

TECO S310+ SERIES OPERATION MANUAL



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**Microprocessor Controlled
I G B T Drive
Inverter Motor Speed
Regulator
Operation Manual**

S310+ Series 400V class

**0.75~3.7kW
(1.7~6.7kVA)**





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This manual may be modified when necessary because of improvement of the product, modification, or changes in specification, this manual is subject to change without notice.

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Chapter 0 Preface

0.1 Preface

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

※Precautions

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



Danger

Indicates a potential hazard that could cause death or serious personal injury if misused.



Caution

Indicates that the inverter or the mechanical system might be damaged if misused.

Danger

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

For 200V class ground resistance 100 Ω or below. For 400V class 10 Ω or below.

Caution

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

0.2 Product Inspection

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

- The model of the inverter are the same as those specified in your purchase order.
- Check for any damages caused by transportation. Please do not apply power, and contact a Taian sales representative if any of the above problems occurred.

Chapter 1 Safety Precautions

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 are power-input terminals and must not be mistaken for U, V and W. 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 overheating 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.

1.2 During Power Up

Danger

- 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.
- When **restarting** the inverter, the operation of the inverter is based on the setup of 00-03 and 04-09 and the condition of external switch (FWD/REV button). Attention: the start operation will be regardless of 04-03.
 1. When 00-03 =0, the inverter will not automatically run after restart.
 2. When 00-03 =1 and the external switch (FWD/REV button) is OFF, the inverter will not run after restart.
 3. When 00-03 =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.

1.3 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.

1.4 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.

1.5 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 Definition of model

2.1 Nameplate Data

Inverter model →	Model	:	S310+-401-H3BCD(0.75kW)
Input voltage →	INPUT	:	3 phase 380-480V
Output specifications→	OUTPUT	:	50/60Hz 4.2A 3 phase 0-480V 0-400Hz 2.3A
	P/N: BAR CODE S/N: BAR CODE		
	RoHS COMPLIANT		
	TECO Electric & Machinery Co., Ltd.		

2.2 Inverter Models

S	310+-	4	01-	H	3	B	C	D
S310+ Series	Supply voltage: 4: 400V	Specification: H: Standard Type	B:Built-in braking unit	Blank:None D :Built-in Keypad Panel				
	Horsepower: 400V: 01: 1 HP 02: 2 HP 05: 5 HP	Power supply : 3: 3 phase	Blank:None C: Built-in RS485					

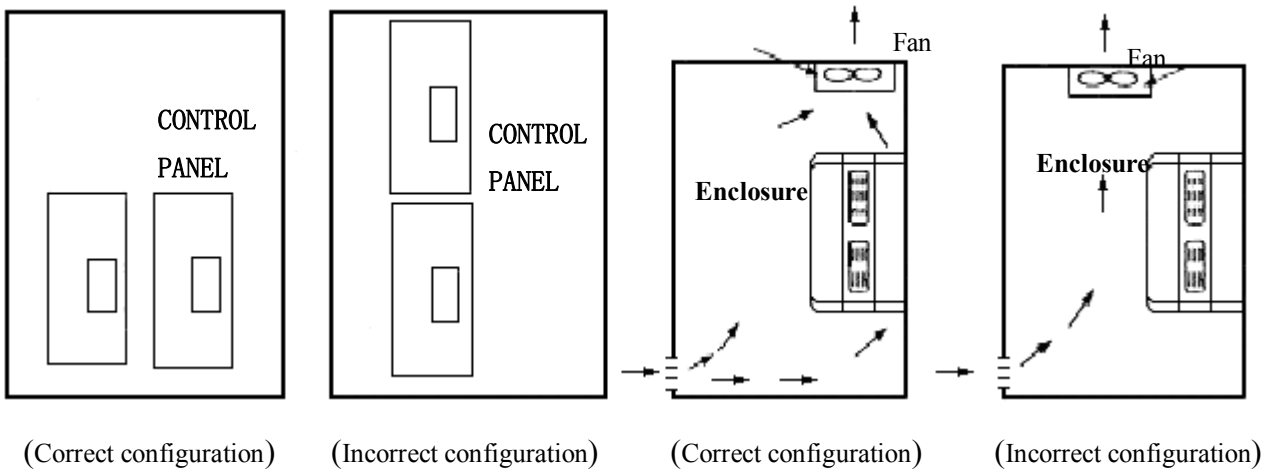
Chapter 3 Ambient Environment and Installation

3.1 Environment

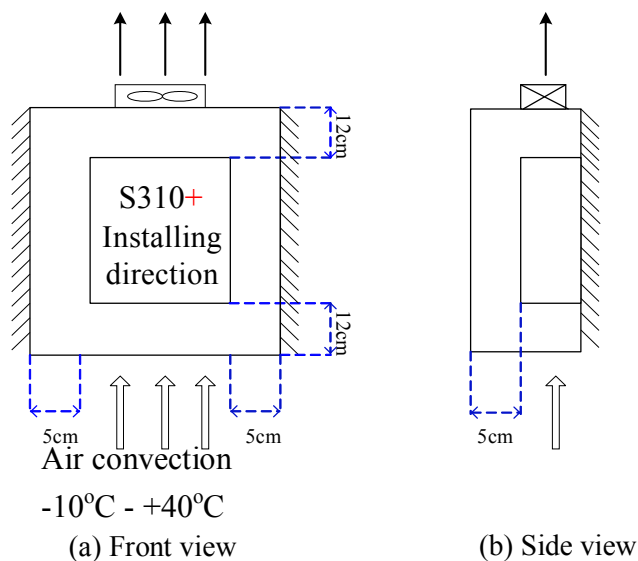
The environment will directly affect the proper operation and the life span of the inverter, so install the inverter in an environment complying with the following conditions:

Ambient temperature: $-10^{\circ}\text{C} \sim +50^{\circ}\text{C}$ (Power distribution panel: $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$)

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

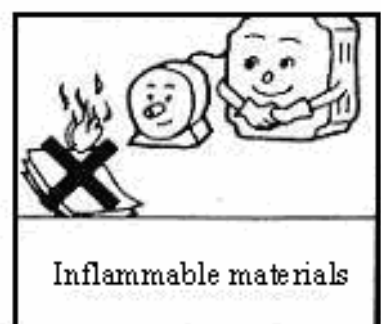
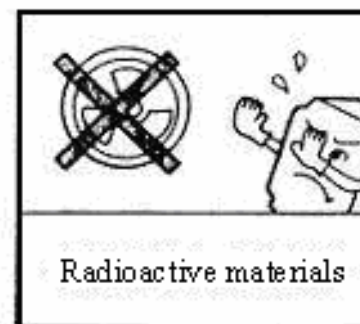
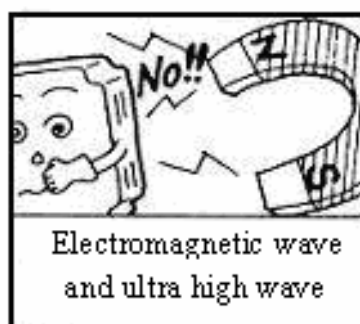
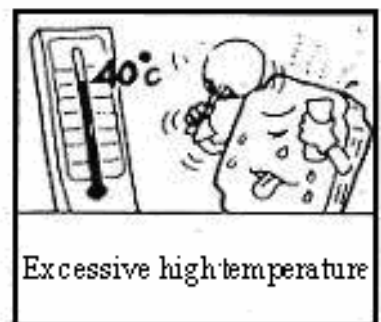
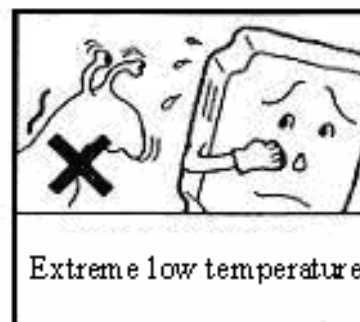
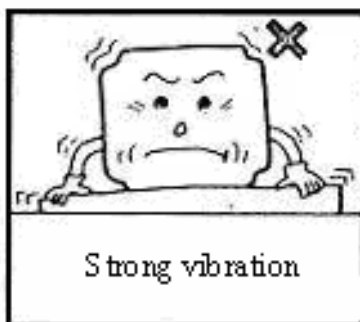
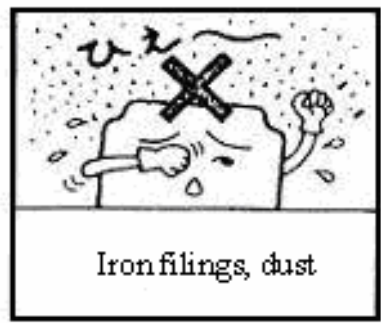
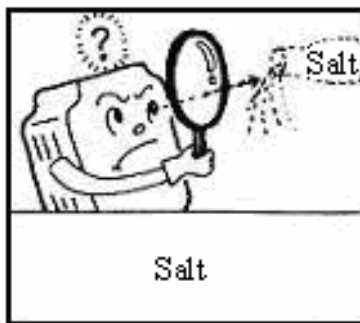
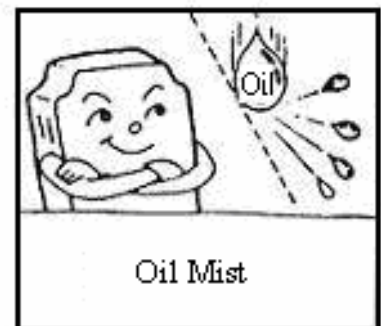
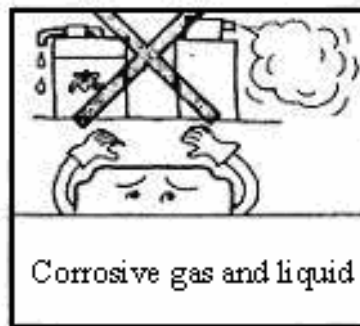
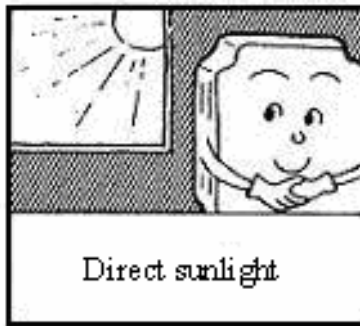


- Place the inverter facing forward and its top facing upward to assist with cooling.



3.2 Environmental precautions

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



3.3 Electrical Installation

3.3.1 Wiring guidelines

A. Tightening torque:

Required Screwdriver Torques are as listed below:

Tightening torque			
Horsepower	Power source	Nominal torque for TM1 terminal	
1/2	380-480V	0.59/0.08 (lbs-ft/kg-m)	13/15 (lbs-ft/kg-m)
3/5	380-480V	1.5/0.21 (lbs-ft/kg-m)	13/15 (lbs-ft/kg-m)

B. Power Cables

Power cables are connected to TM1 terminal block, terminals L1, L2, U, V, W, P1, BR.

