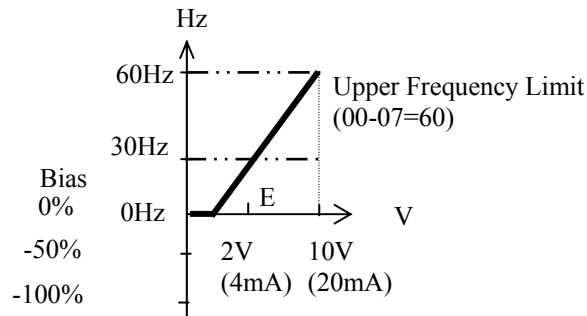
The setting of figure 2-18B:

	2-02 /2-08	2-03 /2-09	2-04 /2-10	2-05 /2-11	2-09
C	100%	50%	0	1	100%
D	100%	0%	0	1	100%



The setting of figure 2-18C:

	2-02 /2-08	2-03 /2-09	2-04 /2-10	2-05 /2-11	2-09
E	100%	20%	1	0	100%



The setting of figure 2-18D:

	2-02 /2-08	2-03 /2-09	2-04 /2-10	2-05 /2-11	2-09
F	100%	50%	1	1	100%

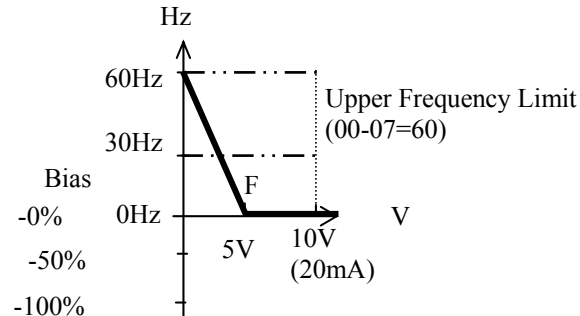


Figure 2-19 Analog scaling examples

- 1) The inverter reads the average value of A/D signals once per (02-01/02-07 × 2mS). Set scan intervals according to possible noise interference in the environment. Increase 02-01/02-07 in an environment with noise interference, but the response time will increase accordingly.

Multifunction analog output control**02-12: Analog Output Voltage Mode****0: Output frequency****1: Frequency Setting****2: Output voltage****3: DC Bus Voltage****4: Output current****02-13: FM+ Gain(%) 0 - 1000****02-14: FM+ Bias(%) 0.0- 100.0****02-15: FM+ Bias Selection 0:positive 1:Negative****02-16: FM+ Slope 0:positive 1:Negative**

1. The multifunction analog output terminal of the terminal block (TM2), is 0~10Vdc analog output. The output type is determined by the 02-12. The output voltage level can be scaled by parameter 02-13 to suit external meters and peripherals.

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

2. FM+ Function Description

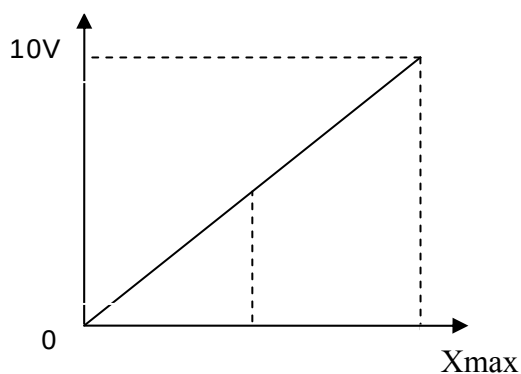


Figure 2-20 Multifunction analog output

2-12=0 Output Frequency	Xmax= upper frequency limit
=1 frequency setting	upper frequency limit
=2 Output Voltage	Motor Rated Voltage (VAC)
=3 DC Bus Voltage	220V: 0~400V 440V: 0~800V
=4 Motor Current	2 times rated current of inverter

Note: 02-13~02-16, refer to Figure 2-19 Analog scaling examples.

Group3- preset Frequency function group

03-00: Preset Speed Control mode Selection =0: common Is uniform time(Acc1/Dec1or Acc2/Dec2) =1: Special (is single time Acc0/Dec0~ Acc15/Dec15)
Setting frequency 03-01~03-16 : Preset Speed 0 ~ Preset Speed 15(Hz): =0.00 ~ 400.00
Setting time 03-17~03-48 : Preset Speed 0~15 Acceleration time(second): =0.1 ~ 3600.0 Preset Speed 0~15 Deceleration time(second): =0.1 ~ 3600.0

1. When 03-00 is set to 0, Acc-time (Dec-time) is determined by the 00-09/00-10(10-05/10-06).

2. When 03-00 is set to 1, Acc-time(Dec-time) is determined by the 03-17~03-48.

Function Description:

1) Formula for calculating acceleration and deceleration time: The denominator is base on the rated frequency of motor (06-04).

$$\text{Actual Acctime} = \frac{\text{Acctime parameter} \times \text{preset frequency}}{06-04}$$

$$\text{Actual Dectime} = \frac{\text{Dectime parameter} \times \text{pr eset f r equency}}{06-04}$$

Example: 06-04=50hz (motor Rated frequency), 03-02=10hz (preset speed) ,
03-19=5s (Acc time), 03-04=20s (Dectime),

$$\text{Preset speed 1 Actual Acc time} = \frac{03-19 \times 10(\text{hz})}{06-04} = 1(\text{s})$$

$$\text{Preset speed 1 Actual Dec time} = \frac{03-20 \times 10(\text{hz})}{06-04} = 4(\text{s})$$

2) When 03-00 is set to 1, the time has two modes to be set:

Example: 00-03=1, 01-00=0 (s1=RUN/STOP),

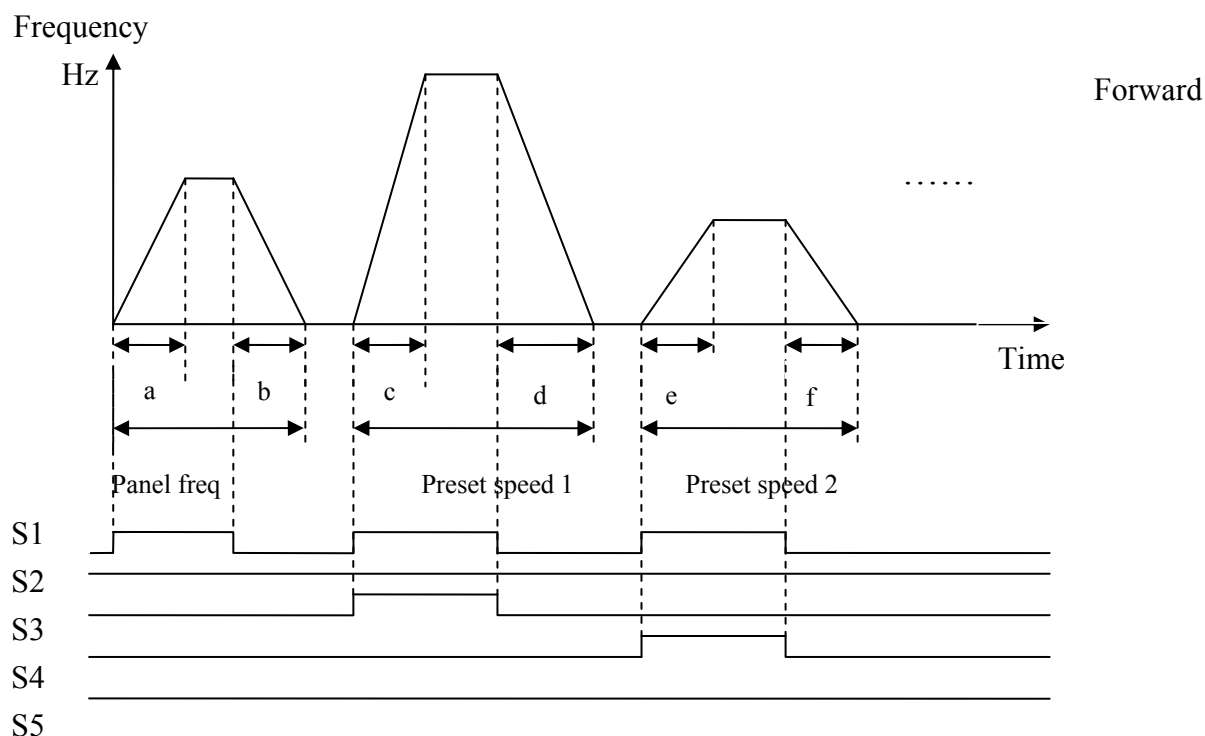
01-01=1 (s2=forward/reserve),

01-02=2 (S3=preset speed1), 01-03=3 (S4= preset speed 2),

01-03=4 (S5= preset speed 4)

model: When the run command is uncontinuous, calculate acceleration and deceleration time of each segment like this

$$a = \frac{(03-17) \times (03-01)}{06-04}, b = \frac{(03-18) \times (03-01)}{06-04}, c = \frac{(03-19) \times (03-02)}{06-04}, d = \frac{(03-20) \times (03-02)}{06-04} \dots\dots$$

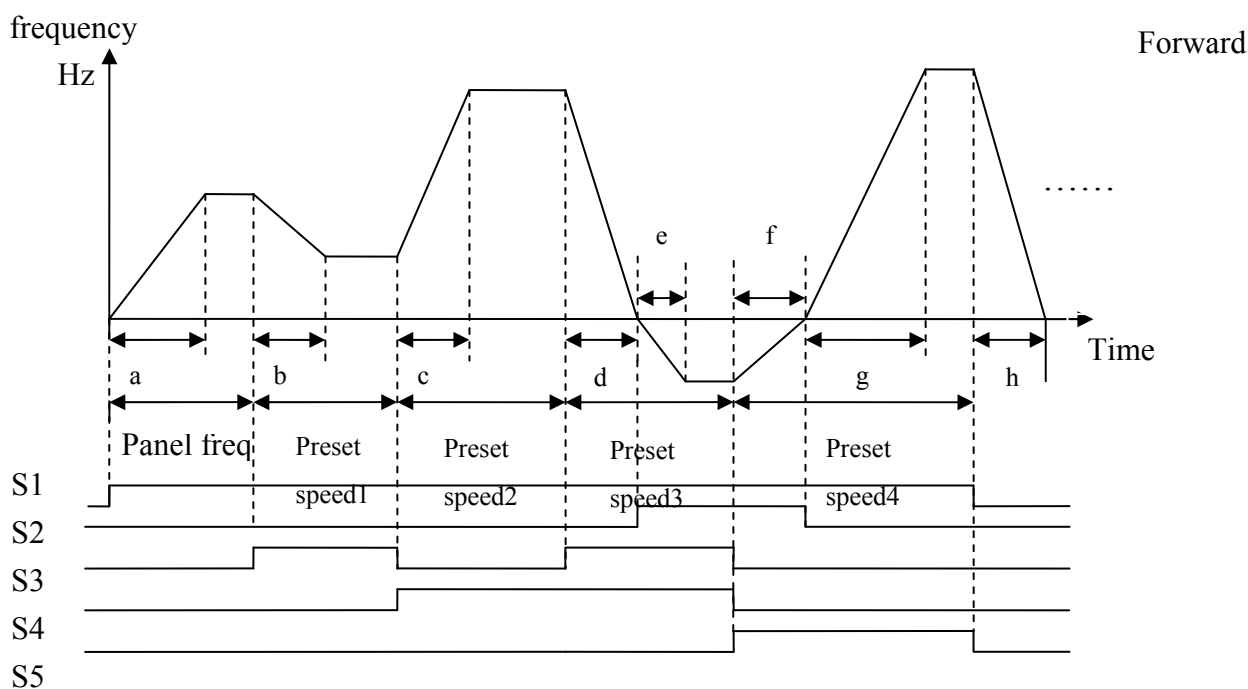


mode2: When the run command is continuous , calculate acceleration and deceleration time of each segment like this

$$a = \frac{(03-17) \times (03-01)}{06-04}, \quad b = \frac{(03-20) \times [(03-01) - (03-02)]}{06-04}, \quad c = \frac{(03-21) \times [(03-03) - (03-02)]}{06-04}$$

$$d = \frac{(03-24) \times (03-03)}{06-04}, \quad e = \frac{(03-23) \times (03-04)}{06-04}, \quad f = \frac{(03-26) \times (03-04)}{06-04}, \quad g = \frac{(03-25) \times (03-05)}{06-04},$$

$$h = \frac{(03-26) \times (03-05)}{06-04} \dots\dots$$



Group4- Start/Stop command group

04-00 : Starting Method Selection

=0: Normal start

=1: Enable Speed Search

1. 04-00=0: On starting, the inverter accelerates from 0 to target frequency in the set time.

2. 04-00=1: On starting, the inverter accelerates to target frequency from the detected speed of motor.

04-01 : Stopping Method Selection

=0: Enhanced braking capacity

=1: Coast to stop

=2: standard braking capacity

1. 04-01=0: the inverter will decelerate to 0Hz in preset deceleration time after receiving the stop command. (Improved stop)

2. 04-01=1: the inverter will stop output as receiving the stop command. The motor will inertia Coast to stop.

3. 04-01=2: the inverter will decelerate to 0Hz in preset deceleration time after receiving the stop command. (Normal stop)

04-02 : Stop Key on keypad

=0: Stop Button Enabled

=1: Stop Button Disabled

04-02=0, The STOP key is available for controlling the inverter to stop.

04-03 : Momentary power loss and restart

=0: Momentary Power Loss and Restart disable

=1: Momentary power loss and restart enable

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

(According to the capacity of DC power)

04-04: Momentary Power Loss Ride-Thru Time (Seconds): 0.0 - 2.0 second

1. If the input power supply due to sudden increase in supply demand by other equipment results in voltage drops below the under voltage level, the inverter will stop output at once. If the power supply voltage level recovers in the 04-04 preset time, it will spin start tracing from the trip frequency, or otherwise the inverter will trip with 'LV-C' fault displayed.

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

3. 04-03=0: as power lost, the inverter will not start.

4. 04-03=1: if the loss time is less than the value of 04-04, the inverter will Spin Start in 0.5 second as the power is resumed and restart times are infinite.

5. 04-03=2: the power lost for long time, before the inverter lost the control power for the CPU, the inverter will restart according to the 00-03 and 04-05 setting and status of external switch as the resumed.

Note: 00-03=1 04-05=0 04-03=1or 2 after a power loss for a long time, please turn OFF the power and power switches to avoid any possible injury to operators and machines when the power is resumed unexpectedly.

04-05 : Auto Restart Method:**=0: Enable Speed Search****=1: Normal Start**

1. 04-05=0: When auto-restarting the inverter will detect the rotating speed of the motor. The Motor will be controlled to accelerate from the present speed to the target speed.
2. 04-05=1: The inverter restart from 0 speed to set frequency in acceleration time when auto-restart.

04-06 : Auto Restart Delay Time (Seconds):0 ~ 800.0 second**04-07 : Number of Auto Restart Attempts: 0 ~ 10 times**

1. 04-07=0: The inverter will not auto restart after trips due to fault.
2. 04-07>0, 04-06= 0:
The inverter will conduct SPIN START in 0.5 second after trips due to fault. The motor will Coast to stop while the output is switched off, Once the rotating speed is determined then it will accelerate or decelerate from this speed to the running speed before the fault.
3. 04-07>0, 04-06>0:
The output will be stopped for a period which is determined by the 04-06 after a fault trip. Then, spin start to set target frequency.
4. Auto restart after a fault will not function while DC injection braking or decelerating to stop.

04-08: Reset Mode Setting**0: Enable Reset Only when Run Command is Off****1: Enable Reset when Run Command is On or Off**

04-08=0 Once the inverter is detected a fault, please turn Run switch Off and then On again to perform reset, otherwise restarting will not be possible.

04-09: Direct Running After Power Up**0: Enable Direct running after power up 1: Disable Direct running after power up****Danger:**

1. 04-09=0 and the inverter is set external terminal controlled (00-03/00-04=1), if the run switch is ON as power is supplied, the inverter will auto start. It is recommend that the power is turned off and the run switch is also off to avoid possibility of injury to operators and machines as the power is reapplied.

Note: IF this mode is required all safety measures must be considered including warning labels.

2. 04-09=1 and the inverter is set external terminal controlled (00-03/00-04=1), if the run switch is ON as power is supplied, the inverter will not auto start and the display will flash with STP1.

It is necessary to turn OFF the run switch and then ON to start normally.

04-10: Delay-ON Timer (Seconds): 1.8 ~ 300.0 second

As power on and 04-09=0, the inverter will perform auto restart in the setting time for delay.

04-11: Kinetic Energy Back-up Deceleration Time (S)**= 0.0:Disable****= 0.1~25.0 : KEB Deceleration Time**

04-11 = 0 KEB function disable 04-11≠ 0 KEB function enables

Example: 220V system

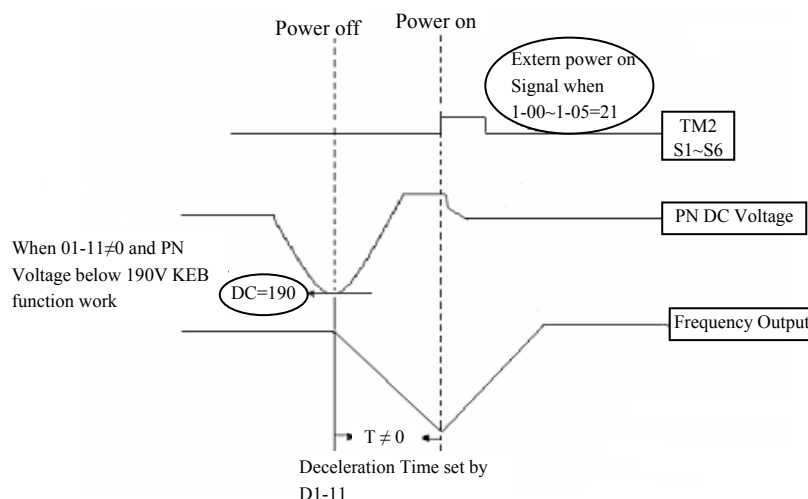


Figure 2-21 KEB function diagram

※**Note:**

1. When 04-11≠0, the momentary power loss and Restart is disabled, the inverter will do KEB Function.
2. When input power is turned off, CPU detects the DC bus Voltage and as soon as DC bus Voltage becomes lower than 190V (220V system) or 380V (440V system), then the KEB function is activated.
3. When KEB function is enabled, the inverter decelerate to zero by 04-11, and the inverter stop
4. IF the power on signal enabled during the KEB function, the inverter accelerate to original frequency.

04-12: Lower Limit of Power Voltage Detect = 150.0 ~ 210.0/300.0 ~ 420.0

04-13: DC Injection Brake Level(%) @start = 0.0 ~150.0

04-14: DC Injection Brake Time (Seconds) @start = 0.0 ~ 25.5

04-15: DC Injection Brake Start Frequency (Hz) @Stopped = 0.10 ~ 10.00

04-16: DC Injection Brake Level (%)@Stopped = 0.0 ~150.0

04-17: DC Injection Brake Time (Seconds)@stopped = 0.0 ~ 25.5

1. 04-17 / 04-15 is the action time and start frequency of DC braking, as graph below:

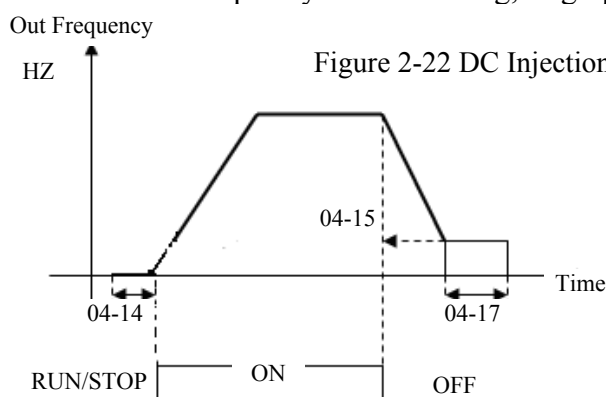


Figure 2-22 DC Injection Braking Example

Group5- V/F command group

V/F PATTERN Selection

05-00: Volts/Hz Curve Modification (Torque Boost) (%)	=0 ~ 30.0
05-01: Motor no load current(Amps AC)	-----
05-02: Motor rated Slip Compensation (%)	= 0.0 ~ 100.0
05-03: v/f Maximum voltage (Vac)	220V series:170.0 ~ 264.0 400V series:323.0 ~528.0
05-04: Maximum Frequency (Hz)	= 0.20 ~ 400.0Hz
05-05: Maximum Frequency Voltage Ratio (%)	= 0.0 ~ 100.0
05-06: Medium Frequency (Hz)	= 0.10 ~ 400.0Hz
05-07: Medium Frequency Voltage Ratio(%)	= 0.0 ~ 100.0
05-08: Minimum Frequency (Hz)	= 0.10 ~400.0Hz
05-09: Minimum Frequency Voltage Ratio (%)	= 0.0 ~ 100.0
05-10: V/F Energy Saving Mode	=0: Disabled =1: Controlled by MFIT at Energy Saving
05-11: V/F Energy Saving Gain (%)	=0 ~ 100
05-12: V/F start Frequency	=0.00~10.00

1. 00-01=18, set the V/F pattern freely complying with 05-04~05-09 (Refer to following diagram)

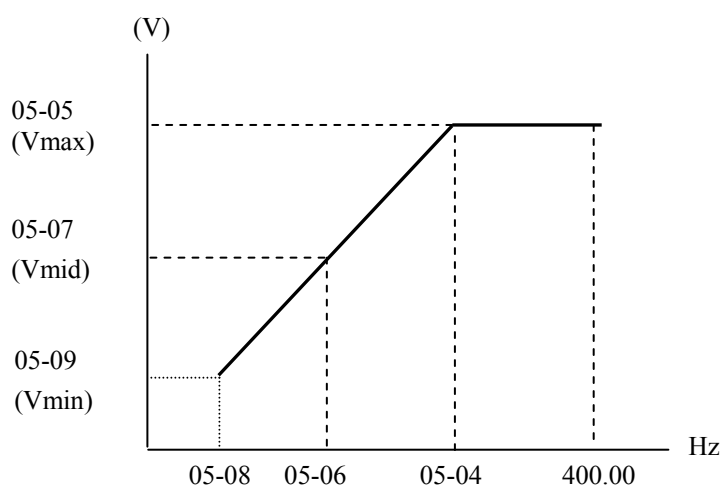


Figure 2-23 Custom V/F Settings

2. 00-01 = 0 – 17 V / F Pattern (Refer to following list)

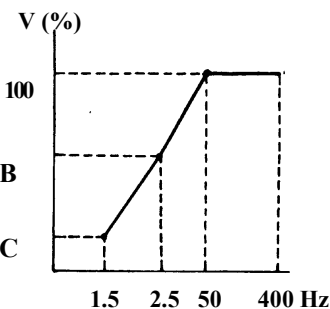
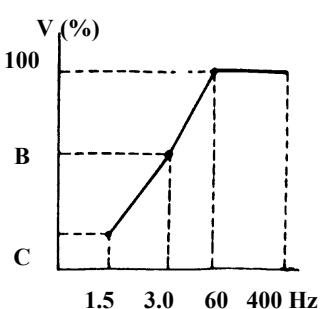
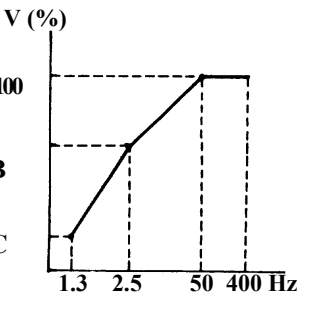
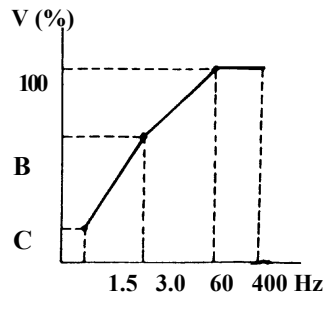
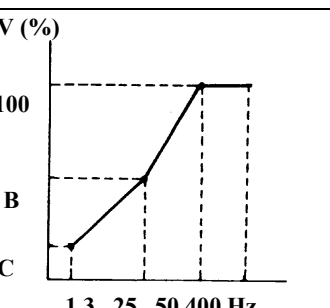
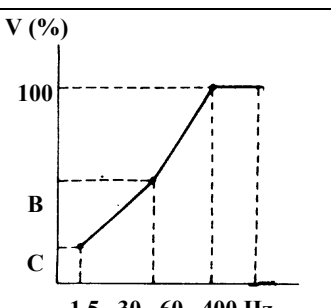
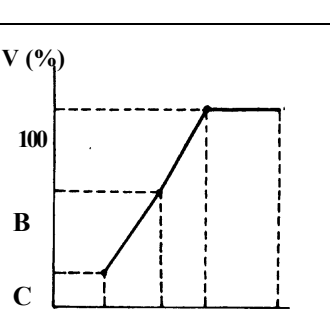
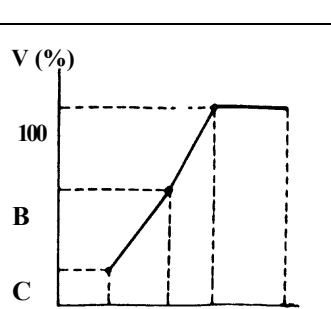
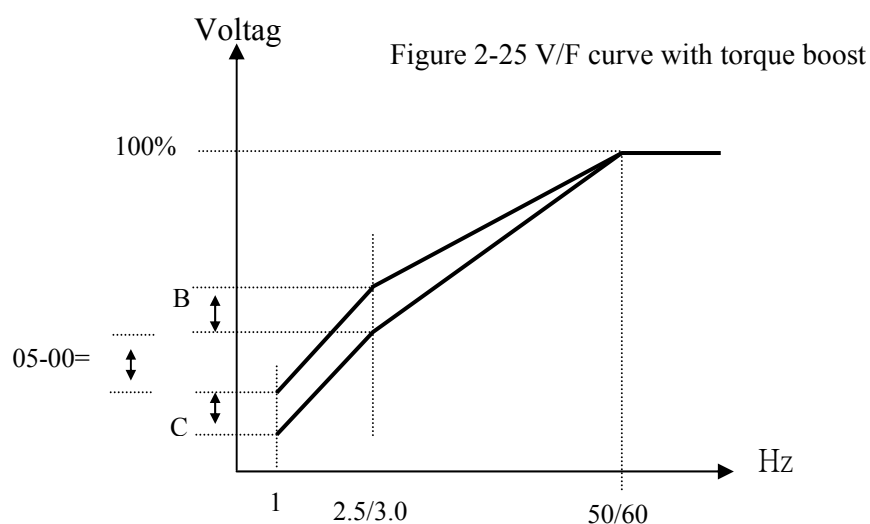
type	Function	00-01	V/F pattern	type	Function	00-01	V/F pattern			
50 Hz	General Use	0		60 Hz	General Use	9				
		High start torque	1						10	
			2						11	
	3		12							
	Decreasing torque	4				Decreasing torque	13			
		5					14			
	Constant torque	6				Constant torque	15			
		7					16			
		8					17			

Figure 2-24 Custom V/F Patterns

00-01	B	C
0 / 9	7.5%	4.5%
1 / 10	10.0%	7.0%
2	11.0%	8.5%
3	12.0%	9.5%
4	17.5%	4.0%
5	25.0%	5.0%
11	11.0%	8.0%
12	12.0%	9.0%
13	20.5%	7.0%
14	28.5%	8.0%
6 / 15	45.0%	1.0%
7 / 16	55.0%	1.0%
8 / 17	65.0%	1.0%

3. The inverter will output the value of B, C voltage (refer to 00-01) plus the 05-00 V/F pattern setting. The starting torque will be raised as shown.



※Note: 05-00=0, Torque boost function is invalid

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

$$\text{Slip frequency boost} = \frac{\text{Output Current}-(05-01)}{(06-01)-(05-01)} \times (05-02)$$

Note : 06-01=motor rated current
05-01=motor no load current

05-02 approximate value= (Motor synchronization speed– Rated speed) / Motor synchronization speed

↑
Marked on the motor nameplate

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

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

※ Note: Motor no load current (05-01) differs with the inverter capacities (12-00) (Refer to 06-01 note). It should be regulated according to actual conditions.

Group6- Motor parameter group

06-00: Motor Rated Voltage (VAC)
06-01: Motor Rated Current (Amp AC)
06-02: Motor Rated Power (kW)
06-03: Motor Rated Speed (RPM)
06-04: Motor Rated Frequency (Hz)
06-05: Motor Parameter Auto Tuning 0: Invalid 1: Valid

06-06: Stator Resistance (Ohms)
06-07: Rotor Resistance (Ohms)
06-08: Equivalent Inductance (mH)
06-09: Magnetizing Current (AmpsAC)
06-10: Ferrite Loss Conductance (gm)
06-11: Low-frequency compensation Gain 0~100

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

Precaution

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

Group7- Protection function group

07-00: Trip Prevention Selection

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

07-01: Trip Prevention Level During Acceleration (%)	50 ~ 200
07-02: Trip Prevention Level During Deceleration (%)	50 ~ 200
07-03: Trip Prevention Level In Run Mode (%)	50 ~ 200
07-04: Over voltage Prevention Level in Run Mode	350.0 VDC ~ 390.0 VDC 700.0 VDC ~ 780.0 VDC

Note:

1. In acceleration, the inverter will delay the acceleration time if the time is too short resulting in the over current in order to prevent the inverter trips.
2. In deceleration, the inverter will delay the acceleration time if the time is too short resulting in the over voltage of DC VUS in order to prevent the inverter trips with 'OV' displayed.
3. Some mechanical characteristics (such as press) or unusual breakdown (seize due to insufficient lubrication, uneven operation, impurities of processed materials, etc.) will cause the inverter to trip, thus inconvenience users. When the operating torque of the inverter exceeds the setting of 07-03, the inverter will lower the output frequency following the deceleration time, and return to the normal operation frequency after the torque get steady.

07-05: Electronic Motor Overload Protection Operation Mode:

- 0: Enable Electronic Motor Overload Protection**
- 1: Disable Electronic Motor Overload Protection**

07-06: Motor type selection:

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

07-07: Motor Overload Protection Curve Selection:

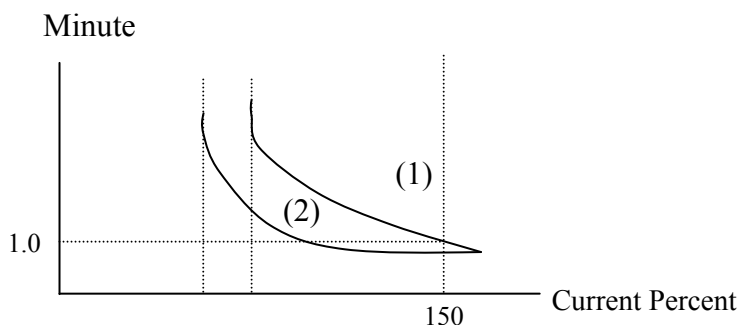
- 0: Constant Torque (OL=103 %) (150 % for 1 Minute)**
- 1: Variable Torque (OL = 113 %)(123 % for 1 Minute)**

07-08: Operation After Overload Protection is Activated

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

Description of the thermal relay function:

1. 07-07 = 0: To protect the general mechanical load, as long as the load is less than 103% rated current, the motor continue to run. The load is larger than 150% rated current, the motor will run for 1 minute. (Refer to following curve (1)).
 = 1: To protect HVAC load(FAN、PUMP...so on): as long as the load is less than 113% rated current, the motor continue to run. The load is larger than 123% rated current, the motor will run for 1 minute.
2. The heat sinking function will not be as effective when the motor run at low speed. So the thermal relay action level will decline at the same time. (The curve 1 will change to curve 2).
3. 07-06 = 0: Set 06-04 as the rated frequency of the serve motor.
4. 07-08 = 0: the inverter coast to stop as the thermal relay acts and flash OL1. Press the 'Reset' or the external reset terminal to continue to run
 = 1: the inverter continues to run as the thermal relay acts and flash OL1. Until the current decline to 103% or 113 % (determined by 9-10), OL1 will disappear.

**07-09: Over torque Detection Selection(OL3)****= 0: Disable Over torque Operation****= 1: Enable Over torque Operation Only if at Set Frequency****= 2: Enable Over torque Operation while the Drive is in Run Mode****07-10: Operation After Over torque Detection is Activated****= 0: Coast-to-Stop After Over torque is Activated****= 1: Drive will Continue to Operate After Over torque is Activated****07-11: Over torque Threshold Level(%): 30 ~ 300****07-12: Over torque Activation Delay Time (Seconds): 0.0 ~ 25.0**

1. Over Torque is detected when the output torque level exceeds the level set in Parameter 07-11 (Inverter rated torque is 100%) and if it is detected for a duration of time which is set in parameter 07-12.
2. 07-10 =0: If there is over torque, the inverter coasts to stop and flashes OL3. It is necessary to press 'RESET' or external terminal to continue to run.
=1: If there is over torque, the inverter can continue to run and flashes OL3 until the output torque is less than the 07-11 set value.
3. Parameter 01-09/10(Multifunction output terminal) = 12, the output terminal signal will be set for over torque condition.

Note: Over torque detection will be enabled only when parameter 07-09 is set to options 1 or 2.**07-13: OH over heat Protection (cooling fan control)****0: 0: Auto (Depends on temp.)****1: Operate while in RUN mode****2: Always Run****3: Disabled**

1. 07-13=0: The fan runs as the inverter senses temperature rises. Thusly, extend the service period.
2. 07-13=1: The fan runs while the inverter is running.
3. 07-13=2: The fan is continuously running regardless of the action of the inverter.
4. 07-13=3: The fan is **Disabled**.

Group8- Communication function group**08-00: Assigned Communication Station Number = 0 ~ 32**

08-00 to set the communication station codes which are suitable for driving more than one inverters situations.

08-01: RTU code /ASCII code Selection =0: RTU code =1 : ASCII code
08-02: Baud Rate Setting (bps) = 0 : 4800 = 1: 9600
= 2: 19200 = 3: 38400

08-03: Stop Bit Selection = 0: 1 stop bit = 1: 2 stop bits

08-04: Parity Selection =0 : no parity =1 : even parity
=2 : odd parity

08-05: Data Format Selection =0 : 8 bit data =1 : 7 bit data

1. RS-485 Communication:

- a. One to one communication: A controller, PC or PLC, controls one inverter. (set 08-00 = 1~32)
- b. One to many communication: A controller, PC or PLC, controls multiple inverters (Up to 32 inverters as max. Set 08-00 = 1~32).
- c. When any inverter receive the communication station number 0, from the PC or PLC (Broadcast mode) then all these inverters will be controlled in communication mode regardless of the setting of parameter 08-00.

2. RS-232 communication: (RS232 interface is required)

- a. One to One communication: A controller, PC or PLC, controls one inverter. (set 08-00 = 1~32)
- b. Communication data parameters (08-02/08-03/08-04/8-05) for controller, PC or PLC and inverters should all be set the same.
- c. The inverter will confirm the validity of new parameters set by PC.
- d. Please refer to the N310 Communication instruction manual for communication protocol.

Note: when 08-01=0, can not set 08-05=1.

08-06: Communication time-out operation selection (second) = 0.0 ~ 25.5

08-07: Communication time-out detection time

1) Time-out detection time: 00.0~25.5sec; setting 00.0 sec: disable time-out function.

2) Time-out operation selection:

- 0: Deceleration to stop (00-10: Deceleration time 1).
- 1: Free run to stop.
- 2: Deceleration to stop (10-06: Deceleration time 2).
- 3: Continue operating.

***Cannot be modified during communication.**

08-08 :Err6 fault tolerance times = 1 ~ 20

When communication error times $\geq$ 08-08 setting, display ERR6 on the keypad.

08-09 Drive Transmit Wait Time (ms) = 5 ~ 65

Setting the time from the beginning of receiving to the end of transmitting.

Group9- PID function group

1 PID function description

The **Proportional, Integral and Derivative** control function provides closed –loop control, or regulation of a system process variable (Flow, Pressure, temperature, etc). This regulation is obtained by comparing a feed back signal with a reference (target) signal, which results in an error signal. The PID control algorithm then performs calculations on this error signal, based upon the PID parameter group9. The result of the PID algorithm is then used as the new frequency reference, or is added to the existing speed reference. The PID target value can be set by parameter 00-05/006, for example the frequency command (target) can be set from Operator keypad, AI1 Analogue input or multi function analog input terminals. Select the PID control feed back signal from external terminal AI2 for a current signal (0-20ma) or a voltage (0-10vdc), depending on setting of Jumper 3 on control board and setting of parameter 2-06.

See PID block diagram below.

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

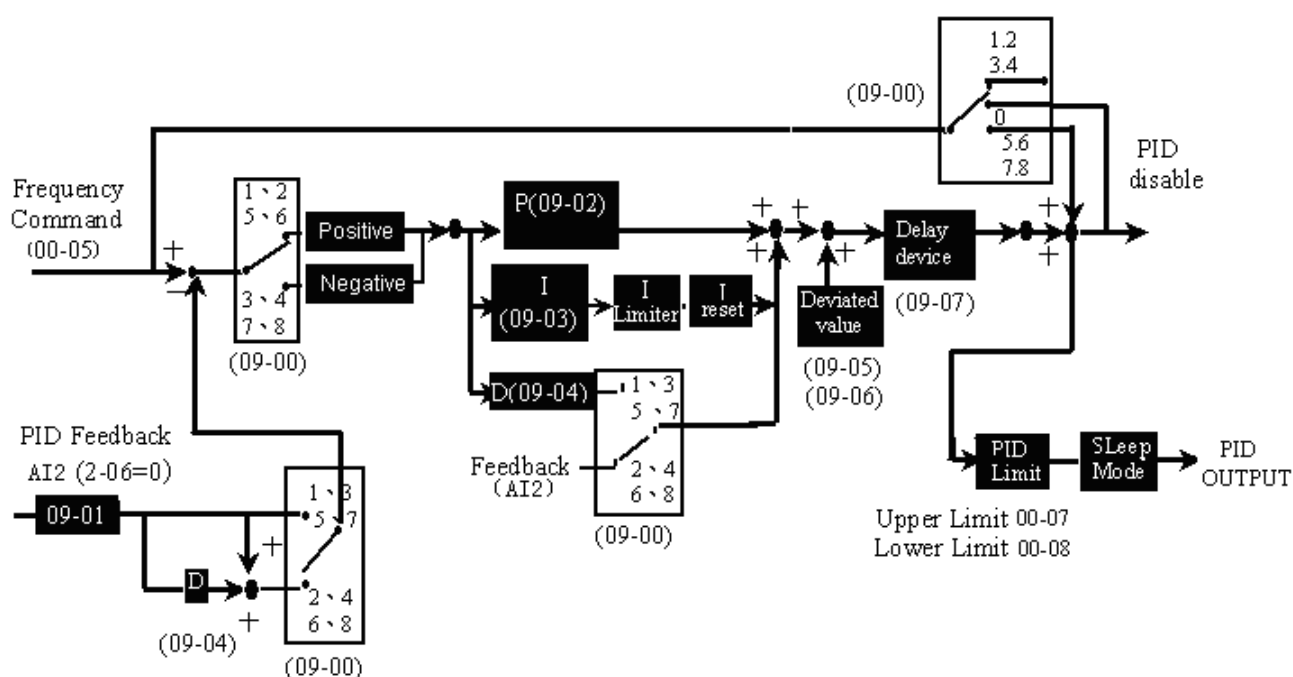


Figure 2-26 PID block diagram

1. To enable PID control, set 02-06=0, AI2 on TM2 is defined as the PID feedback signal.
2. The set point in the above diagram is the 00-05/00-06 input frequency.

2 PID Group 9 parameter descriptions

09-00: PID operation selection

- = 0: disable
- =1: enable (Deviation is D-controlled)
- =2: Feedback D-controlled
- =3: D Reverse characteristic controlled
- =4: Feedback D characteristic controlled
- =5: Frequency command + D controlled
- =6: Frequency command + Feedback D controlled
- =7: Frequency Command + D reverse Characteristic controlled.
- =8: Frequency Command + Feedback D reverse Characteristic controlled.

- 09-00 =1, D is the deviation of (target value – detected value) in the unit time (09-04).
 =2, D is the deviation of the detected values in unit time (09-04).
 =3, D is the deviation of (target value – detected value) in the unit time (09-04). If the deviation is positive, the output frequency decreases, vice versa.
 =4, D is the deviation of detected value in unit time (09-04). When the deviation is positive, the frequency decreases, vice versa.
 =5, D is equal to the deviation of (target value – detected value) in unit time (09-04) + Frequency command.
 =6, D is equal to the deviation of detected values in unit time + Frequency command.
 =7, D is equal to the deviation of (target value – detected value) in unit time + Frequency command. If the deviation is positive, the output frequency decreases, vice versa.
 =8, D is equal to the deviation of detected values in unit time + Frequency command. When the deviation is positive, the frequency decreases, vice versa.

09-01: Feedback Gain coefficient (%) 0.00 - 10.00

09-01 is the calibration gain. Deviation = set point – (feedback signal × 09-01)

09-02: Proportional Gain (%) 0.00 - 10.00

09-02: Proportion gain for P control.

09-03: Integration Time (s) 0.0 - 100.0

09-03: Integrate time for I control

09-04: Differentiation Time (s) 0.00 - 10.00

09-04: Differential time for D control

09-05: PID Offset 0 : Positive Direction 1 : Negative Direction

09-06: PID Offset Adjust (%) 0 ~ 109

09-05/09-06: Calculated PID output is offset by 09-06 (the polarity of offset is according to 09-05).

09-07: PID Output Lag Filter Time (s) 0.0 - 2.5

09-07: Update time for output frequency.

09-08: Feedback Loss Detection Mode 0:Disable**1:Enable – Drive Continues to Operate After Feedback Loss****2:Enable – Drive “STOPS” After Feedback Loss**

09-08= 0: Disable; 09-08= 1: detect, continue running, and display ‘PDER’ ; 09-08= 2: detect, stop, and display ‘PDER’ .

09-09: Feedback Loss Detection Level (%) 0 - 100

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

09-10: Feedback Loss Detection Delay Time (s) 0.0 -25.5

09-10: the minimum time to consider the feedback signal lost.

09-11: Integration Limit Value (%) 0 - 109

09-11: the Limiter to prevent the PID from saturating.

09-12: Integration Value Resets to Zero when Feedback Signal Equals the Intended Value**0:Disable****1:1 second****30: 30 seconds**

09-12=0: As PID feedback value reaches the set point, the integrator will not be reset to 0.

09-12=1~30: As PID feedback value reaches the set point, reset to 0 in 1~30 seconds and inverter stops. The inverter will run again when the feedback value differs from the set point value.

09-13: Allowable Integration Error Margin (Unit) (1 Unit = 1/8192) =0 ~ 100

09-13=0 ~ 100% unit value: Restart the tolerance after the integrator reset to 0.

09-14: Sleep Frequency Level (Hz) = 0.00 ~ 400.00**09-15: Sleep Function Delay Time (S) = 0.0 ~ 25.5****09-16: Wake up frequency Level (Hz) = 0.00 ~ 400.00****09-17: Wake up function Delay Time (S) = 0.0 ~ 25.5**

PID SLEEP MODE:

09-00=1(PID Enable)

02-06=0(PID FEEDBACK Enable)

00-05=PID setting frequency source (Target Value)

09-14: set the sleep threshold frequency, Unit: HZ

09-15: set the time for sleep delay, Unit: sec

09-16: set the wake threshold frequency, Unit: HZ

09-17: set the time for wake delay, Unit: sec

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

When PID output frequency is larger than the Wake threshold frequency for Wake start the inverter will reactivate and enter PID wake mode. The time diagram is as follow:

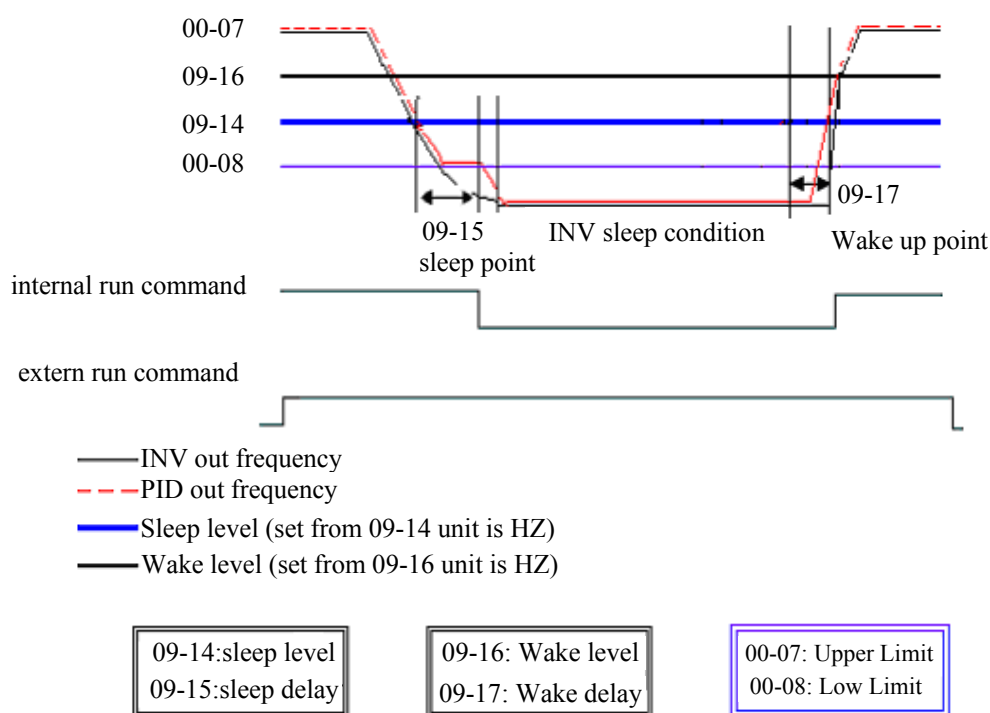


Figure 2-27 PID sleep wake mode diagram

Group10- Assistant function group

10-01: Prevention of Reverse operation
0: Reverse command is enabled
1: Reverse command is disabled

10-01=1, the reverse command is **disabled**.

10-02: Keypad Operation with Up/Down Keys in Run Mode
0: 'Enter' must be pressed after frequency change with Up/Down Keys on keypad.
1: Frequency will be changed directly when Up/Down Keys are Pressed

10-03: Carrier Frequency (KHz) 1-15

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

Note:

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

10-04: Carrier mode selection

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

1. 10-04=0: Carrier mode0 is recommended in environments where low noise is required.
Correct ambient temperature and cooling is necessary.
2. 10-04=1: Carrier mode1 is recommended in locations where fan or pumps is required.
3. 10-04=2: Carrier mode2 Help to slow down the temperature raise prolong life-span of IGBT and control electromagnetism noise.
4. 10-04=3: Carrier mode3 Suit to the application that using lower carrier wave in order to get low temperature or high torque, and hopes to shun shrill electromagnetism noise. This function mostly produces white noise.
5. 10-04=4: Carrier mode4 Reduce 1/3 on-off switch timers, prolong life-span of IGBT, and will not increase electromagnetism noise, even lower.

Note: When the inverter is running at high speed and high carrier frequency is selected then, please set 10-04=1 this can reduce the IGBT switching losses (heat loss).

10-05: Acceleration Time 2 (MFIT) (Seconds)	0.1 ~ 3600.0
10-06: Deceleration Time 2 (MFIT) (Seconds)	0.1 ~ 3600.0
10-07: S-Curve Acc/Dec 1 (Seconds)	0.0 ~ 4.0
10-08: S-Curve Acc/Dec 2 (Seconds)	0.0 ~ 4.0
10-09: S-Curve Acc/Dec 3 (Seconds)	0.0 ~ 4.0
10-10: S-Curve Acc/Dec 4 (Seconds)	0.0 ~ 4.0

Use S Curve parameters where a smooth acceleration or deceleration action is required, this will prevent possible damage caused to machines by sudden acceleration/deceleration.

Four parameters can be selected as shown on the diagram below:

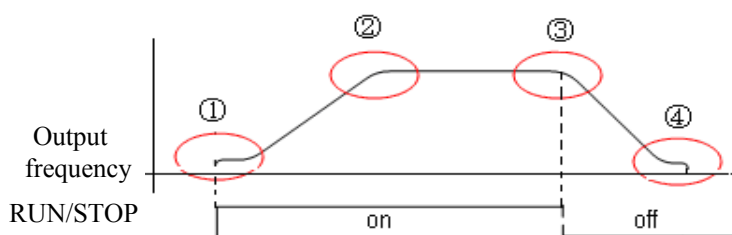


Figure 2-28 S-Curve Characteristics

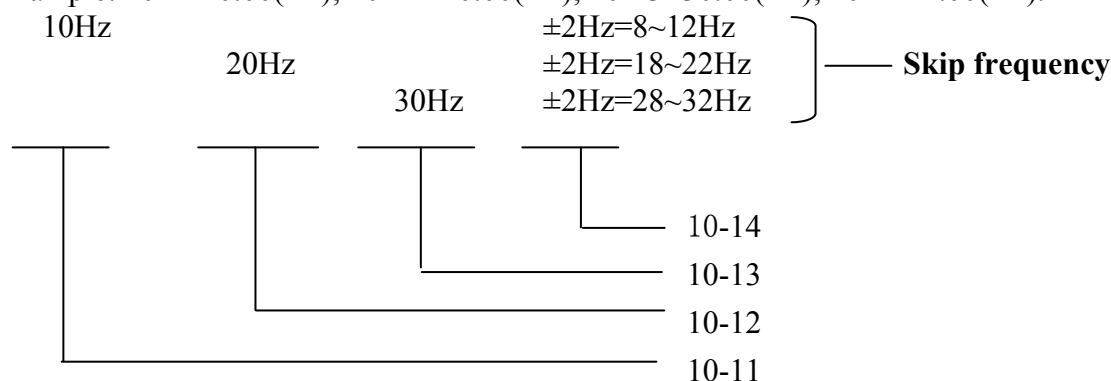
Note:

- a. Regardless of the stall prevention period, actual acceleration and deceleration time = preset acceleration / deceleration time + S curve time.
- b. Please set the S curve time separately in the parameter (10-07~10-10)
- c. When S curve time (10-07~10-10) is set as 0, the S curve function is disabled.
- d. Note: The calculating of S curve time is based on the rated frequency of motor (06-04), Please refer to the parameter (00-09/00-10).

- 10-11: Skip frequency 1(Hz) = 0.00 ~ 400.00**
- 10-12: Skip frequency 2(Hz) = 0.00 ~ 400.00**
- 10-13: Skip frequency 3(Hz) = 0.00 ~ 400.00**
- 10-14: Skip frequency range (± Hz) = 0.00 ~ 30.00**

Skip frequency parameters can be used to avoid mechanical resonance in certain applications.

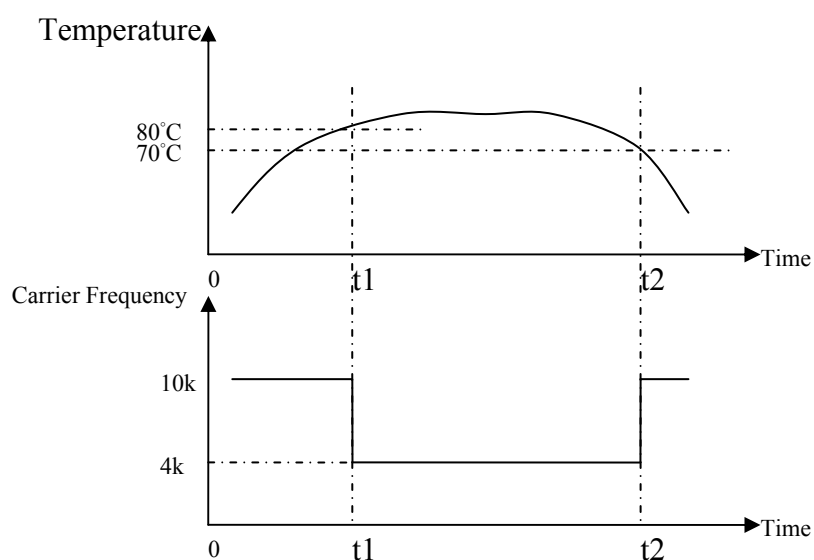
Example: 10-1=10.00(Hz); 10-12=20.00(Hz); 10-13=30.00(Hz); 10-14=2.00(Hz).



10-15 Carrier Frequency reduced by temperature raising

=0: disable =1: Enable

When inverter is temperature overrun 80°C on keypad display(11-00=01000), Carrier Frequency reduced 4K.when inverter is temperature reduced less than 70°C , Carrier Frequency resume.



Group11-keypad display group

11-00 : Display Mode

=xxxx0: Disable Motor Current Display

=xxx0x: Disable Motor Voltage Display

=xx0xx: Disable Bus Voltage Display

=x0xxx: Disable temperature Display

=0xxxx: Disable PID feedback Display

=xxxx1: Enable Motor Current Display

=xxx1x: Enable Motor Voltage Display

=xx1xx: Enable Bus Voltage Display

=x1xxx: Enable temperature Display

=1xxxx: Enable PID feedback Display

11-01: Custom Units (Line Speed) Value 0~65535

The max preset line value of 11-01 is equal to the rated frequency (06-04) of the motor. For instance, given line speed 1800 is equal to display 900 when output is 30Hz while the operation frequency is 60Hz.

11-02: Custom Units (Line Speed) Display Mode**0: Drive Output Frequency is Displayed****1: Line Speed is Displayed in Integer (xxxx)****2: Line Speed is Displayed with One Decimal Place (xxx.x)****3: Line Speed is Displayed with Two Decimal Places (xx.xx)****4: Line Speed is Displayed with Three Decimal Places (x.xxx)**

When 11-02=1/2/3/4, line speed is displayed while the inverter is running or stopped.

11-03: Max PID Feedback Setting =0 ~ 999**11-04: Min PID Feedback Setting =0 ~ 999**

Example: 11-03=100, 11-04=50, 11-00=10000, When the feedback changes from minimum to maximum, the feedback is displayed from 50 to 100 on the panel.

11-05: PID Feedback Display Mode**=0: Displayed in Integer (xxx)****=1: Displayed with One Decimal Place (xx.x)****=2: Displayed with Two Decimal Places (x.xx)****11-06: PID Feedback Display Unit Setting****=0: xxx--****=1: xxxpb (pressure)****=2: xxxfl (flow)****Group12- User parameter group****12-00: Drive Horsepower Code**

12-00	Inverter Model	
20P5	N310-	20P5
2001		2001
2002		2002
2003		2003

12-00	Inverter Model	
4001	N310-	4001
4002		4002
4003		4003
4005		4005
4008		4008
4010		4010
4015		4015

12-01: Software Version**12-02: Fault Log (Latest 3 times)**

- When the inverter trips on a fault, the previous fault log stored in 2.xxx will be transferred to 3.xxx, the one in 1.xxx to 2.xxx. The present fault will be stored in the empty register 1.xxx. The fault stored in 3.xxx is the last one of the most recent three, while the one 1.xxx is the latest.
- When pressing 'ENTER' at 12-02, the fault 1.xxx will be displayed first. Press ▲, to read 2.xxx→3.xxx→1.xxx press ▼ and the order is 3.xxx→2.xxx→1.xxx→3.xxx.
- When pressing 'Reset' at 12-02, the three fault log will be cleared when the reset key is pressed. The log content will change to 1.---, 2.---, 3.---.
- E.g. the fault log content is '1.OC-C'; this indicates the latest fault is OC-C, etc.

12-03: Accumulated Operation Time 1 (Hours): 0 ~ 23

12-04: Accumulated Operation Time 2 (Days): 0 ~ 65535

12-05: Accumulated Operation Time Mode: 0: Power on time 1: Operation time

1. When the operation time is to23 as the elapsed time 1 is set. The next hour will be carried to operation12-04. Meanwhile, the recorded value will be cleared to 0000, and the record value of operation duration 2 will be 01.
2. Description of operation time selection:

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

12-06: Reset Drive to Factory Settings 1150: Reset to the 50Hz factory setting

1160: Reset to the 60Hz factory setting

12-07 : Parameter lock

0: Enable all Functions

1: 03-01~ 03-16 cannot be changed

2: All Functions cannot be changed Except 03-01~ 03-16

3: Disable All Function

12-08 Parameter password 00000 ~ 65535

This function is used to prevent parameter from being modify by disrelated personnels, keep parameter safety.

When a password has been set, parameters cannot be modified, and it is forbidden to reset to factory set.

(1) Setting password:

- ① open 12-08, “00000”is shown on keypad, input password, press “ enter”, display “End”.
- ② When open 12-08 again, display “00001”, input password again, press“ enter”, display “ LOC” display .If setting is different from the first time, display “ Err2”, setting failed

(2) cancel password :

- ① open 12-08 , display“ 00002”,input the correct password, press“ enter” key, display “End”, Disable the password is succeeded.
If typing a wrong password, display “LOC” (password is still holded)

Note: set 12-08=00000, password can’t work

12-09 Copy module Reserved

Note: do not set Reserved Parameter .

Group13- Auto Run (Auto Sequencer) function group

Auto Run(sequencer) mode selection:

13-00: 0: Disabled.

1: Single cycle. (Continues to run from the unfinished step if restarted).

2: Periodic cycle. (Continues to run from the unfinished step if restarted).

3: Single cycle, then holds the speed of final step to run.

(Continues to run from the unfinished step if restarted).

4: Single cycle. (Starts a new cycle if restarted).

5: Periodic cycle. (Starts a new cycle if restarted).

6: Single cycle, then hold the speed of final step to run.

(Starts a new cycle if restarted).

13-01 : Auto _ Run Mode Frequency Command 1 (0-400Hz)

13-02 : Auto _ Run Mode Frequency Command 2 (0-400Hz)

13-03 : Auto _ Run Mode Frequency Command 3 (0-400Hz)

13-04 : Auto _ Run Mode Frequency Command 4 (0-400Hz)

13-05 : Auto _ Run Mode Frequency Command 5 (0-400Hz)

13-06 : Auto _ Run Mode Frequency Command 6 (0-400Hz)

13-07 : Auto _ Run Mode Frequency Command 7 (0-400Hz)

13-08 : Auto _ Run Mode Frequency Command 8 (0-400Hz)

13-09 : Auto _ Run Mode Frequency Command 9 (0-400Hz)

13-10 : Auto _ Run Mode Frequency Command 10 (0-400Hz)

13-11 : Auto _ Run Mode Frequency Command 11 (0-400Hz)

13-12 : Auto _ Run Mode Frequency Command 12 (0-400Hz)

13-13 : Auto _ Run Mode Frequency Command 13 (0-400Hz)

13-14 : Auto _ Run Mode Frequency Command 14 (0-400Hz)

13-15: Auto _ Run Mode Frequency Command 15 (0-400Hz)

13-16 : Auto _ Run Mode Running Time Setting 0 (0-3600sec)

13-17 : Auto _ Run Mode Running Time Setting 1 (0-3600sec)

13-18 : Auto _ Run Mode Running Time Setting 2 (0-3600sec)

13-19 : Auto _ Run Mode Running Time Setting 3 (0-3600sec)

13-20 : Auto _ Run Mode Running Time Setting 4 (0-3600sec)

13-21 : Auto _ Run Mode Running Time Setting 5 (0-3600sec)

13-22 : Auto _ Run Mode Running Time Setting 6 (0-3600sec)

13-23: Auto _ Run Mode Running Time Setting 7 (0-3600sec)

13-24: Auto _ Run Mode Running Time Setting 8 (0-3600sec)

13-25: Auto _ Run Mode Running Time Setting 9 (0-3600sec)

13-26: Auto _ Run Mode Running Time Setting 10 (0-3600sec)

13-27: Auto _ Run Mode Running Time Setting 11 (0-3600sec)

13-28: Auto _ Run Mode Running Time Setting 12 (0-3600sec)

13-29: Auto _ Run Mode Running Time Setting 13 (0-3600sec)

13-30: Auto _ Run Mode Running Time Setting 14 (0-3600sec)

13-31: Auto _ Run Mode Running Time Setting 15 (0-3600sec)

13-32: Auto _ Run Mode Running Direction 0 (0: STOP, 1:forward, 2:reverse)

13-33: Auto _ Run Mode Running Direction 1 (0: STOP, 1:forward, 2:reverse)

13-34: Auto _ Run Mode Running Direction 2 (0: STOP, 1:forward, 2:reverse)

13-35: Auto _ Run Mode Running Direction 3 (0: STOP, 1:forward, 2:reverse)

13-36: Auto _ Run Mode Running Direction 4 (0: STOP, 1:forward, 2:reverse)

13-37: Auto _ Run Mode Running Direction 5 (0: STOP, 1:forward, 2:reverse)

13-38: Auto _ Run Mode Running Direction 6 (0: STOP, 1:forward, 2:reverse)

13-39: Auto _ Run Mode Running Direction 7 (0: STOP, 1:forward, 2:reverse)

13-40: Auto _ Run Mode Running Direction 8 (0: STOP, 1:forward, 2:reverse)

13-41: Auto _ Run Mode Running Direction 9 (0: STOP, 1:forward, 2:reverse)

13-42: Auto_Run Mode Running Direction 10 (0: STOP, 1:forward, 2:reverse)
13-43: Auto_Run Mode Running Direction 11 (0: STOP, 1:forward, 2:reverse)
13-44: Auto_Run Mode Running Direction 12 (0: STOP, 1:forward, 2:reverse)
13-45: Auto_Run Mode Running Direction 13 (0: STOP, 1:forward, 2:reverse)
13-46: Auto_Run Mode Running Direction 14 (0: STOP, 1:forward, 2:reverse)
13-47: Auto_Run Mode Running Direction 15 (0: STOP, 1:forward, 2:reverse)

Note:

In order to selection Auto Run function, you must set to 1-00~1-05=22, and then close the terminals.

1. Auto Run (sequencer) various modes cab is selected by parameter 13-00.
2. Auto Run (sequencer) mode set up parameters are parameters (13-01~13-47).
3. Auto run mode (sequencer) operation as selected by parameter 13-00 can be set up as follows:-
 - a. **Setting multi-step frequency commands**, by using the available multi-step frequency commands 1~15 as required can be set by parameters (13-01~13-15).
 - b. **Setting multi-step run time**, by parameters (13-16~13-31) for each required step.
 - c. FWD/REV direction can be selected by setting of parameters (13-32~13-47).

Some examples in auto_run mode as follows:

(A) Single Cycle Running (13-00= 1, 4)

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

- For example:

13-00=1(or 4)

- Panel Frequency (3-01)=15 Hz 13-01=30Hz 13-02=50Hz 13-03=20Hz
 13-16=20s 13-17=25s 13-18=30s 13-19=40s
 13-32=1 13-33=1 13-34=1(FWD) 13-35=2(REV)
 • 13-04~13-15=0Hz, 13-20~13-31=0s, 13-36~13-47=0

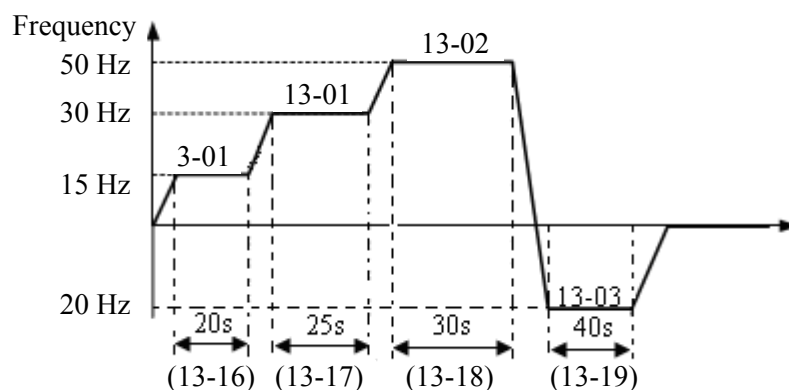


Figure 2-29 Single cycle auto run

(B) Periodic cycle Running (13-00=2, 5)

The inverter will repeat the same cycle periodically.

For

example:

13-00=2 (or 5)

13-01~13-15, 13-16~13-31, 13-32~13-47 : Same setting as the example (A)

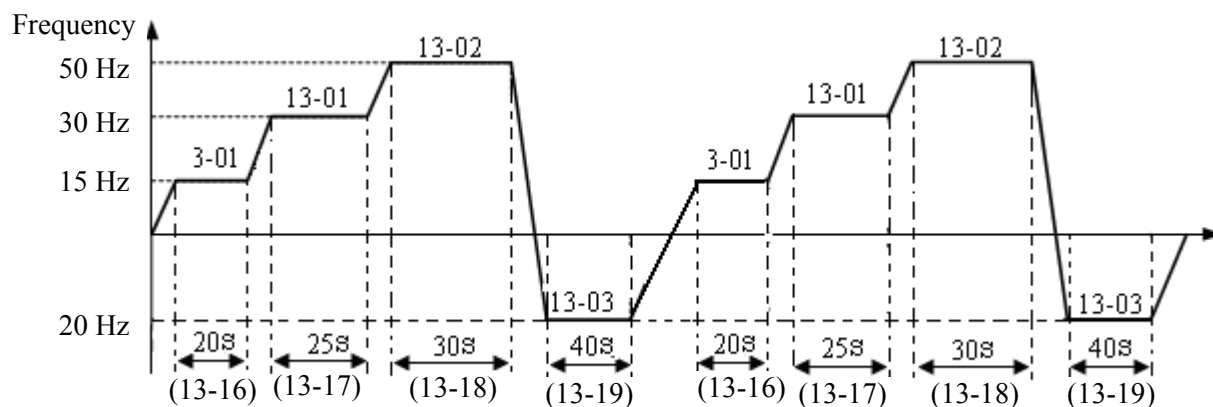


Figure 2-30 Periodic cycle auto run

(C) Auto_Run Mode for Single Cycle (13-00 = 3, 6)

The speed of final step will be held to run.

For example:

13-00 = 3(or 6)

Panel Frequency (3-01) = 15 Hz 13-01=30Hz 13-02=50Hz 13-15=20Hz

13-16=20s 13-17=25s 13-18=30s 13-31=40s

13-32=1 13-33=1 13-34 = 1 13-47=1(FWD)

13-04~13-15=0Hz, 13-20~13-30=0s, 13-35~13-46 = 0

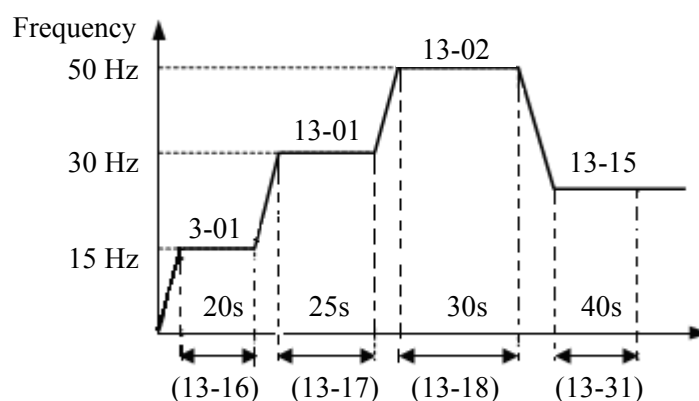


Figure 2-31 Single cycle auto run: final step hold

Note:13-00 = 1~3 : If the inverter stops and re-starts, it will continue running from the unfinished step, according to the setting of 13-00.

= 4~6: If the inverter stops and re-starts, it will begin a new cycle and continue running according to the setting of 13-00.

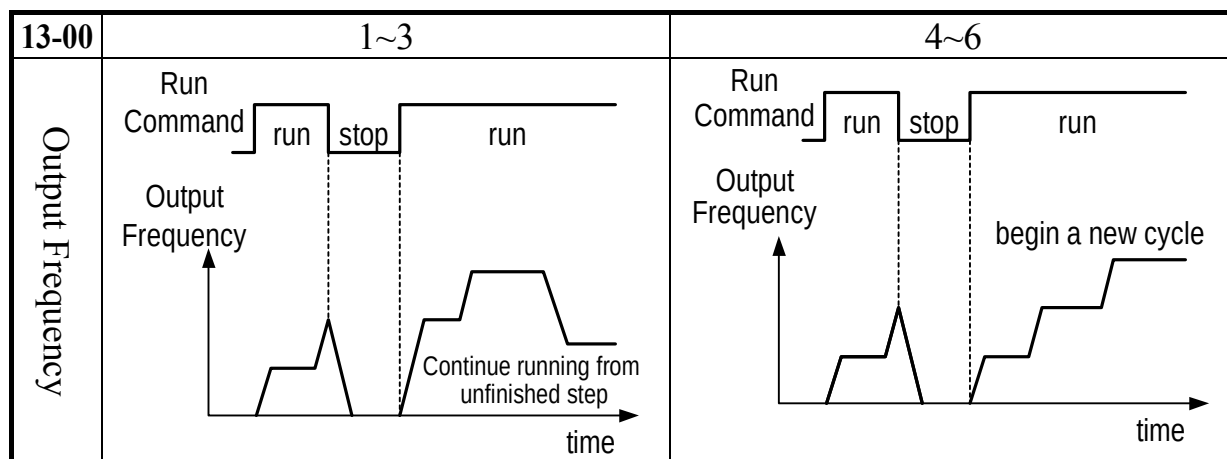


Figure 2-32 AUTO_RUN cycle with interrupt

●ACC/DEC time follow the setting of 00-09/00-10 or 10-05/10-06 in Auto Run Mode.

Note: **Auto _ Run Mode Frequency Command 0 =3-01**(Keypad Freq)

Auto_run mode Description

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

Example: ① 00-03=0 or 00-04=0, refer to P4-20/ P4-24

② 01-00(S1)=22(Auto_run)

③ Set parameter as(A)(B)(C), Auto_run function come true.

④ When S1 close, Auto_run function is enable, press RUN/STOP key on keypad offer Run or stop instruction.

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

Example: ①00-03/00-04=1 (external terminals)

②00-11=0(Operation modes of external terminals : FWD/STOP-REV/STOP)

Note: this section 00-11 do not set 1 or 2.

③ 01-00(S1)=0 (FWD/STOP)

④ 01-01(S2)=22(Auto_run)

⑤ Set parameter as(A)(B)(C) Auto_run function come true

⑥When S2 close, Auto_run function is enable, turn S1 ON/OFF offer Run or stop instruction.

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

Example: ① 01-00(S1)=22(Auto_run Mode)

②Set parameter as(A)(B)(C) , function come true

When S1 close, Auto_run function is enable, communication offer Run or stop instruction.

Chapter 3 Troubleshooting and maintenance

3.1. Error display and corrective action

3.1.1. Faults which can be recovered manually but not automatically

1. Faults which can not be recovered manually

Display	Fault	Cause	Corrective action
-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
EPR	EEPROM problem	Faulty EEPROM	Replace EEPROM

2. Faults which can be recovered manually and automatically

Display	Fault	Cause	Corrective Action
OC-S	Over current at start	1. Short circuit between the motor coil and the case 2. Short circuit between motor coil and ground 3. 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. the 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 (06-05= 1) 3. Reduce stator resistance (06-06) if the above actions are ineffective
OV-C	Excessive Voltage during operation/ deceleration	1. Deceleration time setting too short or excessive load inertia 2. Power voltage varies widely (fluctuates)	1. Set a longer deceleration time 2. Add a brake resistor or brake module 3. Add a reactor at the power input side 4. Increase inverter capacity
Err4	Unacceptable CPU interrupt	External noise interference	Return unit if this happens regularly

3. Faults which can be recovered manually but not automatically

Display	Fault	Cause	Corrective Action
OC	Over-current during stop	1. Detection circuit malfunction 2. Bad connection for CT signal cable	1. Check the noise between Power line and motor line 2. Return the inverter for repair
OL1	Motor overload	1. Excessive load 2. Incorrect settings for 06-01, 07-05~08	1. Increase the motor capacity 2. set 06-01, 07-05~08 correctly
OL2	Inverter overload	Excessive Load	Increase the inverter capacity
OL3	Over torque	1. Excessive Load 2. Incorrect settings for 07-11, 07-12	1. Increase the inverter capacity 2. set 07-11, 07-12 correctly
LV-C	Voltage too low during operation	1. Power voltage too low 2. Power voltage varies widely (fluctuates)	1. Improve power quality or increase the value of 4-04 2. Set a longer acceleration time 3. Add a reactor at the power input side 4. Increase the motor capacity

3.1.2. Special conditions

Display	Fault	Description
STP0	Zero speed at stop	Occurs when preset frequency <0.1Hz
STP1	Fail to start directly On power up.	- If the inverter is set for external terminal control mode (00-03/00-04=1) and direct start is disabled (04-09=1) The inverter cannot be started and will flash STP1. The run input is active at power-up, refer to descriptions of (04-09). - Direct start is possible when 04-09=0.
STP2	Keypad Stop Operated when inverter in external Control mode.	- With the function of Stop key enabled by (04-02=0) And if the Stop key is pressed while the inverter is set to external control mode (00-03/00-04=1) then, the inverter will stop according to the setting of 04-01 and the error message, 'STP2' flashes after stop. Release and re-activate the run contact to restart the inverter. - If the inverter is in communication mode and the Stop key is enabled (04-02=0), the inverter will stop in the way set by 04-01 when Stop key is pressed during operation and then flashes STP2. The Host controller has to send a Stop command then a Run command to the inverter for it to be restarted. - Stop key will be disabled when 04-02=1
E.S.	External Rapid stop	The inverter will decelerate to stop and then flash E.S., when input external Rapid stop signal via the multifunctional input terminal activates (refer to descriptions of 01-00~01-05).
b.b.	External base block	The inverter stops immediately and then flashes b.b., when external base block is input by the multifunctional input terminals. (Refer to descriptions of 01-00~01-05).
ATER	Auto-tuning faults	- Motor data error resulting in auto-tuning failure - Stopping the inverter during Auto-tuning before completion
PDER	PID feedback loss	PID feedback loss detect
COT	Communication error	Communication error detect (refer group 8)

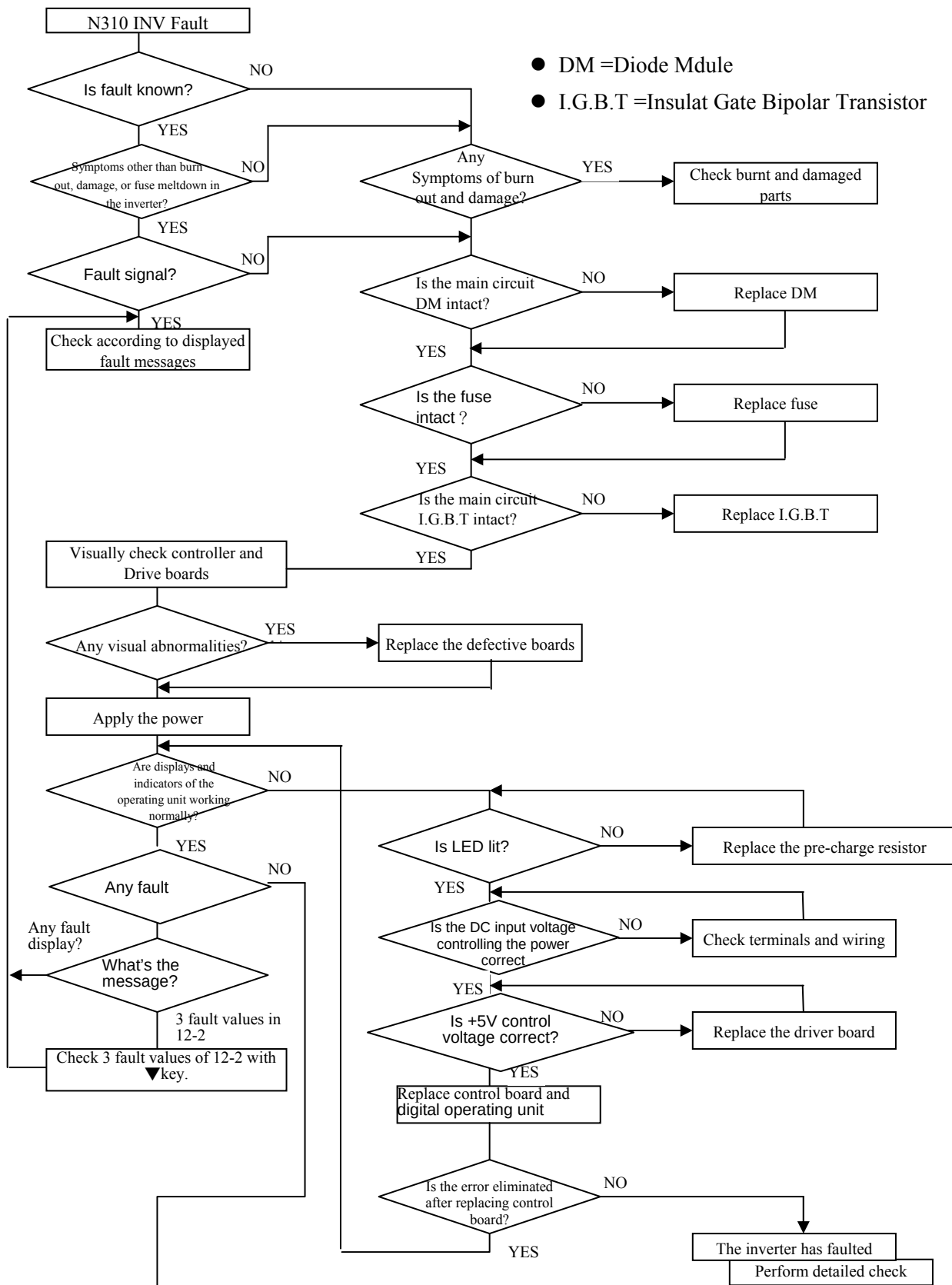
3.1.3. Operation errors

Display	Error	Cause	Corrective Action
LOC	Parameter and frequency reverse already locked	1. Attempt to modify frequency parameter while 12-07>0 2. Attempt to reverse while 10-01=1	1. Set 12-07=0 2. Set 10-01=0
Err1	Keypad operation error	1. Press ▲ or ▼ while 00-05/00-06>0 or running at preset speed. 2. Attempt to modify the Parameter. Can not be modified during operation (refer to the parameter list).	1. The ▲ or ▼ is available for modifying the parameter only when 00-05/00-06=0 2. Modify the parameter in STOP mode.
Err2	Parameter setting error	1. 00-08 is within the range of 10-11 ± 10-14 or 10-12 ± 10-14 or 10-13 ± 10-14 2. 00-07 ≤ 00-08 3. Setting error while Performing Auto tuning. (e.g. 00-03/00-04 ≠ 0, 00-05/00-06 ≠ 0)	1. Modify 10-11~10-13 or 10-14 2. Set 00-07>00-08 3. Set 00-03/00-04=0 and 05/00-06=0, during Auto tuning
Err5	Modification of parameter is not available in communication	1. Control command sent during communication. 2. Attempt to modify the function 08-02 ~ 08-05 during communication	1. Issue enable command before communication 2. Set parameters 08-02 ~ 08-05 function before communication
Err6	Communication failed	1. Wiring error 2. Communication parameter setting error. 3. Check-Sum error 4. Incorrect communication protocol	1. Check hardware and wiring 2. Check Functions 08-02 ~ 08-05
Err7	Parameter conflict	1. Attempt to modify the function 12-00/12-06. 2. Voltage and current detection circuit is abnormal	If Reset is not possible, please Return the inverter

3.2 General troubleshooting

Status	Checking point	Remedy
Motor can not run	Is power applied to L1, L2, and L3 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	Are wiring for output terminals T1, T2, and T3 correct?	• Wiring must match U, V, and W terminals of the motor.
	Are wiring for forward and reverse signals correct?	• Check for correct wiring.
The motor speed can not be regulated.	Is the wiring for the analog frequency inputs correct?	• Check for correct wiring.
	Is the setting of operation mode correct?	• Check the operation mode of the operator.
	Is the load too excessive?	• Reduce the load.
Motor running speed too high or too low	Check the motor specifications (poles, voltage...) correct?	• Confirm the motor specifications.
	Is the gear ratio correct?	• Confirm the gear ratio.
	Is the setting of the highest output frequency correct?	• Confirm the highest output frequency.
Motor speed varies unusually	Is the load too excessive?	• Reduce the load.
	Does the load vary excessively?	• Minimize the variation of the load. • Increase capacities of the inverter and the motor.
	Is the input power erratic or is a phase loss occurring?	• Add an AC reactor at the power input side if using single-phase power. • Check wiring if using three-phase power.