Choose power cables according to the following criteria:

- (1) Use copper wires only. Correct wire diameters should be based on ratings at 105°C.
- (2) For rating voltage of wires, the minimum voltage of 480V class type is 600V.
- (3) To ensure safety, the power cables should be locked with O-type terminals.

C. Control Cables

Control cables are connected to TM2 control terminal block.

Choose control cables according to the following criteria:

- (1) Use copper wires only. Correct wire diameters should be based on ratings at 105°C.
- (2) For rating voltage of wires, the minimum voltage of 480V class type is 600V. To avoid noise interference, do not route power and control cables in the same conduit or trucking.
- (3) Where possible use screened / shielded control cables to minimize electromagnetic interference. To avoid ground loops always earth the shield of control cables at one end only.

D. Nominal electrical specifications of the terminal Block TM1:

Horsepower	Power source	Amps	Volts
1/2/3/5	380-480V	20	600

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

3.3.2 Contactor and Circuit Breaker specification and wiring.

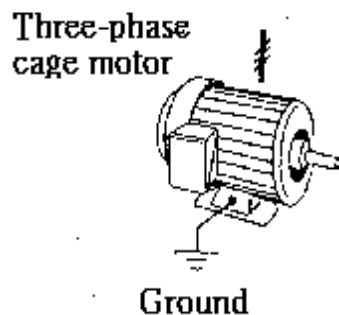
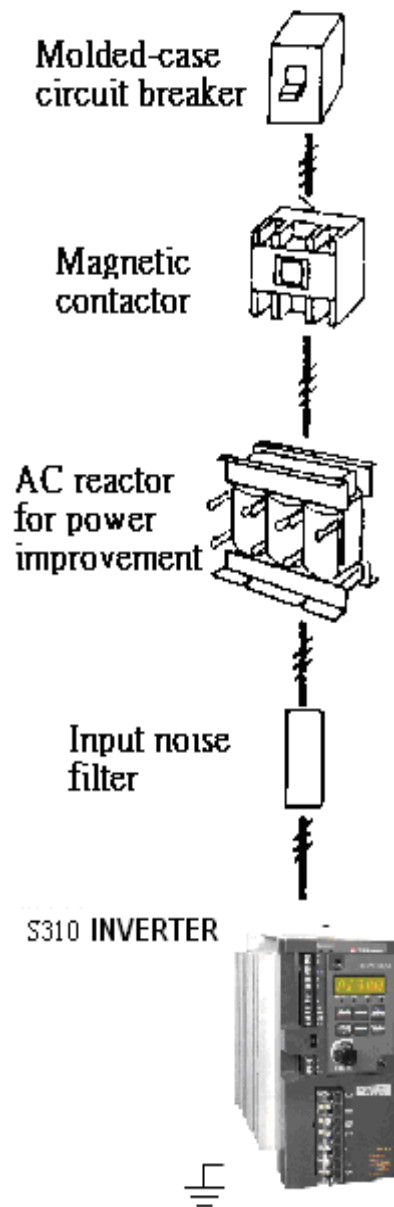
Molded-case circuit breaker/magnetic contactor

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

model : S310+□□□-XXX	401 402 403 405
Molded-case circuit breaker made by Taian	50E 10A
Magnetic contactor (MC) made by Taian	CN-11
Main circuit terminals (TM1)	Wire gauge 2.0 mm ² terminal screw M3
Control board signal terminals (TM2)1~18	Wire gauge 0.8mm ² (# 18 AWG) terminal screw M2
Relay signal terminals (RY1)1~3	Wire gauge 0.8mm ² (# 18 AWG) terminal screw M2

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

3.3.3 Precautions for peripheral applications:



Power supply:

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

Molded-case circuit breaker:

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

Leakage breaker:

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

Magnetic contactor:

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

AC reactor for power quality improvement:

- When inverters below 400V class 15KW are supplied with high capacity (above 600KVA) power source or an AC reactor can be connected to improve the power performance.

Install fast action fuse:

- To ensure the safety of peripheral devices, please install fast action fuse. Regarding the specification, please refer to P3-4.

Input noise filter:

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

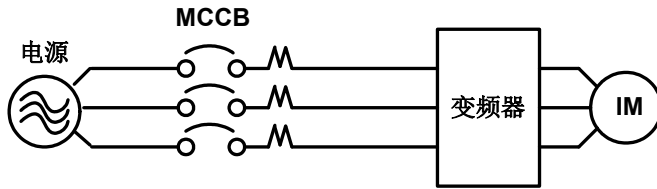
Inverter:

- Input power terminals L1、L2、L3 can be used in any sequence regardless of phase.
- Output terminals U, V, and W are connected to U, V, and W terminals of the motor. If the motor is reversed while the inverter is set to run forward, just swap any two terminals of U, V, and W.
- To avoid damaging the inverter, do not connect the input terminals U, V, and W to AC input power.
- Connect the ground terminal properly. 400 V class: grounding, $<10\Omega$

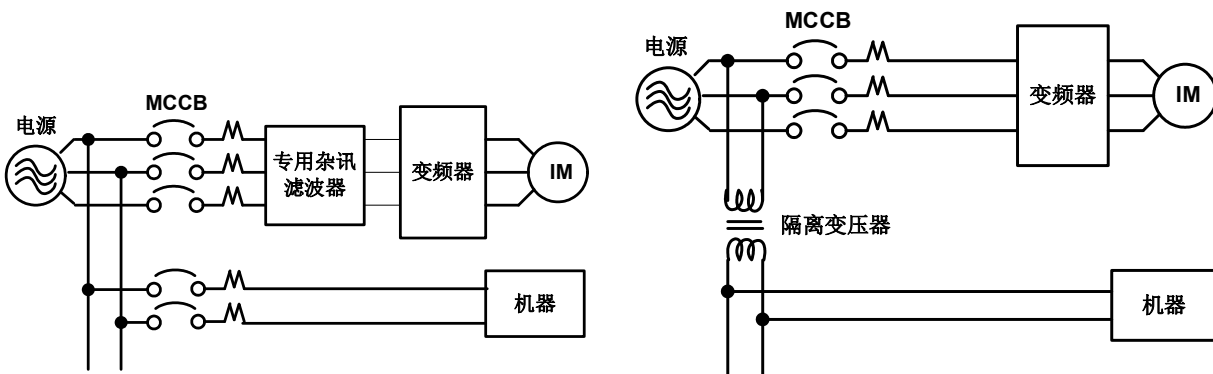
Make external connections according to the following instruction. Check connections after wiring to make sure all connections are correct. (Do not use the control circuit buzzer to check connections)

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

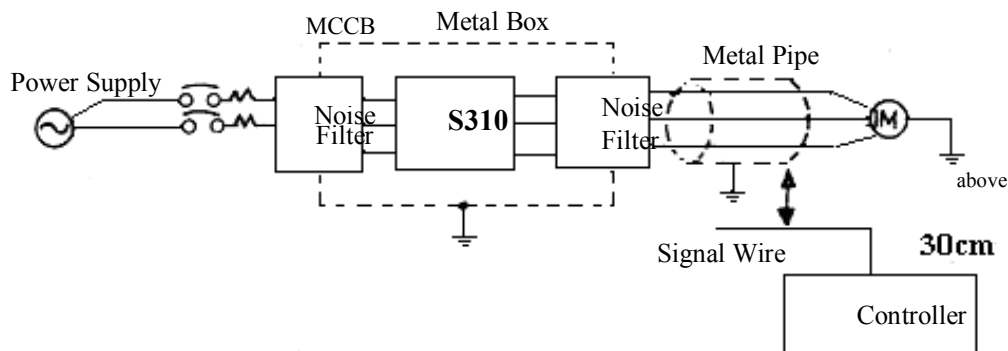
- The inverter uses dedicated power line.



- Add a noise filter or separation transformer when sharing the power line with other machines.



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



- When the connection between the inverter and the motor is too long , consider the voltage drop of the cables.

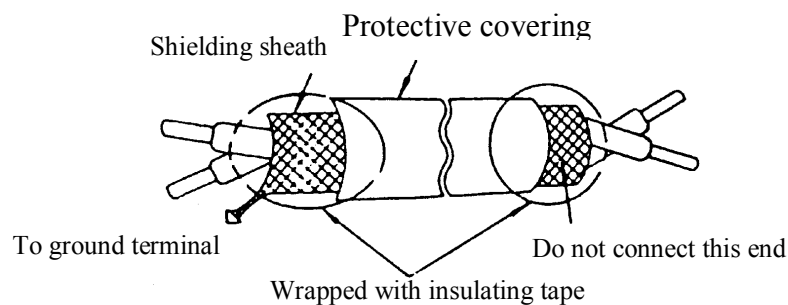
Phase-to-phase voltage drop (V) = $\sqrt{3} \times \text{resistance of wire } (\Omega/\text{km}) \times \text{length of line (m)} \times \text{current} \times 10^{-3}$.

- Carrier frequency must be adjusted based on the motor cable length.

Cable length between the inverter and the motor	Below 150 ft	Below 300 ft	Above 300 ft
Recommended carrier frequency	Below 12KHz	Below 8KHz	Below 5KHz
Setting of parameter 10-03	12	8	5

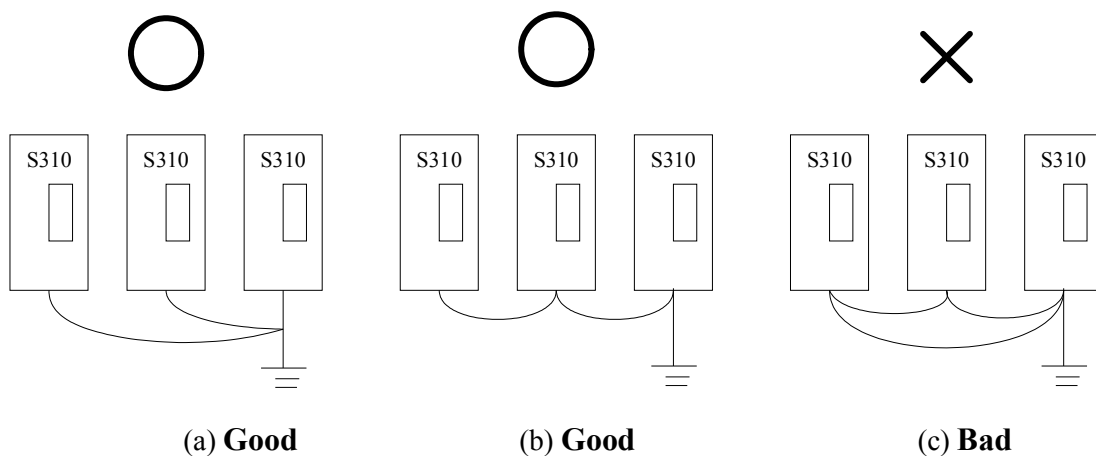
(B) The control circuit wiring must be separated and routed away from the main circuit control line or other high voltage or current power lines to avoid noise interference

- To avoid erroneous operation caused by noise interference, shield the control circuit wiring with twisted-wires, and connect the shielded wire to a ground terminal. Refer to the figure below. The wiring distance should not exceed 50 meters.