3.3 Quick troubleshooting of N310



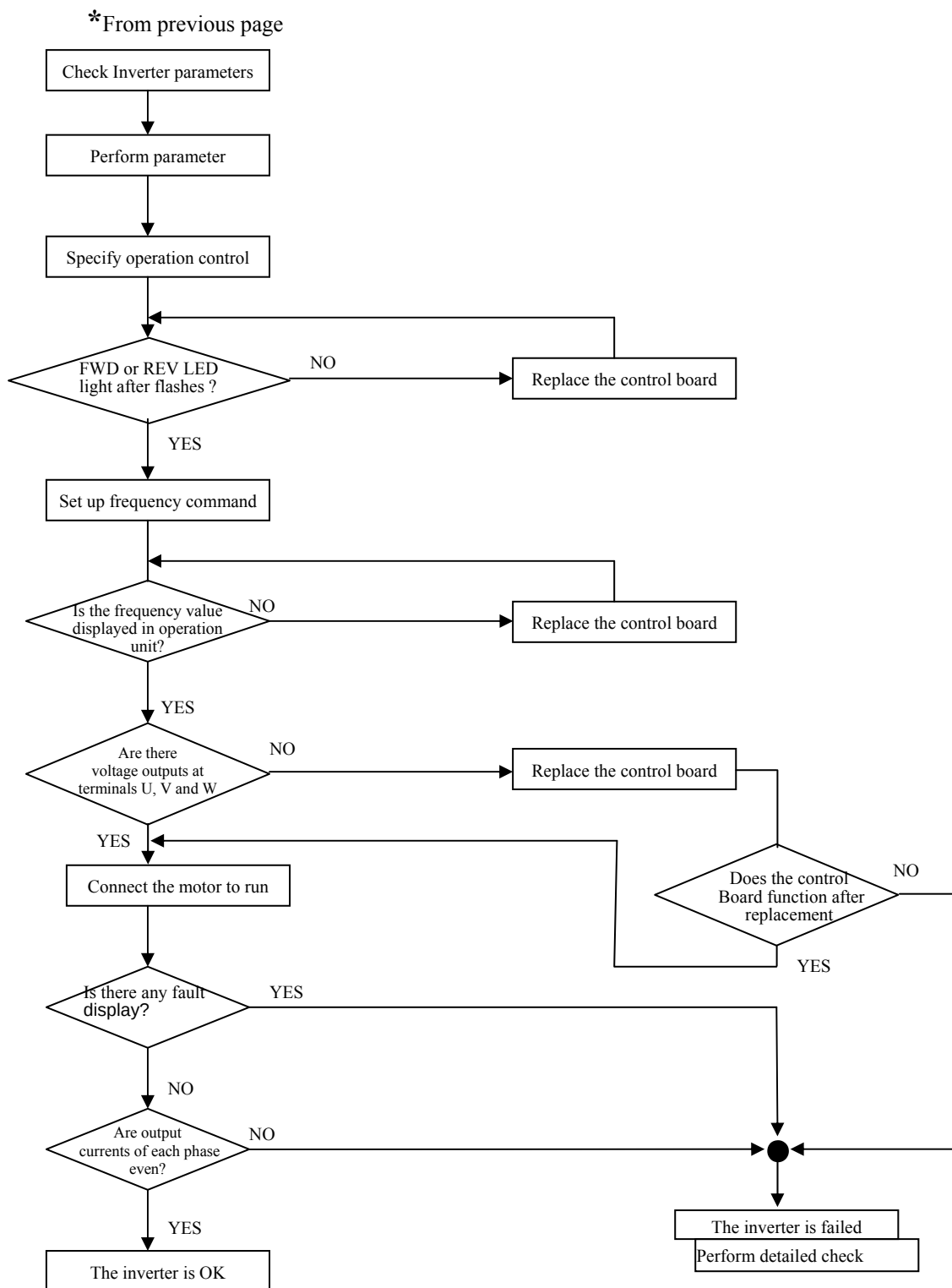


Figure 3-1 N310 fault display and troubleshooting flow chart

Troubleshooting for OC, OL error displays

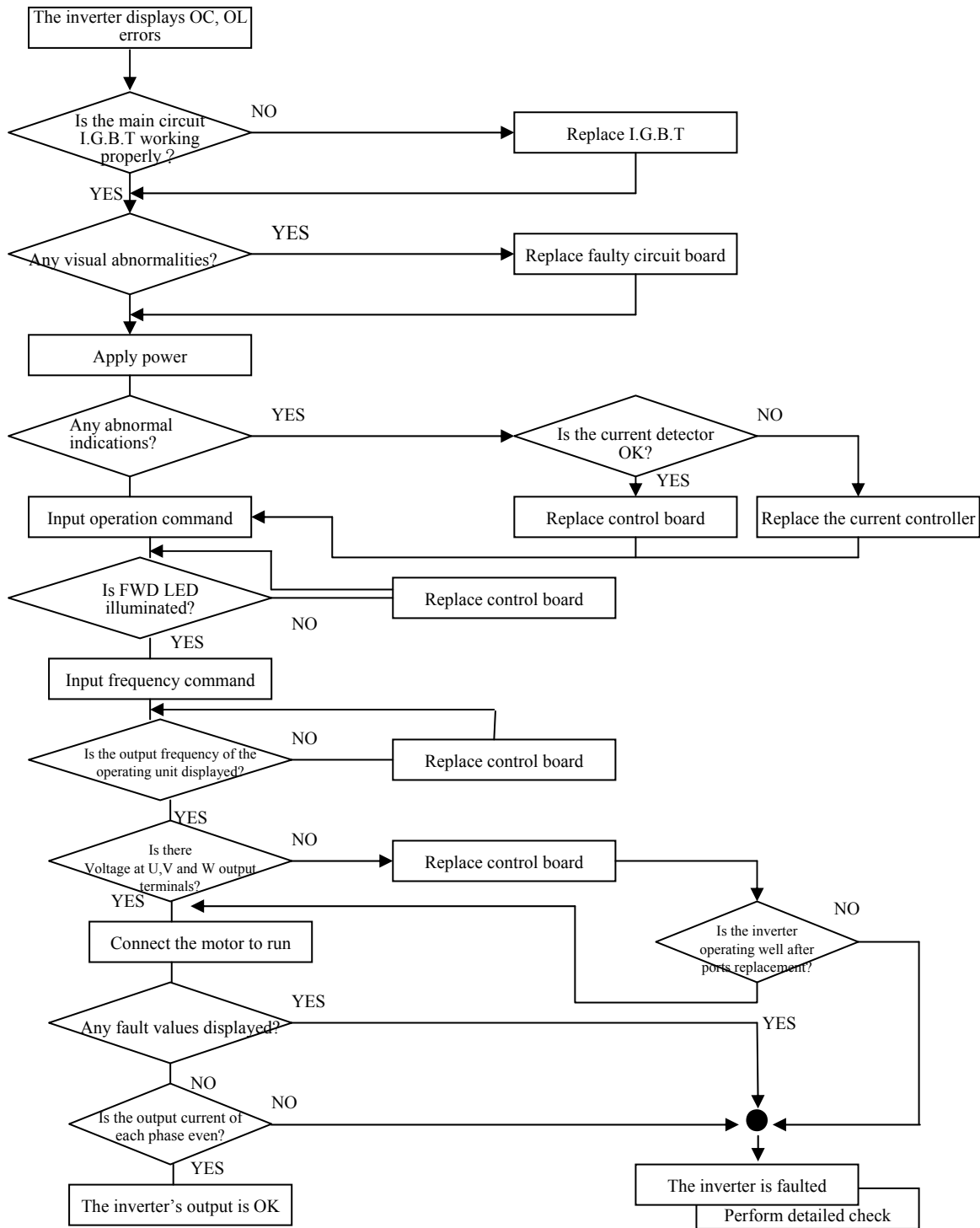


Figure 3-2 OC, OL Fault Display Flow Chart

Troubleshooting for OV, LV error

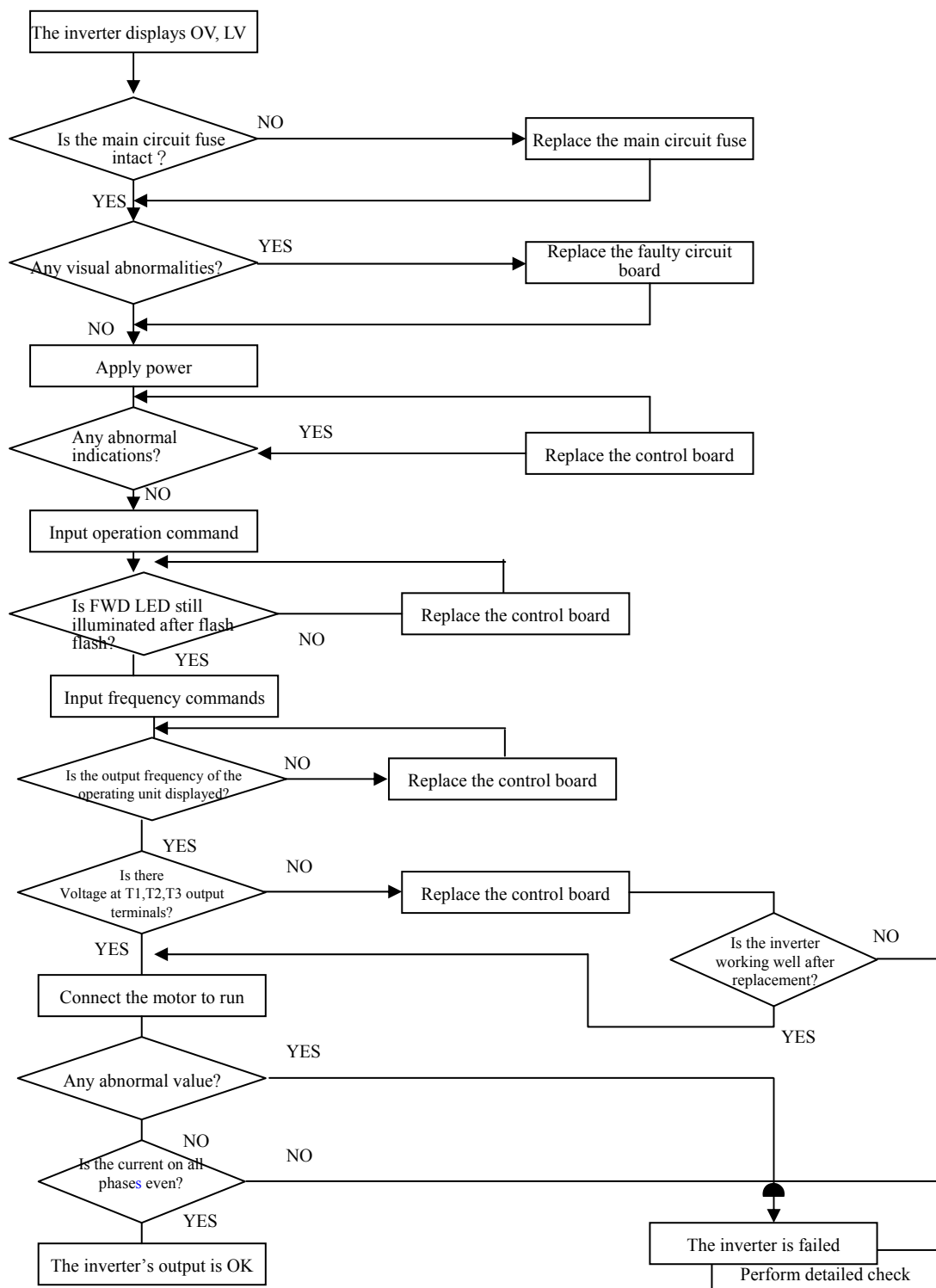
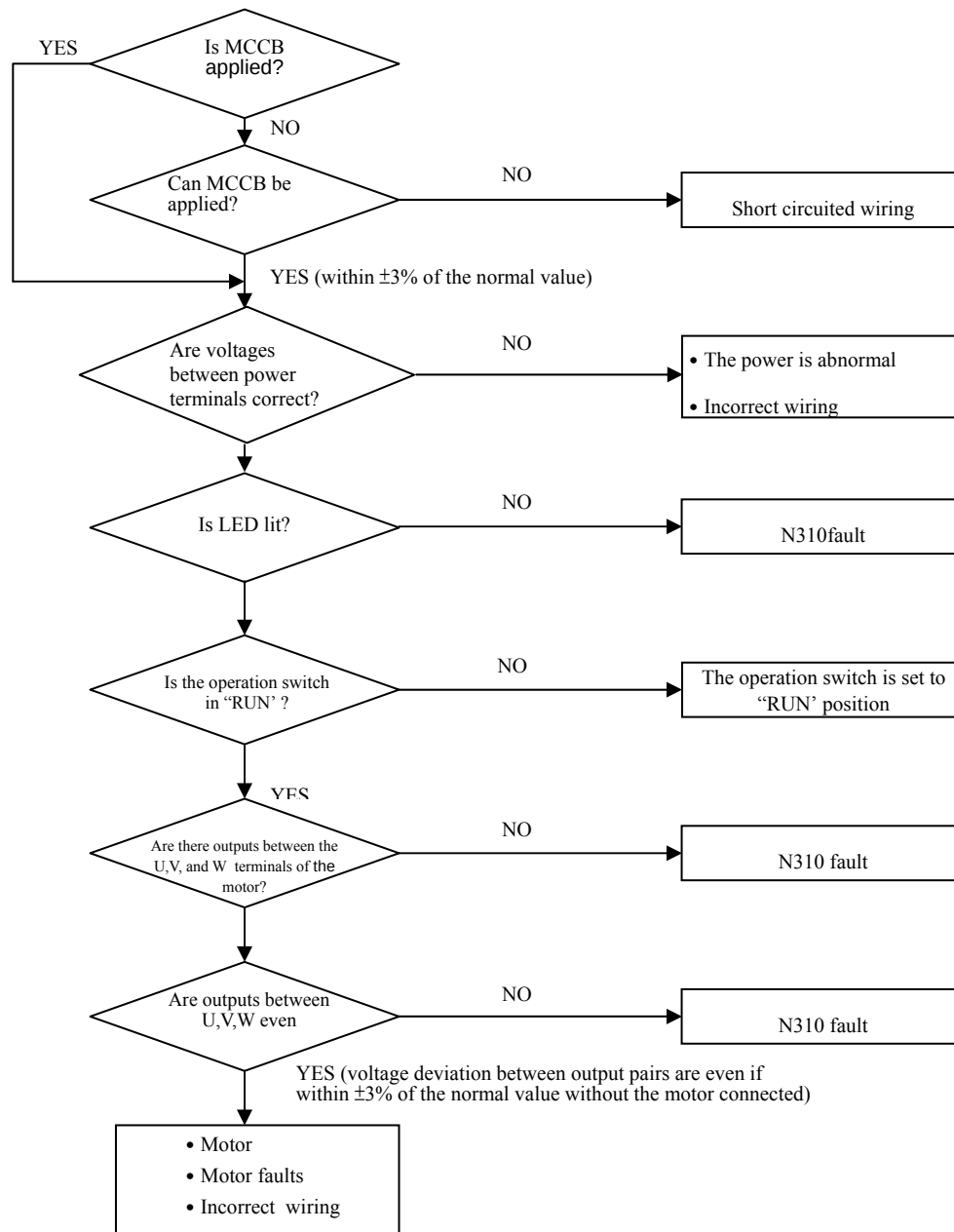


Figure 3-3 OV, LV Fault Display Flow Chart

The motor can not run

● Figure 3-4 Motor RUN failure Flow chart

Motor Overheating

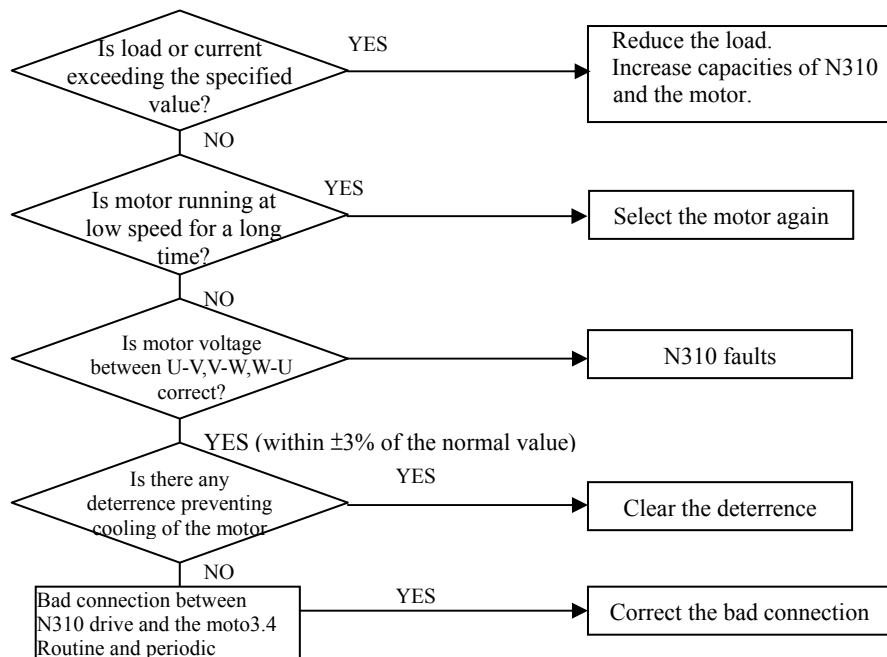


Figure 3-5 Motor Overheat Troubleshooting Flow Chart

Motor runs unevenly

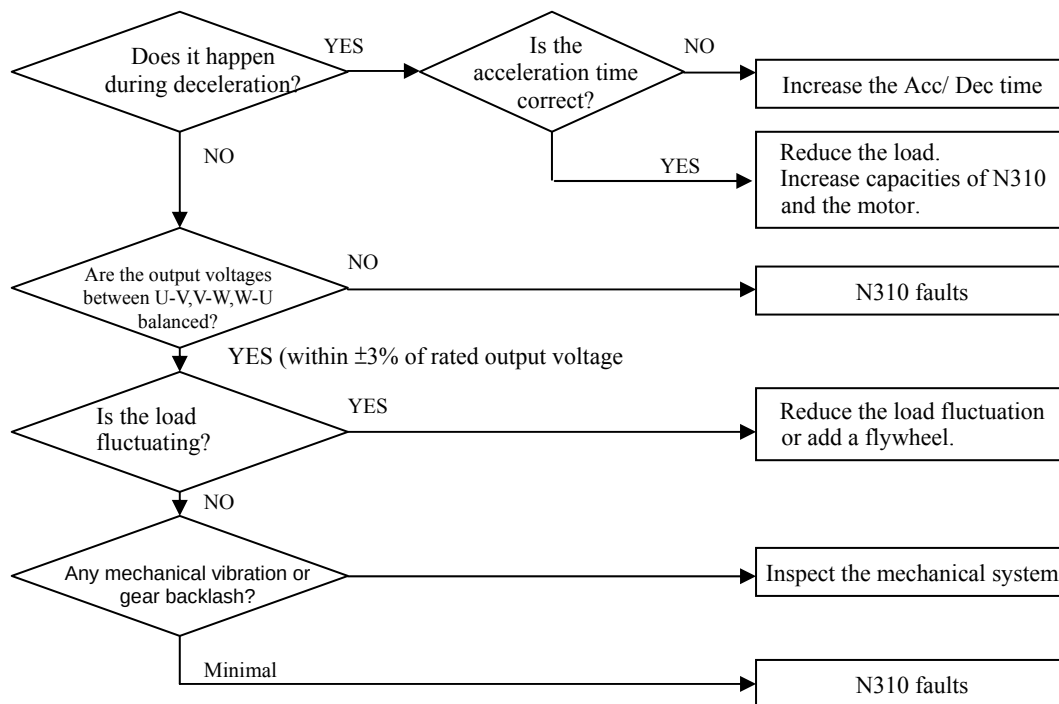


Figure 3-6 Motor Instability Troubleshooting Flow Chart

3.4 Routine and periodic inspection

To ensure stable and safe operations, check and maintain the inverter at regular intervals.

The table below lists the items to be checked to ensure stable and safe operations.

Check these items 5 minutes after the “Charge” indicator goes out to prevent injury to personnel by residual electric power.

Items	Details	Checking period		Methods	Criteria	Remedies
		Daily	1Year			
Ambient conditions around the machine	Confirm the temperature and humidity at the machine	○		Measure with thermometer and hygrometer according to installation notices.	Temperature: -10 – 40°C (14-120°F) Humidity: Below 95% RH	Improve the ambient or relocate the drive to a better area.
	Are there inflammable materials in the vicinity?	○		Visual check	Keep area clear	
Installation and grounding of the inverter	Any unusual vibration from the machine	○		Visual, hearing check	No vibration	Secure screws
	Is the grounding resistance correct?		○	Measure the resistance with a multi-tester	200Vclass: below 100Ω 400V class: 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	○				

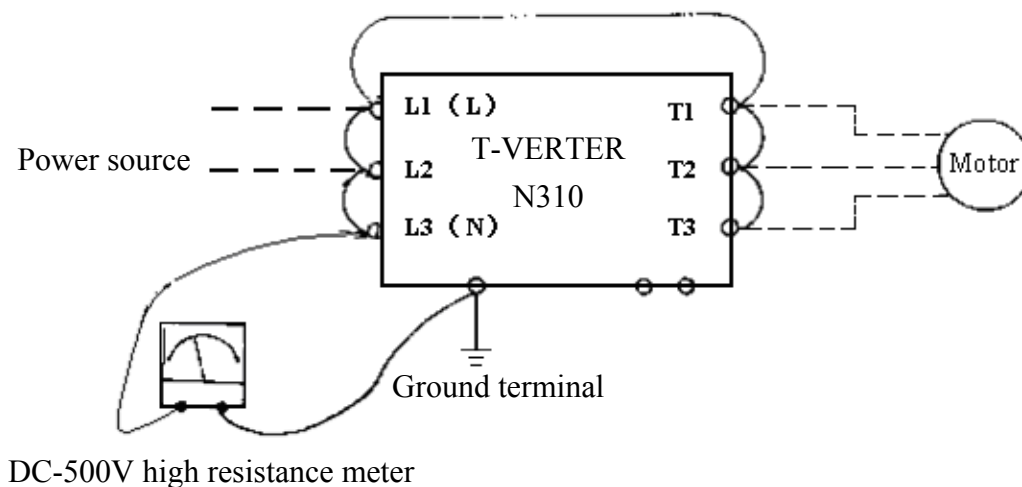
3.5 Maintenance and Inspection

Inverter doesn't need daily inspection and maintenance.

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

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

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



Insulation Test Diagram

N310 使用手冊

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快速使用指南

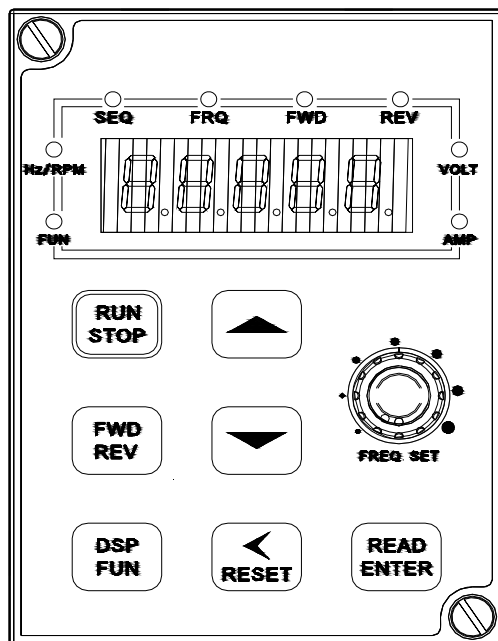
本指南有助於用戶安裝及使用本公司變頻器，讓您的馬達能適當的運轉。運轉、停止和速度調整都可通過數位操作面板直接控制。若您需要外部控制或其他特別系統規劃，可參閱隨機附的N310使用手冊。

一、安裝變頻器

請先參閱 N310 使用手冊第零章(前言)及第一章(安全注意事項)，並確認本變頻器安裝在適切的環境中(參閱第三章：使用環境及安裝)。如果您仍存有疑問，請暫時不要送電，請合格檢測人員檢視。(未確實遵守可能導致人身傷害或設備損壞)。

- 請檢查變頻器及馬達銘板，確認兩者有相同馬力數及額定電壓。(確認馬達滿載電流小於變頻器額定電流)。
- 移除配線上蓋，將馬達電源線接至變頻器輸出端子上。
 - a. 確認 AC 電源線接至變頻器輸入端子 L1、L2 及 L3。(參閱手冊 3-12 頁)
 - b. 確定馬達線接至變頻器輸出端子 T1、T2 及 T3 上。(參閱手冊 3-12 頁)

操作面板狀態指示燈說明:



1. FUN、Hz/RPM、VOLT、AMP 等四種狀態指示燈動作，及五位數七段顯示器的顯示內容請參考操作面板使用說明。
2. SEQ LED：00-03 (或 00-04) 設為 1/2/3 時，SEQ 狀態指示燈常亮。
3. FRQ LED：00-05 (或 00-06) 設為 1/2/3/4 時，FRQ 狀態指示燈常亮。
4. FWD LED：設定正轉時，FWD 狀態指示燈於停機中閃爍，運轉後則常亮。
5. REV LED：設定反轉時，REV 狀態指示燈於停機中閃爍，運轉後則常亮。

二、送電

AC 電源投入，並觀察操作面板，五位數七段顯示器會先顯示電源電壓 2 秒，而後顯示頻率為 5.00。當七段顯示器的顯示及 FWD LED 會持續閃爍時，變頻器處於待機狀態，即通電未運轉狀態。

三、馬達空轉試運轉並檢視轉向

- 按 RUN 鍵，FWD LED 持續亮，變頻器處於運轉狀態，五位數七段顯示器會由 0.00 增至 5.00。
- 檢查馬達轉向，如馬達轉向不正確：按下 STOP 鍵讓馬達停止運轉，移除 AC 電源，待所有的 LED 燈熄滅後，將 T1、T2、T3 其中任意 2 條接線對調。重新投入電源，檢查此時馬達轉向。

四、設定頻率指令至滿載 50Hz/60Hz

- 頻率可藉由上、下箭號變更；數位顯示則可藉 RESET 鍵向左右移位。頻率設定完成後請按下 READ/ENTER。
- 依據上述規則設定頻率至 50Hz/60Hz。
- 按 RUN 鍵，觀察馬達加速至設定頻率是否出現異常。
- 按 STOP 鍵停止運轉，觀察馬達減速是否出現異常。

五、其他設定

運轉控制選擇設定：00-03(或 00-04)

頻率指令選擇設定：00-05(或 00-06)

- 1、使用操作面板的 RUN/STOP 控制變頻器的運轉/停止，面板上之旋鈕設定頻率，設定參數 00-03=0,00-05=1 即可
- 2、使用外部的開關信號接在 TM2 控制端子 S1 和 COM 之間來控制變頻器的運轉/停止，外接電位器在 TM2 上 10V、AI1、GND 上來設定頻率，設參數 00-03=1 00-05=2 即可，若要外接一個頻率顯示器，接於 FM+和 GND。

其他詳細功能調整，可參照 N310 使用手冊中的參數

控制模式選擇	P. 4-08
設定馬達額定電流	P. 4-13
設定加速時間	P. 4-08
設定減速時間	P. 4-08
設定頻率指令上限	P. 4-08
設定頻率指令下限	P. 4-08

第一章 安全注意事項

1.1 使用時注意事項

1.1.1 送電前

△ 注意

所選用的電源電壓必須與變頻器之輸入電壓規格相同。

■ 危險

主迴路端子配線必須正確，L1(L)、L2、L3(N)為電源輸入端子，T1、T2、T3 為變頻器輸出端子，請勿接電源於輸出端子上，以避免將造成變頻器的損壞。

△ 注意

- 搬運變頻器時，請勿直接提取前蓋，應由變頻器本體搬運，以防止前蓋脫落，避免變頻器掉落造成人員受傷或變頻器損壞。
- 請將變頻器安裝於金屬類等不易燃燒的材料上。請勿安裝在易燃性材料上或附近，以防止發生火災。
- 若多台變頻器同放在一個控制盤內，請外加散熱風扇，使箱內溫度低於 40℃，以防過熱或火災等發生。
- 請於關閉電源後，再拆卸或裝入操作器；並請按圖操作固定操作器，以免接觸不良造成操作器故障或不顯示。

警告

- 本產品系通過 IEC 61800-3 限制區域使用等級。在某些環境下使用本產品時，可能造成電磁干擾，故在使用前請先進行適當的測試。
- 未提供馬達過溫度保護功能。

△ 注意

為確保周邊設備安全，建議在變頻器輸入側外加高速保險絲，所採用保險絲規格請參閱光碟手冊 P3-4。

1.1.2 送電中

⚠ 危險

- 送電中絕不可插拔變頻器上的連接器(Connector)，以避免控制板因插拔所產生的突波衝入造成內部損壞。
- 若停電時間大於兩秒（馬力數越大，可允許斷電時間愈長），會使變頻器失去控制電源，故在電源回復後之控制，是根據 00-03(或 00-04)及 04-09 參數的設定及外部開關的狀態而決定，此時視為重新開機。
- 若停電時間短，變頻器仍擁有控制電源，因此當電源回復時，變頻器能否自行啓動，將取決於 04-03/04-04 參數的設定。
- 當重新開機時，變頻器運轉與否，取決於 00-03(或 00-04)及 04-09 的設定及電源開關/運轉開關(FWD/REV 開關)的狀態(與 04-03/04-04/04-06/04-07 無關)：
 - 1.00-03(或 00-04)=0 時，重新開機後，不會自動啓動。
 - 2.00-03(或 00-04)=1 且電源開關或運轉開關(FWD/REV 開關) OFF 時，重新開機後，不會自動啓動。
 - 3.00-03(或 00-04)=1 電源開關及運轉開關 ON 且 04-09=0 時，重新開機後，會自動啓動。基於安全考慮，請在停電以後將電源開關及運轉開關關斷，以避免突然復電後，對機器及人身造成傷害。
- 04-09=0 時，為確保人身及機器設備安全，請參照 04-09 詳細使用說明及建議。

1.1.3 運轉前

⚠ 危險

請確認所使用變頻器的機種容量和變頻器內功能參數 12-0 所設定的機種容量相同。

△ 注意

電源投入時，變頻器會先閃爍 5-03 所設定的變頻器供電電源電壓 2 秒。

1.1.4 運轉中

⚠ 危險

運轉中不可將馬達機組投入或切離，否則會造成變頻器過電流跳機甚或將變頻器主迴路損壞。

⚠ 危險

- 變頻器送電狀態時請勿取下前蓋，以防人員觸電傷亡。
- 如設定自動再啟動功能時，馬達於運轉停止後會自動再啟動，請勿靠近機器以免危險。
- 停止開關的功能須設定才有效，與緊急停止開關的用法不同，使用時請留意。

⚠ 注意

- 散熱座、煞車電阻等發熱部件請勿觸摸。
- 變頻器可以很容易使馬達低速到高速運轉，請確認馬達與機械的容許範圍。
- 使用制動單元等選配產品時，請注意其使用時的相關設定。
- 變頻器運轉時，請勿檢查電路板上的信號。

⚠ 注意

請先確認電源切斷後，且充電指示燈熄滅後，才可進行拆裝或實施檢查。

1.1.5 檢查保養時

△注意

變頻器周圍溫度應在 $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$ 95%RH 不結露環境中使用

△注意

去掉變頻器防塵蓋後，則周圍溫度應在 $-10^{\circ}\text{C} \sim +50^{\circ}\text{C}$ 95%RH 不結露環境中使用，但需確保周圍環境無滴水及金屬粉塵。

變頻器報廢時注意事項

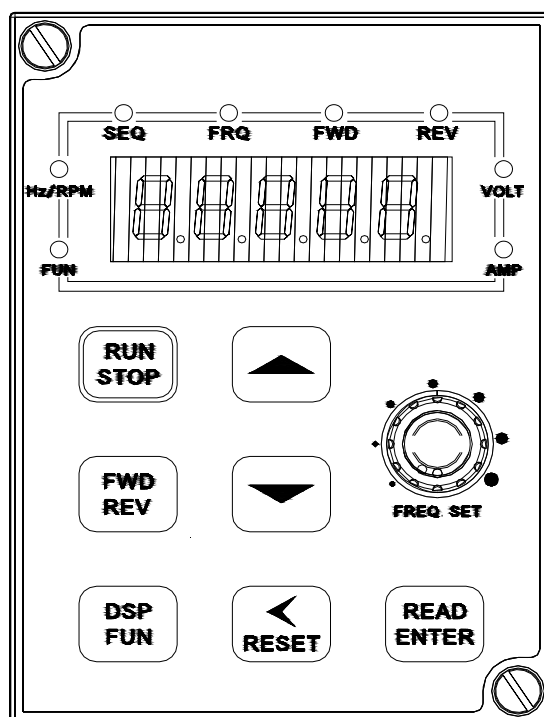
△ 注意

當變頻器要處理報廢時，請作為工業垃圾進行處理,並請注意以下事項：
變頻器主回路的電解電容和印刷電路板上的電解電容焚燒時可能會發生爆炸
變頻器的上蓋面板等塑膠件焚燒時會產生有毒氣體。

第二章 軟體索引

2.1 操作器使用說明

2.1.1 鍵盤顯示及操作說明



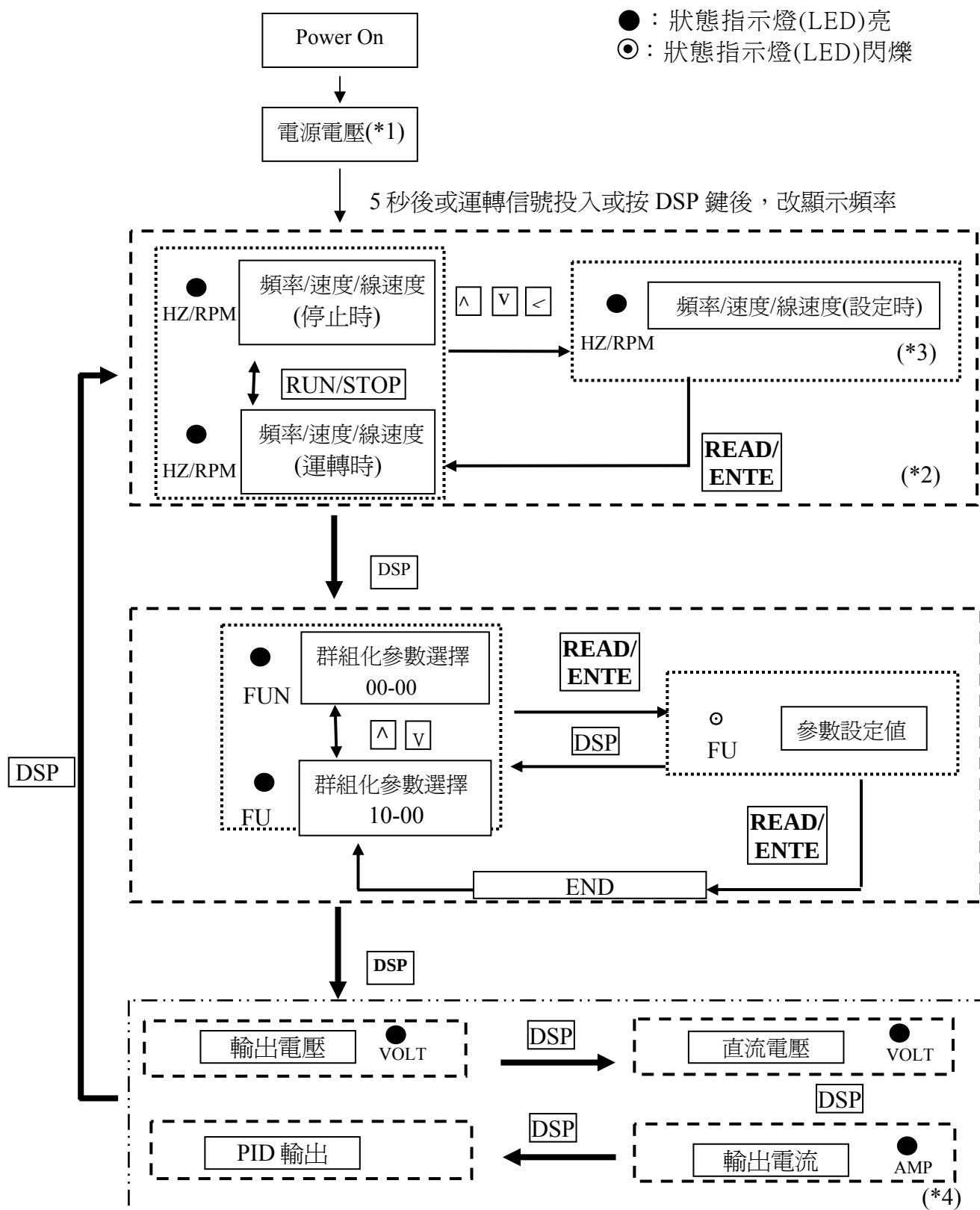
1. SEQ LED：00-03(或 00-04)設為 1/2/3 時，LED 燈亮。
2. FRQ LED：00-05(或 00-06)設為 1/2/3/4 時，LED 燈亮。
3. FWD LED：轉向設定正轉時，LED 燈會動作(停機中閃爍，運轉後持續亮著)。
4. REV LED：轉向設定反轉時，LED 燈會動作(停機中閃爍，運轉後持續亮著)。
5. FUN、Hz/RPM、VOLT、AMP 等 4 種 LED 燈的動作情況，及五個 7 段顯示器內容請參考鍵盤按鍵操作說明。