(C) Inverter Ground terminal must be connected to installation ground correctly and according to the required local wiring regulations. For 400V class ground resistance should be 10Ω or less.

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



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

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

3.4 Specifications

3.4.1 Product Specifications

Three phase, 380~480V model

S310+-□□□-XXX	401	402	403	405
Horsepower(HP)	1	2	3	5
Max Applicable Motor Output (KW)	0.75	1.5	2.2	3.7
Rated Output Current(A)	2.3	3.8	5.2	8.8
Rated Capacity(KVA)	1.7	2.9	4.0	6.7
Max. Input Voltage	Three Phase: 380~480V +10% -15% , 50/60Hz ± 5%			
Max. Output Voltage	Three Phase: 380~480V			
Input Current(A)	4.2	5.6	7.3	11.6
Net Weight (KG)	1.1	1.2	2.0	2.0
Allowable momentary power loss time (second)	1.0	2.0	2.0	2.0

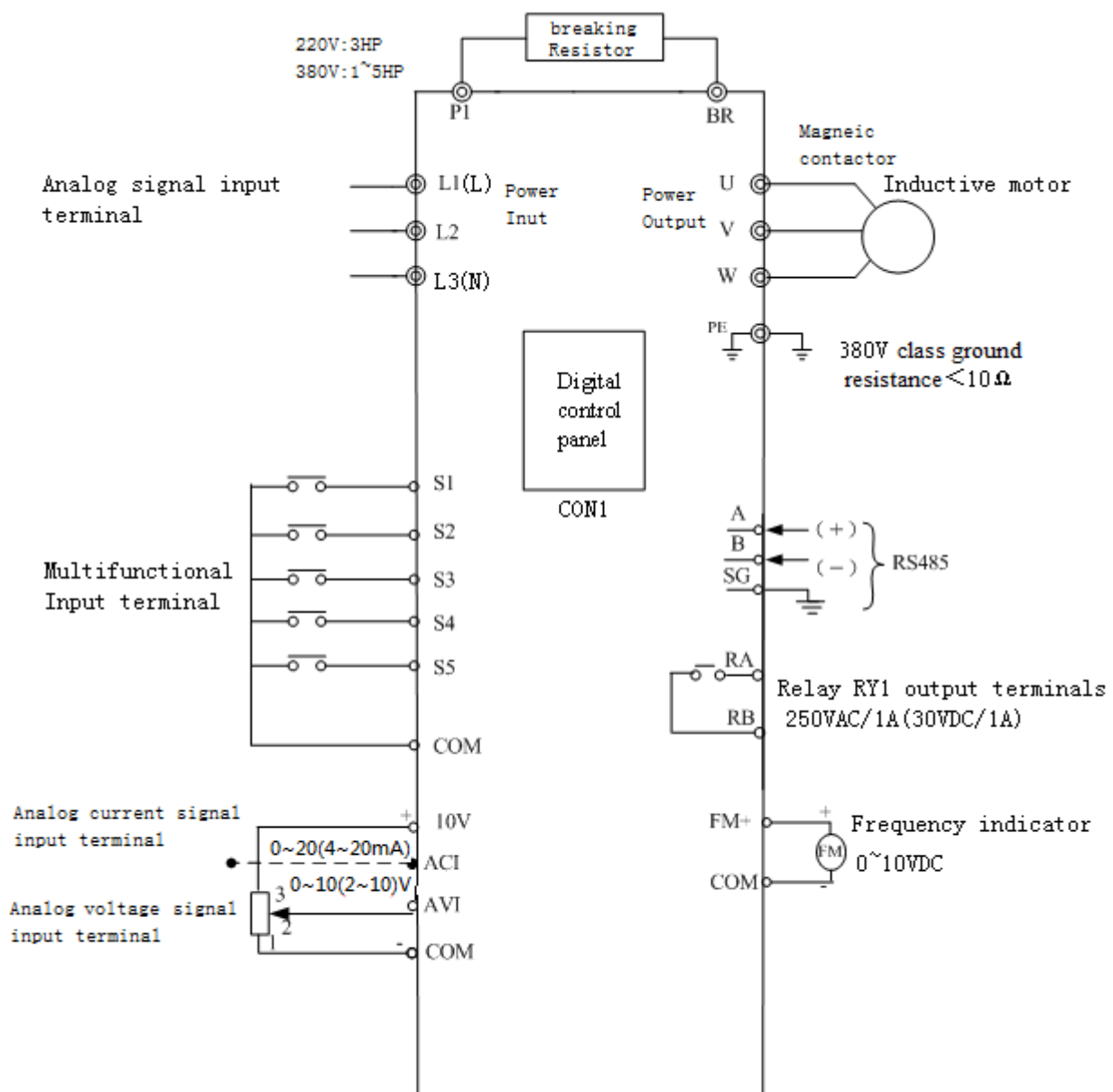
3.4.2 General Specifications

Item		S310+ series
Control Mode		V/F or SLV
Frequency Control	Range	0.01~400.00 Hz
	Starting torque	140% /1Hz (SLV mode)
	Speed control range	1:50 (SLV mode)
	Speed control accuracy	±1% (SLV mode)
	Setting resolution	Digital: 0.01Hz, Analog: 0.06Hz/ 60Hz(10bits)
	Keypad setting	Set directly with ▲ ▼ keys or the VR on the keypad
	Display Function	Five digital LED and status indicator: display frequency / Inverter parameter/ Fault Log/ Program Version
	External signal setting	1. External potentiometer 0-10V/ 0-20mA 2. Provides up/down controls, speed control or automatic procedure control with multifunctional contacts on the terminal block(TM2)
	Frequency Limit Function	Upper/lower frequency limits
General Control	Carrier frequency	1 ~ 12 kHz
	V/F pattern	6 fixed patterns, 1 programable curve
	Acc/Dec control	Acc/Dec time (0.1 ~ 3,600 seconds)
	Multifunction analog output	5 functions (refer to description on 2-12)
	Multifunction input	12 functions (refer to description on 01-00~01-04)
	Multifunction output	6 functions (refer to description on 01-09)
	Other Functions	Momentary Power Loss Restart, Overload Detection, 8 preset speeds, 2/3-wire Control, torque boost, Slip Compensation, Frequency Upper/ Lower Limit, Modbus slave and PC/PDA Link, Auto Restart.
Communication Control		1. Control by RS485 2. One to one or one to many (RS485 ONLY) control. 3. BAUD RATE/STOP BIT/PARITY/bit can be set
Braking Torque		About 20% , standard model the specified external braking resistors can provide 100%
Operation temperature		-10℃ ~ +50℃ (Power distribution panel: -10℃ ~ +40℃)
Storage temperature		-20 ~ 60℃
Humidity		0 – 95% Relative Humidity(Non-condense)
Vibration		1G (9.8m/s ²)
Enclosure		IP20

Protective Functions	FUSE protection	The motor stops after FUSE melt
	Over Voltage	400V class: DC Voltage > 820V
	Under Voltage	400V class: DC Voltage > 380V
	Momentary Power Loss Restart	Restart can be initiated with spin start .
	Stall protection	Stall protection can be set in acceleration ,deceleration ,constant speed.
	Other Function	Over torque detection, error contact control, reverse prohibit, prohibit for direct start after power up and error recovery and parameter lock .

3.5 Wiring diagram S310+ series inverter

Inverter Model: S310+ -203-H1/401-H3/402-H3/403-H3/405-H3



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

2: please avoid connecting output of inverter to the earth.

3.6 Description of connection terminals

Descriptions of main circuit terminals

Symbol	Description		
L1	Main power input. Model 401/402/403/405: L1/L2/L3		
L2			
L3			
BR	Braking resistor connection terminal: Used in applications when it is required to stop a high inertia load rapidly. (refer to specifications of the braking resistor)	For 400V class:1~5HP.	
P1			
U	Inverter outputs		
V			
W			

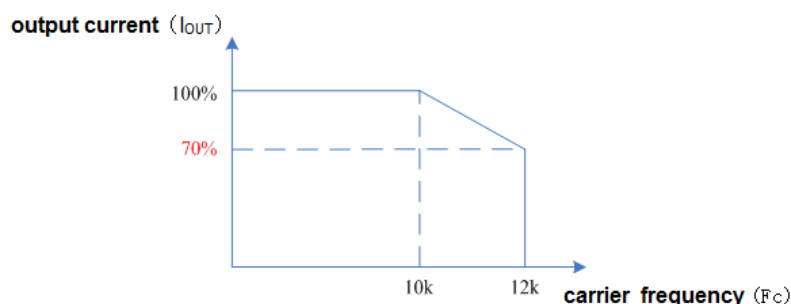
Descriptions of S310 control circuit terminals

Symbol	Description		
RB	Normal close contact	Multifunctional output terminals	Contact rated capacity: (250VAC/1A or30VDC/1A) Contact using description:(refer to parameters 01-09)
RA	Normal open contact		
10V	Frequency knob (VR) power source terminal (pin 3)		
AIN	Analog signal input terminal 0~10(2~10)VDC/0~20(4~20)mA, Select by JP1.		
AVI	Analog signal input terminal 0~10(2~10)VDC(S310+-203H1/401/402/403/405-H3)		
ACI	Analog signal input terminal 0~20(4~20)mA(S310+-203H1/401/402/403/405-H3)		
COM	Common for digital input signal for S1~S5 input.		
FM+	The positive multifunction analog output signal for multifunction (refer to parameter 2-12 description), the signal for output terminal is 0-10VDC (below 2mA).		
S1	multifunction input terminals（refer to parameter 1-00~1-05 description）		
S2			
S3			
S4			
S5			
A	(+) RS485 communication applications		
B	(-) RS485 communication applications		
SG	Ground(RS485)		

Inverter Derating Based on Carrier Frequency.

401/402/405 does not need Derating.

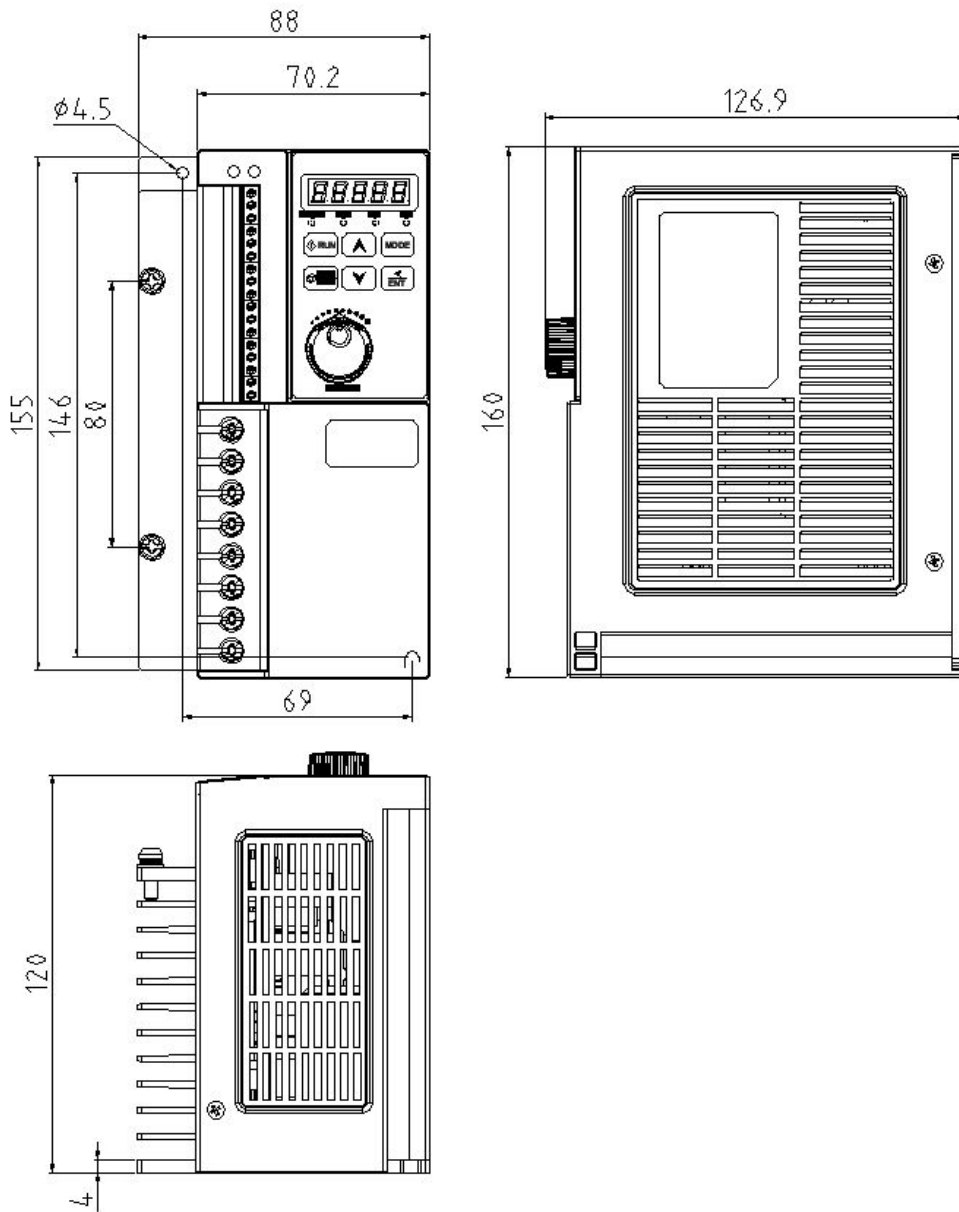
403 need Derating according to the following curve.



3.7 Outline Dimension (unit: mm)

1)Frame1 : Three phase : S310+-401-H3(With No Fan)

Three phase : S310+--402-H3(With Fan)



unit: mm

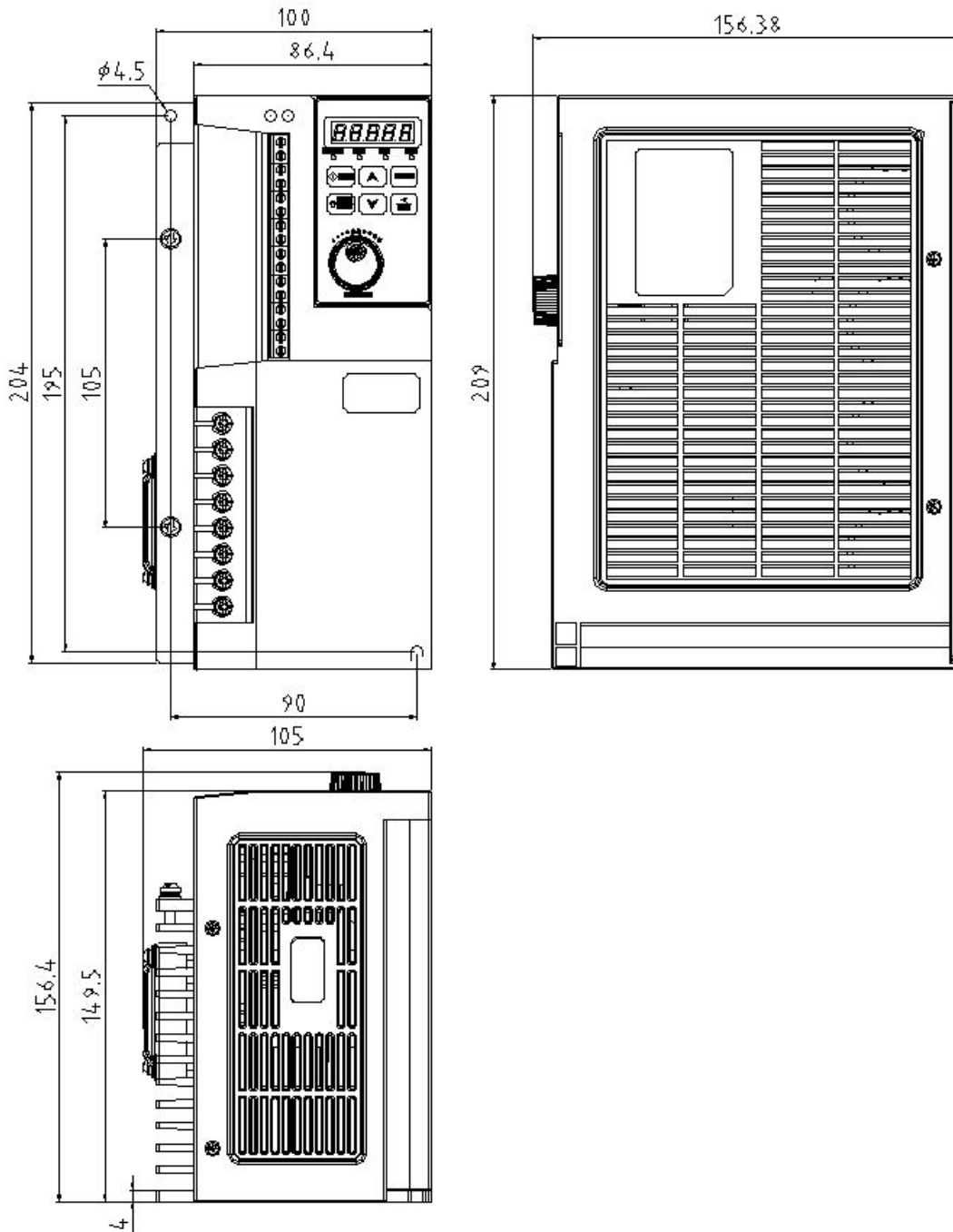
No dimensioning tolerance: $\pm 0.4\text{mm}$

Models : S310+-401-H3

Models : S310+-402-H3

2)Frame2 : Three phase : S310+-403-H3

Three phase : S310+-405-H3



unit: mm

No dimensioning tolerance: $\pm 0.4\text{mm}$

Models : S310+-403-H3

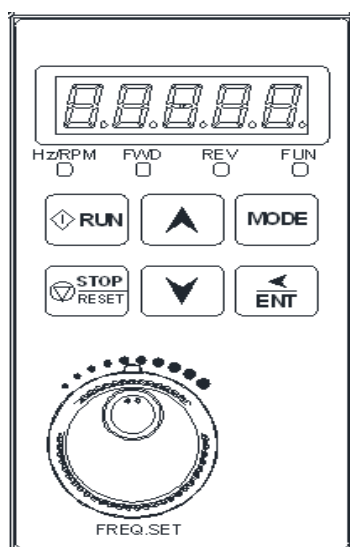
Models : S310+-405-H3

Chapter 4 Software Index

4.1 Keypad Description

4.1.1 Keypad Display and Keys

401/402/403/405 models:

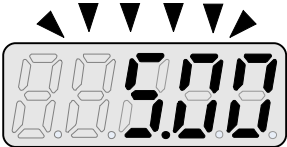
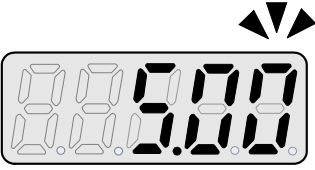


type	name	Description
DISPLAY	5 Digit LED Display	Monitor inverter signals, view / edit parameters, fault / alarm display.
		Hz/RPM: Frequency / Rotational Speed LED FWD: LED ON when inverter is running in forward direction, flashing when stopping. REV: LED ON when inverter is running in reverse direction, flashing when stopping. FUN: LED ON when keypad view parameters.
Potentiometer	Potentiometer on Keypad	FREQ.SET : Frequency can setting by knob.
6 KEYS	RUN	RUN: RUN Inverter in Local Mode
	STOP/RESET	STOP: STOP Inverter RESET: Used to reset fault condition.
	▲	Parameter navigation Up, Increase parameter or reference value.
	▼	Parameter navigation down, decrease parameter or reference value.
	MODE	
	</ ENT (Short press for <; long press for ENT)	<: Selects active seven segment digit for editing with the ▲ ▼ keys ENT: Used to read and save the value of the active parameter.

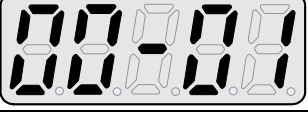
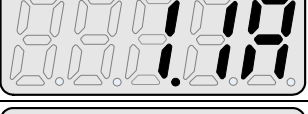
4.1.2 Display Description

Eight Segment Display Description

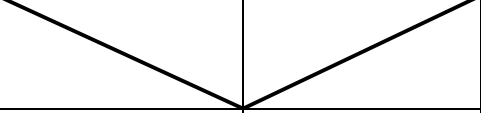
Actual	Display	Actual	Display	Actual	Display	Actual	Display
0		A		L		Y	
1		b		n		-	
2		C		o		°	
3		d		P		_	
4		E		q		.	
5		F		r			
6		G		S			
7		H		t			
8		I		u			
9		J		v			

Display output frequency	Set Frequency Reference	
LED lights on	LED flashes	Selected flashes
		

LED Digital tube display

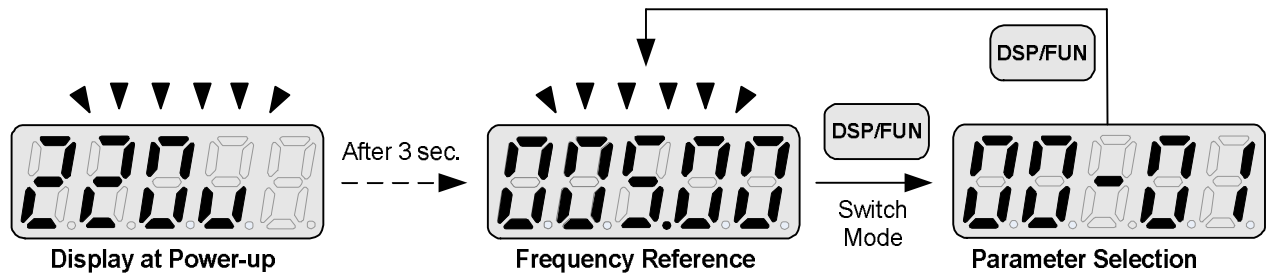
Display	Description
	1. Displays the frequency reference at stop operation. 2. Displays the actual output frequency during run operation.
	Displays parameter code.
	Displays the setting value of parameter.
	Displays input voltage.
	Displays inverter current.
	Displays DC Bus Voltage.
	Displays temperature.
	Error display, refer to chapter 5 Troubleshooting and Maintenance.