⚠ 注意

請不要將螺絲起子等尖硬工具用於按鍵面板，以避免按鍵面板損壞。

2.1.2 按鍵面板使用說明

- ：狀態指示燈(LED)亮
 ◎：狀態指示燈(LED)閃爍



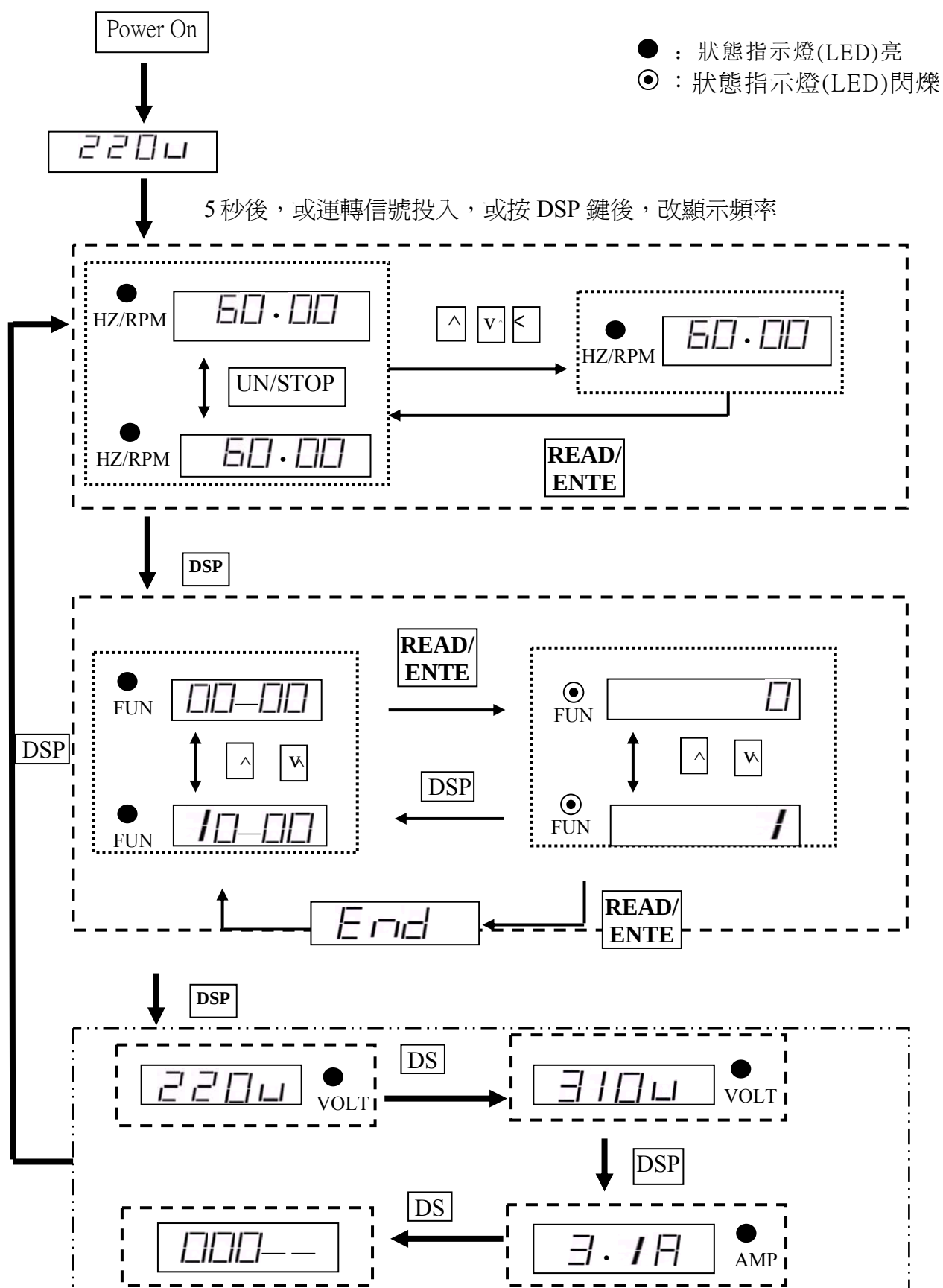
*1：開機後，變頻器會先閃爍目前 05-03(電源電壓)的設定值。

*2：顯示頻率或轉速或線速度由 11-01、11-02 決定。

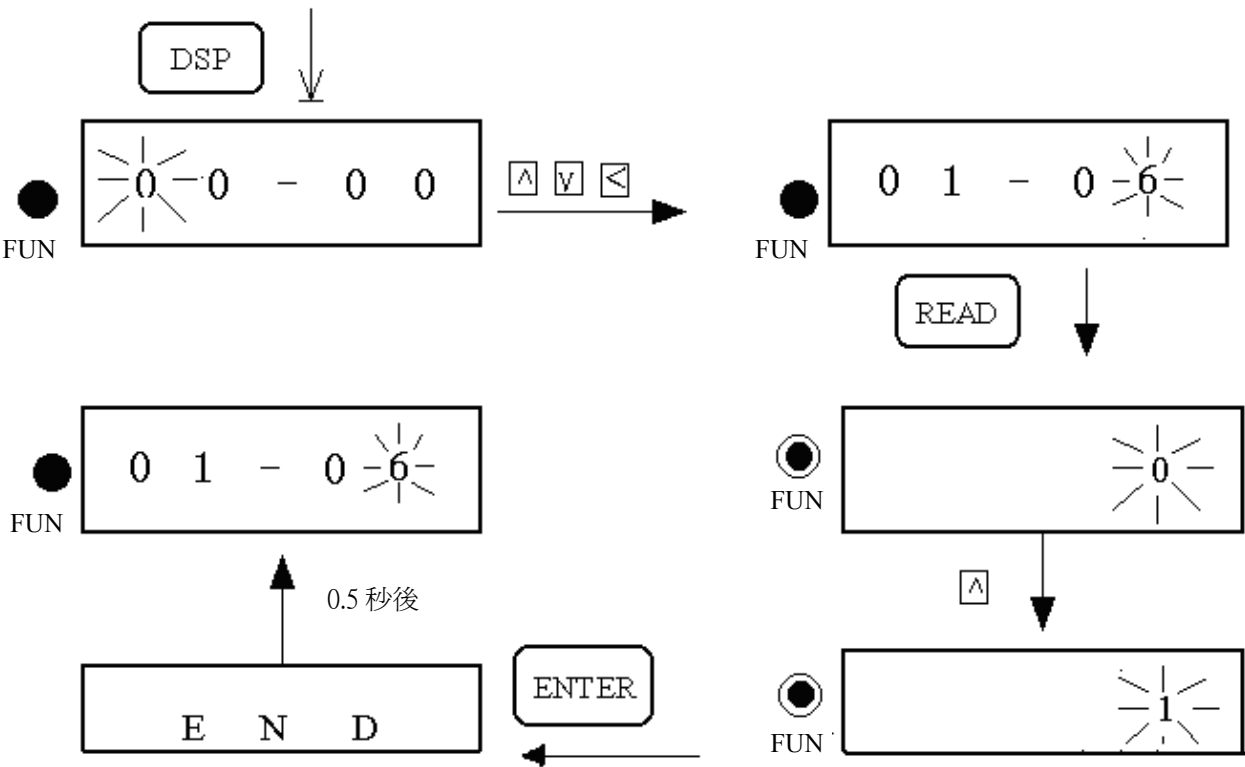
*3：停機中修改時，不需要按 ENTER 鍵，請參考操作範例 1、2。

*4：輸出電流、輸出電壓、直流電壓、散熱片溫度、PID 顯示與否分別由 11-00 決定。

2.1.3 按鍵面板操作說明(LED)

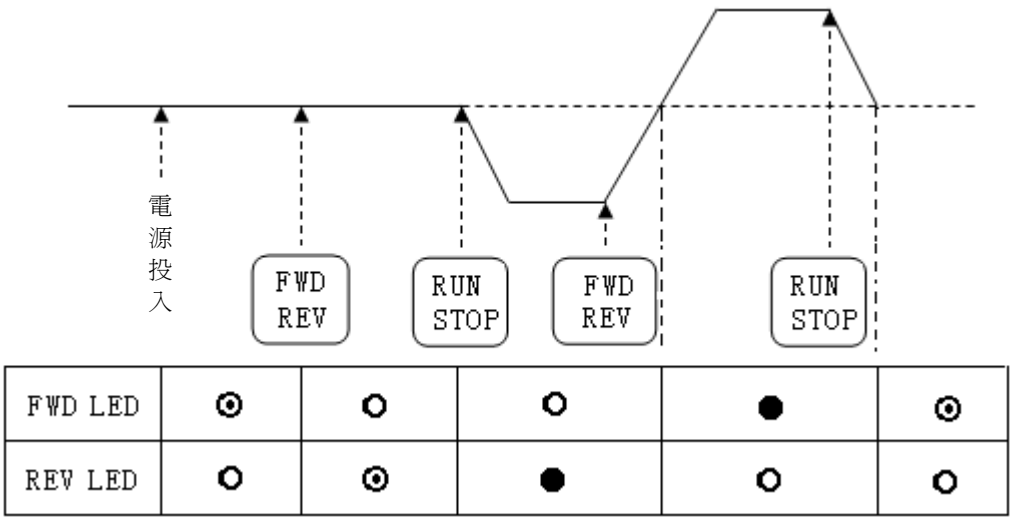


操作範例 4、參數值修改



註：XX.XX 表示目前的輸出頻率

操作範例 5、運轉控制



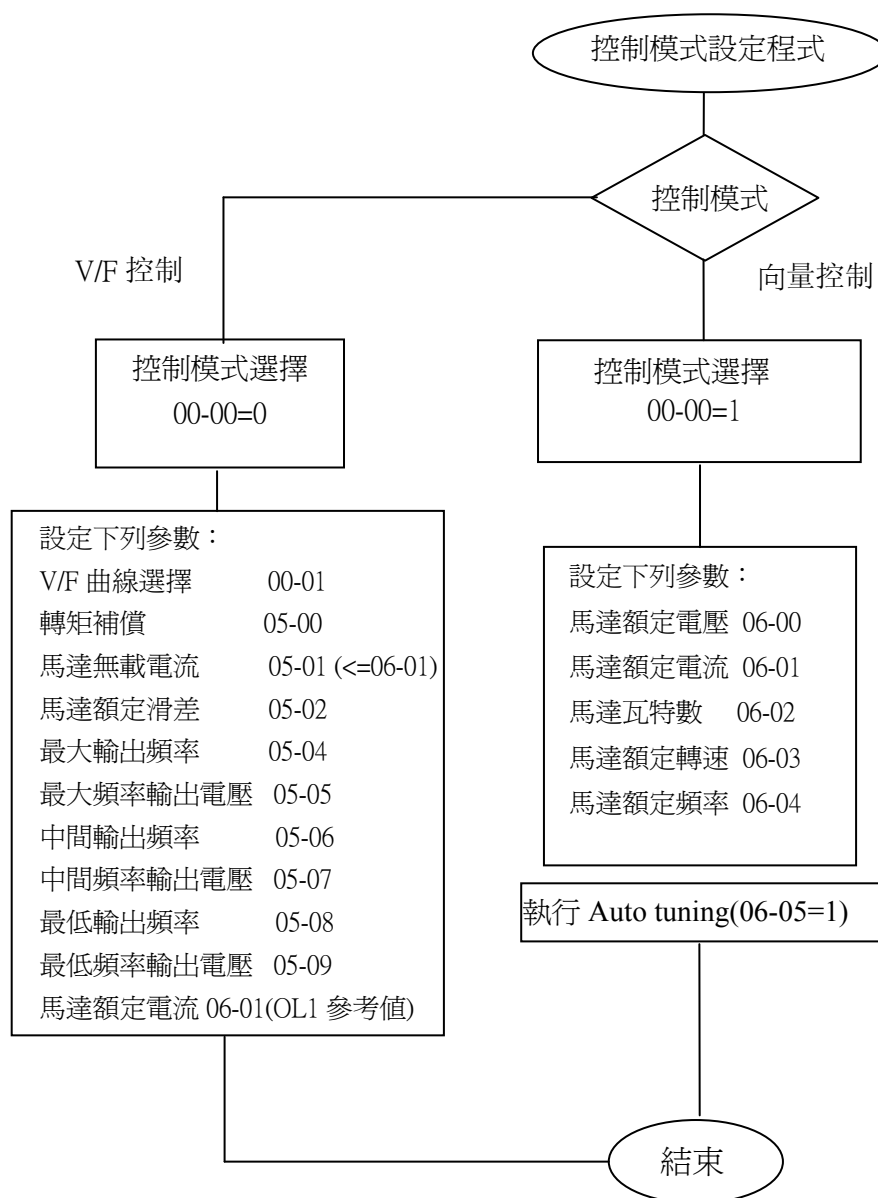
●：LED 燈亮 ●：LED 燈閃爍 ○：LED 燈熄滅

2.2 控制模式選擇

N310系列提供兩種控制模式：

1、V/F模式 2、向量模式

使用者可根據自己的應用需求，利用數位操作器做控制模式選擇。變頻器出廠時，已設定為V/F控制模式，使用前請根據下列的流程設定控制模式和馬達相關參數：
(向量控制模式僅適用於與變頻器容量相同、大一級或小一級的馬達)



※ 註：

- 使用 V/F 模式時機：
 - (1) 一台變頻器同時帶多台馬達
 - (2) 馬達銘牌未知，或馬達規格特殊，導致 Auto-tuning 失敗時。
 - (3) 變頻器與馬達馬力數容量相差一級以上。
- 一台變頻器同時帶多台馬達此時只能選擇 V/F 控制，輸入馬達參數請遵循以下原則：
 - (1) 馬達額定電流(06-01)將所有馬達的額定電流相加。
 - (2) 其他則輸入適當的 V/F 曲線參數(05-04~05-09)即可。
- 馬達銘牌未知時，變頻器會以東元標準馬達參數設定為內建值。
- 執行 Auto tuning 時，若 00-00=0，會顯示 Err2。
- 向量模式時，06-01~06-05 上下值會依據東元標準馬達銘牌的限制(上下各一級)。V/F 模式時，則無任何限制。

2.3 參數一覽表

參數群組	說 明
00-	基本功能組
01-	外部端子數值功能組
02-	外部端子類比功能組
03-	多段速功能參數群組
04-	起動停止控制組
05-	V/F 控制組
06-	馬達參數組
07-	保護功能組
08-	通訊功能組
09-	PID 功能組
10-	輔助功能組
11-	數位顯示操作
12-	用戶使用參數組
13-	自動程式運轉參數組

0- 基本功能組

功能代碼	功 能 說 明	範 圍 / 代 碼	出廠設定	備 註
00-00	控制模式	0：V/F 模式 1：向量模式	0	
00-01	V/F 曲線選擇	0~18	0/9	*5
00-02	-----	-----	----	預留
00-03	主運轉命令來源選擇	0：按鍵面板 1：外部端子 2：通訊控制 3：擴充卡（預留）	0	
00-04	副運轉命令來源選擇	0：按鍵面板 1：外部端子 2：通訊控制 3：擴充卡（預留）	0	
00-05	主頻率命令來源選擇	0：按鍵面板上下鍵設定頻率 1：按鍵面板旋鈕設定頻率 2：外部 AI1 類比輸入信號設定頻率 3：外部 Up/Down 增減設定頻率 4：通訊設定頻率	0	
00-06	副頻率命令來源選擇	0：按鍵面板上下鍵設定頻率 1：按鍵面板旋鈕設定頻率 2：外部 AI1 類比輸入信號設定頻率 3：外部 Up/Down 增減設定頻率 4：通訊設定頻率	0	
00-07	頻率上限(Hz)	0.01~400.00	50.00/ 60.00	
00-08	頻率下限(Hz)	0.00~399.99	0.00	
00-09	加速時間 1（秒）	0.1~3600.0	10.0	*1
00-10	減速時間 1（秒）	0.1~ 3600.0	10.0	*1
00-11	外部端子運轉模式	0：正轉/停止-反轉/停止 1：運轉/停止-正轉/反轉 2：3 線制運轉/停止	0	
00-12	寸動頻率(Hz)	1.00~25.00	2.00	*1
00-13	寸動加速時間(秒)	0.1~25.5	0.5	*1
00-14	寸動減速時間(秒)	0.1~25.5	0.5	*1

1-外部端子數值功能組

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
01-00	端子 S1 功能設定	0：正轉/停止*1 1：反轉/停止*2	0	
01-01	端子 S2 功能設定	2：多段速設定位元 0(3-02) 3：多段速設定位元 1(3-03)	1	
01-02	端子 S3 功能設定	4：多段速設定位元 2(3-05) 5：多段速設定位元 3(3-09)	2	
01-03	端子 S4 功能設定	6：寸動正轉指令 7：寸動反轉指令	3	
01-04	端子 S5 功能設定	8：加/減速時間 2 9：緊急停止(減速到零停止)	4	
01-05	端子 S6 功能設定	10：遮斷停止(自由運轉停止) 11：速度搜尋 12：節能運轉 (V/F) 13：主/副運轉信號切換 14：加/減速禁止 15：Up 增頻率指令 16：Down 減頻率指令 17：主/副頻率切換 18：PID 功能禁止 19：PID 積分器復歸 20：故障復歸(Reset) 21：電源電壓偵測電能回升功能 22：自動程式運轉	20	
01-06	S1~S6 信號確認掃描時間	1~200(mSec X 2)	10	
01-07	up/down 頻率幅寬設定(Hz)	0.00~5.00	0.00	
01-08	up/down 頻率保持選擇	0：當使用增/減頻率指令時，變頻器停止運轉時，設定的頻率將被保持 1：當使用增/減頻率指令時，當變頻器停止運轉時，設定的頻率將被歸至 0 Hz 2：當使用增/減頻率指令時，當變頻器停止運轉時，設定的頻率將被保持，停機時增/減頻率功能有效	0	
01-09	繼電器 RY1	0：運轉中 1：故障接點	1	
01-10	開集電極輸出 TR1	2：頻率到達 3：任意頻率一致(1-11±1-12) 4：頻率檢出 1 (> 1-11) 5：頻率檢出 2 (< 1-11) 6：自動再啓動 7：瞬停動作 8：緊急停止 9：遮斷停止 10：馬達過載保護(OL1) 11：變頻器過載保護(OL2) 12：過轉矩回饋(OL3) 13：PID 回饋信號斷線 14：電流到達	0	
01-11	頻率到達輸出設定值(Hz)	0.00~400.00	0.00	*1

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
01-12	頻率輸出偵測範圍 (±Hz)	0.00~30.00	2.00	*1
01-13	S1~S5 接點類型選擇	xxxx0 : S1 常開接點 xxxx1 : S1 常閉接點 xxx0x : S2 常開接點 xxx1x : S2 常閉接點 xx0xx : S3 常開接點 xx1xx : S3 常閉接點 x0xxx : S4 常開接點 x1xxx : S4 常閉接點 0xxxx : S5 常開接點 1xxxx : S5 常閉接點	00000	
01-14	S6 接點類型選擇	xxxx0 : S6 常開 xxxx1 : S6 常閉	00000	
01-15	電流到達準位 (A)	0.1~500.0	0.1	
01-16	電流到達檢測延遲時間(s)	0.1~10.0	0.1	

2-外部端子類比功能組

功能代碼	功 能 說 明	設 定 範 圍			出廠設定	備 註
02-00	AI1 與 AI2 輸入信號種類	設定值	AI1	AI2	0	
		0	0~10V 或 (0~20mA)	0~10V 或 (0~20mA)		
		1	0~10V 或 (0~20mA)	2~10V 或 (4~20mA)		
		2	2~10V 或 (4~20mA)	0~10V 或 (0~20mA)		
		3	2~10V 或 (4~20mA)	2~10V 或 (4~20mA)		
02-01	AI1 信號掃描濾波時間	1~200(mSec x 2)			100	
02-02	AI1 增壓值(%)	0~1000			100	*1
02-03	AI1 偏壓值(%)	0.0~100.0			0	*1
02-04	AI1 偏壓值正負選擇	0 : 正向 1 : 負向			0	*1
02-05	AI1 信號方向控制選擇	0 : 正向 1 : 負向			0	*1
02-06	AI2 功能選擇	0 : PID 回饋信號 (端子 AI2) 1 : AI2 偏差信號輸入 (端子 AI2)			0	
02-07	AI2 信號掃描濾波時間	1~200 (mSec x 2)			100	
02-08	AI2 增益值(%)	0~1000			100	*1
02-09	AI2 偏壓值(%)	0.0~100.0			0	*1
02-10	AI2 偏壓值正負選擇	0 : 正向 1 : 負向			0	*1
02-11	AI2 信號方向控制選擇	0 : 正向 1 : 負向			0	*1

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
02-12	類比輸出種類選擇 FM+	0：輸出頻率 1：頻率設定 2：輸出電壓 3：直流電壓 4：輸出電流	0	*1
02-13	類比輸出 FM+增益	0~1000	100	*1
02-14	類比輸出 FM+偏置	0.0~100.0	0	*1
02-15	FM+偏置值正負選擇	0：正向 1：負向	0	*1
02-16	FM+信號方向控制選擇	0：正向 1：負向	0	*1

3- 多段速功能參數組

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
03-00	多段速加減速模式選擇	0：段速加減速時間統一由 00-09/10、10-05/06 設定 1：段速加減速時間獨立設定	0	
03-01	多段速 0 (Hz)	0.00~400.00	5.00	面板 頻率
03-02	多段速 1 (Hz)	0.00~400.00	5.00	*1
03-03	多段速 2 (Hz)	0.00~400.00	10.00	*1
03-04	多段速 3 (Hz)	0.00~400.00	15.00	*1
03-05	多段速 4 (Hz)	0.00~400.00	20.00	*1
03-06	多段速 5 (Hz)	0.00~400.00	25.00	*1
03-07	多段速 6 (Hz)	0.00~400.00	30.00	*1
03-08	多段速 7 (Hz)	0.00~400.00	35.00	*1
03-09	多段速 8 (Hz)	0.00~400.00	40.00	*1
03-10	多段速 9 (Hz)	0.00~400.00	45.00	*1
03-11	多段速 10 (Hz)	0.00~400.00	50.00	*1
03-12	多段速 11 (Hz)	0.00~400.00	0.00	*1
03-13	多段速 12 (Hz)	0.00~400.00	0.00	*1
03-14	多段速 13 (Hz)	0.00~400.00	0.00	*1
03-15	多段速 14 (Hz)	0.00~400.00	0.00	*1
03-16	多段速 15 (Hz)	0.00~ 400.00	0.00	*1
03-17	多段速 0 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-18	多段速 0 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-19	多段速 1 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-20	多段速 1 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-21	多段速 2 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-22	多段速 2 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-23	多段速 3 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-24	多段速 3 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-25	多段速 4 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-26	多段速 4 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-27	多段速 5 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-28	多段速 5 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
03-29	多段速 6 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-30	多段速 6 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-31	多段速 7 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-32	多段速 7 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-33	多段速 8 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-34	多段速 8 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-35	多段速 9 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-36	多段速 9 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-37	多段速 10 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-38	多段速 10 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-39	多段速 11 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-40	多段速 11 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-41	多段速 12 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-42	多段速 12 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-43	多段速 13 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-44	多段速 13 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-45	多段速 14 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-46	多段速 14 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-47	多段速 15 加速時間 (秒)	0.1~3600.0 (秒)	10.0	*1
03-48	多段速 15 減速時間 (秒)	0.1~3600.0 (秒)	10.0	*1

4- 起動停止控制組

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
04-00	起動方式選擇	0：正常起動 1：Speed Search 方式啟動	0	
04-01	停止方式選擇	0：減速停止(增強煞車能力) 1：自由停止 2：減速停止(一般煞車能力)	2	
04-02	按鍵面板停止鍵	0：停止按鈕有效 1：停止按鈕無效	0	
04-03	瞬停再啟動	0：瞬停再啟動無效 1：瞬停再啟動有效 2：CPU 工作中瞬停再啟動有效 (由直流電容量決定)	0	
04-04	允許瞬停時間	0.0~2.0	0.5	
04-05	自動復歸再啟動方式	0：Speed Search 方式啟動 1：正常啟動	0	
04-06	自動復歸再啟動時間(s)	0.0~800.0	0.0	
04-07	自動復歸再啟動次數	0~10	0	
04-08	復歸模式設定	0：當 RUN 指令存在時，復歸指令無效 1：復歸指令與 RUN 指令狀態無關	0	
04-09	開機後直接啟動	0：外部運轉命令有效時，送電後直接啟動 1：外部運轉命令有效時，送電後不可直接啟動	1	

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
04-10	開機直接啟動延時(s)	1.8~300.0	1.8	*6
04-11	瞬停時動能回升設定	0.0：不執行瞬停動能回升功能 0.1~25.0：瞬停時動能回升時間	0.0	
04-12	主迴路低電壓偵測	150.0~210.0 300.0~420.0	190.0/ 380.0	
04-13	啟動時直流煞車準位(%)	0.0~150.0	50.0	
04-14	啟動時直流煞車時間(秒)	0.0~25.5	0.5	
04-15	停止時直流煞車頻率(Hz)	0.10~10.00	1.50	
04-16	停止時直流煞車準位(%)	0.0~150.0	50.0	
04-17	停止時直流煞車時間(秒)	0.0~25.5	0.5	
04-18	過勵磁增益	0.00~0.25	0.00	

5- V/F 控制組

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
05-00	轉矩補償增益 (V/F 曲線修正)(%)	0~30.0	10.0	*5
05-01	馬達空載電流(Amps AC)	-----		*5
05-02	馬達額定滑差補償(%)	0.0~100.0	25.0	*5
05-03	VF 最大輸出電壓(Vac)	200V 系列：170.0~264.0 400V 系列：323.0~528.0		*5
05-04	最大輸出頻率(Hz)	0.20~400.00	50.00/ 60.00	*5
05-05	最大輸出電壓比(%)	0.0~100.0	100.0	*5
05-06	中間輸出頻率(Hz)	0.10~400.00	25.00/ 30.00	*5
05-07	中間輸出電壓比(%)	0.0~100.0	50.0	*5
05-08	最小輸出頻率(Hz)	0.10~400.00	0.50/ 0.60	*5
05-09	最小輸出電壓比(%)	0.0~100.0	1.0	*5
05-10	V/F 節能模式運轉	0：無效 1：多功能端子設為節能運轉控制端子	0	*5
05-11	V/F 節能運轉增益(%)	0~100	80	*5
05-12	V/F 啟動頻率	0.00~10.00	0.00	*5

6- 馬達參數組

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
06-00	馬達額定電壓 (Vac)	-----		*4
06-01	馬達額定電流 (A)	-----		*4
06-02	馬達額定功率(kW)	-----		*4
06-03	馬達額定轉速(RPM)	-----		*4
06-04	馬達額定頻率 (Hz)	-----		*4
06-05	馬達參數自動調校	0：不執行 1：執行馬達參數自動調校	0	
06-06	定子電阻增益(Rs)	-----		*3*4
06-07	轉子電阻增益(Rr)	-----		*3*4
06-08	等效電感增益 (LKg)	-----		*3*4
06-09	磁化電流增益 (imag)	-----		*3*4
06-10	鐵損電導增益 (gm)	-----		*3*4
06-11	低頻補償增益	0~100	30	

7-保護功能組

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
07-00	失速防止功能	xxxx0：加速時失速防止有效 xxxx1：加速時失速防止無效 xxx0x：減速時失速防止有效 xxx1x：減速時失速防止無效 xx0xx：運轉中失速防止有效 xx1xx：運轉中失速防止無效 x0xxx：運轉中過電壓防止有效 x1xxx：運轉中過電壓防止無效	00000	
07-01	加速失速防止準位(%)	50~200(變頻器額定電流 200%)	200	*6
07-02	減速失速防止準位(%)	50~200(變頻器額定電流 200%)	200	*6
07-03	運轉失速防止準位(%)	50~200(變頻器額定電流 200%)	200	*6
07-04	運轉過電壓防止準位	350VDC~390VDC 700VDC~780VDC	380/ 760	
07-05	電子電譯保護馬達 OL1	0：電子繼電器保護馬達有效 1：電子繼電器保護馬達無效	1	
07-06	馬達類型選擇	0：電子繼電器保護標準馬達 1：電子繼電器保護專用馬達	0	
07-07	馬達超載保護選擇	0：馬達電子繼電器保護 (OL=103 %) (150%1 分鐘) 1：馬達電子繼電器保護 (OL=113%) (123%1 分鐘)	0	

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
07-08	過載(OL1)保護動作 啟動方式	0：過載保護後停止輸出（自由運轉停止） 1：過載保護後繼續運轉（僅顯示 OL1）	0	
07-09	過轉矩偵測控制(OL3)	0：過轉矩偵測無效 1：到達設定頻率後開始偵測 2：運轉中即偵測	0	
07-10	過轉矩保護動作選擇	0：過轉矩偵測後停止輸出（自由運轉停止） 1：過轉矩偵測後繼續運轉（僅顯示 OL3）	1	
07-11	過轉矩偵測準位(%)	30~300	160	
07-12	過轉矩偵測時間(s)	0.0~25.0	0.1	
07-13	OH 過熱保護風扇控制方式	0：感溫自動運轉 1：RUN 機中運轉 2：持續運轉 3：停止運轉	1	

8-通訊功能組

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
08-00	變頻器通訊站別	0~32	1	*2*4
08-01	RTU 碼/ASCII 碼選擇	0：RTU 碼 1：ASCII 碼	0	*2*3
08-02	串列傳輸速率設定(bps)	0：4800 1：9600 2：19200 3：38400	2	*2*3
08-03	停止位元選擇	0：1 停止位元 1：2 停止位元	0	*2*3
08-04	奇偶位元選擇	0：無奇偶位元 1：偶位元 2：奇位元	0	*2*3
08-05	資料位元選擇	0：8 位元資料 1：7 位元資料	0	*2*3
08-06	通訊異常檢測時間（s）	0.0~25.5	0.0	
08-07	通訊異常檢出處理	0：通訊中斷後依第一段減速時間停止並顯示 COT 1：通訊中斷後採取自由運轉停止並顯示 COT 2：通訊中斷後依第二段減速時間停止並顯示 COT 3：通訊中斷後繼續運轉並顯示 COT	0	
08-08	Err6 容許出錯次數	1~20	3	
08-09	通訊等待時間（ms）	5~65	5	

9- PID 功能組

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
09-00	PID 運轉模式選擇	0：PID 運轉功能無效 1：PID 控制，偏差 D 值控制 2：PID 控制，回饋 D 值控制 3：PID 控制，偏差 D 值反特性控制 4：PID 控制，回饋 D 值反特性控制 5：PID 控制，頻率指令+偏差 D 值控制 6：PID 控制，頻率指令+回饋 D 值控制 7：PID 控制，頻率指令+偏差 D 值反特性控制 8：PID 控制，頻率指令+回饋 D 值反特性控制	0	
09-01	回饋比例係數	0.00~10.00	1.00	*1
09-02	比例增益(%)	0.0~10.0	1.0	*1
09-03	積分時間(s)	0.0~100.0	10.0	*1
09-04	微分時間(s)	0.00~10.00	0.00	*1
09-05	PID Offset	0：正方向 1：負方向	0	*1
09-06	PID Offset 調整(%)	0~109	0	*1
09-07	PID 一次延遲過濾時間(s)	0.0~2.5	0.0	*1
09-08	回饋信號喪失時檢出模式	0：不檢出 1：檢出運轉 2：檢出停止	0	
09-09	回饋信號斷線檢出準位比例係數	0~100	0	
09-10	回饋信號斷線時檢出延遲時間(s)	0.0~25.5	1.0	
09-11	積分極限值	0 - 109	100	*1
09-12	回饋信號到達設定值時積分器歸零(0~30)	0：無效 1：1 秒 30：30 秒	0	
09-13	允許誤差範圍(單位值) (1 單元=1/8192)	0~100	0	
09-14	設定睡眠開始頻率 (Hz)	0.00~400.00	0.00	
09-15	設定睡眠延遲時間(s)	0.0~25.5	0.0	
09-16	喚醒開始頻率 (Hz)	0.00~400.00	0.00	
09-17	喚醒延遲時間(s)	0.0~25.5	0.0	

10- 輔助功能組

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
10-00	擴充卡類型		預留	
10-01	反轉指令	0：反轉指令有效 1：反轉指令無效	0	
10-02	按鍵面板 運轉中頻率修改	0：運轉中，面板上下鍵設定頻率按 “Enter” 鍵後變更 1：運轉中，面板上下鍵設定頻率可變更速度	0	
10-03	載波頻率	1~15	5	*6
10-04	載波模式選擇	0：載波模式 0 三相調變 1：載波模式 1 兩相調變 2：載波模式 2 兩相隨機調變 3：載波模式 3 隨機載波頻率調變 4：載波模式 4 雙隨機調變	1	
10-05	加速時間 2 (秒)	0.1~3600.0	10.0	*1
10-06	減速時間 2 (秒)	0.1~3600.0	10.0	*1
10-07	第一段加速 S 曲線(秒)	0.0~4.0	0.2	
10-08	第二段加速 S 曲線(秒)	0.0~4.0	0.2	
10-09	第三段減速 S 曲線(秒)	0.0~4.0	0.2	
10-10	第四段減速 S 曲線(秒)	0.0~4.0	0.2	
10-11	跳躍頻率 1 (Hz)	0.00~400.00	0.00	*1
10-12	跳躍頻率 2 (Hz)	0.00~400.00	0.00	*1
10-13	跳躍頻率 3 (Hz)	0.00~400.00	0.00	*1
10-14	跳躍頻率範圍(± Hz)	0.00~30.00	0.00	*1
10-15	載波頻率隨溫度降低選擇	0: 載波頻率隨溫度降低無效 1: 載波頻率隨溫度降低有效	0	

11- 面板顯示組

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
11-00	顯示模式	xxxx0：不顯示馬達輸出電流 xxxx1：顯示馬達輸出電流 xxx0x：不顯示馬達輸出電壓 xxx1x：顯示輸出馬達電壓 xx0xx：不顯示變頻器直流電壓 xx1xx：顯示變頻器直流電壓 x0xxx：不顯示散熱片溫度 x1xxx：顯示散熱片溫度 0xxxx：不顯示 PID 回饋 1xxxx：顯示 PID 回饋	00000	*1
11-01	線速度顯示	0 - 65535	1500/ 1800	*1
11-02	線速度顯示模式	0：顯示變頻器輸出頻率 1：以整數顯示線速度(xxxxx) 2：以小數點 1 位顯示線速度(xxxx.x) 3：以小數點 2 位顯示線速度(xxx.xx) 4：以小數點 3 位顯示線速度(xx.xxx)	0	*1

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
11-03	PID 回饋最大值設定	0-999	100	*1
11-04	PID 回饋最小值設定	0-999	0	*1
11-05	PID 回饋顯示模式	0：以整數顯示回授值(XXX) 1：以小數點 1 位顯示回授值(XX.X) 2：以小數點 2 位顯示回授值(X.XX)	0	*1
11-06	PID 回饋顯示單位設定	0：xxx--（無單位） 1：xxxpb（壓力） 2：xxxfl（流量）	0	*1

12- 用戶使用參數組

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
12-00	變頻器馬力數		----	*3
12-01	軟體版本	----	----	*3
12-02	故障記錄		----	*3
12-03	累計工作時間設定 1(小時)	0~23	----	*3
12-04	累計工作時間設定 2(天)	0~65535	----	*3
12-05	累計工作時間選擇	0：通電時累計時間 1：運轉時累計時間	0	*3
12-06	恢復出廠設定	1150：將參數恢復為出廠值（50hz） 1160：將參數恢復為出廠值（60hz）	----	
12-07	參數鎖定	0：頻率參數可讀可寫 1：除參數 3-01~3-16 以外可讀可寫 2：除參數 3-01~3-16 以外可讀不可寫 3：所有參數可讀不可寫	0	
12-08	參數密碼	00000~65535	00000	
12-09	複製模組	-----	預留	

13- 自動程式運轉參數組

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
13-00	自動程式運轉模式選擇	0：自動程式運轉無效 1：執行單一週期之自動運轉模式，停止後會由停止前的速度起，繼續運轉 2：連續迴圈週期之自動運轉模式，停止後會由停止前的速度起，繼續運轉 3：單一週期結束後，以最後一段運轉速度繼續運轉；停止後會由停止前的速度繼續運轉 4：執行單一週期之自動運轉模式，停止後會從第一段速起，開始運轉 5：連續迴圈週期之自動運轉模式，停止後會從第一段速起，開始運轉 6：單一週期結束後，以最後一段運轉速度繼續運轉；停止後會從第一段速開始運轉	0	
13-01	第 1 段速頻率設定（Hz）	0.00~400.00		*1
13-02	第 2 段速頻率設定（Hz）			
13-03	第 3 段速頻率設定（Hz）			
13-04	第 4 段速頻率設定（Hz）			

功能代碼	功 能 說 明	設 定 範 圍	出廠設定	備 註
13-05	第 5 段速頻率設定 (Hz)		0.00	
13-06	第 6 段速頻率設定 (Hz)			
13-07	第 7 段速頻率設定 (Hz)			
13-08	第 8 段速頻率設定 (Hz)			
13-09	第 9 段速頻率設定 (Hz)			
13-10	第 10 段速頻率設定 (Hz)			
13-11	第 11 段速頻率設定 (Hz)			
13-12	第 12 段速頻率設定 (Hz)			
13-13	第 13 段速頻率設定 (Hz)			
13-14	第 14 段速頻率設定 (Hz)			
13-15	第 15 段速頻率設定 (Hz)			
13-16	第 0 段運轉時間 (秒)	0.0~3600.0	0.0	
13-17	第 1 段運轉時間 (秒)			
13-18	第 2 段運轉時間 (秒)			
13-19	第 3 段運轉時間 (秒)			
13-20	第 4 段運轉時間 (秒)			
13-21	第 5 段運轉時間 (秒)			
13-22	第 6 段運轉時間 (秒)			
13-23	第 7 段運轉時間 (秒)			
13-24	第 8 段運轉時間 (秒)			
13-25	第 9 段運轉時間 (秒)			
13-26	第 10 段運轉時間 (秒)			
13-27	第 11 段運轉時間 (秒)			
13-28	第 12 段運轉時間 (秒)			
13-29	第 13 段運轉時間 (秒)			
13-30	第 14 段運轉時間 (秒)			
13-31	第 15 段運轉時間 (秒)			
13-32	第 0 段運轉轉向選擇	0：停止 1：正轉 2：反轉	0	
13-33	第 1 段運轉轉向選擇			
13-34	第 2 段運轉轉向選擇			
13-35	第 3 段運轉轉向選擇			
13-36	第 4 段運轉轉向選擇			
13-37	第 5 段運轉轉向選擇			
13-38	第 6 段運轉轉向選擇			
13-39	第 7 段運轉轉向選擇			
13-40	第 8 段運轉轉向選擇			
13-41	第 9 段運轉轉向選擇			
13-42	第 10 段運轉轉向選擇			
13-43	第 11 段運轉轉向選擇			
13-44	第 12 段運轉轉向選擇			
13-45	第 13 段運轉轉向選擇			
13-46	第 14 段運轉轉向選擇			
13-47	第 15 段運轉轉向選擇			

※註：

- *1 表示參數在運轉中可修改
- *2 表示此參數在通訊中不可修改
- *3 作出廠設定時，此參數不會改變
- *4 參數在重置模式下會被改變（詳見附錄說明）
- *5 僅限用 V/F 控制模式
- *6 4020~4075 機種，參數 4-10 出廠設是 5s，
參數 7-01~7-03 出廠設是 130（變頻器額定電流 200%），參數 4-10 出廠設是 10K。
（軟體 V2.0（含）以上）

2.4 參數功能說明

參數群組 0- 基本功能組

00-00 控制模式

- =0：V/F 模式
- =1：向量模式

請依據負載特性來選擇最適合的向量控制或 V/F 控制模式：

- 1) 選擇 V/F 控制模式時，可依負載需要設定參數群組 5，利用 00-01 選擇固定 V/F 曲線或自定義 1 條任意曲線。
- 2) 用於普通負載或轉矩急速改變的場合，請選用向量模式(一般模式)。