LED Indicator Description

	LED Illuminated		LED flashing	
	Display		Display	
Frequency / Rotational Speed LED	 Hz/RPM	Illuminated when display frequency or rotational Speed.		
Display mode LED	 FUN	Illuminated when not display frequency or rotational Speed.		
Forward LED	 FWD	Illuminated when Inverter is running in forward direction.	 FWD	Flashing when forward direction active, no run command.
Reverse LED	 REV	Illuminated when Inverter is running in reverse direction.	 REV	Flashing when reverse direction active, no run command.

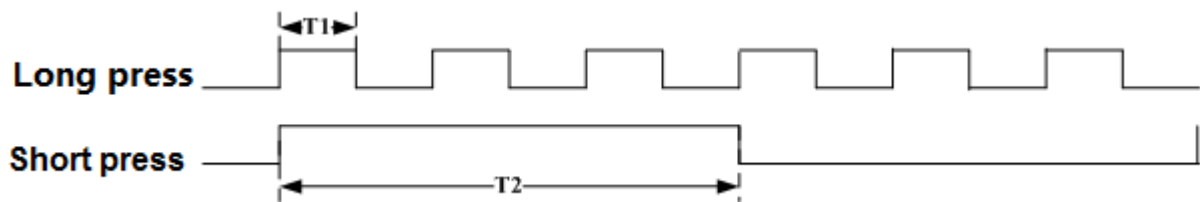
4.1.3 Function of digital tube display

Basic display:



Special keys:

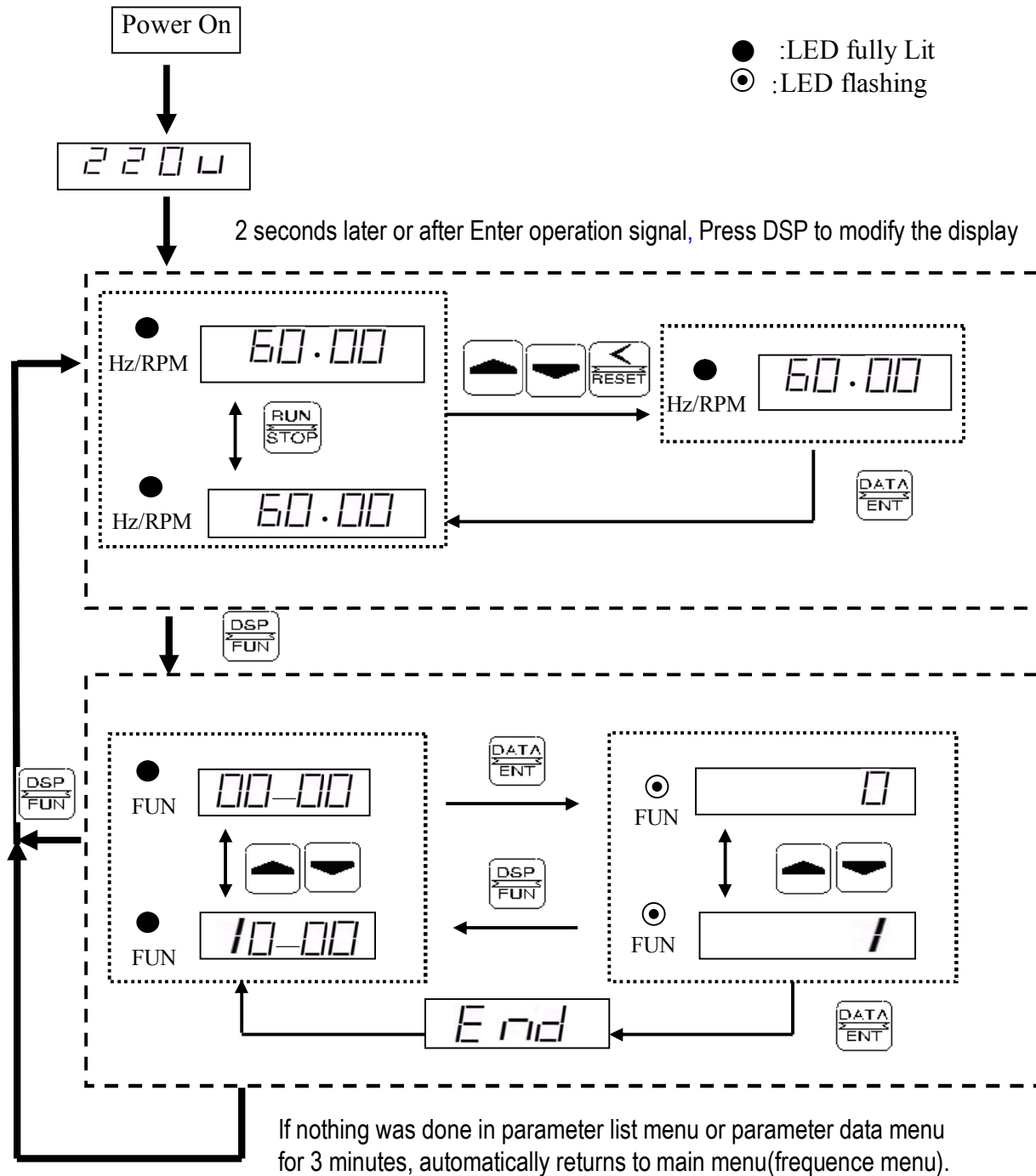
▲ / ▼ :



The digits can be selected by short press and can only change one unit; the select digits can be changed continuously by long press.

4.1.4 Operational examples of Keypad

Operation Instruction of the LED keypad



The instructions for the Power and Alarm LED of the inverter are as follows:

Power indicator light:

On power up, Power LED action, otherwise Power LED Turn off

Alarm indicator light: (note1:)

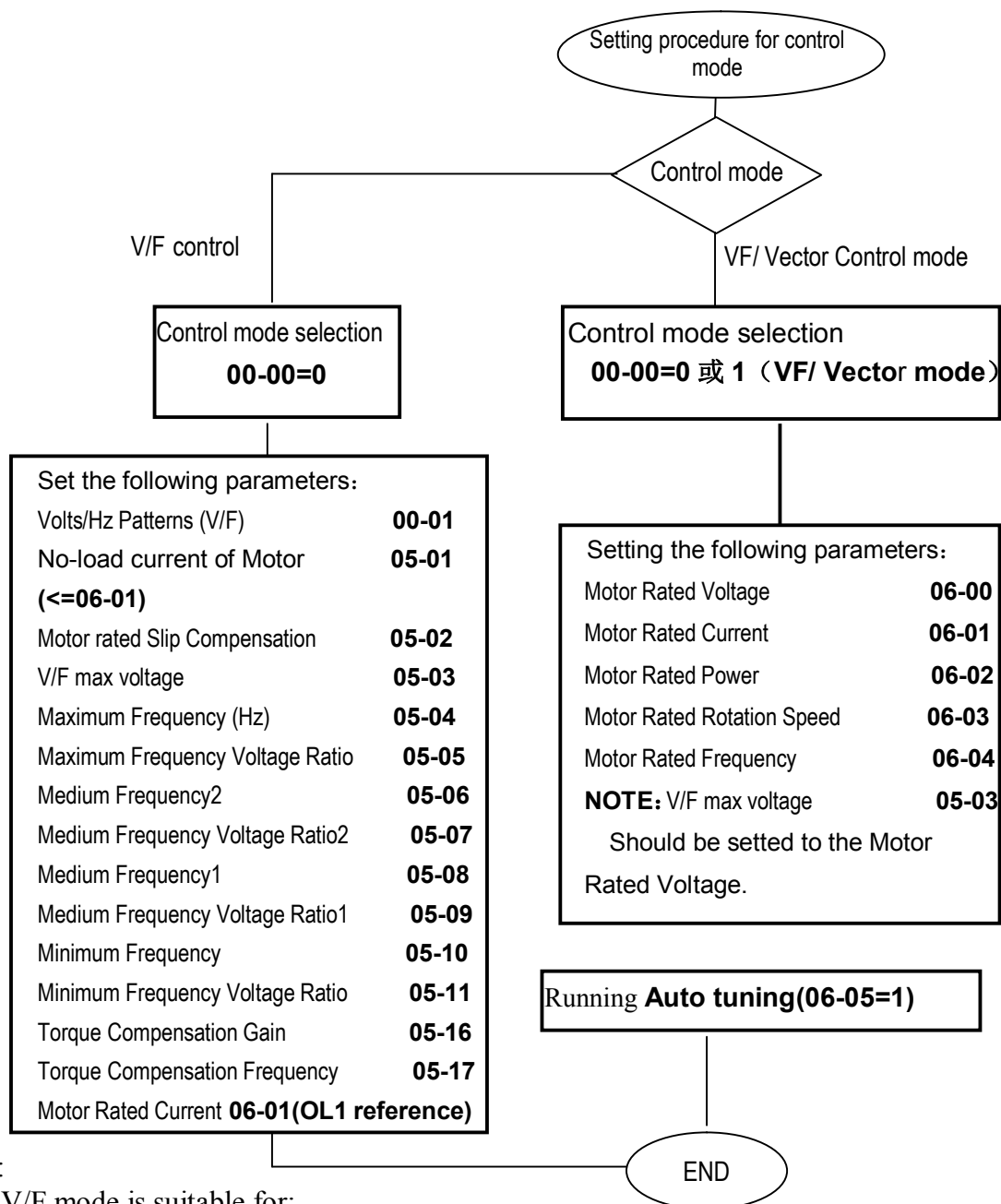
- When the inverter have mistakes which cannot be reseted, such as: CTER,EPR,OH,LV,OV,OC , the Alarm LED flashes quickly
- When the inverter have mistakes which can be reseted, such as: OH-C, OV-C, OC-S, OC-d, OC-C, OC-a, OL2, OL1, the Alarm LED flashes slowly

4.1.5 Control Mode Selection

The inverter provides two control modes:

1、 V/F mode 2、 General Vector Control Mode

- 2、 Users can set the control mode according to their own application. The inverter default Value is V/F mode. Please set control mode and motor related parameters according to the following procedure before using (The Vector control mode mode only suitable for the motors with the same power rating as the inverter, or one size bigger or smaller, only suitable for the motors with the same power rating as the inverter).



※ NOTE:

1. The V/F mode is suitable for:
 - (1) A inverter loads multiple motors at the same time.
 - (2) The motor nameplate is unknown , Or the motor specification is special causing Auto-tuning fail .
 - (3) The inverter and the horsepower of the motor differ more than one level.
2. If a inverter loads multiple motors, only V/F mode can be chosen, and should follow these principles:
 - (1) Motor rated current (06-01) will add up all the rated current of the motors .
 - (2) The others set the appropriate V/F curve parameters (05-04 ~ 05-09).
3. When the motor nameplate is unknown , the inverter will be setted to the internal value of TECO standard motor parameters.

4.2 S310+ Programmable Functions List

Parameter group	Parameter group description
Group 00	Basic Parameters
Group 01	External terminal digital signal input function group
Group 02	External terminal analog signal input function group
Group 03	Preset Frequency function group
Group 04	Start/Stop command group
Group 05	V/F command group
Group 06	Motor parameters group
Group 07	Protection function group
Group 08	Communication function group
Group 09	Reserved
Group 10	Assistant function group
Group 11	Keypad display group
Group 12	User parameter group
Group 13	Auto Run(Auto Sequencer) function group

Parameter Attribute	
*1	Parameters can be changed during run operation.
*2	Parameters can not be changed during communication.
*3	Parameters will not reset to default during a factory reset (initialization).
*4	Parameters will be changed in reset mode.
*5	Only used for V/F control mode.

Group 00: Basic Parameters					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
00-00	Control Mode Selection	0:V/F mode	0	-	
		1: SLV mode			
00-01	Volts/Hz Patterns (V/F)	1~7	1/4	-	*5
00-02	Motor rotation	0: Forward	0	-	*1
		1: Reverse			
00-03	Main Run Command Source Selection	0: Keypad	0	-	
		1: External Run/Stop Control			
		2: Communication			
00-04 Reserved					
00-05	Main Frequency Command Source Selection	0: Keypad	0	-	
		1: Potentiometer on Keypad			
		2: External AVI Analog Signal Input			
		3: Communication Control			
		4: Pulse Input			
		5: Terminal Command UP/DOWN			
00-06 Reserved					
00-07	Frequency Upper Limit (Hz)	0.01~400.00	50.00/60.00	Hz	
00-08	Frequency Lower Limit (Hz)	0.00~399.99	0.00	Hz	
00-09	Acceleration Time 1(S)	0.1~3600.0	10.0	Sec	*1
00-10	Deceleration Time 1(S)	0.1~3600.0	10.0	Sec	*1
00-11	Operation modes for external terminals	0: Forward/Stop-Reverse/Stop	0		
		1: Run/Stop-Forward/Reverse			
		2: 3-Wire Control Mode-Run/Stop			
		3: 4 –Wire pulse Control Mode-Run/Stop			
00-12	Jog Frequency (Hz)	1.00~25.00	2.00	Hz	*1
00-13	Jog Acceleration Time (MFIT) (Seconds)	0.1~25.5	0.5	Sec	*1
00-14	Jog Deceleration Time (MFIT) (Seconds)	0.1~25.5	0.5	Sec	*1

Group 01- External terminal digital signal input function group					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
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)	5	-	
01-03	Multifunction Input Term. S4	3: Preset Speed unit 1 (3-03)	6	-	
01-04	Multifunction Input Term. S5	4: Preset Speed unit 2 (3-05)	8	-	
		5: Jog Command			
		6: Emergency Stop(decelerate to zero and stop)			
		7: Base Block (rotation freely to stop)			
		8: Fault Reset (RESET)			
		9: Auto Running Mode			
		10: Speed up			
		11: Slow Down			
		12: Pulse input - Pulse width measurement (S5)			
		13: Pulse input - Frequency measurement (S5)			
		14: UP Frequency Increasing Command			
		15: DOWN Frequency Decreasing Command			
01-05	Speed up / Slow Down Value	0~ 100	20	%	
01-06	Multifunction terminal S1~ S5 confirm the scan times	1~200	10	2mS	
01-07	UP/DOWN Frequency Detection Width	0.00~5.00	0.00	Hz	
01-08	UP/DOWN Frequency Hold/Adjust Selection	When an increase/decrease frequency command is used, when the converter stops running, the set frequency will be maintained.	0	-	
		1: The setting frequency will be normalized to 0 Hz			
		2: The setting frequency will be maintained, and the increase/decrease frequency function will be effective when the machine stops.			
01-09	Output Relay RY1 Operation mode	0: Run	0	-	
		1: Frequency Reached (Running Frequency Reached setting value)			
		2: Fault			
		3: Any Frequency matches (1-11±1-12)			
		4: Frequency Threshold Level (> 1-11) - Frequency Reached 1			
		5: Frequency Threshold Level (> 1-11) - Frequency Reached 2			
		6: Setting value reached			
		7: Current value reached			
01-10	Relay output contact mode	0:A contact (Normal open)	0		
		1:B contact (Normal close)			
01-11	Frequency Output Setting (Hz)	0.00~400.00	0.00	Hz	*1
01-12	Frequency Detection Range	0.00~30.0040	2.00	Hz	*1
01-13	S1~ S5 switch type select NO(Normal open) NC(Normal close)	xxxx0: s1 NO xxx1: s1 NC	00000		
		xxx0x: s2 NO xxx1x: s2 NC			
		xx0xx: s3 NO xx1xx: s3 NC			
		x0xxx: s4 NO x1xxx: s4 NC			
		0xxxx: s5 NO 1xxxx: s5 NC			
01-14	Input pulse frequency (Pulse width measurement)	0.01~0.20	0.1	kHz	

Group 01- External terminal digital signal input function group					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
01-15	Pulse frequency multiple	0.01~9.99	1.00		
01-16	Pulse input filtering coefficient	0~100	5		
01-17	Count value reaches the setting value	0~9999	0		
01-18	Pulse input counting filtering coefficient	1~100	1		
01-19	Current reaches the alignment	0.1~15.0	0.1	A	
01-20	Current arrives to detect the delay time	0.1~15.0	0.1	Sec	

Group 02- External terminal analog signal input function group					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
02-00	AVI(AIN) and ACI analog Input signal type select	value	AVI(AIN)	ACI	
		0	0~10V or(0~20mA)	0~20mA	
		1	0~10V or(0~20mA)	4~20mA	
		2	2~10V or(4~20mA)	0~20mA	
		3	2~10V or(4~20mA)	4~20mA	
02-01	AVI(AIN) signal scanning and filtering time	1~200	100	2mSec	
02-02	AVI(AIN) Gain	0 ~ 200	100	%	*1
02-03	AVI(AIN) Bias	0 ~ 100	0	%	*1
02-04	AVI(AIN) Bias Selection	0: Positive 1: Negative	0	-	*1
02-05	AVI(AIN) signal directional control selection	0: Positive 1: Negative	0	-	*1
02-06	ACI Function selection	0:PID feedback signal (terminal ACI) 1:ACI deviation signal input (terminal ACI)	0		
02-07	ACI signal scanning and filtering time	1~200	100	2mSec	
02-08	ACI Gain	0 ~ 200	100	%	*1
02-09	ACI Bias	0 ~ 100	0	%	*1
02-10	ACI Bias Selection	0: Positive 1: Negative	0	-	*1
02-11	ACI signal directional control selection	0: Positive 1: Negative	0	-	*1
02-12	Analog Output mode(FM+)	0: Output Frequency	0	-	*1
		1: Frequency Setting			
		2: Output Voltage			
		3: DC Bus Voltage			
		4: Output Current			
02-13	Analog Output Gain	0 ~ 200	100	%	*1
02-14	Analog Output filtering coefficient	0 ~ 100	5	%	*1

Group 03- Multi-Speed Parameters					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
03-00	Acceleration and Deceleration Selection of Multi-Speed	0: Part acceleration and deceleration time are set by acceleration and deceleration time ¹	0	-	
		1: Part acceleration and deceleration time are set by independently			
03-01	Frequency Setting of Speed-Stage 0	0.00 ~ 400.00	5.00	Hz	*1
03-02	Frequency Setting of Speed-Stage 1	0.00 ~ 400.00	5.00	Hz	*1
03-03	Frequency Setting of Speed-Stage 2	0.00 ~ 400.00	10.00	Hz	*1
03-04	Frequency Setting of Speed-Stage 3	0.00 ~ 400.00	15.00	Hz	*1
03-05	Frequency Setting of Speed-Stage 4	0.00 ~ 400.00	20.00	Hz	*1
03-06	Frequency Setting of Speed-Stage 5	0.00 ~ 400.00	25.00	Hz	*1
03-07	Frequency Setting of Speed-Stage 6	0.00 ~ 400.00	30.00	Hz	*1
03-08	Frequency Setting of Speed-Stage 7	0.00 ~ 400.00	35.00	Hz	*1
03-09~03-16 Reserved					
03-17	Acceleration Time Setting of Multi Speed 0	0.1 ~ 3600.0	10.0	Sec	*1
03-18	Deceleration Time Setting of Multi Speed 0	0.1 ~ 3600.0	10.0	Sec	*1
03-19	Acceleration Time Setting of Multi Speed 1	0.1 ~ 3600.0	10.0	Sec	*1
03-20	Deceleration Time Setting of Multi Speed 1	0.1 ~ 3600.0	10.0	Sec	*1
03-21	Acceleration Time Setting of Multi Speed 2	0.1 ~ 3600.0	10.0	Sec	*1
03-22	Deceleration Time Setting of Multi Speed 2	0.1 ~ 3600.0	10.0	Sec	*1
03-23	Acceleration Time Setting of Multi Speed 3	0.1 ~ 3600.0	10.0	Sec	*1
03-24	Deceleration Time Setting of Multi Speed 3	0.1 ~ 3600.0	10.0	Sec	*1
03-25	Acceleration Time Setting of Multi Speed 4	0.1 ~ 3600.0	10.0	Sec	*1
03-26	Deceleration Time Setting of Multi Speed 4	0.1 ~ 3600.0	10.0	Sec	*1
03-27	Acceleration Time Setting of Multi Speed 5	0.1 ~ 3600.0	10.0	Sec	*1
03-28	Deceleration Time Setting of Multi Speed 5	0.1 ~ 3600.0	10.0	Sec	*1
03-29	Acceleration Time Setting of Multi Speed 6	0.1 ~ 3600.0	10.0	Sec	*1
03-30	Deceleration Time Setting of Multi Speed 6	0.1 ~ 3600.0	10.0	Sec	*1

Group 03- Multi-Speed Parameters					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
03-31	Acceleration Time Setting of Multi Speed 7	0.1 ~ 3600.0	10.0	Sec	*1
03-32	Deceleration Time Setting of Multi Speed 7	0.1 ~ 3600.0	10.0	Sec	*1
03-33~03-48 Reserved					