00-01 V/F 曲線選擇 = 0 ~ 18

00-01 設定為 0~17 為 17 條固定曲線，

設定為 18 時，可搭配 05-04~05-09 作任意 V/F 曲線設定，參見 5 群組說明。

00-02 預留

註：請勿設定

00-03 主運轉命令來源選擇

- =0：按鍵面板
- =1：外部端子
- =2：通訊控制
- =3：擴充卡（預留）

00-04 副運轉命令來源選擇

- =0：按鍵面板
- =1：外部端子
- =2：通訊控制
- =3：擴充卡（預留）

- 1) 當 00-03/00-04=0 時，變頻器為按鍵面板運轉控制。
- 2) 當 00-03/00-04=1 時，變頻器為外部端子運轉控制時，可按面板上的 Stop 鍵做緊急停止(參考 04-02 說明)註：00-03/00-04=1 時，請參考 04-03，04-04，04-06，04-07 的參數說明，以確保人員及機器安全。
- 3) 當 00-03/00-04=2 時，變頻器為通訊運轉控制。
- 4) 當 00-03/00-04=3 時，變頻器為擴充卡模組運轉控制。
- 5) 當參數群 01-00~01-05 的設定值為 13（主/副運轉信號切換）時，若多功能輸入接點關斷，則運轉命令由 00-03 所設定的運轉命令控制，如多功能輸入接點導通，則頻率由 00-04 所設定的運轉命令來源控制

00-05 主頻率命令來源選擇

- =0：按鍵面板上下鍵設定頻率
- =1：按鍵面板旋鈕設定頻率
- =2：外部 AI1 類比輸入信號設定頻率
- =3：外部 Up/Down 增減設定頻率
- =4：通訊設定頻率

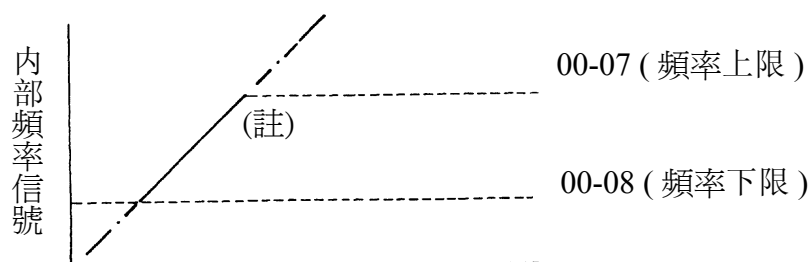
00-06 副頻率指令來源選擇

- =0：按鍵面板上下鍵設定頻率
- =1：按鍵面板旋鈕設定頻率
- =2：外部 AI1 類比輸入信號設定頻率
- =3：外部 Up/Down 增減設定頻率
- =4：通訊設定頻率

- 1)增/減頻率端子的用法，請參考參數群 01-00~01-05 (多功能輸入端子)說明。
- 2)頻率命令優先權為 寸動 > 段速 > (按鍵面板上的▲▼鍵或 TM2 的增/減頻率鍵或通訊時設定頻率)
- 3)當參數群 01-00~01-05 的設定值為 17 (主/副頻率換)時，若多功能輸入接點關斷，則主頻率由 00-05 所設定的頻率來源設定，若多功能輸入接點導通，則主頻率由 00-06 所設定的頻率設定。

00-07 頻率上限(Hz) =0.01~400.00

00-08 頻率下限(Hz) =0.00~399.99



- ※註：若 00-08 = 0 Hz，且頻率指令等於 0 Hz，則變頻器零速停止。
 若 00-08 > 0 Hz，且頻率指令 ≤ 00-08，則變頻器以 00-08 的設定值輸出。

00-09 加速時間 1 (S) =0.1~3600.0

00-10 減速時間 1 (S) =0.1~3600.0

- 1)00-09 是對應 0Hz 加速到額定頻率 (06-04) 的時間，00-10 是對應額定頻率 (06-04) 減速到 0Hz 的時間，一般設定頻率的加減速時間計算公式如下：

$$\text{加速到設定頻率的時間} = \frac{00-09 \text{ (或 } 10-05) \times \text{設定頻率}}{06-04}$$

$$\text{減速到設定頻率的時間} = \frac{00-10 \text{ (或 } 10-06) \times \text{設定頻率}}{06-04}$$

- 2)當 01-00~01-05 設定為 08 (加減速時間切替 2)，可由外部輸入端子的導通與否來選擇第一段加速/減速時間或第二段加速/減速時間。
- 3)當 01-00~01-05 設定為 06/07 (寸動)，可由外部輸入端子的導通與否來選擇寸動運轉，此時變頻器以寸動加速時間/寸動減速時間作加減速動作。
其設定如下：

設定值	功能	加速/減速時間 1 (00-09/0-10)	加速/減速時間 2 (10-05/10-06)	寸動加減速時間 (00-13/00-14)
		00-05/00-06 決定輸出頻率	00-05/00-06 決定輸出頻率	運轉 00-12 寸動頻率
01-00~01-05=06/07 寸動指令		Off	Off	On
01-00~01-05=08 加減速時間切換		Off	On	Off

00-11 外部端子運轉模式

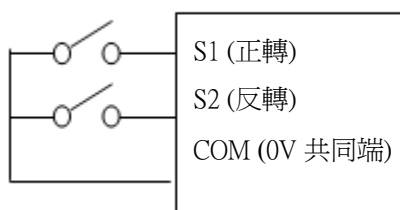
=0：正轉/停止-反轉/停止

=1：運轉/停止-正轉/反轉

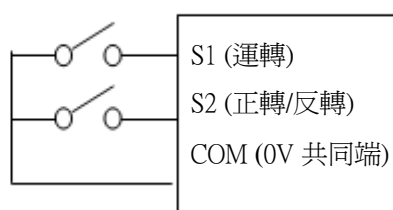
=2：3 線制運轉/停止

- 1) 00-03/00-04 = 1 (外部端子控制)時，00-11 才有效。
 - 2) 00-03/00-04 = 1 (外部端子控制)時，可以按面板上的 Stop 鍵作緊急停止(參考 04-02)。
 - 3) 若正轉-反轉指令同時 ON，視為停機。
 - 4) 00-11=0 時，外部端子代碼範圍中，0：正轉/停止，1：反轉/停止
 - 5) 00-11=1 時，外部端子代碼範圍中，0：運轉/停止，1：正轉/反轉
- 以下以 S1,S2,S3 為例說明外控方式接線，參數設定 1-01(S1)=0, 1-02(S2)=1

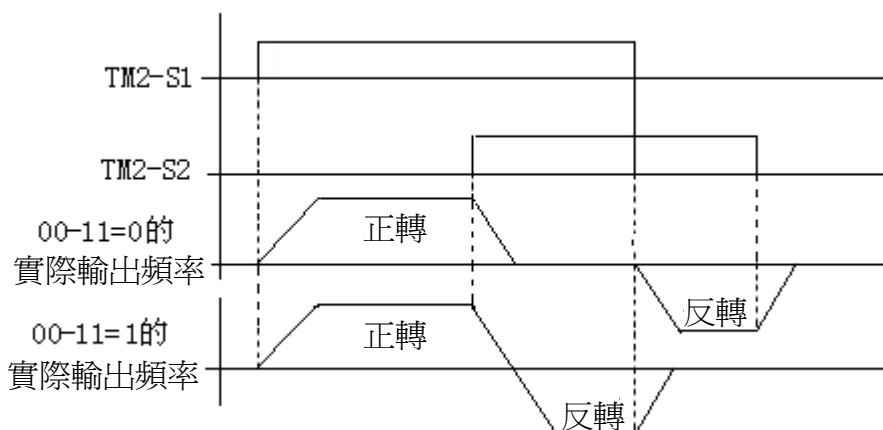
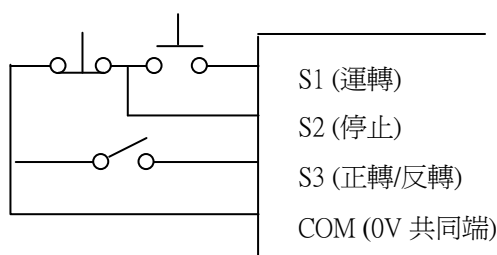
1.參數 00-11 = 0，控制方式如下：

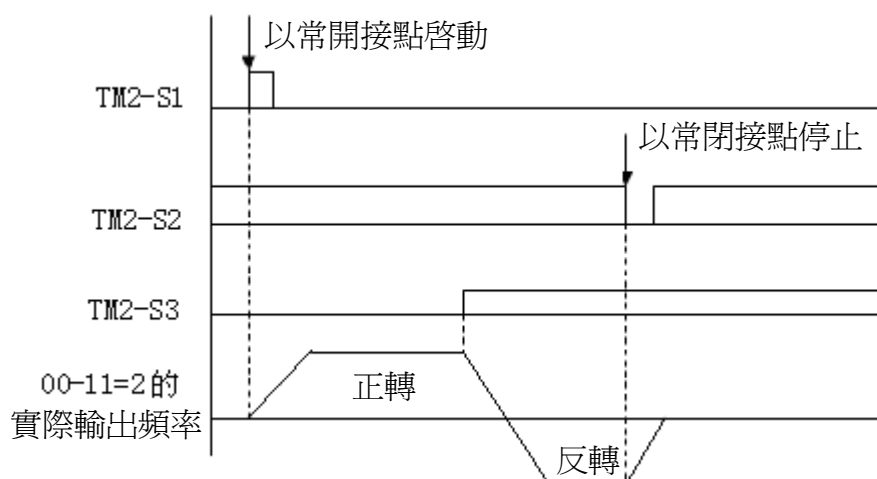


2.參數 00-11 = 1，控制方式如下：



3.參數 00-11 = 2，控制方式如下：





※註：1.設定 3 線制控制模式後，端子 S1、S2、S3 不受參數 01-00、1-01、1-02 控制
 2. 10-01=1 時，反轉命令無效。(※上圖為線控制時序圖)

00-12 寸動頻率(Hz) =1.00~25.00

00-13 寸動加速時間 (S) =0.1~25.5

00-14 寸動減速時間 (S) =0.1~25.5

寸動功能實現需設定外部任意 2 個端子分別為寸動正轉、寸動反轉功能.

例：1-00(S1)=6，1-01(S2)=7

參數群組 1- 外部端子數值功能組

多功能輸入接點(TM2 的 S1~S6 端子)功能選擇：

01-00~05 =0：正轉/停止
 =1：反轉/停止
 =2：多段速設定 0(3-02)
 =3：多段速設定 1(3-03)
 =4：多段速設定 2(3-05)
 =5：多段速設定 3(3-09)
 =6：寸動正轉指令
 =7：寸動反轉指令
 =8：加/減速時間 2
 =9：緊急停止(減速到零停止)
 =10：遮斷停止(自由運轉停止)
 =11：Speed Search
 =12：節能運轉(V/F)
 =13：主/副運轉信號切換
 =14：加/減速禁止
 =15：Up 增頻率指令
 =16：Down 減頻率指令
 =17：主/副頻率切換
 =18：PID 功能禁止
 =19：PID 積分器復歸
 =20：故障復歸(Reset)
 =21：電源電壓偵測電能回升功能
 =22：自動程式控制

1) 端子台(TM2)端子 S1~S6 為多功能輸入點，共可設成上述的 23 種功能。

2) 01-00~05 的功能說明如下：

A.01-00~05=0/1(正轉/反轉/停止)

正轉指令 ON 時同正轉指令，關斷時不動作，01-00 出廠設定為正轉指令

反轉指令 ON 時同反轉指令，關斷時不動作，01-01 出廠設定為反轉指令。

B.01-00~05=2/3/4/5(多段速 1/2/4/8)

由 01-00~01-05 中 4 個端子分別設定為 2/3/4/5 後各端子導通與關斷，組合出 16 段速，此 16 段速運轉時間由端子持續導通時間決定，各對應頻率參照下表。(0 為 off，1 為 on)

輸出頻率設定值 (面板頻率)	多段速端子 4 設定值=5	多段速端子 3 設定值=4	多段速端子 2 設定值=3	多段速端子 1 設定值=2
3-01 多段速 0	0	0	0	0
3-02 多段速 1	0	0	0	1
3-03 多段速 2	0	0	1	0
3-04 多段速 3	0	0	1	1
3-05 多段速 4	0	1	0	0
3-06 多段速 5	0	1	0	1

3-07 多段速 6	0	1	1	0
3-08 多段速 7	0	1	1	1
3-09 多段速 8	1	0	0	0
3-10 多段速 9	1	0	0	1
3-11 多段速 10	1	0	1	0
3-12 多段速 11	1	0	1	1
3-13 多段速 12	1	1	0	0
3-14 多段速 13	1	1	0	1
3-15 多段速 14	1	1	1	0
3-16 多段速 15	1	1	1	1

A. 01-00~05=6/7(寸動正轉/寸動反轉)

由外部輸入端子導通時，變頻器以寸動頻率運轉，寸動運轉時可設定 00-13/00-14（寸動加/減速時間），對應頻率設定 00-12。

頻率讀取的優先順序：寸動 → 段速 → 按鍵面板頻率或外部頻率信號。

B. 01-00~05=8 (加減速時間切換)

由外部輸入端子導通或關斷來選擇第一段加/減速時間或第二段加/減速時間。

C. 01-00~05=9：緊急停止(減速到 0 停止)

當外部緊急停止信號輸入後，變頻器會以第 2 段減速時間（10-06）減速停止：（不受 04-01 控制）。停止後閃爍 E.S.，待緊急停止信號脫離後，將運轉開關關斷再導通(04-01=1)或按運轉鍵(04-01=0)，變頻器才從啟動頻率重新啟動。若外部緊急停止信號在變頻器未完全停止前脫離，變頻器仍執行緊急停止命令。故障接點動作與否，則由 01-09/10 決定：01-09/10=1 外部緊急停止信號輸入後，故障接點動作。

D. 01-00~05=10：外部遮斷

當外部遮斷信號輸入後，變頻器立刻遮斷(不受 04-01 控制)，自由運轉停止並閃爍 b.b.；待外部遮斷信號無效後，變頻器會自動以 Speed Search 方式重新啟動。

E. 01-00~05=11：速度搜尋

啟動時變頻器先偵測馬達目前的轉速後，由目前速度直接加速至設定頻率。

F. 01-00~05=12：節能運轉

用於風機、水泵或一些重慣性負載，在啟動時需大扭力，但啟動完成後則只需轉速而不需大扭力，所以利用節能運轉功能調降其輸出電壓準位可達到節能運轉功效。

多功能輸入端子導通時輸出電壓會慢慢下降；當此端子關斷時，輸出電壓會慢慢回升（升至原來電壓）。

※註：節能運轉控制的電壓下降及上升速度和速度搜尋時電壓增/減頻率速度相同。

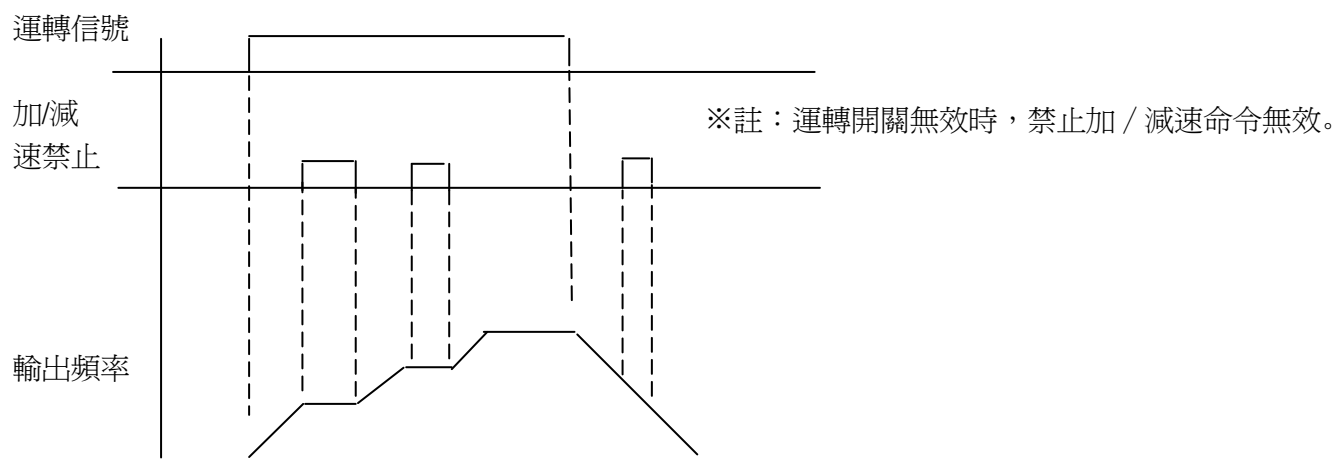
G. 01-00~05=13：主/副運轉控制信號

外部控制端子 OFF：運轉信號的控制權由 00-03 決定。

外部控制端子 ON：運轉信號的控制權由 00-04 決定。

H. 01-00~05=14：禁止加/減速

當外部控制端子導通，變頻器停止做加/減速的動作，直到此信號消失後，再繼續執行加/減速動作，其動作圖如下：



I. 01-00~05=15、16：UP（增頻率）/DOWN（減頻率）功能：

（實際加/減速時間按照加/減速時間設定）

- 1) 當使用到增/減頻率功能時，要將 00-05/00-06 設定為 3，此時無法用按鍵面板的上下鍵直接改變頻率。
- 2) 設定 01-07=0 且 01-08=0，當運轉接點動作後，變頻器加速至 03-01，之後維持定速輸出，當增/減頻率接點動作後，變頻器開始加/減速，增頻率（減頻率）信號消失後，變頻器停止加（減）速，之後維持定速輸出，當運轉信號消失後，變頻器減速停止或自由運轉停止（由 04-01 決定），並將運轉信號消失時的運轉頻率記憶在 03-01，停機中增/減頻率無效，欲修改設定頻率，需經由按鍵面板修改 03-01。
- 3) 設定 01-08=1 時，當運轉接點動作後，變頻器固定從 0Hz 運轉，增/減頻率動作方式同上述，當運轉信號消失後，變頻器減速停止或自由運轉停止（由 04-01 決定），且固定回到 0Hz，即下次再運轉時，都從 0Hz 開始輸出。
- 4) 增/減頻率信號同時動作無效。
- 5) 設 01-07≠0 時，當運轉接點動作後，變頻器加速至 03-01 之後維持定速輸出，當增/減頻率接點動作後，變頻器的設定頻率由目前 03-01±01-07，且變頻器開始加/減速到 03-01 設定頻率，但此時仍會以頻率上下限值為限制值。此刻若增/減頻率信號仍維持動作，時間超過 2 秒後，則變頻器開始加/減動作。如 01-07=0 時如同，直到增/減頻率鍵停止動作。增/減頻率的幅度可設定，請參考 01-07。

J. 01-00~05=17 主/輔頻率切換

外部控制端子 OFF：頻率信號的控制權由 00-05 決定。

外部控制端子 ON：頻率信號的控制權由 00-06 決定

K. 01-00~05=18（PID 功能禁止）

PID 功能禁止節點導通時，會停止運轉 PID 功能；關斷時依 09-00 設定的 PID 功能運轉。

L. 01-00~05=19 PID 積分器復歸

當 01-00~05=19 時，功能接點導通 PID 積分器歸 0。

M. 01-00~05=20（Reset 指令）

Reset 功能接點導通時，同時復歸 Reset 指令，關斷時不動作。

N. 01-00~05=21

電源電壓偵測電能回升功能配合 04-11 使用

O. 01-00~05=22（自動程式運轉）

自動程式運轉即一般的簡易內建 PLC 功能，當外部端子設定定為 22，當端子導通則配合 13 群組的相關設定，完成實現自動程式運轉功能，參見 13 群組。

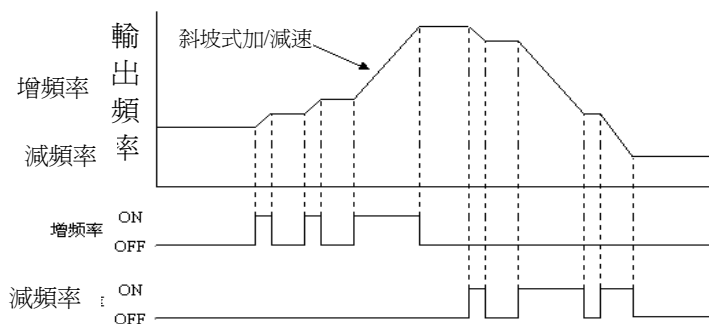
數位輸入訊號掃描次數：**01-06 S1~S6 信號確認掃描時間 1~200(mSecx2)**

- 1) 變頻器的 CPU 晶片對 TM2 端子進行掃描時，如連續有 N 次(即掃描次數)相同訊號輸入，則變頻器將此訊號視為正常的執行訊號，若少於 N 次，則視為雜訊。
- 2) 一次掃描時間為 2ms。
- 3) 使用者可根據使用環境的雜訊影響程度，決定掃描的間隔時間，當雜訊嚴重時，將 01-06 調高，但此時反應速度會變慢。

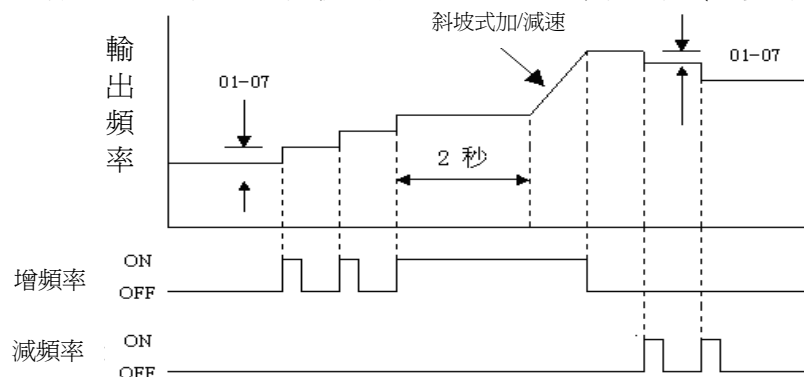
01-07 UP/DOWN 頻率幅寬設定(Hz) 0.00~5.00

分為以下兩種模式運作

- 1) 若 01-07 = 0.00 則 RUN 機時按照控制器內固定的運作方式進行，增頻率端子導通時頻率上升，減頻率端子導通時頻率下降！(請參考下圖)



- 2) 若 01-07 = 0.01~5.00 時，增／減頻率端子導通一次，即增／減頻率為 01-07 所設定的頻率，若按鍵導通時間超過 2 秒，即恢復固定的增／減頻率模式。(請參考以下)



使用多功能端子實現增/減頻率功能，停止方式設定：

01-08 up/down 頻率保持選擇

- =0：當使用增/減頻率指令時，變頻器停止運轉時，設定的頻率將被保持。
- =1：當使用增/減頻率指令時，變頻器停止運轉時，設定頻率將被歸至 0Hz。
- =2：當使用增/減頻率指令時，變頻器停止運轉時，設定的頻率將被保持，
停機時增頻率或減頻率功能有效。

- 1) 設定 01-08=0 時，當運轉接點動作後，變頻器加速至 03-01 之後維持恒速運轉，當增/減頻率接點動作後，變頻器開始加/減速，增/減頻率信號消失後，變頻器停止加/減速，之後維持定速輸出，當運轉信號消失後，變頻器減速停止或立刻停止輸出（04-01 決定），並將運轉信號消失時的運轉頻率記憶在 03-01，停機時，增／減頻率鍵無效，欲修改設定頻率，需經由按鍵面板修改 03-01；但 01-08=2 時，停機時，增／減頻率鍵有效。
- 2) 設定 01-08=1 時，當運轉接點動作後，變頻器固定從 0Hz 運轉，增／減頻率鍵動作方式同上所述，當運轉信號消失後，變頻器減速停止或立刻停止輸出（由 04-01 決定），且固定回到 0Hz，即下次再運轉時，都從 0Hz 開始輸出。

多功能輸出接點控制：

01-09 繼電器 RY1

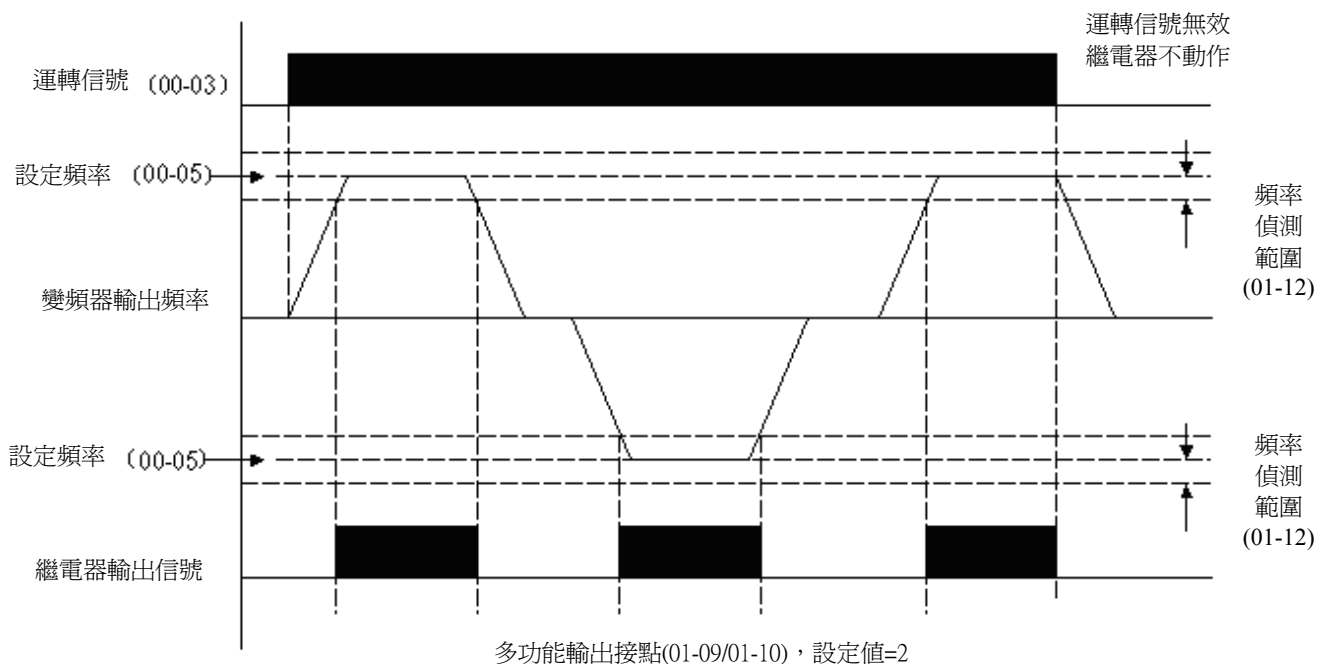
01-10 開集電極輸出 TR1

- =0: 運轉中
- =1：故障接點
- =2：頻率到達
- =3：任意頻率一致(01-11±01-12)
- =4：頻率檢出 1 (>1-11)
- =5：頻率檢出 2 (<1-11)
- =6：自動再啟動
- =7：瞬停動作
- =8：緊急停止
- =9：遮斷停止
- =10：馬達過載保護(OL1)
- =11：變頻器過載保護(OL2)
- =12：轉矩回饋(OL3)
- =13：PID 回饋信號斷線
- =14：電流到達

01-11 頻率到達輸出設定值 =0.00~400.00Hz

01-12 頻率輸出偵測範圍 (Hz) =0.00~30.00Hz

- A. 01-09/10=0 時，當變頻器開始運轉，則繼電器輸出。
- B. 01-09/10=1 時，當變頻器出現故障時，繼電器輸出。

C. $1-09/10=2$ ：頻率到達(頻率命令 $\pm 01-12$)D. $01-09/10=3$ ：任意頻率一致 $F_{out} = 01-11 \pm 01-12$

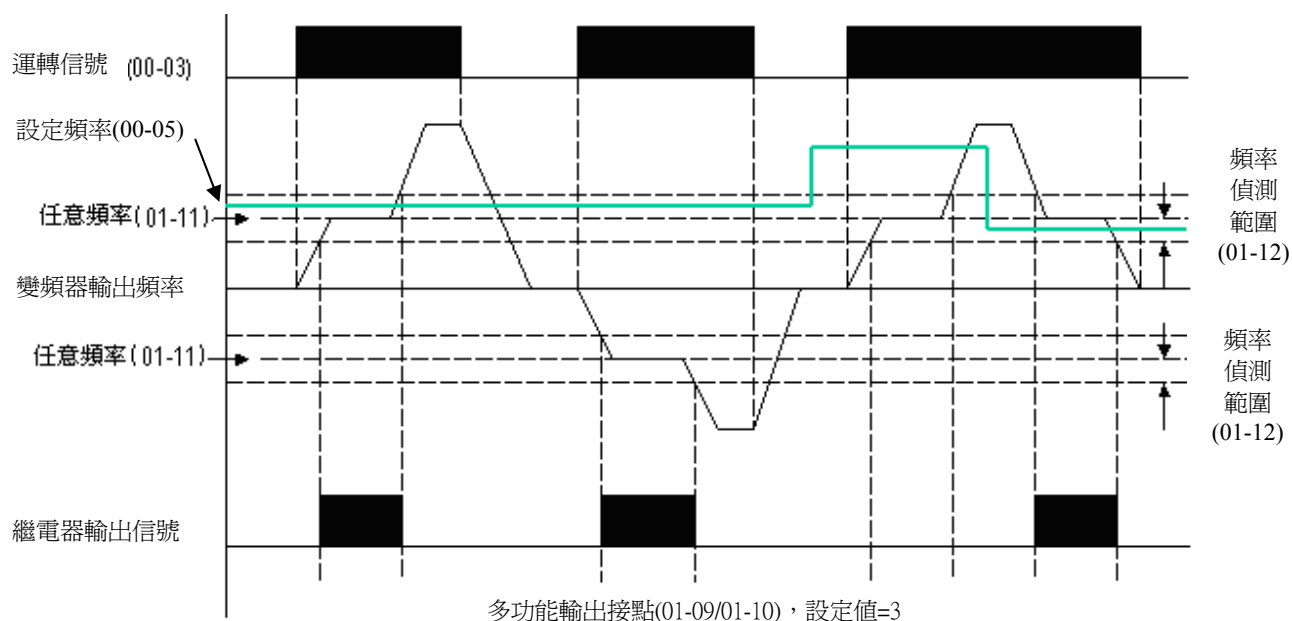
運轉頻率到任意頻率(01-11+01-12)

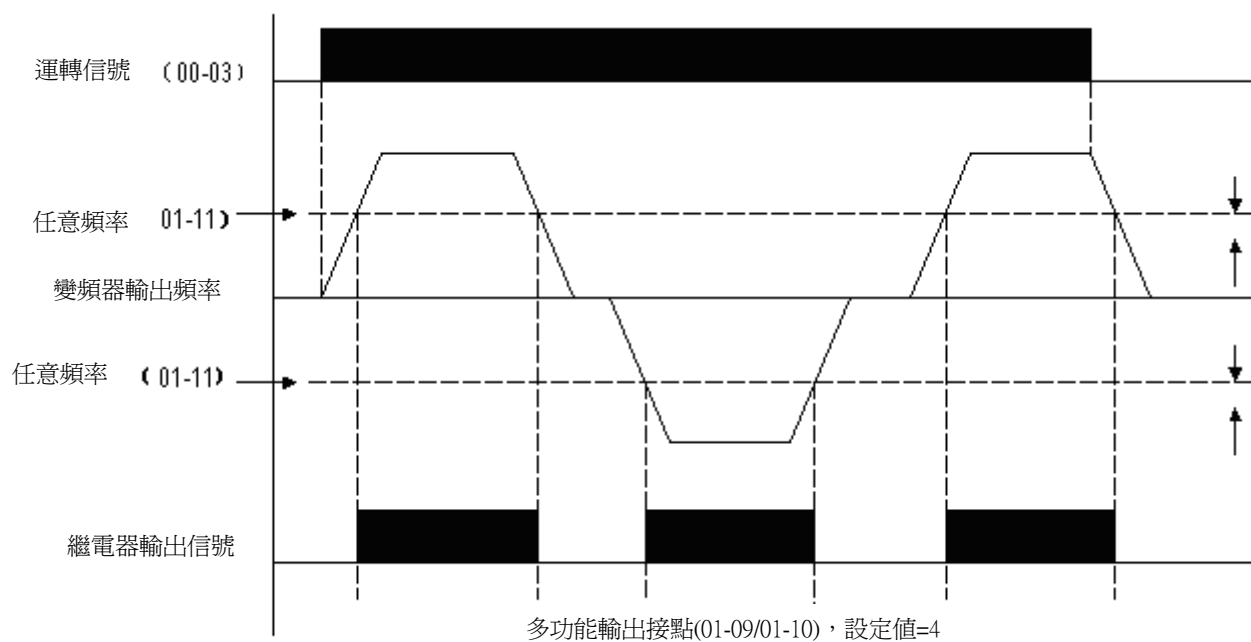
動作條件：

A. 輸出頻率-頻率指令(00-05)頻率檢出範圍(01-12)

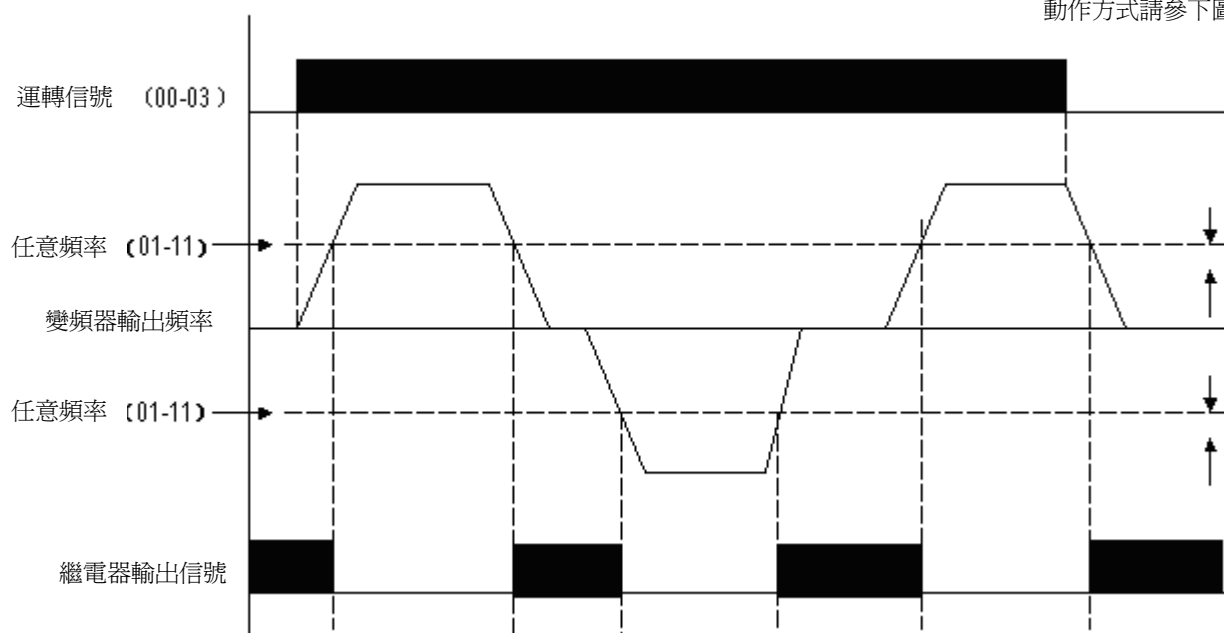
B. 輸出頻率-頻率指令(01-11)頻率檢出範圍(01-12)

運轉信號無效或
設定頻率不一致
繼電器不動作

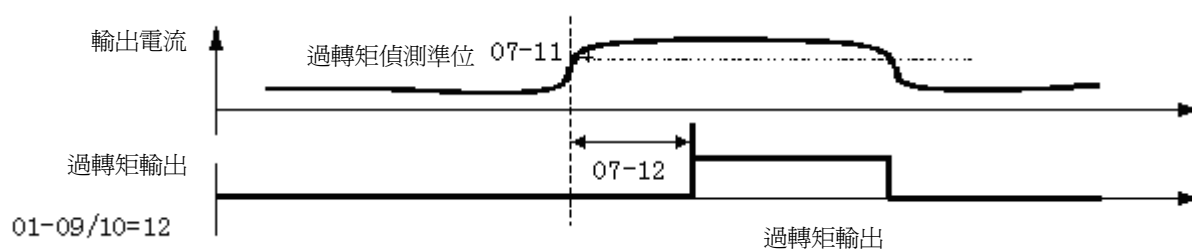


E. 01-09/10 = 4 : 頻率檢出 $F_{out} > 01-11$ F. 01-09/10 = 5 : 頻率檢出 $F_{out} < 01-11$

運轉信號無效時，繼電器也會動作
動作方式請參下圖



01-09/10=12:



01-13 S1~S5 常開常閉選擇

xxxx0 : S1 常開接點	xxxx1 : S1 常閉接點
xxx0x : S2 常開接點	xxx1x : S2 常閉接點
xx0xx : S3 常開接點	xx1xx : S3 常閉接點
x0xxx : S4 常開接點	x1xxx : S4 常閉接點
0xxxx : S5 常開接點	1xxxx : S5 常閉接點

01-14 S6 常開常閉選擇

xxxx0 : S6 常開
xxxx1 : S6 常閉

一般外部端子在使用時，要接開關，開關的種類有所不同，有常閉開關和常開開關，在選用時要注意，因為兩種開關工作狀態不一樣，若不注意會造成不必要的損害。此參數是決定需要常開開關，還是常閉開關輸入。

01-13 的每個位代表如下：

01-13= 0 0 0 0 0

s5 s4 s3 s2 s1

0：代表接常開開關

1：代表接常閉開關

有用戶選擇需要的開關輸入種類

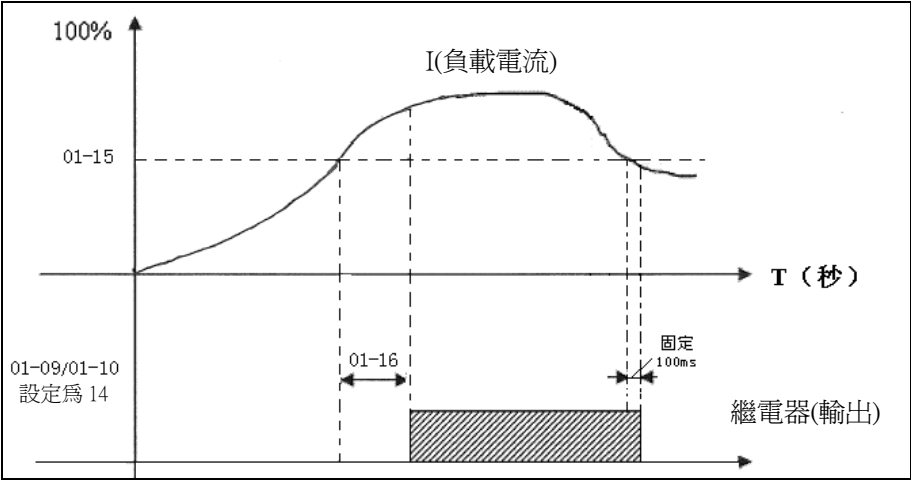
例：需要 S1、S2 接常閉開關，則設定 01-13=00011。

註：在設定端子接常開開關還是常閉開關之前，不要設定運轉命令來自外部端子，否則會造成不必要的傷害。

01-15 電流到達準位 (A) =0.1~500.0

01-16 電流到達檢測延遲時間(s) =0.1~10.0

- 1) 01-09/01-10 設定為 14 時：當輸出電流> 01-15 時，繼電器動作。
- 2) 01-15：設定值 (0.1~500.0)依據馬達額定電流(06-01)
- 3) 01-16：設定值 (0.1~10.0)單位秒，另外繼電器信號從 ON 到 OFF 延遲時間為 100ms（固定）。



參數群組 2- 外部端子類比功能組

02-00 AI1 與 AI2 信號種類

- =0 : AI1 為 0~10V (0~20mA) , AI2 為 0~10V (0~20mA)
- =1 : AI1 為 0~10V (0~20mA) , AI2 為 2~10V (4~20mA)
- =2 : AI1 為 2~10V (4~20mA) , AI2 為 0~10V (0~20mA)
- =3 : AI1 為 2~10V (4~20mA) , AI2 為 2~10V (4~20mA)