Group 04- Start/stop command group					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
04-01	Stopping Method Selection	0: Enhanced braking capacity	0	-	
		1: Coast to stop			
04-02 Reserved					
04-03	Momentary Power Loss and Restart	0: Momentary Power Loss and Restart disable	0	-	
		1: Momentary power loss and restart enable			
04-04~04-07 Reserved					
04-08	Reset Mode Setting	0: Enable Reset Only when Run Command is Off	0	-	
		1: Enable Reset when Run Command is On or Off			
04-09	Direct Running After Power Up	0: Enable Direct running after power up	1	-	
		1: Disable Direct running after power up			
04-10~04-14 Reserved					
04-15	DC Injection Brake Start Frequency @stopped	0.10 ~ 10.00	1.5	Hz	
04-16	DC Injection Brake Level @stopped	0 ~ 20	5	%	
04-17	DC Injection Brake Time@stopped	0.0 ~ 25.5	0.5	Sec	
04-18	DC Injection Brake@running	0 : DC Injection Brake @running enable	0	-	
		1 : DC Injection Brake @ running disable			
04-19	Brake chopper enable alignment	400V: 550.0~800.0	690	V	
04-20	STP2 enable	0 : enable 1 : disable	1		

Group 05- V/F command group					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
05-00 Reserved					
05-01	No-load Current of Motor	-----		Amps	*5
05-02	Motor rated Slip Compensation	0.0 ~100.0	0.0	%	*5
05-03	V/f max voltage	400.0V:323.0~528.0	380.0	Vac	
05-04	Maximum Frequency	0.20 ~ 400.00	50.00/60.00	Hz	*5
05-05	Maximum Frequency Voltage	400V:0.0 ~ 528.0	380.0	Vac	*5
05-06	Medium Frequency2	0.10 ~ 400.00	2.50/3.00	Hz	*5
05-07	Medium Frequency Voltage 2	400V:0.0 ~ 528.0	30.4	Vac	*5
05-08	Medium Frequency1	0.10 ~ 400.00	2.50/3.00	Hz	*5
05-09	Medium Frequency Voltage 1	400V:0.0 ~ 528.0	30.4	Vac	*5

Group 05- V/F command group					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
05-10	Minimum Frequency	0.10 ~400.00	1.50	Hz	*5
05-11	Minimum Frequency Voltage	400V:0.0 ~ 528.0	22.8	Vac	*5
05-12	Reserved				
05-13	Slip compensation Low-pass Filter time	0.05 ~10.00	0.10	mS	*5
05-14	Reserved				
05-15	Auto-Torque compensation Filter time coefficient	0.1~1000.0	0.1	-	*1*5
05-16	Auto-Torque compensation gain	0~200	35	%	*1*5
05-17	Auto-Torque compensation frequency	1.00~5.00	1.00	Hz	*1

Group 06- Motor Parameters					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
06-00	Motor rated voltage	-----		Vac	*4
06-01	Motor rated current	-----		A	*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 parameters automatic tuning	0: Disable 1: Perform static self-learning of motor parameters	0		
06-06	Stator resistance gain	-----		Rs	*4
06-07	Rotor resistance gain	-----		Rr	*4
06-08	Equivalent inductance gain	-----		1kg	*4
06-09	Magnetizing current gain	-----		imag	*4
06-10	Iron loss conductance gain	-----		gm	*4
06-11	Deadtime gain	0~100	100		*4

Group 07- Protection Parameters					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
07-00	Stall Prevention Function	xxxx0: Stall prevention is enabled in acceleration	00000	-	*1
		xxxx1: Stall prevention is disabled in acceleration.			
		xxx0x: Stall prevention is enabled in deceleration.			
		xxx1x: Stall prevention is enabled in deceleration.			
		xx0xx: Stall prevention is enabled in operation			
		xx1xx: Stall prevention is disabled in operation			
		x0xxx: Enable over voltage Prevention in deceleration			
		x1xxx: Disable over voltage Prevention in deceleration			
07-01	Stall Prevention Level During Acceleration (%)	50 ~ 200	160	%	
07-02	Stall Prevention Level During deceleration (%)	50 ~ 200	160	%	

Group 07- Protection Parameters					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
07-03	Stall Prevention Level In Run Mode (%)	50 ~ 200	160	%	
07-04	over voltage Prevention Level in Run Mode (%)	80~100 （OV %）	100	%	
07-05	Electronic Motor Overload Protection Operation Mode OL1	0: Enable motor Protect by relay	1	-	
		1: Disable motor Protect by relay			
07-06~07-12 Reserved					
07-13	OH over heat Protection (cooling fan control)	0: Auto (Depends on temp.)	1	-	
		1: Operate while in RUN mode			
		2: Always Run			
		3: Disabled			
07-14~07-17 Reserved					
07-18	OL2 protection reset time	1.0~10.0	5.0		

Group 08- Communication function group					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
08-00	Assigned Communication Station Number	1~ 32	1	-	*2*3
08-01	RTU/ASCII slection	0: RTU code	0		*2*3
		1: ASCII code			
08-02	Baud Rate Setting (bps)	0:2400	3	bps	*2*3
		1:4800			
		2:9600			
		3:19200			
		4:38400			
08-03	Stop Bit Selection	0: 1 Stop Bit	0	-	*2*3
		1: 2 Stop Bits			
08-04	Parity Selection	0: Without Parity	0	-	*2*3
		1: With Even Parity			
		2: With Odd Parity			
08-05	Data Format Selection	0: 8-Bits Data	0	-	*2*3
		1: 7-Bits Data			
		1: 7-Bits Data			
08-06	Communication time-out detection time	0.0~25.5	0.0	Sec	
08-07	Communication time-out operation selection	0: Deceleration to stop	0	-	
		1: Coast to stop			
		2: continue operating.			
08-08	Err6 fault tolerance times	1~20	3		

Group 09- PID Parameters					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
09-00	PID mode selection	0: Disable	0		
		1: Bias D Control (Fwd/Rev,positive Characteristics)			
		2: Feedback D Control (Fwd/Rev ,positive Characteristics)			
		3.Bias D Control (Fwd/Rev, Reversed Characteristics)			

Group 09- PID Parameters					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
09-00	PID mode selection	4: Feedback D Control (Fwd/Rev, Reversed Characteristics)	0		
09-01	Feedback Gain coefficient	0.00 ~ 10.00	1.00		*1
09-02	Proportional Gain	0.0 ~ 10.0	1.0	%	
09-03	Integral Time	0.0 ~ 100.0	10.0	Sec	
09-04	Differential Time	0.00 ~ 10.00	0.00	Sec	
09-05	PID Offset	0: Positive	0		
		1: Negative			
09-06	PID Offset Adjust	0 ~109	0	%	
09-07	PID Output Lag Filter Time	0.0 ~ 2.5	0.0	Sec	
09-08	Feedback Loss Detection Mode	0: Disabled	0		
		1: Enabled - Drive Continues to Operate After Feedback Loss			
		2: Enabled - Drive "STOPS" After Feedback Loss			
09-09	Feedback Loss Detection Level	0 ~ 100	0		
09-10	Feedback Loss Detection Delay Time	0.0 ~25.5	1.0	Sec	
09-11	Integration Limit Value	0 ~ 109	100		
09-12~09-13 Reserved					
09-14	Sleep Frequency Level	0.00~400.00	0.00	Hz	
09-15	Sleep Function Delay Time	0.0 ~25.5	0.0	Sec	
09-16	Wake up frequency Level	0.00 ~ 400.00	0.00	Hz	
09-17	Wake up function Delay Time	0.0 ~ 25.5	0.0	Sec	

Group 10- Assistant function group					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
10-01	Reverse operation control	0: Reverse command is enabled	0		
		1: Reverse command is disabled			
10-02 Reserved					
10-03	Carrier Frequency	1~12	5	kHz	
10-04	Carrier mode Selection	0: Carrier mode 0	1		
		1: Carrier mode 1			
10-05~10-06 Reserved					
10-07	S-Curve Acc/Dec 1	0.0 ~4.0	0.0	Sec	
10-08	S-Curve Acc/Dec	0.0 ~ 4.0	0.0	Sec	
10-09	S-Curve Acc/Dec 3	0.0 ~ 4.0	0.0	Sec	
10-10	S-Curve Acc/Dec 4	0.0 ~ 4.0	0.0	Sec	
10-11~10-15 Reserved					
10-16	Automatic Voltage Regulation (AVR)	0: Enable	0		
		1: Disable			
10-17	Carrier Output Tuning with temperature	0: Enable	0		
		1: Disable			

Group 11- Keypad display group					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
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	00000		*1
11-01	Custom Units (Line Speed) Value	0 ~ 65535	1500/ 1800		*1
11-02	Custom Units (Line Speed) Display Mode	0: Drive Output Frequency is Displayed 1: Line Speed is Displayed in Integer (xxxxx) 2: Line Speed is Displayed with One Decimal Place (xxxx.x) 3: Line Speed is Displayed with Two Decimal Places (xxx.xx) 4: Line Speed is Displayed with Three Decimal Places (xx.xxx)	0		*1
11-03~11-07 Reserved					
11-08	Keypad frequency flashing when stop	0: Enable	0		
		1: Disable			

Group 12- User parameter group					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
12-00	Drive Horsepower Code		----		*3
12-01	Software Version	----	----		*3
12-02	Fault Log		----		*3
12-03	Accumulated Operation Time1	0~23	----	hour	*3
12-04	Accumulated Operation Time2	0~65535	----	day	*3
12-05	Accumulated Operation Time Mode	0: Time Under Power	0		*3
		1: Run Mode Time Only			
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	0		
		1: 03-01~03-16 cannot be changed			
		2: All Functions cannot be changed Except 03-01~ 03-16			
		3: Disable All Function			

Group 13- Auto Run function group					
Code	Parameter Name	Setting Range	Default	Unit	Attribute
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	0.00	Hz	*1
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				
13-08~13-15 Reserved					
13-16	Auto_ Run Mode Running Time Setting 0	0.0~3600.0	0.0	Sec	*1
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				
13-24~13-31 Reserved					
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				

4.3 Parameter Function Description

Group0- The basic parameters group

00-00	Control Mode
range	【0】 : V/F mode 【1】 : Vector mode

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

00- 01	Volts/Hz Patterns (V/F)
range	【1~7】

00-01= 0~6, V / F Pattern.

00-01=7, Flexible V/F pattern, programmable according to parameters refer to group5.

00- 02	Motor rotation
range	【0】 : Forward 【1】 : Reverse

You can set 00-02 parameters to make a forward/reverse switch

Note : when **10-01=1** : Reverse operation disable, **00-02** cannot set to 1, keypad display " LOC " .

00- 03	Main Run Command Source Select
range	【0】 : Keypad 【1】 : External Run/Stop Control 【2】 : Communication

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

2) **00-03=1**, the inverter is controlled by the external terminals, and the Stop key for emergency stop is operational.