02-00 : AI1 與 AI2 信號種類 (由 SW1/ SW2 決定 V 或 I 信號)

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

$$F(hz) = \frac{I(mA)}{20(mA)} \times (00 - 07), SW1 = I \text{ 電流輸入模式}$$

$$F(hz) = \frac{V(v)}{10(v)} \times (00 - 07), SW1 = V \text{ 電壓輸入模式}$$

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

$$F(hz) = \frac{I-4(mA)}{20-4(mA)} \times (00 - 07), I \geq 4; SW2 = I \text{ 電流輸入模式, 或 } F=0, I < 4$$

$$F(hz) = \frac{V-2(v)}{10-2(v)} \times (00 - 07), V \geq 4; SW2 = V \text{ 電壓輸入模式, 或 } F=0, V < 2$$

02-01 AI1 信號掃描濾波時間=1~200 (× 2mSec)

02-02 AI1 增益值(%)=0~1000

02-03 AI1 偏置值(%)=0~100

02-04 AI1 偏置值正負選擇 : =0:正向 =1:負向

02-05 AI1 信號方向控制選擇 : =0:正向 =1:負向

註：請參考AI1及AI2 (AI2偏差信號輸入模式) 的信號操作模式說明

02-06 AI2 功能選擇

=0 : PID 回饋信號 (端子 AI2)

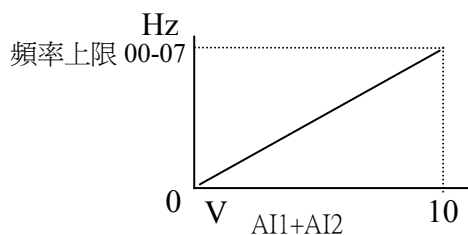
=1 : AI2 偏差信號輸入 (端子 AI2)

1) 02-06=0 (PID 回饋輸入點)

類比接點 AI2 設定為 0 後為 PID 功能回饋輸入點，此時依 09-00 設定的 PID 功能運轉，可接受 0~10V (0~20 mA) 或 2~10V (4~20mA) 的信號。

2) 02-06=1 (偏差信號輸入)

為按鍵面板上的電位器或 AI1 類比輸入的偏移量調整，只能接受 0~10V (0~20 mA) 或 2~10V (4~20mA) 信號。



02-07 AI2 信號掃描濾波時間	=1~200 (× 2mSec)
02-08 AI2 增益值(%)	=0~1000
02-09 AI2 偏置值(%)	= 0~100
02-10 AI2 偏置值正負選擇	=0:正向 = 1:負向
02-11 AI2 信號方向控制選擇	= 0:正向 = 1:負向

註：除 02-08 以外 2-7~2-11 只有在 2-6=1 時才有效，根據下圖所示設定相關參數

下面為AI1及AI2（PID回饋信號）的信號操作模式說明

1 參數說明

1) 偏置值

給定信號為“0”時的對應頻率稱為偏置頻率，用百分數 fBI%表示：

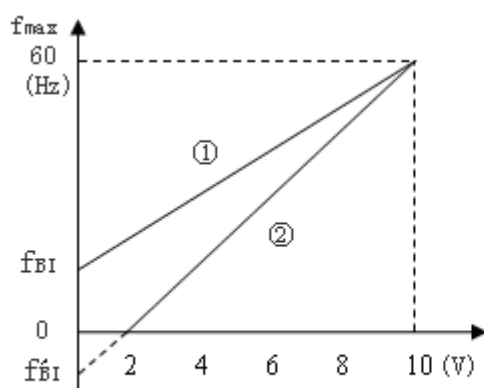


圖 1 偏置頻率值

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

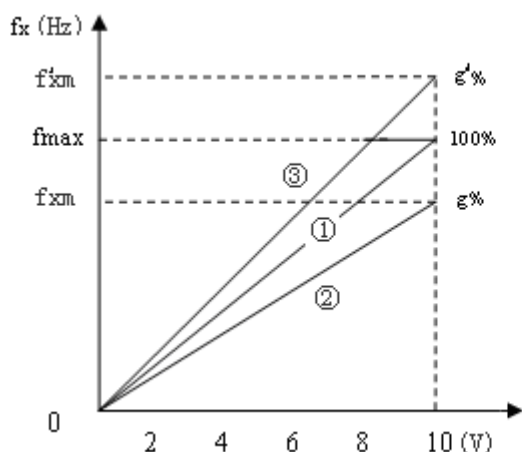
式中，fBI%：偏置頻率百分比

fBI：偏置頻率(Hz)

fMAX：變頻器輸出最大頻率(Hz)

2) 頻率增益

當給定信號為最大值 xmax 時，對應的最大給定頻率 fxm 與變頻器預置的最大輸出頻率 fmax 之比的百分數，用 g%表示：



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

式中，g%：頻率增益(%)

fmax：變頻器預設最大頻率(Hz)

fxm：虛擬的最大頻率 (Hz)

在這裏，變頻器的最大給定頻率 fxm 不一定與最大頻率 fmax 相等。

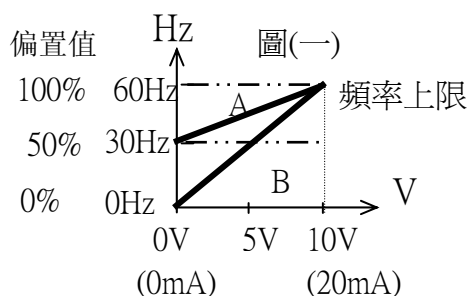
當 g %<100%時，變頻器實際輸出最大頻率就等於 fxm，如圖 2 中曲線②所示(曲線①是基本頻率給定線)

當 g %>100%時，變頻器實際輸出的最大頻率等於 fmax，如圖 2 中的曲線③所示。

2 舉例說明

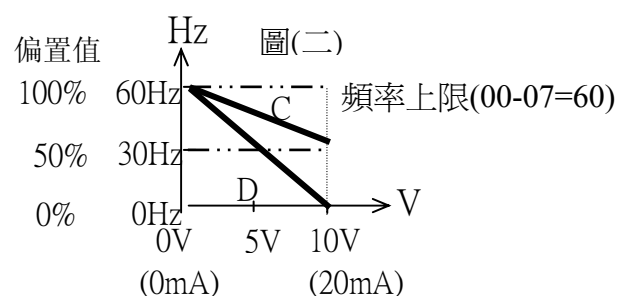
1) 圖(一)的設定如下:

	02-02 或 02-08	02-03 或 02-09	02-04 或 2-10	02-05 或 2-11	02-09
A	100%	50%	0	0	100%
B	100%	0%	0	0	100%



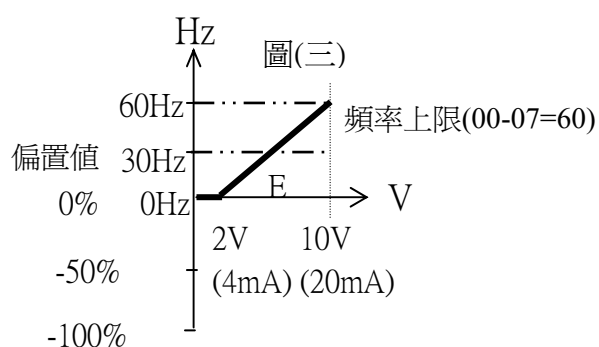
2) 圖(二)的設定如下:

	02-02 或 02-08	02-03 或 02-09	02-04 或 2-10	02-05 或 2-11	02-09
C	100%	50%	0	1	100%
D	100%	0%	0	1	100%



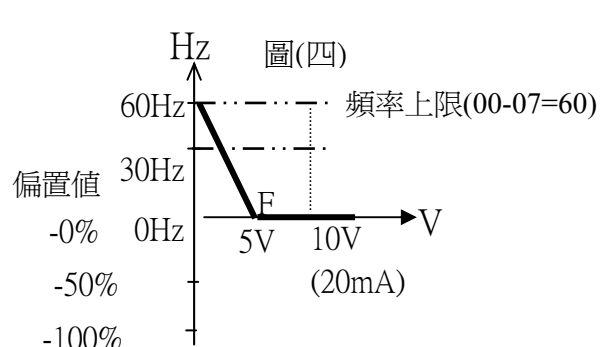
3) 圖(三)的設定如下:

	02-02 或 02-08	02-03 或 02-09	02-04 或 02-10	02-05 或 02-11	02-09
E	100%	20%	1	0	100%



4) 圖(四)的設定如下:

	02-02 或 02-08	02-03 或 02-09	02-04 或 02-10	02-05 或 02-11	02-09
F	100%	50%	1	1	100%



- 1) 變頻器每(02-01/02-07 x 2mS)讀取一次 A/D 訊號的平均值，使用者可根據使用環境的雜訊影響程度，決定，掃描的間隔時間，當雜訊嚴重時要將 02-01/02-07 調高，但此時對信號的反應速度會變慢。

02-12 類比輸出種類選擇 FM+

=0: 輸出頻率 =1: 頻率設定 =2: 輸出電壓

=3: 直流電壓 =4: 輸出電流

02-13 FM+增益值(%) =0~1000

02-14 FM+偏壓值(%) =0~100

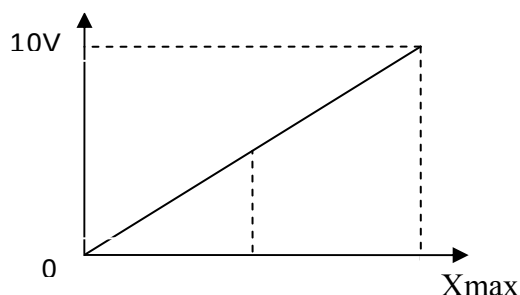
02-15 FM+偏置值正負選擇: =0:正向 =1:負向

02-16 FM+信號方向控制選擇: =0:正向 =1:負向

端子台(TM2)多功能類比輸出端子為 0~10Vdc 的類比輸出，其輸出種類由 02-12 決定，而當外部電錶或其他週邊設備有誤差時，可利用 02-13 調整。

※註：因受硬體線路限制，此輸出電壓最大為 10V，若應輸出電壓大於 10V，則仍以 10V 為輸出電壓。

1) 以下為 FM+之說明



2-12=0 輸出頻率 Xmax=上限頻率
 =1 設定頻率 =上限頻率
 =2 輸出電壓 =馬達額定電壓
 =3 直流電壓 =220V : 0~400V
 440V : 0~800V
 =4 輸出電流 =2 倍變頻器額定電流

02-13~02-16 的功能參見類比輸入部分。

參數群組 3- 多段速功能參數組

03-00 多段速之加/減速時間（面板及段速 1~15） =0：段速加減速時間統一由 00-09/10，10-05/06 設置 =1：段速加減速時間獨立設置
各段速設定頻率 03-01~03-16 多段速 0~多段速 15（Hz）：0.00~400.00
各段速加速時間 03-17~03-48 多段速 0~15 加速時間（秒）：0.1~3600.0 多段速 0~15 減速時間（秒）：0.1~3600.0

- 03-00 = 0 時，多段速之各自加/減速時間設定（面板及段速 1~15）無效
 即，面板頻率與各段速的加/減速時間均由 00-09/00-10（10-05/10-06）決定。
- 03-00 = 1 時，多段速之各自加/減速時間（面板及段速 1~15）有效
 即，面板頻率與各段速的加/減速時間搭配 03-01~03-16 來計算，
 且不由 00-09/00-10（10-05/10-06）決定。

功能說明：

- 運轉時加/減速時間計算公式：分母是以馬達額定頻率(06-04)為基準

$$\text{到達設定頻率的加速時間} = \frac{0 \text{ 群組織加速時間} \times \text{設定頻率}}{06-04}$$

$$\text{到達設定頻率的減速時間} = \frac{0 \text{ 群組織減速時間} \times \text{設定頻率}}{06-04}$$

例：06-04=50hz（馬達額定頻率），13-02=10hz（多段速），
 03-19=5s（加速時間），03-04=20s（減速時間），則

$$\text{段速 1 的實際加速時間} = \frac{03-19 \times 10(hz)}{06-04} = 1(s)$$

$$\text{段速 1 的實際減速時間} = \frac{03-20 \times 10(hz)}{06-04} = 4(s)$$

2) 當 03-00=1 時，時間設定有兩種模式

例：0-03=1（外部端子運轉），01-00=0（s1=RUN/STOP），01-01=1（s2=正轉/反轉），

01-02=2（S3=段速 1），01-03=3（S4=段速 2），01-03=4（S5=段速 4）；

模式 1：運轉指令斷續時，各段速加減速時間(a~f)計算依據方式

例： $a = \frac{(03-17) \times (03-01)}{06-04}$, $b = \frac{(03-18) \times (03-01)}{06-04}$, $c = \frac{(03-19) \times (03-02)}{06-04}$, $d = \frac{(03-20) \times (03-02)}{06-04}$ 單位(s)

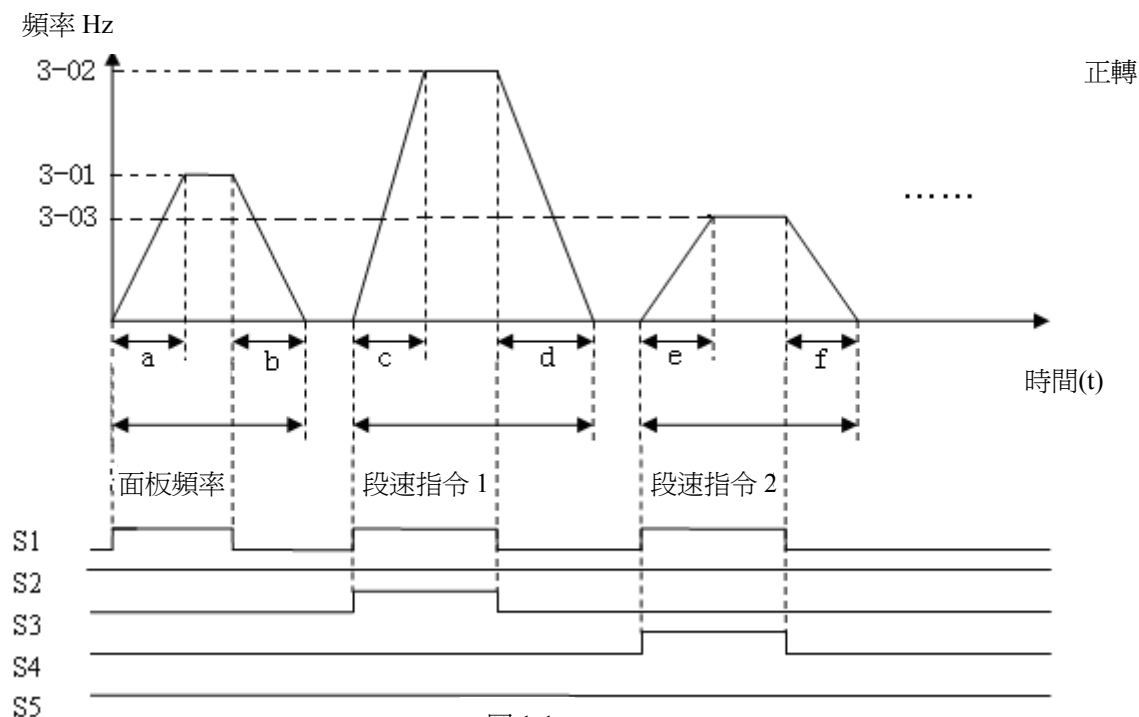


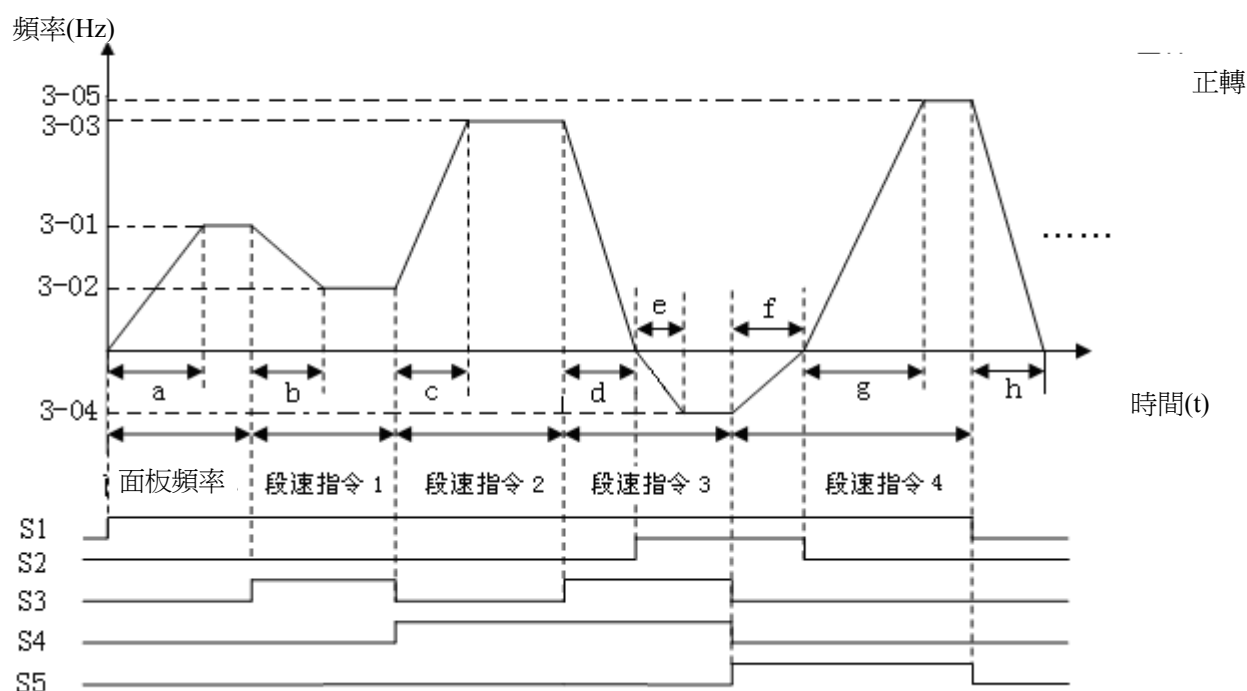
圖 1-1

模式 2：運轉指令持續時，各段速加減速時間(a~h)計算依據方式

例： $a = \frac{(03-17) \times (03-01)}{06-04}$, $b = \frac{(03-20) \times [(03-01) - (03-02)]}{06-04}$, $c = \frac{(03-21) \times [(03-03) - (03-02)]}{06-04}$

$d = \frac{(03-24) \times (03-03)}{06-04}$, $e = \frac{(03-23) \times (03-04)}{06-04}$, $f = \frac{(03-26) \times (03-04)}{06-04}$, $g = \frac{(03-25) \times (03-05)}{06-04}$,

$h = \frac{(03-26) \times (03-05)}{06-04}$ 單位(s)



參數群組 4- 啟動停止控制組

04-00 啟動方式選擇 =0：正常啟動
=1：速度搜尋

- 1) 04-00=0：啟動時變頻器從零速依設定的加速時間加速至設定頻率。
- 2) 04-00=1：啟動時變頻器先偵測馬達的轉速後，由馬達目前速度直接加速至設定頻率。

04-01 停止方式選擇 =0：減速停止(增強煞車能力)
=1：自由停止
=2：減速停止(一般煞車能力)

- 1) 04-01=0：變頻器收到停機指令後，依設定的減速時間減速到 0Hz，馬達停止。（煞車能力增強）
- 2) 04-01=1：變頻器收到停機指令後，立刻停止輸出，馬達則以其慣性自由運轉停止。
- 3) 04-01=2：變頻器收到停機指令後，依設定的減速時間減速到 0Hz，馬達停止。（煞車能力一般）

04-02 按鍵面板停止鍵 =0：停止按鈕有效
=1：停止按鈕無效

04-02=0，變頻器可由按鍵面板上的停止(STOP)鍵將變頻器停止

04-03 電網低壓瞬停再啟動
= 0：瞬停再啟動無效
= 1：瞬停再啟動有效
= 2：CPU 工作中瞬停再啟動有效(有直流電容決定)
04-04 允許瞬停時間(秒) =0.0~2.0 秒

- 1) 當同一供電系統有其他大負載啟動，會造成瞬間電源電壓下降，當電壓下降至變頻器的低電壓保護準位時，變頻器會立即停止輸出。若電源可以在 04-04 所設定的時間內恢復，則變頻器會以速

度搜尋方式重新起動（從跳脫頻率開始追蹤），否則變頻器會顯示“LV-C”並跳脫。

- 2) 變頻器本身允許瞬間停電時間，因機種差異而有不同，範圍從 1 秒到 2 秒。
- 3) 當 04-03=0：瞬停復電後，變頻器不會再啟動。
- 4) 當 04-03=1：若瞬停時間小於 04-04，變頻器會在復電 0.5 秒後，以速度搜尋方式重新啟動，且重新啟動次數不受限制。
- 5) 當 04-03=2：若停電時間太久，變頻器會停止運轉；當電源恢復供電後，變頻器的運轉情況是根據 00-03 及 04-05 設定情況及外部開關的狀態而決定，執行重新啟動。

※註：參數 00-03=1 且 04-05=0，當設參數 04-03=1 或 2 時，在長時間停電後，要將電源開關及運轉開關關斷，以避免突然復電後，對機器或人員造成危害。

**04-05 自動復歸再啟動方式 =0：速度搜尋
=1：正常啟動**

- 1) 4-05=0：自動復歸再啟動時變頻器先偵測馬達的轉速後，由馬達目前速度直接加速至設定頻率。
- 2) 4-05=1：自動復歸再啟動時變頻器從零速依設定的加速時間加速至設定頻率。

**04-06 自動復歸再啟動時間 (S) = 0~800.0 秒
04-07 自動復歸再啟動次數 = 0~10 次**

- 1) 當 04-07=0：變頻器故障跳脫後，無法自動復歸再啟動。
- 2) 當 04-07>0，04-06=0：變頻器會在故障跳脫 0.5 秒後自動復歸，會以速度搜尋方式將輸出由慣性運轉，拉至跳脫前的運轉頻率，之後再加速或減速至目前的設定頻率。
- 3) 當 04-07>0，04-06>0：變頻器會在故障跳脫後，停止輸出一段時間（時間長短由 04-06 決定），之後以速度搜尋方式重新加速至目前的設定頻率。
- 4) 當變頻器處於減速停車及直流煞車狀態時，不執行異常再啟動動作。

**04-08 復歸模式設定 = 0：當 RUN 指令無效時，復歸指令無效
= 1：復歸指令與 RUN 指令狀態無關**

04-08=0 當變頻器故障檢出後，需先將運轉開關關斷，才能執行復歸，否則無法再啟動。

**04-09 開機後直接啟動 =0：外部運轉命令有效時，送電後直接啟動
=1：外部運轉命令有效時，送電後不可直接啟動**

⚠ 危險：

- 1) 04-09=0 且變頻器設定外部運轉（00-03/00-04=1）時，若電源投入時，運轉開關導通，則變頻器會自動啟動，建議客戶在停電時，將電源開關及運轉開關關斷，以免復電後，變頻器直接運轉對人員及機器造成危害。
- 2) 04-09=1 且變頻器設定外部運轉（00-03/00-04=1）時，若電源投入時，運轉開關導通，則無法啟動，此時閃爍 STP1，必須先將運轉開關關斷，之後再導通，才可啟動。

04-10 開機直接啟動延遲 (S) = 1.8~300.0 秒

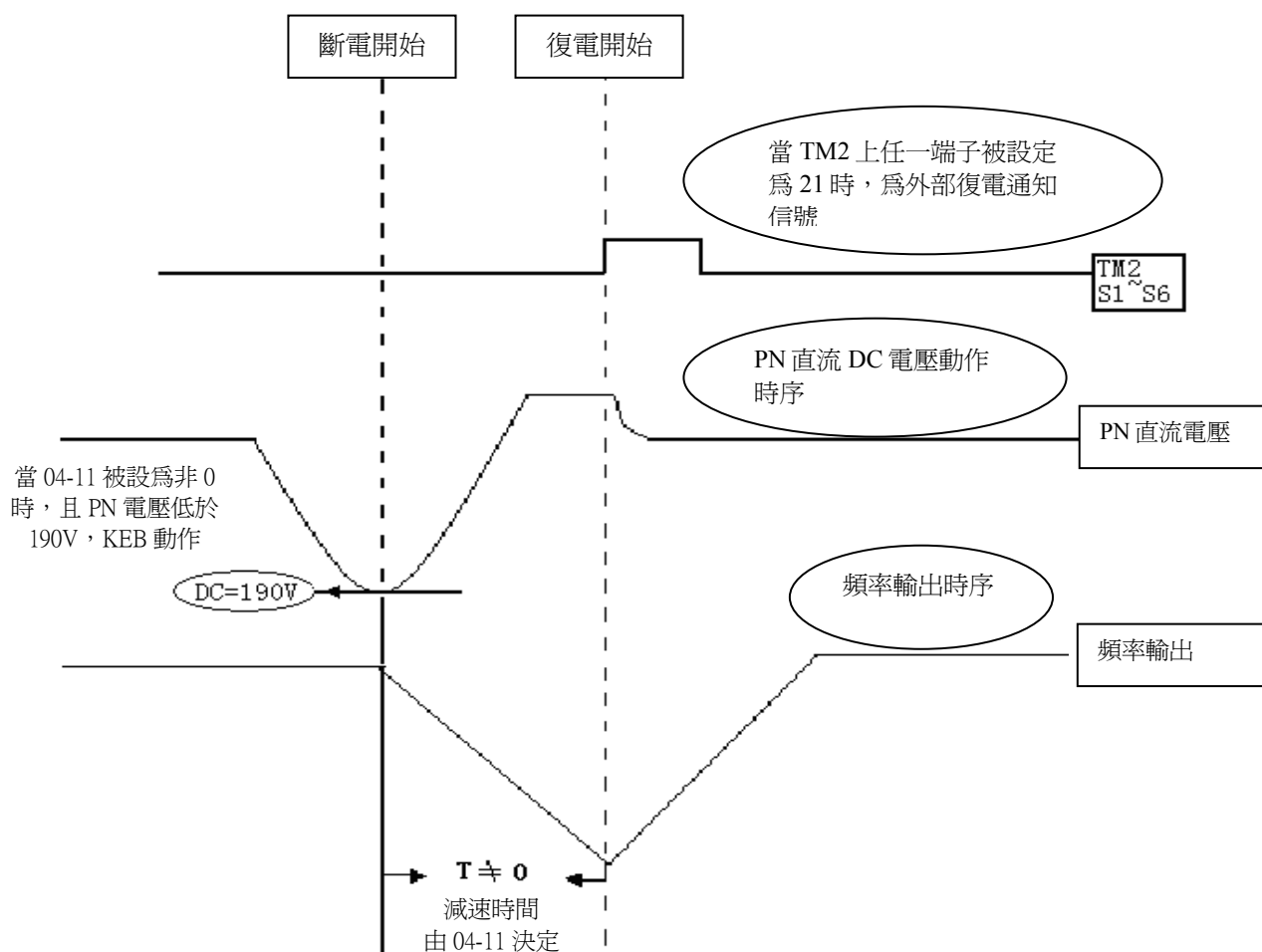
若電源投入時且 04-09=0，則變頻器會在 04-10 所設定的延遲時間後自動啟動。

**04-11 瞬停時動能回升設定(S) = 0.0：不執行瞬停時動能回升功能
= 0.1~25.0：瞬停時動能回升時間**

04-11 = 0 不執行瞬停時動能回升功能

04-11 ≠ 0 執行瞬停時動能回升功能

例：220V 產品



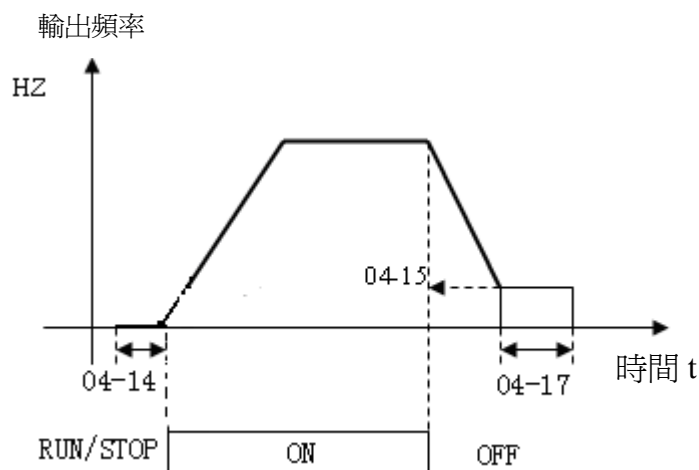
※註：

1. 當 04-11 $\neq 0$ ，瞬停再啟動時，執行瞬停動能回升功能。
2. 斷電時，當直流電壓低於 190V（220V 系列）或 380V（440V 系列），執行瞬停動能回升功能。
3. 瞬停動能回升功能執行時，當 04-11 設定減速至 0，則變頻器停止運轉。
4. 若在執行瞬停時動能回升功能時復電，變頻器會加速至斷電之前的頻率。

04-12 主迴路低電壓檢出	= 150.0~210.0 / 300.0~420.0
04-13 啟動時直流煞車準位(%)	= 0.0~150.0
04-14 啟動時直流煞車時間(S)	= 0.0~25.5

04-15 停止時直流煞車頻率(Hz)	= 0.1~10.0
04-16 停止時直流煞車準位(%)	= 0.0~150.0
04-17 停止時直流煞車時間(S)	= 0.0~25.5

04-17 / 04-15 為變頻器減速停止直流煞車的動作時間及起始頻率，如下圖所示



04-18 過勵磁增益 = 0.00~0.25

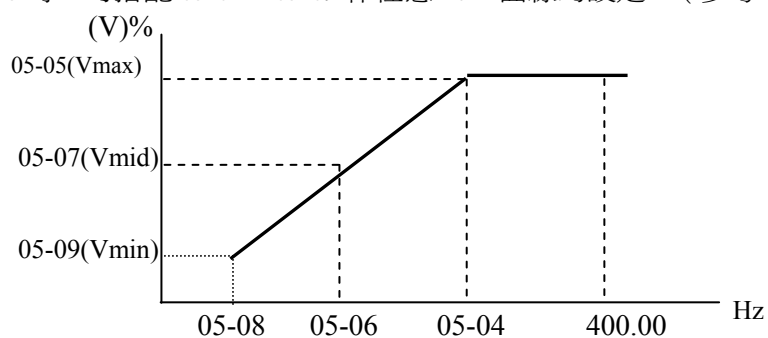
該功能配合 (04-01=0) 增強煞車功能時使用，是為了縮短減速時間，使減速中的馬達為過勵磁狀態的增益，最佳值根據馬達的電磁飽和特性而異。

參數群組 5- V/F 控制組

轉矩曲線(V/F PATTERN) 選擇

- 05-00 轉矩補償增益(V/F 曲線修正)% = 0.0~30.0
- 05-01 馬達載電流(Amps AC) -----
- 05-02 馬達額定滑差補償(%) = 0.0~100.0
- 05-03 VF 最大輸出電壓 (Vac)
- 05-04 最大輸出頻率(HZ) = 0.20~400.00
- 05-05 最大輸出頻率電壓比(%) = 0.0~100.0
- 05-06 中間輸出頻率(HZ) = 0.10~400.00
- 05-07 中間輸出頻率電壓比(%) = 0.0~100.0
- 05-08 最小輸出頻率(HZ) = 0.10~400.00
- 05-09 最小輸出頻率電壓比(%) = 0.0~100.0
- 05-10 V/F 節能運轉模式運轉 =0：無效
=1：多功能端子設為節能運轉控制端子
- 05-11 V/F 節能運轉增益(%) =0~100
- 05-12 V/F 啟動頻率 =0.00~10.00

1)00-01 設定為 18 時，可搭配 05-04~05-09 作任意 V/F 曲線的設定。(參考下圖)

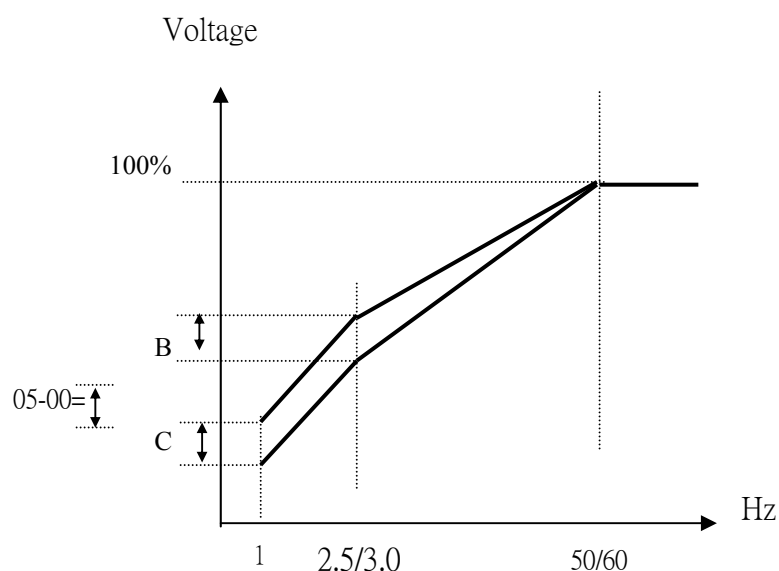


2) 00-01 = 0 - 17 為固定的 V / F 曲線（參考下表）：

規格	用途	00-01	V/F 曲線	規格	用途	00-01	V/F 曲線
50 Hz 系	一般用途	0		60	一般用途	9	
		高啓動轉矩	1				高啓動轉矩
	2		11				
	3		12				
	遞減轉矩	4		遞減轉矩	13		
		5			14		
	定出力轉矩	6		定出力轉矩	15		
		7			16		
		8			17		

00-01	B	C
0 / 9	7.5%	4.5%
1 / 10	10.0%	7.0%
2	11.0%	8.5%
3	12.0%	9.5%
4	17.5%	4.0%
5	25.0%	5.0%
11	11.0%	8.0%
12	12.0%	9.0%
13	20.5%	7.0%
14	28.5%	8.0%
6 / 15	45.0%	1.0%
7 / 16	55.0%	1.0%
8 / 17	65.0%	1.0%

- 3) 變頻器以 V/F 曲線的 B，C 點電壓（參照 00-01 說明）加上 05-00 設定值之後的 V/F 曲線輸出，來提升輸出轉矩



※註：05-00=0 時，轉矩提升功能無效

- 4) 感應馬達在運轉時，會因負載原因而造成若干程度上的滑差，補償滑差可提高速度控制的精確度。

$$\text{滑差補償頻} = \frac{\text{輸出電流} - (05-01)}{(06-01) - (05-01)} \times (05-02) \quad \begin{array}{l} \text{註：06-01=馬達額定電流} \\ \text{05-01=馬達無載電流} \end{array}$$

$$\text{05-02的概略值} = \frac{\text{馬達同步轉速} - \text{馬達額定轉速}}{\text{馬達同步轉速}} \quad \begin{array}{l} \text{參考馬達銘牌的標示} \end{array}$$

$$\text{馬達同步轉速 (RPM)} = \frac{120}{\text{馬達級數}} \times \text{馬達額定頻率 (50Hz或60Hz)}$$

$$\text{例 4：60Hz 感應馬達的同步轉} = \frac{120}{4} \times 60 = 1800 \text{ (RPM)}$$

※註：馬達無載電流（05-01），會因變頻器容量（12-00）的差異而不同（參照 06-01 註），請視實際情況調整。

參數群組 6- 馬達參數組

06-00 馬達額定電壓 (Vac)
06-01 馬達額定電流 (A)
06-02 馬達額定功率 (kW)
06-03 馬達額定轉速 (RPM)
06-04 馬達額定頻率 (Hz)
06-05 馬達參數自動調校 = 0：不執行
= 1：執行馬達參數靜態自動調校

06-06	定子電阻增益(R_s)
06-07	轉子電阻增益(R_r)
06-08	等效電感增益(l_{kg})
06-09	磁化電流增益(i_{mag})
06-10	鐵損電導增益(g_m)
06-11	低頻補償增益 0~100

- 1) 若選擇向量控制(00-00= 1)，於開機後將馬達銘牌參數設定到 06-00~06-04，再把 06-05 設定為 1，此時變頻器會對馬達執行自動參數量測功能，當面板顯示由-AT-轉變為 END 並回復到頻率顯示後，即表示馬達參數已偵測完畢，變頻器會自動將所偵測到的馬達內部參數寫入 06-06~06-10，且 06-05 會自動恢復為 0。
- 2) 每更換一次馬達，均須執行馬達參數自動參數量測。如已知馬達內部參數，可直接輸入 06-06~06-10。
- 3) 此參數群組僅對向量模式有影響。

 注意

- 1.馬達參數自動調校採用靜態調校，所以調校時馬達不會運轉，並顯示-AT-訊息。
- 2.執行馬達參數自動調校的過程中，控制迴路端子的輸入信號無效。
- 3.馬達參數自動調校開始之前，請先保證馬達處於停止狀態。
- 4.馬達參數自動調校功能只適用於向量模式(00-00=1)，不適用 V/F 模式。

參數群組 7- 保護功能組

07-00 失速防止功能

- = xxxx0：加速時失速防止有效
- = xxxx1：加速時失速防止無效
- = xxx0x：減速時失速防止有效
- = xxx1x：減速時失速防止無效
- = xx0xx：運轉中失速防止有效
- = xx1xx：運轉中失速防止無效
- = x0xxx：運轉中過電壓防止有效
- = x1xxx：運轉中過電壓防止無效

07-01 加速時失速防止準位(%) =50~200

07-02 減速時失速防止準位(%) =50~200

07-03 運轉中失速防止準位(%) =50~200

07-04 運轉過電壓防止準位 =350VDC~390VDC
= 700VDC~780VDC

- 1) 變頻器加速時，如果加速時間設定太短，造成電流過高，變頻器會自動延長加速時間，以防止變頻器過流跳脫。
- 2) 變頻器減速時，如果減速時間過短，造成直流母線電壓過高，變頻器會自動延長減速時間，以防止變頻器因“OV”跳脫。
- 3) 變頻器於運轉中如因機械特性（如沖床…）或機械的非常態性故障（如潤滑不足卡住，機械運轉不順，加工材質雜質…等）均會造成變頻器超載跳脫，此時就會造成使用者無法正常使用。所以當變頻器運轉轉矩超過 07-03 設定值時，變頻器以減速時間下降輸出頻率，待轉矩恢復正常後，再回升到正常運轉頻率。

07-05 電子電譚保護馬達 OL1

- = 0：電子繼電器保護馬達有效
- = 1：電子繼電器保護馬達無效

07-06 馬達種類選擇

- = 0：電子繼電器保護標準馬達
- = 1：電子繼電器保護專用馬達

07-07 馬達超載保護選擇

- = 0：馬達電子繼電器保護 (OL=103%)(150%，1 分鐘)
- = 1：馬達電子繼電器保護 (OL=113%)(123%，1 分鐘)

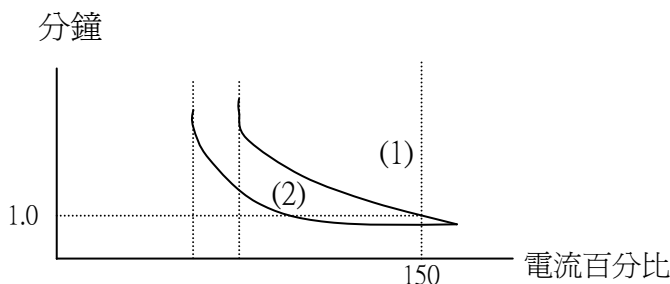
07-08 過載(OL1)保護動作啟動方式

- = 0：過載保護後停止輸出(自由運轉停止)
- = 1：過載保護後繼續運轉(僅顯示 OL1)

保護馬達的電子繼電器功能如下：

- 1) 07-07 = 0：保護一般機械負載：負載在馬達額定電流 103%以內，可連續運轉，負載在馬達額定電流 150%時，只可運轉 1 分鐘(參考下圖曲線(1))。
= 1：保護 HVAC 負載(風扇、水泵…等)：負載在額定電流 113%以內，可連續運轉，負載在馬達額定電流 123%時，只可運轉 1 分鐘。
- 2) 馬達在低速運轉時，其散熱效果會跟著下降，故電子繼電器的保護動作準位也要跟著下降（由下圖曲線(1)，變為曲線(2)）。
- 3) 07-06 = 0：請將 06-04 設定成所使用馬達的額定頻率。

- 4) 07-08 = 0：保護馬達電子繼電器動作後，變頻器會立刻遮斷，並閃爍 OL1；如需繼續運轉需以 RESET 鍵或外部復歸端子復歸後才行。
- = 1：保護馬達電子繼電器動作後，可繼續運轉，但變頻器會以閃爍方式顯示 OL1，直到電流降至 103% 或 113% (07-07 決定) 以下，OL1 的顯示才會消失。



07-09 過轉矩偵測控制(OL3)

- = 0：過轉矩偵測無效
- = 1：到達設定頻率後開始偵測
- = 2：運轉中即偵測

07-10 過轉矩保護動作選擇

- = 0：過轉矩偵測後停止輸出(自由運轉停止)
- = 1：過轉矩偵測後繼續運轉(僅顯示 OL3)

07-11 過轉矩偵測準位(%) 30~300

07-12 過轉矩偵測時間(S) 0.0~25.0

- 1) 若輸出轉矩在參數 07-12 所指定的時間內，其準位(以變頻器額定轉矩為 100%)皆超過參數 07-11 所設定的準位，稱之為過轉矩。
 - 2) 07-10= 0 時：若發生過轉矩，變頻器立刻停止運轉，並以閃爍方式顯示 OL3；欲繼續運轉，需以 RESET 鍵或外部復歸端子復歸後，方可繼續運轉。
 - = 1 時：若發生過轉矩，變頻器可繼續運轉，但會以閃爍方式顯示 OL3，直到輸出轉矩低於參數 07-11 設定值。
 - 3) 參數 01-09/10 (多功能輸出接點控制) 設定為 12 時，多功能輸出接點即為過轉矩輸出信號。
- ※ 註：過轉矩輸出信號，必須在參數 07-09=1 或 2，且準位及時間超過時，才有信號輸出。

07-13 OH 過熱保護風扇控制方式

- =0：感溫自動運轉
- =1：變頻器運行時運轉
- =2：持續運轉
- =3：停止運轉

- 1) 當 07-13=0：變頻器感測至特定溫度後才自動運轉，此功能可增加散熱風扇使用壽命。
- 2) 當 07-13=1：變頻器運轉中風扇才運轉。
- 3) 當 07-13=2：變頻器送電以後，風扇即運轉。
- 4) 當 07-13=3：變頻器送電風扇永不運轉。

參數群組 8- 通訊功能組

08-00 變頻器通訊站別：0~32

08-00 可設定通訊識別碼，適用於驅動多台變頻器時使用。

08-01 RTU/ASCII 碼選擇 =0：RTU 碼
=1：ASCII 碼

08-02 串列傳輸速率設定(bps) = 0：4800
= 1：9600
= 2：19200
= 3：38400

08-03 停止位元選擇 = 0：1 停止位元
= 1：2 停止位元

08-04 奇偶位元選擇 = 0：無奇偶位元
= 1：偶位元
= 2：奇位元

08-05 資料位元選擇 = 0：8 位元數據
= 1：7 位元數據

1) RS-485 通訊：

(1) 1 對 1 控制：用 PC 或 PLC 或控制器控制一台變頻器(08-00 設為 1~32)

(2) 1 對多控制：用 PC 或 PLC 或控制器控制多台變頻器(變頻器台數最多可到 32 台，變頻器 08-00 設為 1~32)，當變頻器收到通訊站別=0 時，則不管 08-00 設定值為何，都會接受通訊控制。

2) RS-232 通訊：(需使 RS232 介面裝置)

1 對 1 控制：以 PC 或 PLC 或控制器控制一台變頻器(08-00 設為 1~32)。

※註：a. PC(或 PLC 或控制器)和變頻器的串列傳輸速率(08-01)及通訊格式(08-02/08-03/08-04)必須一致。

b. PC 在變頻器下修改參數的命令後，變頻器會將新參數做參數範圍及是否有效確認。

c. 通訊協定 (PROTOCOL) 請參考 N310 通訊協定的說明。

d. 當 08-01=0 即為 RTU 輸入時，08-05=0，不能使用 08-05=1。

08-06 通訊異常檢測時間 (s) = 0.0~25.5

08-07 通訊異常檢出處理

1) 通訊異常檢測時間：0.0~25.5 秒；設定為 0.0 秒時，通訊逾時不檢出；出廠值為 0.0 秒。

2) 通訊異常檢出處理：

= 0：通訊中斷後依第一段減速時間停止並顯示 COT

= 1：通訊中斷後採取自由運轉停止並顯示 COT

= 2：通訊中斷後依第二段減速時間停止並顯示 COT

= 3：通訊中斷後繼續運轉並顯示 COT

※註：通訊中此值不可修改。

08-08 Err6 容錯次數= 1~20

當通訊出錯次數大於等於Err6容錯次數(08-08)時，才顯示ERR6警告資訊

08-09 通訊等待時間 (ms) = 5~65

用來設定變頻器從接收資料到開始發送為止的時間

參數群組 9- PID 功能組

09-00 PID 運轉模式選擇

- = 0：PID 運轉功能無效
- = 1：PID 控制，偏差 D 值控制
- = 2：PID 控制，回饋 D 值控制
- = 3：PID 控制，偏差 D 值反特性控制
- = 4：PID 控制，回饋 D 值反特性控制
- = 5：PID 控制，頻率指令+偏差 D 值控制
- = 6：PID 控制，頻率指令+回饋 D 值控制
- = 7：PID 控制，頻率指令+偏差 D 值反特性控制
- = 8：PID 控制，頻率指令+回饋 D 值反特性控制

09-00 = 1 時，D 為(設定值－回饋值)的單位時間(09-04)變化量。

= 2 時，D 為回饋值的單位時間(09-04)變化量。

= 3 時，D 為(設定值－回饋值)的單位時間(09-04)變化量。當(設定值－回饋值)為正時，輸出頻率下降；當(設定值－回饋值)為負時，輸出頻率上升。

= 4 時，D 為回饋值的單位時間(09-04)變化量。當(設定值－回饋值)為正時，輸出頻率下降；當(設定值－回饋值)為負時，輸出頻率上升。

= 5 時，D 為(設定值－回饋值)的單位時間(09-04)變化量+頻率指令。

= 6 時，D 為回饋值的單位時間(09-04)變化量+頻率指令。

= 7 時，D 為(設定值－回饋值)的單位時間(09-04)變化量+頻率指令。當(設定值－回饋值)為正時，輸出頻率下降；當(設定值－回饋值)為負時，輸出頻率上升。

= 8 時，D 為回饋值的單位時間(09-04)變化量+頻率指令。當(設定值－回饋值)為正時，輸出頻率下降；當(設定值－回饋值)為負時，輸出頻率上升。

09-01 回饋比例係數(%) = 0.00~10.00

09-01：為偏壓回饋比例系數值，亦即偏差量為：(設定值－回饋值) × 09-01。

09-02 比例增益(%) = 0.00~10.00

09-02：P 控制時的比例增益值。

09-03 積分時間 (s) = 0.0~100.0

09-03：I 控制時的積分時間值。

09-04 微分時間 (s) = 0.00~10.00

09-04：D 控制時的微分時間值。

09-05 PID 偏置 = 0：正方向

= 1：負方向

09-06 PID 偏置調整(%)= 0~109

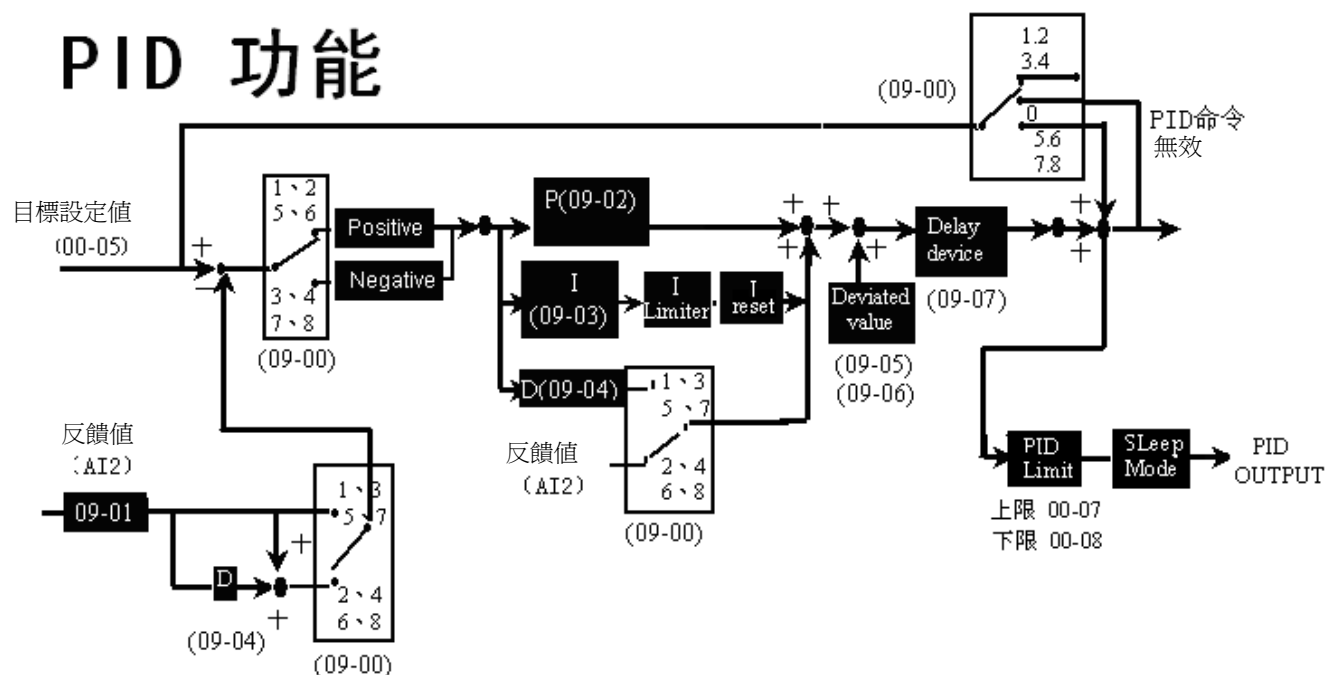
09-05 / 09-06：PID 運算結果加上 09-06(由 09-05 決定 09-06 的正負號)。

09-07 PID 一次延遲過濾時間 (s) = 0.0~2.5

09-07：輸出頻率指令的更新時間。

※註：PID 功能用於變頻器輸出流量控制、外部風扇風量控制、溫度控制等場合，其控制流程如下：

PID 功能



- 1) 執行 PID 控制時，請將 TM2 上的端子 AI2 設定為 PID 回饋信號，即 02-06=0。
- 2) 上圖所敘述的設定值為 00-05/00-06 設定所輸入的頻率。

09-08 回饋信號斷線時檢出模式

- =0：不檢出
- =1：檢出運轉
- =2：檢出停止

09-08= 0：不檢出；09-08= 1：檢出運轉並顯示 PDER；09-08= 2：檢出停止並顯示 PDER。

09-09 回饋信號斷線檢出準位比例係數(%) = 0~100

09-09：回饋信號斷線準位設定，偏差值=設定值 - 回饋值。當偏差值大於斷線檢出準位時，無論此時是否斷線均判定為回饋信號斷線。

09-10 回饋信號斷線時檢出延遲時間 (s) = 0.0~25.5

09-10：回饋信號斷線時，檢出動作的延遲時間設定。

09-11 積分極限值比例係數(%) = 0~109

09-11：為不使 PID 飽和所加的限制器。

09-12 回饋信號到達設定值時積分器歸零(0~30)

- =0：無效
- =1：1 秒
- =30：30 秒

09-12= 0：PID 回饋值到達命令值時積分器不歸零。

09-12=1~30：回饋值到達命令值後，於 1~30 秒後歸零，即變頻器停止輸出，直到回饋值不等於命令值時，變頻器再輸出。

09-13 允許誤差範圍（單位值）(1 Unit = 1/8192)：=0~100

09-13=0~100%單位值：積分器歸零後，到重新啟動的誤差值。

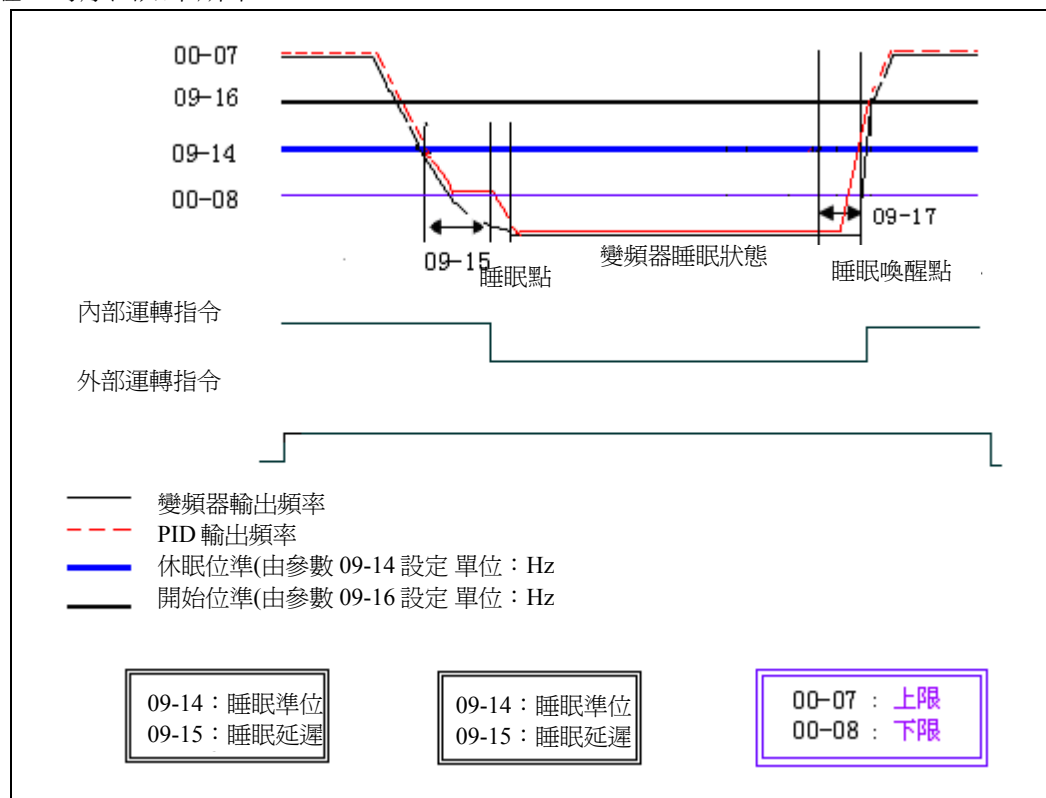
09-14 PID 睡眠開始頻率 (Hz) = 0.00~400.00
 09-15 PID 睡眠延遲時間 (S) = 0.0~25.5
 09-16 PID 喚醒起始頻率 (Hz) = 0.00~400.00
 09-17 PID 喚醒延遲時間 (S) = 0.0~25.5

PID 休眠模式：

09-00=1 (PID 有效)
 02-06=0 (PID 回饋有效)
 00-05=PID 設定頻率來源(Target Value)
 03-01=PID 設定頻率
 09-14=PID 睡眠起始頻率，單位：Hz
 09-15=PID 睡眠延遲時間，單位：Sec
 09-16=PID 喚醒起始頻率，單位：Hz
 09-17=PID 喚醒延遲時間，單位：Sec

當 PID 輸出頻率小於休眠起始頻率(09-14)且維持至超出休眠延遲時間(09-15)後，變頻器輸出開始減速到零，即進入 PID 休眠模式。

當 PID 輸出頻率大於休眠起始頻率(09-16)，變頻器輸出開始動作，即將變頻器從 PID 休眠狀態喚醒。時序圖如下所示：



參數群組 10- 輔助功能組

10-00 擴充卡類型 預留參數

預留參數請不要設定

10-01 反轉命令

= 0：反轉命令有效

= 1：反轉命令無效

10-01=1 時，變頻器不接受反轉命令。

10-02 按鍵面板運轉中的頻率修改

= 0：運轉中，面板上下鍵設定頻率後，按"Enter"鍵後變更

= 1：運轉中，面板上下鍵設定頻率可直接變更速度

10-03 載波頻率 1~15

10-03	載波頻率	10-03	載波頻率	10-03	載波頻率	10-03	載波頻率
1	1KHz	5	5KHz	9	9KHz	13	13KHz
2	2KHz	6	6KHz	10	10KHz	14	14KHz
3	3KHz	7	7KHz	11	11KHz	15	15KHz
4	4KHz	8	8KHz	12	12KHz		

※註：1、IGBT 驅動型變頻器雖然在變頻器工作時可提供低雜訊運轉環境，但由於高頻元件會有高載波頻率波形切割，可能造成外部電子零件（或其他控制器）受干擾情形，甚至與馬達配接時造成振動現象，此時是有必要調整載波頻率的。

2、載波頻率設定應大於 10 倍頻率上限值，例如運轉頻率上限為 400Hz 時，載波設定應高於 4K，頻率上限為 300Hz 時，載波頻率應高於 3K，以此類推。

10-04 載波模式選擇 =0：載波模式 0 三相調變
 =1：載波模式 1 兩相調變
 =2：載波模式 2 兩相隨機調變
 =3：載波模式 3 隨機載波頻率調變
 =4：載波模式 4 雙隨機調變

1) 10-04=0：載波模式 0 為變頻器要求低雜訊，但冷卻效果佳之場所。

2) 10-04=1：載波模式 1 為變頻器使用風水力之場所。

3) 10-04=2：載波模式 2 對溫升、IGBT 壽命有改善，同時對電磁雜訊有一定的抑制作用。

4) 10-04=3：載波模式 3 適用於某些追求低溫升或高轉矩而採用較低載波（5k 以下），同時又希望可以避免因此而帶來的尖銳電磁雜訊的情況。

5) 10-04=4：載波模式 4 減少了 IGBT 的 1/3 的開關次數，延長了 IGBT 的壽命，同時也不會增加電磁雜訊，並且有良好抑制效果。

註：運轉在高速、高載率時請設定載波模式 10-4=1 以降低開關損耗。

10-05 加速時間 2（秒） =0.1~3600.0

10-06 減速時間 2（秒） =0.1~3600.0

參見加/減速時間 1(00-09/00-10)說明

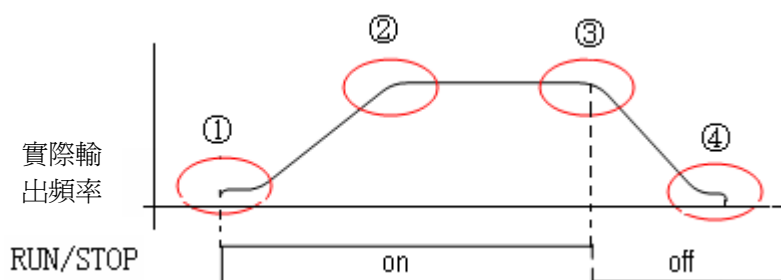
10-07 第一段加減速 S 曲線 (秒) = 0.0~4.0

10-08 第二段加減速 S 曲線 (秒) = 0.0~4.0

10-09 第三段加減速 S 曲線 (秒) = 0.0~4.0

10-10 第四段加減速 S 曲線 (秒) = 0.0~4.0

S 曲線的作用是：防止機械設備起動/停止期間的衝擊，產生緩啟動的效果。按照起動/停止的不同階段可分為 4 段：如下圖①~④，4 段 S 曲線



在不考慮失速的情況下，實際加/減速時間=設定加/減速時間+S 曲線時間。

其中，S 曲線時間可以對 S1~S4 分別設定，即 10-07~10-10。

若 10-07~10-10 = 0，則 S 曲線無效，起動/停止以直線方式進行加減速。

註：此處 S 曲線的時間設定為對應到 6-04（額定頻率）的時間，計算可參考 00-09/00-10。

10-11 跳躍頻率 1 (Hz) = 0.00~400.00

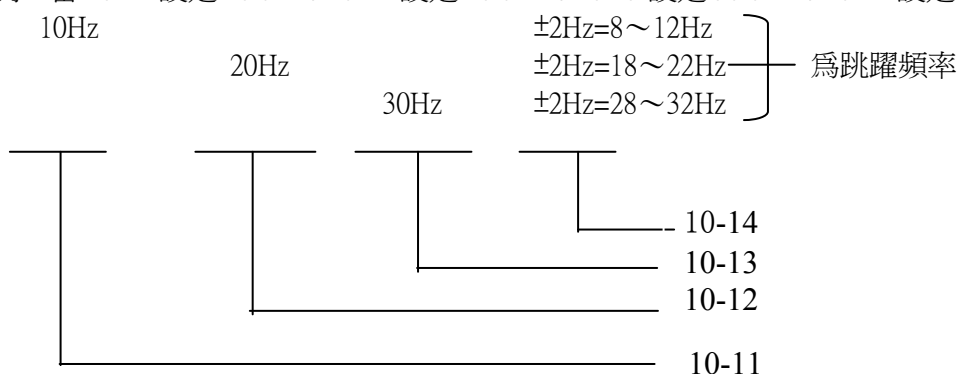
10-12 跳躍頻率 2 (Hz) = 0.00~400.00

10-13 跳躍頻率 3 (Hz) = 0.00~400.00

10-14 跳躍頻率範圍 ($\pm$ Hz) = 0.00~30.00

當希望避免由於機械系統的固有頻率原因引起的共振時，以上參數可以用來跳過共振頻率。

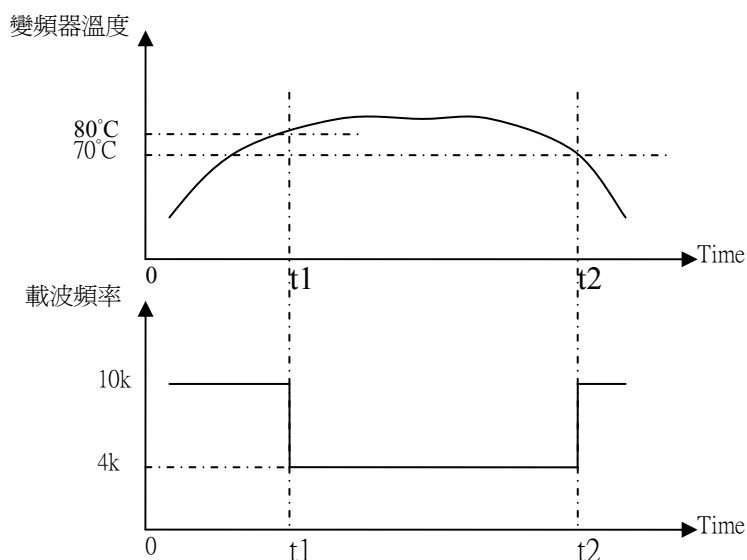
例：當 10-11 設定 10.0Hz / 10-12 設定 20.0 Hz / 10-13 設定 30.0 Hz / 10-14 設定 2.0Hz



10-15 載波頻率隨溫度降低選擇 =0：載波頻率隨溫度降低無效

=1：載波頻率隨溫度降低有效

當面板顯示變頻器溫度（11-00=01000 時）大於 80℃，載波頻率降為 4K；當變頻器溫度降到 70℃ 以下，再恢復原來設定的載波頻率。



參數群組 11- 面板顯示組

11-00 參數組 A 顯示

- =xxxx0：不顯示馬達輸出電流
- =xxxx1：顯示馬達輸出電流
- =xxx0x：不顯示馬達輸出電壓
- =xxx1x：顯示輸出馬達電壓
- =xx0xx：不顯示變頻率直流電壓
- =xx1xx：顯示變頻率直流電壓
- =x0xxx：不顯示變頻器溫度
- =x1xxx：顯示變頻器溫度
- =0xxxx：不顯示 PID 回饋
- =1xxxx：顯示 PID 回饋

11-01 線速度顯示：= 0~65535

11-01：設定線速度時的最大值對應於馬達額定頻率(06-04)，例如指定線速度值 1800 相等於運轉頻率 60Hz 時，輸出 30Hz 鍵盤顯示為 900。

11-02 線速度顯示模式

- =0：顯示變頻器輸出頻率
- =1：以整數顯示線速度(xxxx)
- =2：以小數點 1 位顯示線速度(xxx.x)
- =3：以小數點 2 位顯示線速度(xx.xx)
- =4：以小數點 3 位顯示線速度(x.xxx)

11-02=1/2/3/4，變頻器在停機，運轉以及修改頻率時都顯示線速度。

11-03 PID 回饋最大值設定：=0~999

11-04 PID 回饋最小值設定：=0~999

例：11-03=100，11-04=50，則當 11-00=10000 時，當實際的回饋從最小到最大範圍內變化時，可以從面板讀出回饋值 50 到 100 變化

11-05 PID 回饋顯示模式

- =0：以整數顯示回授值(XXX)
 =1：以小數點 1 位顯示回授值(XX.X)
 =2：以小數點 2 位顯示回授值 (X.XX)

11-06 PID 回饋顯示單位設定

- =0：xxx--（無數據單位）
 =1：xxxpb（壓力）
 =2：xxxfl（流量）

參數群組 12- 用戶參數組**12-00 變頻器馬力代碼**

12-0	變頻器型號		12-0	變頻器型號		12-0	變頻器型號	
20P5	N310	2P5	4005	N310	4005	4050	N310	4050
2001		2001	4008		4008	4060		4060
2002		2002	4010		4010	4075		4075
2003		2003	4015		4015	-		-
4001		4001	4020		4020			
4002		4002	4030		4030			
4003		4003	4040		4040			

12-01 軟體版本

註：唯讀

12-02 故障紀錄（最近 3 次）

- 1) 變頻器發生故障時，會先將故障記憶內容 2.xxx 存放在 3.xxx，之後將故障記憶內容 1.xxx 存在 2.xxx，最後才將此次的故障內容存放在 1.xxx 故 3.xxx 為最早發生的故障，1.xxx 為最近發生的故障。
- 2) 進入 12-02 後，首先讀出 1.xxx，之後若按▲鍵，則依序讀出 2.xxx→3.xxx→1.xxx 若按▼鍵，則依序讀出 3.xxx→2.xxx→1.xxx→3.xxx。
- 3) 進入 12-02 後，若按復歸（RESET）鍵，則會將 3 個故障記錄都清除掉，故障記錄清除後故障記憶內容變成 1.---，2.---，3.---。
- 4) 故障記憶內容為 1.OC-C 時，表示最後發生的故障為 OC-C，以此類推。

12-03 累積工作時間設定 1 (小時) = 0~23

12-04 累積工作時間設定 2 (天) = 0~65535

12-05 累積工作時間選擇
 = 0：通電時累積時間
 = 1：運轉時累積時間

- 1) 當累積工作時間設定 1 計數至 23 後，下一小時計數將進位至累積工作時間設定 2，此時累積工作時間設定 1 將恢復為 0000，而累積工作時間設定 2 則為 01。

2) 累積工作時間選擇的說明如下：

設定值	說明
0	變頻器電源投入時，累積工作時間
1	變頻器運轉時，累積工作時間

12-06 出廠設定功能	=1150：將參數復歸為出廠值（50Hz） =1160：將參數復歸為出廠值（60Hz）
12-07 參數鎖定功能	=0：所有參數可讀可寫 =1：除參數 3-01~3-16 以外可讀可寫 =2：除參數 3-01~3-16 以外可讀不可寫 =3：所有參數可讀不可寫
12-08 參數密碼	00000~65535

該功能用於防止無關人員修改參數，保護變頻器參數安全。

當設定密碼後，則無法修改參數，也無法進行出廠設定。具體如下：

（1）如何設定密碼：

- ① 進入 12-08，顯示 00000，輸入設定密碼，按 enter 鍵後顯示 End。
- ② 再次進入 12-08，顯示 00001，再次輸入設定密碼，按 enter 鍵後顯示 LOC，即密碼設定成功；
如果和第一次設定不同，就顯示 Err2，即密碼設定失敗；

（2）如何取消密碼：

- 進入 12-08，顯示 00002，輸入正確的用戶密碼，按 enter 鍵後顯示 End，即密碼取消；
如果輸入錯誤的用戶密碼，就顯示 LOC（密碼仍然鎖定）。

註：設定 12-08=00000，為無密碼狀態

12-09 拷貝模組	預留
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註：預留參數請勿設定

參數群組 13- 自動程式運轉參數組

13-00 自動程式運轉模式選擇

- = 0：自動程式運轉無效
- = 1：執行單一週期之自動運轉模式，停止後會由停止前的速度起，繼續運轉
- = 2：連續迴圈週期之自動運轉模式，停止後會由停止前的速度起，繼續運轉
- = 3：單一週期結束後，以最後一段運轉速度繼續運轉；停止後會由停止前的速度起，繼續運轉
- = 4：執行單一週期之自動運轉模式，停止後會從第一段速起，開始運轉
- = 5：連續迴圈週期之自動運轉模式，停止後會從第一段速起，開始運轉
- = 6：單一週期結束後，以最後一段運轉速度繼續運轉；停止後會從第一段速起，開始運轉

13-01 第 1 段速頻率設定 (Hz) = (0~400 Hz)

13-02 第 2 段速頻率設定 (Hz) = (0~400 Hz)

13-03 第 3 段速頻率設定 (Hz) = (0~400 Hz)

13-04 第 4 段速頻率設定 (Hz) = (0~400 Hz)

13-05 第 5 段速頻率設定 (Hz) = (0~400 Hz)

13-06 第 6 段速頻率設定 (Hz) = (0~400 Hz)

13-07 第 7 段速頻率設定 (Hz) = (0~400 Hz)

13-08 第 8 段速頻率設定 (Hz) = (0~400 Hz)

13-09 第 9 段速頻率設定 (Hz) = (0~400 Hz)

13-10 第 10 段速頻率設定 (Hz) = (0~400 Hz)

13-11 第 11 段速頻率設定 (Hz) = (0~400 Hz)

13-12 第 12 段速頻率設定 (Hz) = (0~400 Hz)

13-13 第 13 段速頻率設定 (Hz) = (0~400 Hz)

13-14 第 14 段速頻率設定 (Hz) = (0~400 Hz)

13-15 第 15 段速頻率設定 (Hz) = (0~400 Hz)

13-16 第 0 段運轉時間 (秒) = 0.0~36000 (面板頻率運轉的時間)

13-17 第 1 段運轉時間 (秒) = 0.0~36000

13-18 第 2 段運轉時間 (秒) = 0.0~36000

13-19 第 3 段運轉時間 (秒) = 0.0~36000

13-20 第 4 段運轉時間 (秒) = 0.0~36000

13-21 第 5 段運轉時間 (秒) = 0.0~36000

13-22 第 6 段運轉時間 (秒) = 0.0~36000

13-23 第 7 段運轉時間 (秒) = 0.0~36000

13-24 第 8 段運轉時間 (秒) = 0.0~36000

13-25 第 9 段運轉時間 (秒) = 0.0~36000

13-26 第 10 段運轉時間 (秒) = 0.0~36000

13-27 第 11 段運轉時間 (秒) = 0.0~36000

13-28 第 12 段運轉時間 (秒) = 0.0~36000

13-29 第 13 段運轉時間 (秒) = 0.0~36000

13-30 第 14 段運轉時間 (秒) = 0.0~36000

13-31 第 15 段運轉時間 (秒) = 0.0~36000

13-32 第 0 段運轉轉向選擇(0:停止 1:正轉 2:反轉) (面板頻率運轉轉向選擇)
 13-33 第 1 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-34 第 2 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-35 第 3 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-36 第 4 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-37 第 5 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-38 第 6 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-39 第 7 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-40 第 8 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-41 第 9 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-42 第 10 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-43 第 11 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-44 第 12 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-45 第 13 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-46 第 14 段運轉轉向選擇(0:停止 1:正轉 2:反轉)
 13-47 第 15 段運轉轉向選擇(0:停止 1:正轉 2:反轉)

註：需利用外部端子設定 22 並端子導通，則進行以下動作

1) 自動程式運轉模式選擇(13-00)

2) 自動程式運轉模式設定(13-01~13-47)

- 自動程式運轉模式選擇與運轉：利用頻率指令 1~15(13-01~13-15)及自動程式運轉模式時間參數(13-17~13-31)，配合自動程式運轉模式選擇(13-00)，可作簡易 PLC 運轉之操作模式使用，各段速的運轉方向可利用(13-33~13-47)設定。另外，第 0 段速頻率為設定面板頻率 3-01，運行時間為設定 13-16，運行轉向為設定 13-32。

- 各種自動程式運轉模式運轉例子如下：

(A) 單一週期運轉(13-00=1,4)

變頻器依據所設定的運轉模式，完成一個週期後，停止運轉。

例：

13-00=1 (或 4)

面板頻率(3-01)=15 Hz

13-01=30Hz

13-02=50Hz

13-03=20Hz

13-16=20s

13-17=25s

13-18=30s

13-19=40s

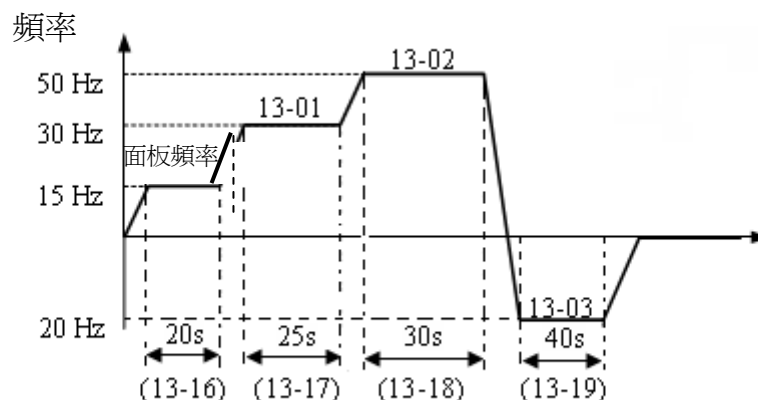
13-32=1

13-33=1

13-34=1(FWD)

13-35=2(REV)

13-04~13-15=0Hz 13-20~13-31=0s 13-36~13-47=0



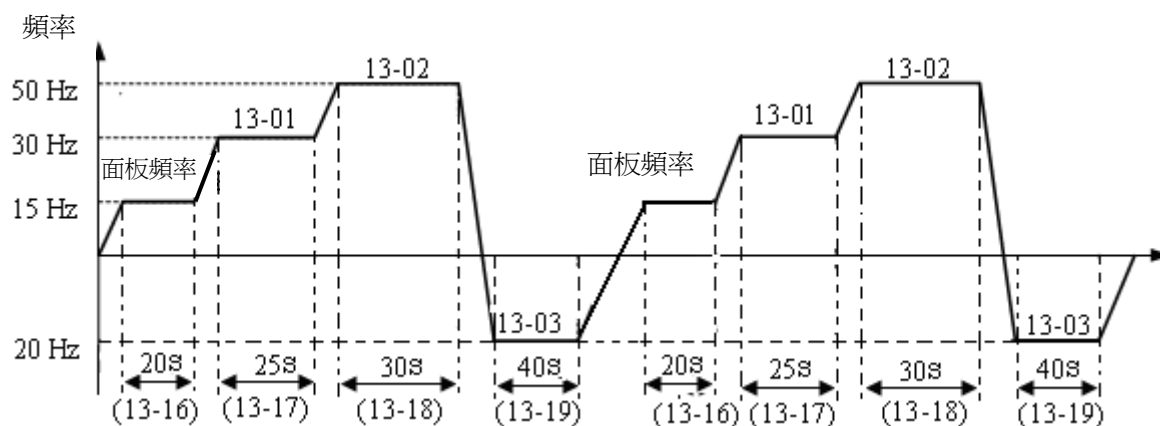
(B) 連續迴圈週期運轉(13-00=2,5)

變頻器依據所設定的運轉模式，完成一個週期後，會一直重複同樣的週期。

例：

13-00=2 (或 5)

13-01~13-15, 13-16~13-31, 13-32~13-47：設定值與(A)相同

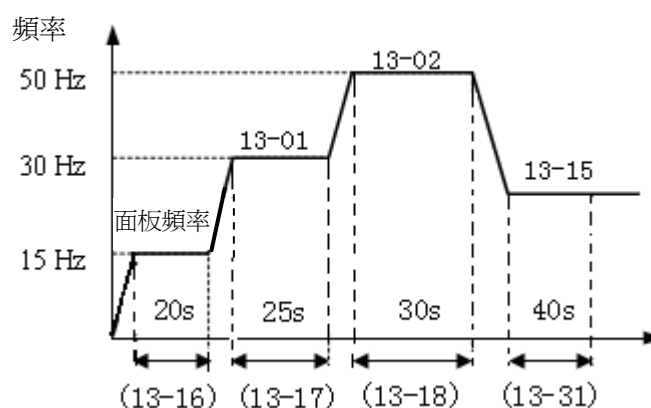
**(C) 單一週期結束後，以最後一段速度繼續運轉(13-00=3,6)**

變頻器依據所設定的運轉模式，完成一個週期後，會以最後一段速度繼續運轉。這裏的最後一段指第 15 段速。

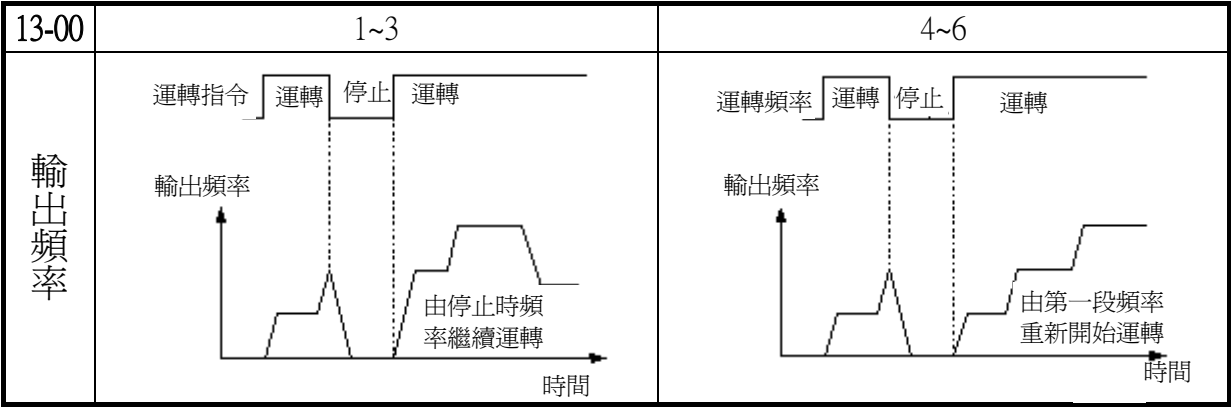
例：

13-00 = 3 (或 6)

面板頻率(3-01)=15 Hz	13-01=30Hz	13-02=50Hz	13-15=20Hz
13-16=20s	13-17=25s	13-18=30s	13-31=40s
13-32=1	13-33=1	13-34 = 1	13-47=1(FWD)
13-04~13-15=0Hz	13-20~13-30=0s	13-35~13-46=0	



- 13-00 設定為 1~3，停止後再啟動時，會有原來停止時的速度依 13-00 的設定內容，繼續運轉。
- 13-00 設定為 4~6，停止後再啟動時，會重新由第一段速度依 13-00 的設定內容，開始運轉。



● 自動運轉模式之加減速時間依據 00-09/00-10 或 10-05/10-06。

註：13-16，及 13-32，需配合面板頻率（3-01）做為自動程式運轉的第 0 段速。

自動程式運轉使用說明：

1、面板 RUN/STOP 鍵為運轉命令來源，使用自動程式運轉，需設定以下參數

例：① 00-03 或 00-04=0，使用 00-04 時需配合外部端子主/副運轉功能代碼 13，參見 P4-20、P4-24 參數說明。

② 01-00 (S2) =22（自動程式運轉）

③ 依據上面 (A) (B) (C) 的設定來實現自動程式運轉

④ 設定完以上參數後，當 S1 導通，則此時為自動程式運轉模式，利用面板 RUN/STOP 鍵來給定自動程式運轉的運轉指令和停止指令。

2、外部端子為運轉命令來源，使用自動程式運轉，需設定以下參數

例：① 00-03/00-04=1（外部端子）

② 00-11=0（外部端子運轉模式=正轉/停止-反轉/停止）

註：00-11 禁止設定為 1，或 2

③ 01-00 (S1) =0（正轉/停止功能），

④ 01-01 (S2) =22（自動程式運轉）

⑤ 依據上面 (A) (B) (C) 的設定來實現自動程式運轉，

⑥ 當 S2 導通，則此時為自動程式運轉模式，利用 S1 的導通關斷來給定自動程式運轉的運轉指令和停止指令。

3、通訊控制為運轉命令來源，使用自動程式運轉，需設定以下參數

例：① 01-00 (S1) =22（自動程式運轉）

② 依據上面 (A) (B) (C) 的設定來實現自動程式運轉，

用外部端子 S1 導通，則此時為自動程式運轉模式，利用通訊給定自動程式運轉的運轉指令和停止指令。

第三章故障排除及保養

3.1 故障指示及對策

3.1.1 故障指示及對策

一、無法手動復歸且無法自動復歸的故障

顯示	內容	異常原因	對策
-OV-	停機中 電壓過高	偵測線路故障	變頻器送修
-LV-	停機中 電壓過低	1.電源電壓過低 2.限流電阻(R1)或保險絲燒斷 3.偵測線路故障	1.檢查電源電壓是否正常 2.換修限流電阻或保險絲 3.變頻器送修
-OH-	停機中 變頻器過熱	1.偵測線路故障 2.周溫過熱或通風不良	1.變頻器送修 2.改善通風條件
CTER	電流感測器偵 測錯誤	電流感測元件或線路故障	變頻器送修
EPR	EEPROM 異常	EEPROM 故障	更換 EEPROM
COt	通訊異常	通訊中斷	檢查通訊線路

※註：“@”符號表示當此故障發生時，故障接點不動作。

二、可手動復歸及自動復歸的故障

顯示	內容	異常原因	對策
OC-S	啟動瞬間過電流	1.馬達繞組與外殼短路 2.馬達接線與大地短路 3.IGBT 模組損壞	1.檢修馬達 2.檢查配線 3.更換 IGBT 模組
OC-D	減速時過電流	減速時間設定太短	設定較長的減速時間
OC-A	加速時過電流	1.加速時間設定太短 2.使用的馬達容量大於變 頻器容量 3.馬達繞組與外殼短路 4.馬達接線與大地短路 5.IGBT 模組損壞	1.設定較長的加速時間 2.更換容量相當的變頻器 3.檢修馬達 4.檢查配線 5.更換 IGBT 模組
OC-C	定速中過電流	1.負載瞬間變化 2.電源瞬間變化	1.加大變頻器容量 2.重新執行自動參數量測 功能(06-05=1) 3.若上述皆無效，則將定子 電阻降低(06-06)

顯示	內容	異常原因	對策
OV-C	運轉中/減速中 電壓過高	1.減速時間設定太短或負載 慣性較大 2.電源電壓變化過大	1.設定較長的減速時間 2.外加煞車電阻或煞車模組 3.電源輸入側加裝電抗器 4.加大變頻器容量
Err4	CPU 非法中斷	外界雜訊干擾	如時常發生，請與東元電機 聯絡

三、可手動復歸但不可自動復歸的故障

顯示	內容	異常原因	對策
OC	停機中過電流	1.偵測線路故障 2.CT 訊號線連接不良	1.檢查接線確認是否受到干擾 2.變頻器送修
OL1	馬達過載	1.負載太大 2.06-01、07-05~08 設定不當	1.加大馬達容量 2.依說明設定 06-01、07-05~08
OL2	變頻器過載	負載太大	加大變頻器容量
OL3	過轉矩	1.負載太大 2.07-11、07-12 設定太小	1.加大變頻器容量 2.依需要設定 07-11、07-12
LV-C	運轉中電壓過低	1.電源電壓過低 2.電源電壓變化過大	1.改善電源品質或調高 04-04 2.設定較長的加速時間 3.電源輸入側加裝電抗器 4.加大變頻器容量

※註：“@”符號表示當此故障發生時，故障接點不動作。

3.1.2 特殊情況說明

顯示	內容	說明
STP0	零速停止中	設定頻率為 $<0.1\text{Hz}$ 時發生
STP1	直接啟動失效	1.變頻器設定外部運轉(00-03/00-04=1)，且直接啟動功能無效(04-09=1)時，若電源投入時，運轉開關放在導通的位置，則變頻器無法啟動，此時閃爍 STP1(請參考 04-09 說明)。 2.04-09=0 時，可直接啟動。
STP2	鍵盤緊急停止	1.變頻器設定外部運轉(00-03/00-04=1)，且 STOP 鍵設定有效(04-02=0)時，若在運轉中，按下鍵盤上的 STOP 鍵則變頻器依 04-01 的設定方式停止，停止後閃爍 STP2，必須將運轉開關先關斷再導通後，才會再啟動。 2.變頻器處於通訊狀態，且 STOP 鍵設定有效(04-02=0)時，若在運轉中，按下鍵盤上的 STOP 鍵，則變頻器依 04-01 設定的方式停止，停止後閃爍 STP2，此時 PC 必須先送 STOP 命令，再送運行命令給變頻器，變頻器才會再啟動。 3.04-02=1 時，STOP 鍵無緊急停止功能。
E.S.	外部緊急停止	外部緊急停止信號經由多功能輸入端子輸入時，變頻器減速停止，停止後閃爍 E.S.(請參考 01-00~01-05 的說明)。
b.b.	外部遮斷 BASE BLOCK	外部遮斷信號經由多功能輸入端子輸入時，變頻器立刻停止輸出，並閃爍 b.b.(詳細請參考 01-00~01-05 說明)。
ATER	參數自動調校 出錯	1.馬達銘牌輸入錯誤，造成自動參數量測失敗。 2.執行參數自動調校 Auto tuning 過程中緊急停機。
PDER	PID 回饋斷線	PID 回饋信號線路斷線檢出。

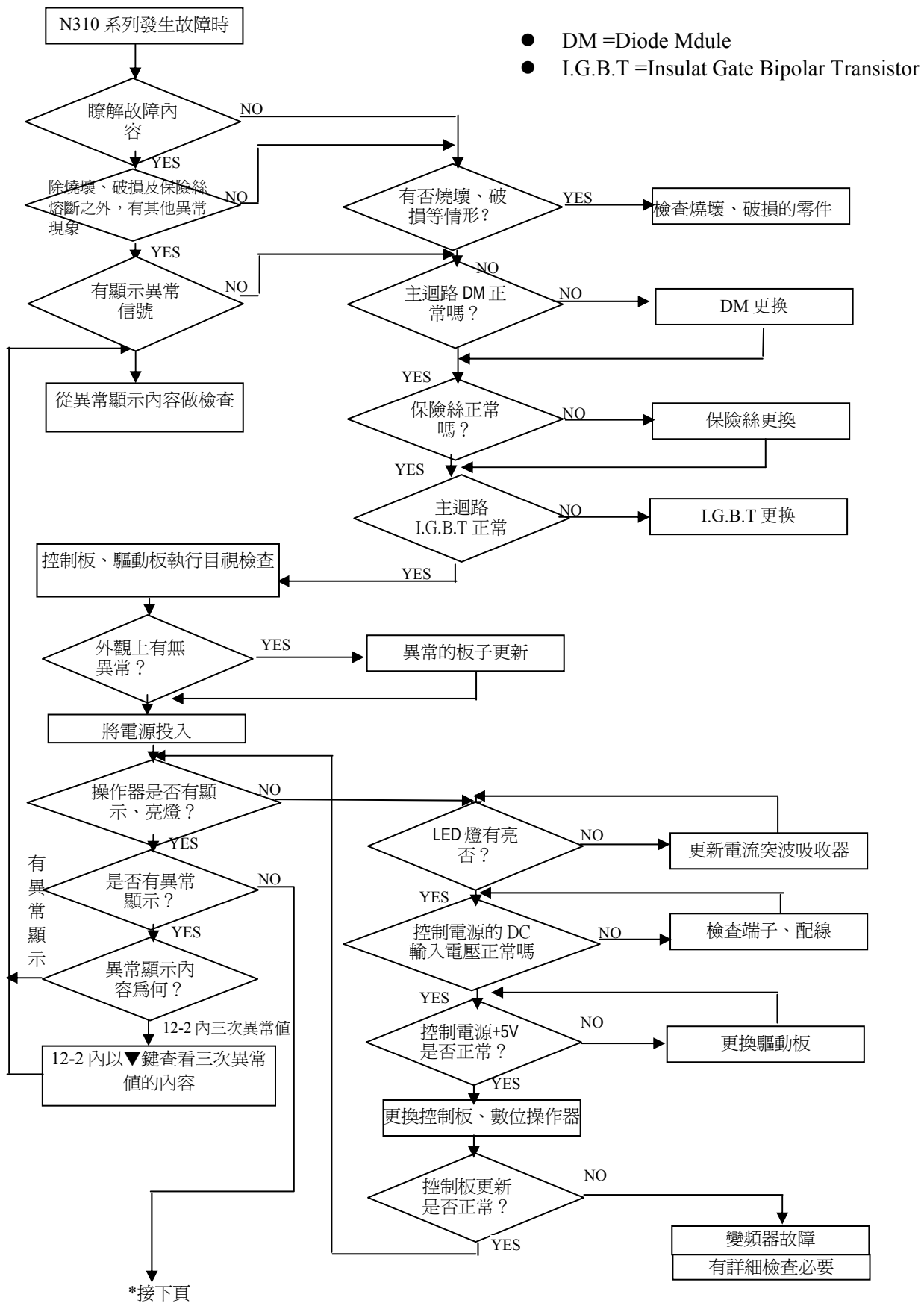
3.1.3 按鍵操作錯誤說明

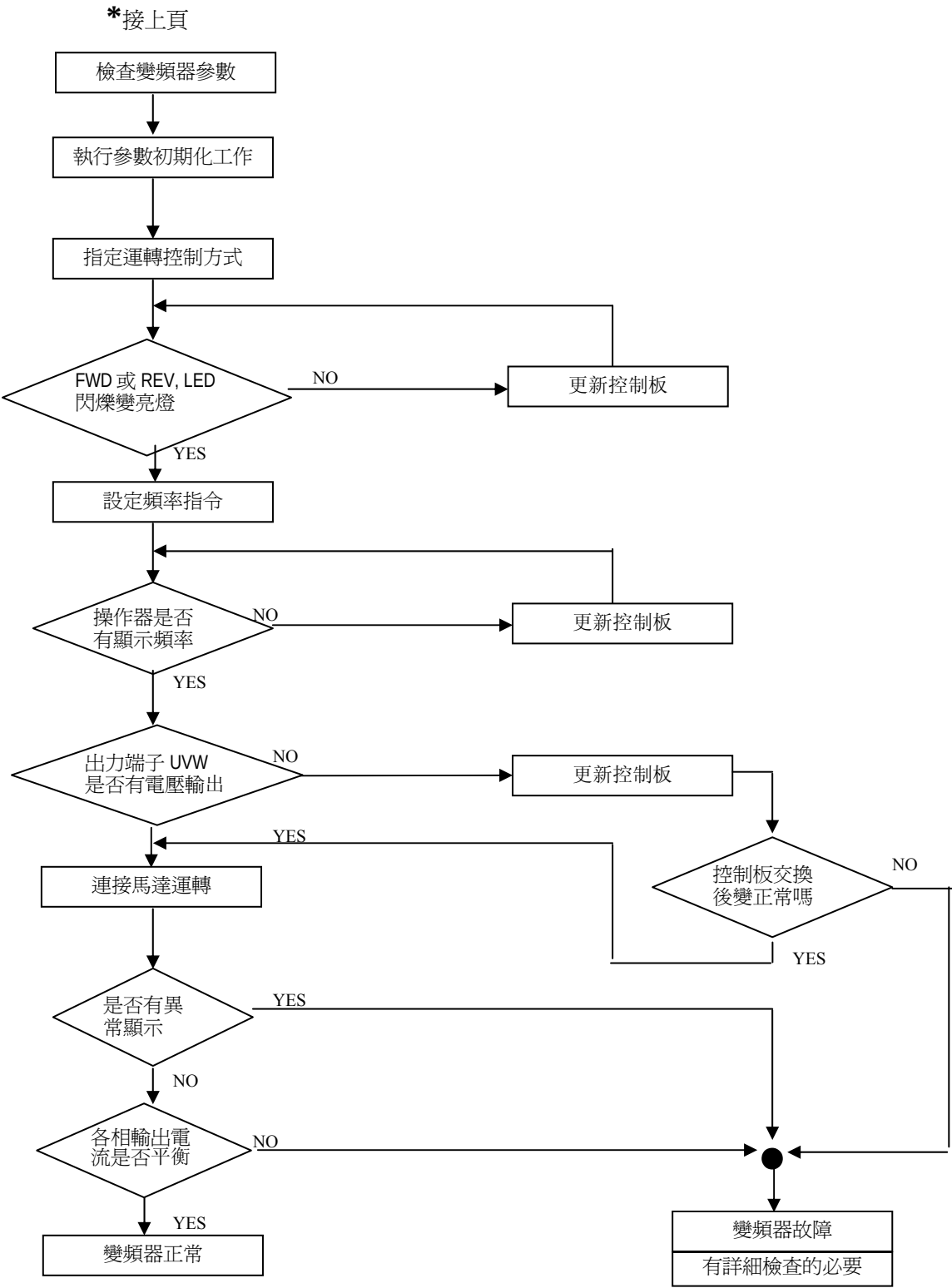
顯示	內容	錯誤原因	對策或說明
LOC	參數、頻率轉向已鎖定	1.12-07>0 時，企圖修改頻率/參數 2.於 10-01=1 下，企圖反轉	1.12-07 設為 0 2.10-01 設為 0
Err1	操作方式錯誤	1.01-06>0 或段速運轉時，按▲或▼鍵 2.運轉中企圖修改運轉中不可修改的參數(可參考參數一覽表)	1.00-05/00-06=0 時，才可由▲或▼鍵修改頻率。 2.停機後才修改。
Err2	參數設定錯誤	1.00-08 在 10-11±10-14 或 10-12±10-14 或 10-13±10-14 的範圍 2.00-07≤00-08 3.執行 Auto tuning 時條件設定錯誤(如：00-03/00-04 未設定為 0、00-05/00-06 未設定為 0)	1.修改 10-11~10-13 或 10-14 2.00-07>00-08 3.執行 Autotuning 時，00-03/00-04 設定為 0；00-05/00-06 設定為 0
Err5	通訊中，修改參數無效	1.通訊中禁止下控制命令 2.通訊中修改 8-2~8-5	1.通訊前必須先下致能命令 2.通訊前，先設定好參數
Err6	通訊失敗	1.接線錯誤 2.通訊參數設定錯誤 3.Check sum 錯誤 4.通訊格式錯誤	1.檢查硬體及配線 2.檢查 8-2~8-5
Err7	參數設定錯誤	1.企圖修改 12-0 或 12-6 2.電壓、電流偵測線路異常	復歸變頻器，如仍故障變頻器送修。

3.2 一般故障檢查方法

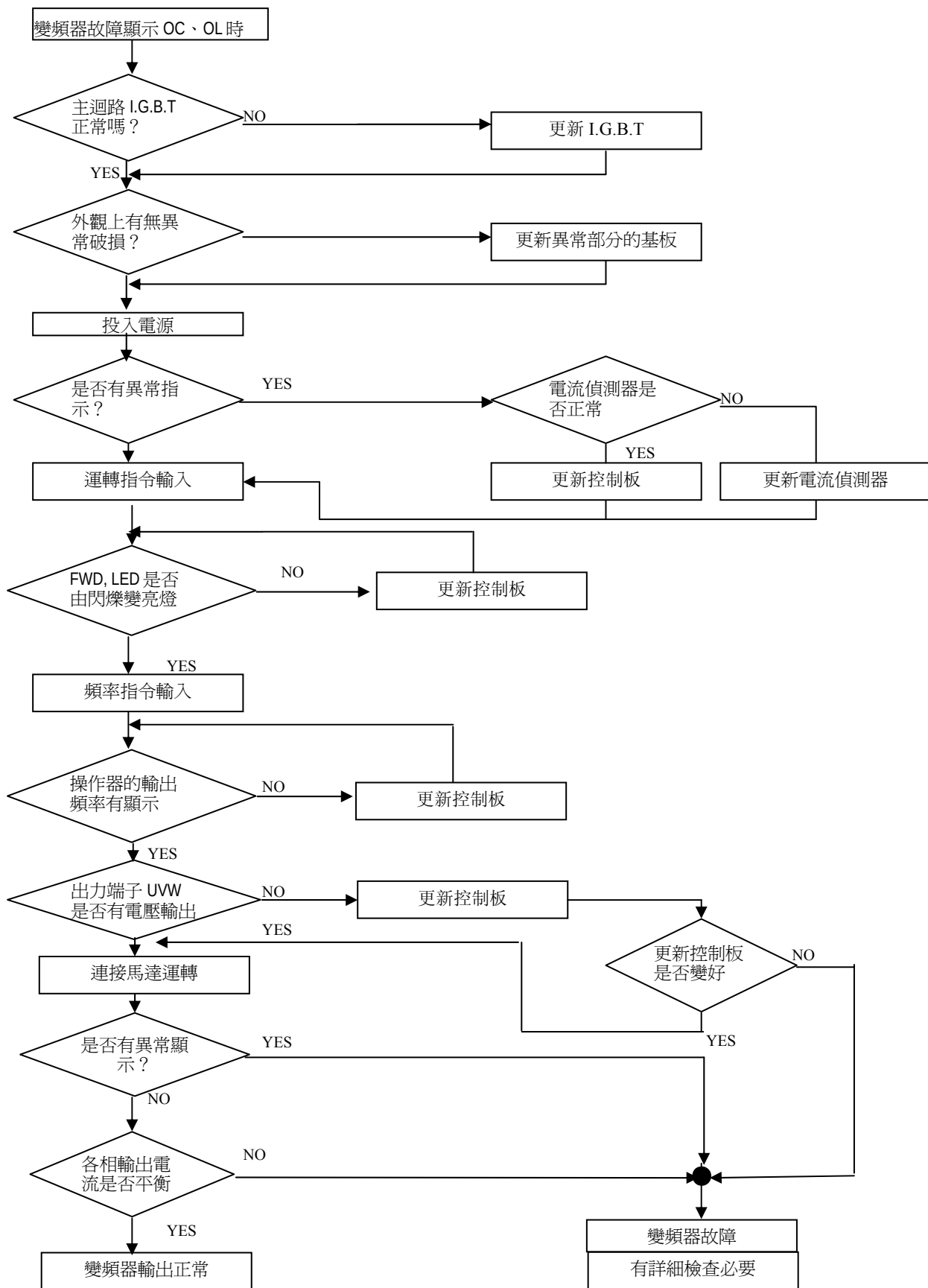
異常現象	檢查要點	處理內容
馬達不運轉	電源電壓是否正常投入 L1 (L)、L2、L3 (N)端(充電指示燈是否亮了)嗎？	• 電源是否投入 • 將電源先斷電後再送電一次 • 電源電壓等級確認 • 端子螺絲是否鎖緊
	輸出端子 T1、T2、T3 是否有電壓輸出？	• 將電源先斷電後再送電一次
	負荷是否過重，造成馬達堵死嗎？	• 減輕負荷使馬達可以運轉
	變頻器有異常發生嗎？	• 參考故障指示排除，檢查配線 不正常需更正。
	正/反轉運轉指令送至變頻器了嗎？	
	類比頻率設定值已輸入嗎？	• 類比頻率輸入信號配線是否正確 • 頻率輸入設定電壓是否正確
	運轉模式設定值正確嗎？	• 由操作面板設定運轉
馬達馬達 方向相反	輸出端子 T1、T2、T3 配線正確嗎？	• 要與馬達的 U、V、W 相配合
	正轉或反轉信號配線正確嗎？	• 配線檢查並更正
馬達運轉 無法變速	類比頻率輸入配線正確嗎？	• 配線檢查並更正
	運轉模式設定正確嗎？	• 操作器運轉模式設定檢查
	負荷是否過重嗎？	• 減輕負荷
馬達運轉速度 過高或過低	馬達的規格(極數、電壓)正確嗎？	• 確認馬達規格
	齒輪比正確嗎？	• 確認齒輪比
	最高輸出頻率設定值正確嗎？	• 確認最高輸出頻率值
馬達運轉時 速度變動異常	負荷會過重嗎？	• 減輕負荷
	負荷的變動很大嗎？	• 負荷變動要減少 • 變頻器及馬達容量加大
	輸入電源是否有欠相的情形嗎？	• 使用單相規格時，在輸入電源側加裝 AC 電抗器 • 使用三相輸入規格時請檢查配線

3.3 故障品簡單排除步驟

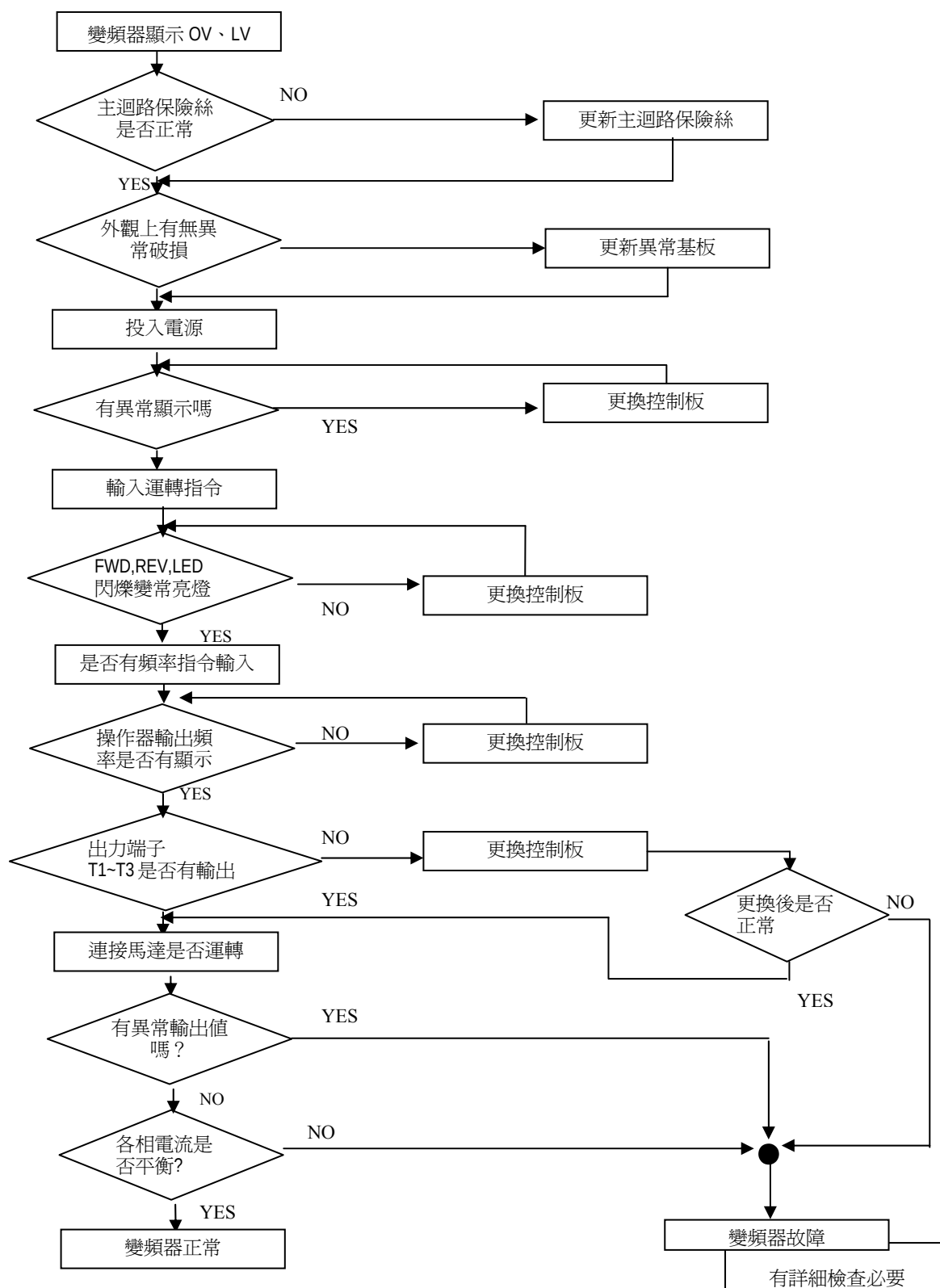




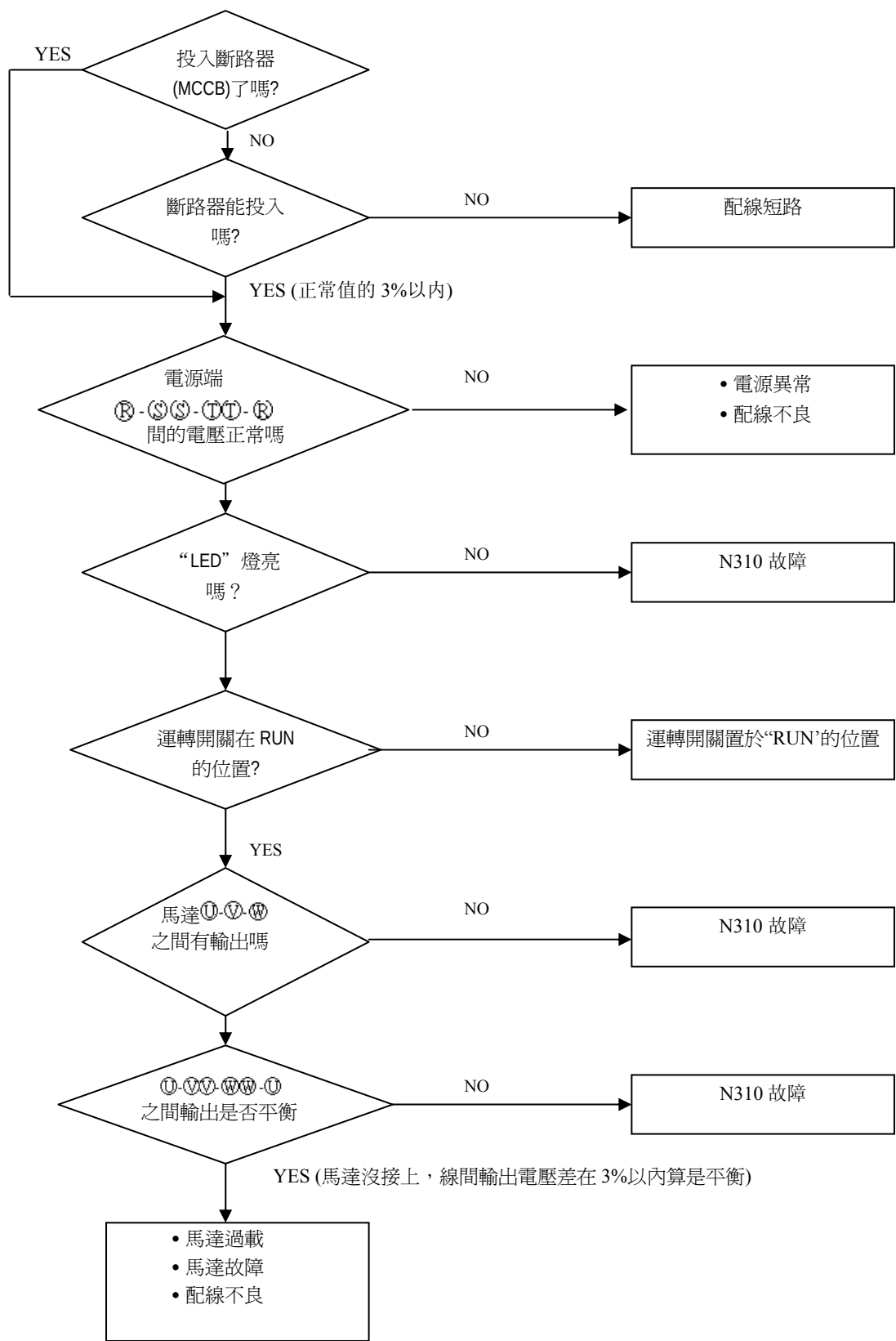
故障顯示 OC、OL 時，處理方式



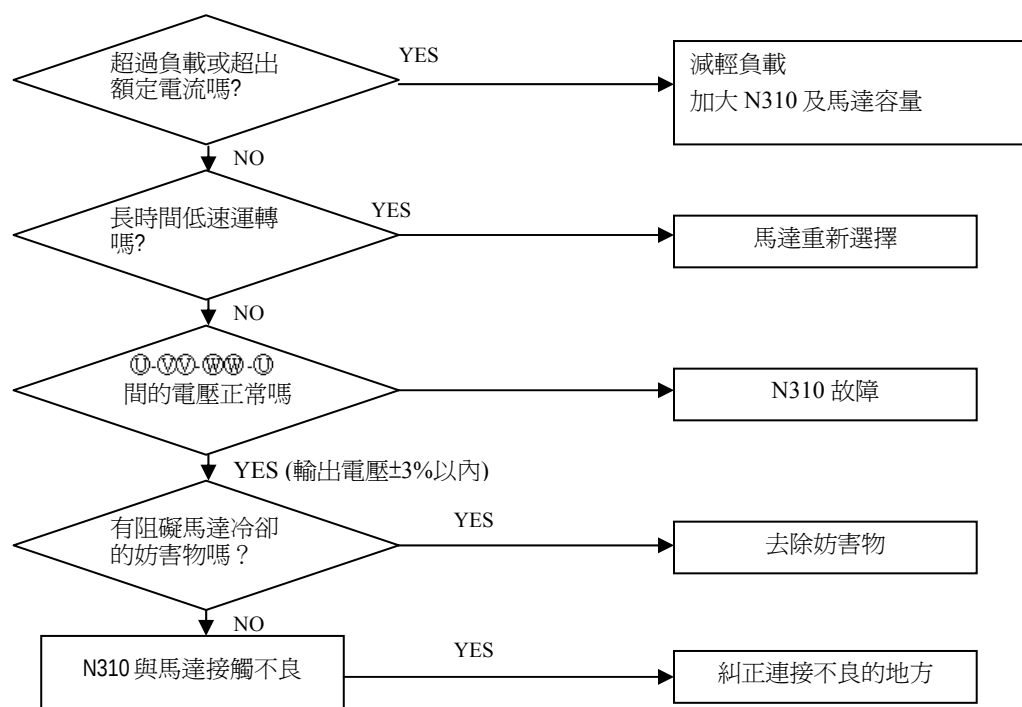
故障顯示 OV、LV 時，處理方式



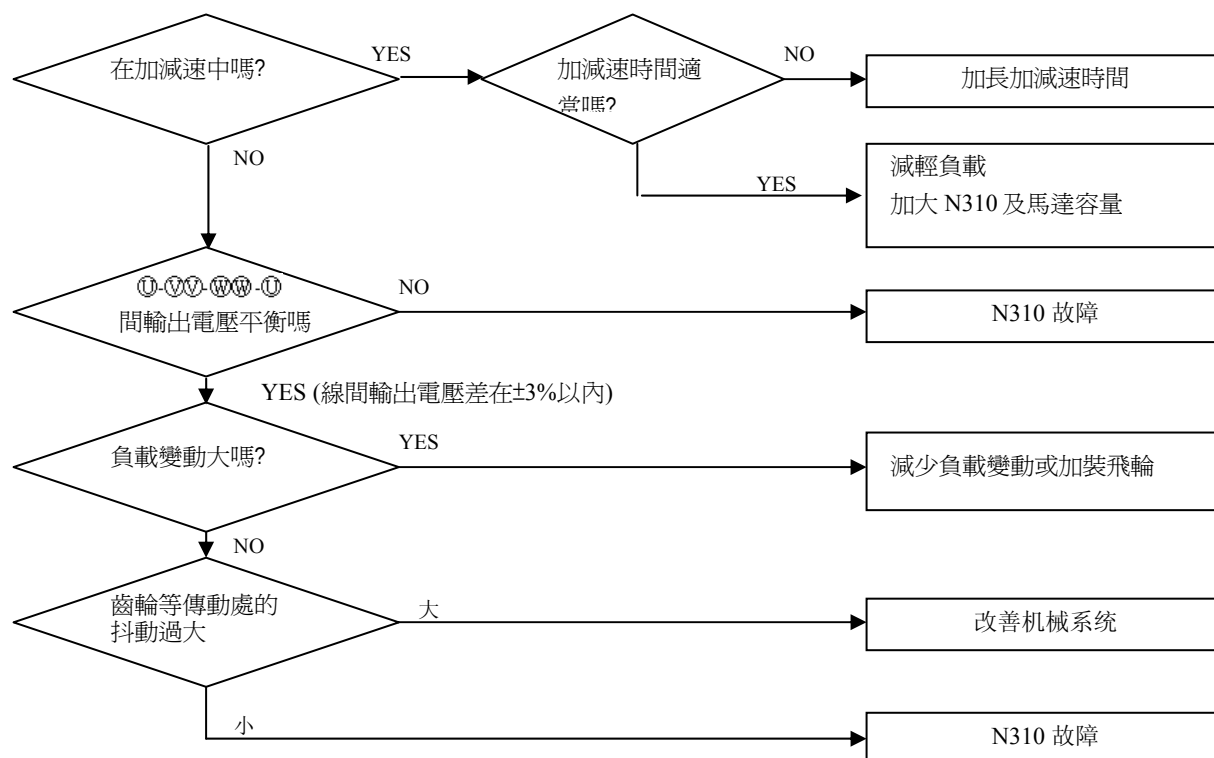
馬達無運轉



馬達過熱



馬達運轉不平滑



3.4 日常檢查與定期檢查

變頻器需作日常及定期維護檢查，以使變頻器的運轉更穩定安全。

下列列舉必須檢查的專案，以使變頻器的運轉更穩定安全。且必須在變頻器的按鍵面板熄滅 5 分鐘後再檢查，以免變頻器的電容器的殘留電力傷及保養人員。

檢查專案	檢查內容	檢查週期		檢查方法	判定基準	異常時對策
		日常	一年			
使用機台周圍環境	請確認周圍溫度、濕度	○		依安裝注意事項以溫度計、濕度計量測	溫度-10~40℃ 濕度 95%RH 以下	改善現場環境
	是否有堆積易燃物	○		目視	無異物	
變頻器安裝及接地	機台有無異常振動	○		目視，聽覺	無異物	鎖緊安裝螺絲
	接地電阻值是否合規定		○	以萬用電錶測量阻值	220V 級 100Ω 以下 440V 級 10Ω 以下	改善接地
輸入電源電壓	主迴路電壓是否正常	○		以萬用電錶測電壓值	合乎規格的電壓值	改善輸入電源
變頻器的外部端子內部固定螺絲	鎖緊部位是否鬆脫、搖動		○	目視，用起子檢查螺絲是否有鬆脫	無異常	鎖緊或送修
	端子台等是否有破損		○			
	是否有明顯生鏽狀況		○			
變頻器內部的連接線	是否變形、歪斜		○	目視	無異常	更換或送修
	導線外皮是否破損		○			
散熱片	是否有灰塵雜屑堆積	○		目視	無異常	消除灰塵等堆積物
印刷電路板	是否有導電性金屬或油漬堆積		○	目視	無異常	清除或更換電路板
	零件有無變色過熱焦黑現象		○			
冷卻風扇	有無異常振動、異常聲部		○	目視、聽覺	無異常	更換冷卻風扇
	是否有灰塵雜屑堆積	○		目視		清除
功率組件	是否有灰塵雜屑堆積		○	目視	無異常	清除
	檢查各端子間的電阻值		○	以萬用電錶測量	三相輸出無短路或斷路情形	更換功率部件或變頻器
電容器	是否有異臭、漏液等情形	○		目視	無異常	更換電容器或變頻器
	是否有膨脹、突出等情形	○				

3.5 保養與檢查

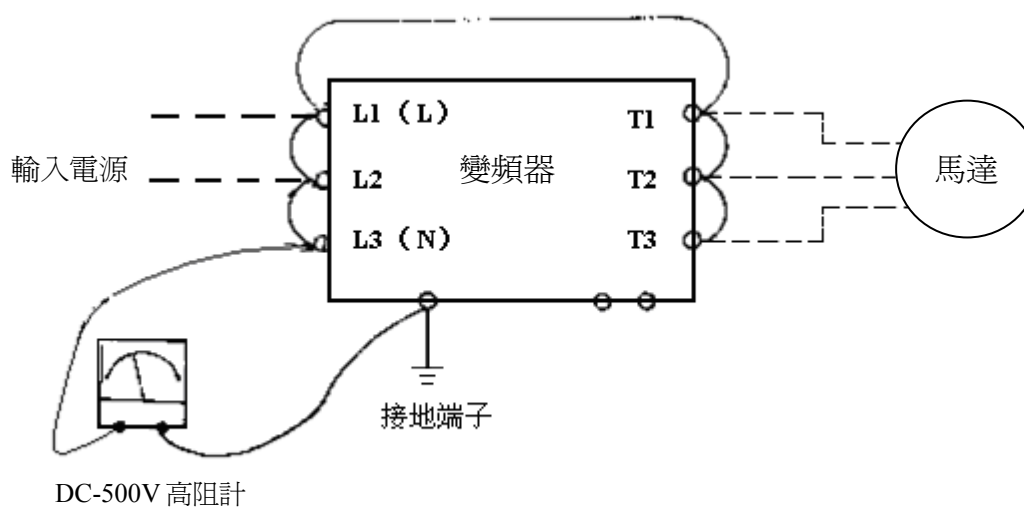
變頻器並不需要經常性的檢查、保養。

爲了長時間保持良好的可靠性，請依下列各點作定期性的查視。查視時，一定要關掉電源，待操作面板顯示燈熄滅後，方可開始進行。(因爲內部的大容量電容器會有殘留電壓)。

- (1) 掃除內部的積存物。
- (2) 端子螺絲、零件固定螺絲是否鬆動，鬆動的螺絲將其鎖緊。
- (3) 耐壓絕緣測試。
 - (a) 外部迴路的絕緣耐壓測試時，變頻器與外部連接的導線全部除去，不可通電。
 - (b) 變頻器內部的絕緣耐壓測試時，僅對變頻器主體的迴路實施。測試時使用 DC 500V 的高阻計，絕緣電阻須在 $5\text{M}\Omega$ 以上。

注意！絕不可對控制電路實施耐壓絕緣測試。

耐壓絕緣測試的接線圖





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