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

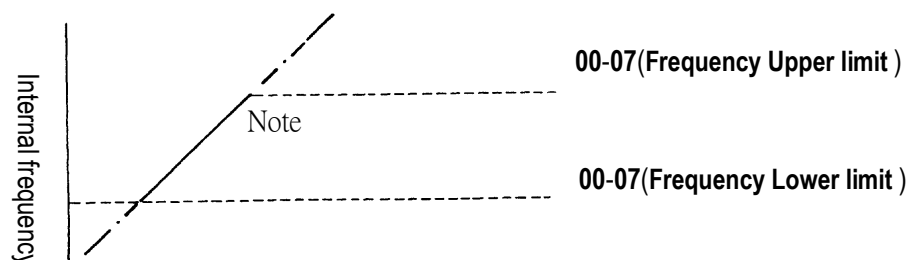
3) **00-03=2**, the inverter is controlled by Communication.

00- 05	Main Frequency Command Source Select
range	【0】 : UP/DOWN of Keypad 【1】 : Potentiometer on Keypad 【2】 : External AVI Analog Signal Input 【3】 : Communication Control 【4】 : Pulse Input 【5】 : Terminal Command UP/DOWN

1) Please refer to description of parameter group **01-00 ~ 01-04** (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.

00-07	Frequency Upper limit
range	【0.01~400.00】 Hz
00-08	Frequency Lower limit
range	【0.00~499.99】 Hz



※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
range	【0.1~3600.0】 Sec
00-10	Deceleration time 1
range	【0.1~3600.0】 Sec

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

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

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

00-11	Operation modes for external terminals
range	【0】 Forward/stop-reverse/stop 【1】 Run/stop-forward/reverse 【2】 3 wire control mode -run/stop 【3】 4 wire control mode -run/stop

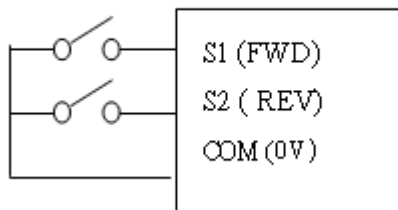
1.) When operation command **00-03 = 1** (external terminal), **00-11** is valid.

2.) When operation command **00-03 = 1** (external terminal control), the stop button for emergency is available.

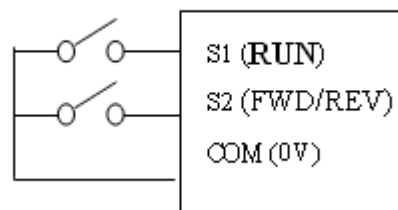
3.) That both forward and reverse commands are ON will be treated as STOP.

External terminals control connection mode is described below with s1, s2 and s3, set parameters **1-01(S1)=0**, **1-02(S2)=1**.

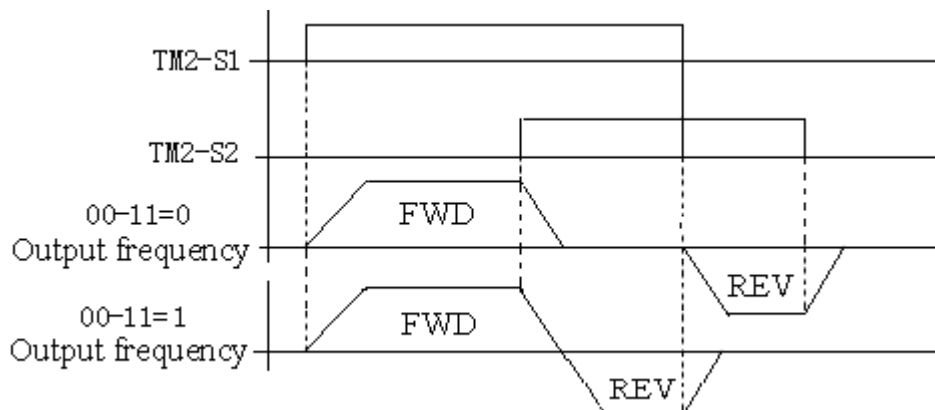
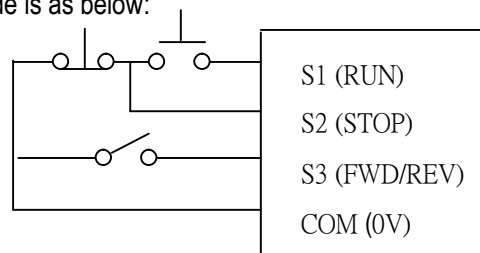
1、00-11 = 0, Control mode is as below:

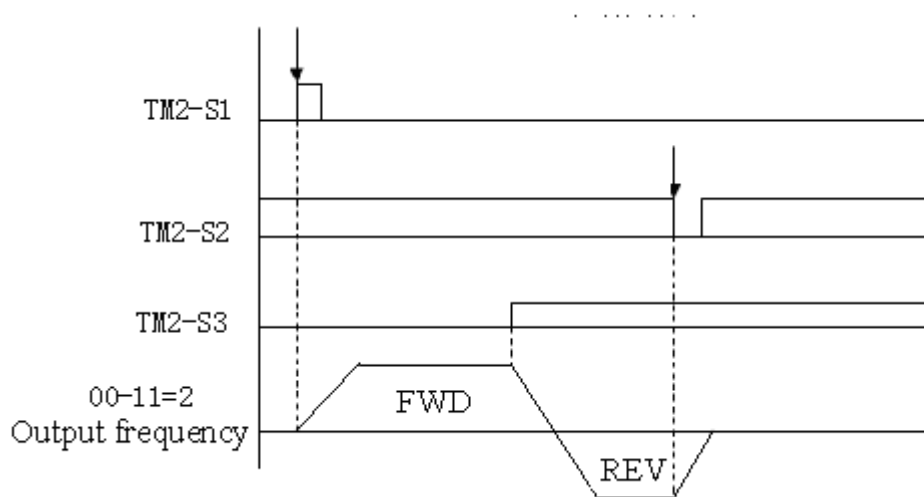


2、00-11 =1, Control mode is as below:



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





- ※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
range	【1.00~25.00】 Hz
00-13	Jog Acceleration Time
range	【0.1~25.5】 Sec
00-14	Jog Deceleration Time
range	【0.1~25.5】 Sec

When the external terminal set to the point function, and when the input signal is valid, the point action function is executed, and the point action frequency is set by **00-12**.The point movement and deceleration time are set by **00-13/00-14** respectively.

Group1- External terminal digital signal input function group

01- 00	Multifunction input terminals controlling S1
01- 01	Multifunction input terminals controlling S2
01- 02	Multifunction input terminals controlling S3
01- 03	Multifunction input terminals controlling S4
01- 04	Multifunction input terminals controlling S5
range	【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】 : JOG Command 【6】 : Emergency Stop 【7】 : Base Block 【8】 : Reset 【9】 : Auto _ Run Mode 【10】 : Speed up 【11】 : Slow Down 【12】 : Pulse input- Pulse width measurement (S5) 【13】 : Pulse input- Frequency measurement (S5) 【14】 : Up Command 【15】 : Down Command

- 1) The terminals **S1- S5** on terminal block (**TM2**) are multifunction input terminals. The 9 functions shown above can be set for these terminals.
- 2) Function Description for **1-00~04**:

A.01-00~04=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.

B.01-00~04=2/3/4 (Frequency Command 1/2/4)

The corresponding preset frequency will be according to preset value of parameters **3-01 to 3-08** and in relation to the operation of input terminals 1 to 3. as shown in the table below:

Output frequency preset value	Multifunction terminal 3 Preset value =4	Multifunction terminal 2 Preset value =3	Multifunction terminal 1 Preset value =2
3-01 Preset Speed 0	0	0	0
3-02 Preset Speed 1	0	0	1
3-03 Preset Speed 2	0	1	0
3-04 Preset Speed 3	0	1	1
3-05 Preset Speed 4	1	0	0
3-06 Preset Speed 5	1	0	1
3-07 Preset Speed 6	1	1	0
3-08 Preset Speed 7	1	1	1

C.01-00~ 04=5(JOG Command)

When Jog operation, is selected, the inverter operates at the Jog acceleration and deceleration times.

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

D.01-00~ 04=6: External Emergency Stop

The inverter will decelerate to stop 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.

E.01-00~04=7: Base Block

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

F.01-00~04=8 (Reset Command)

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

G.01-00~04=9

Automatic program operation is generally simple built-in PLC function, when the external terminal set to 9, the general principles of the terminal guided 13 groups of related setting and complete function of automatic program running, refer to 13 groups.

H. 01-00~04=10/11(Speed up / Slow Down)

Increase or decrease the reference value by set in the parameter 01-05 acceleration/deceleration value by percentage (relative)

01- 06	Speed up / Slow Down Value
range	【1~100】 %

Enter a relative percentage value to be added to the actual rise or deceleration reference value or subtract from it.

The actual frequency input value = Frequency input value + Frequency input value × (parameter 01-05)

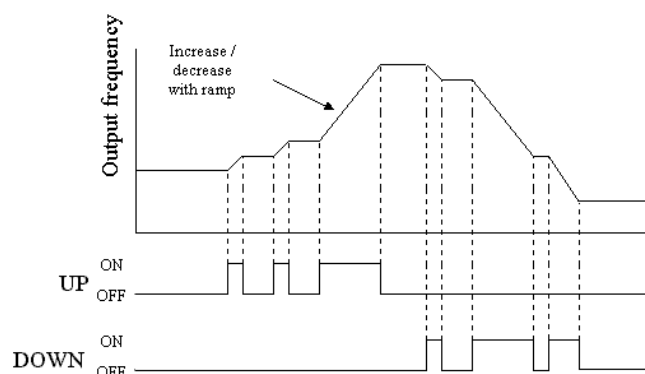
01- 06	Digital /Analog input signal scan times
range	【1~200】 2mSec

- 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.

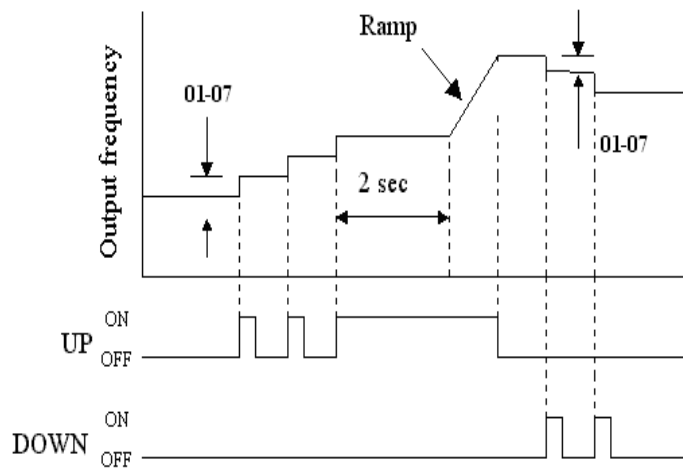
01- 07	Step of Up/Down Function
range	【0.00~5.00】 Hz

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).



- 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)

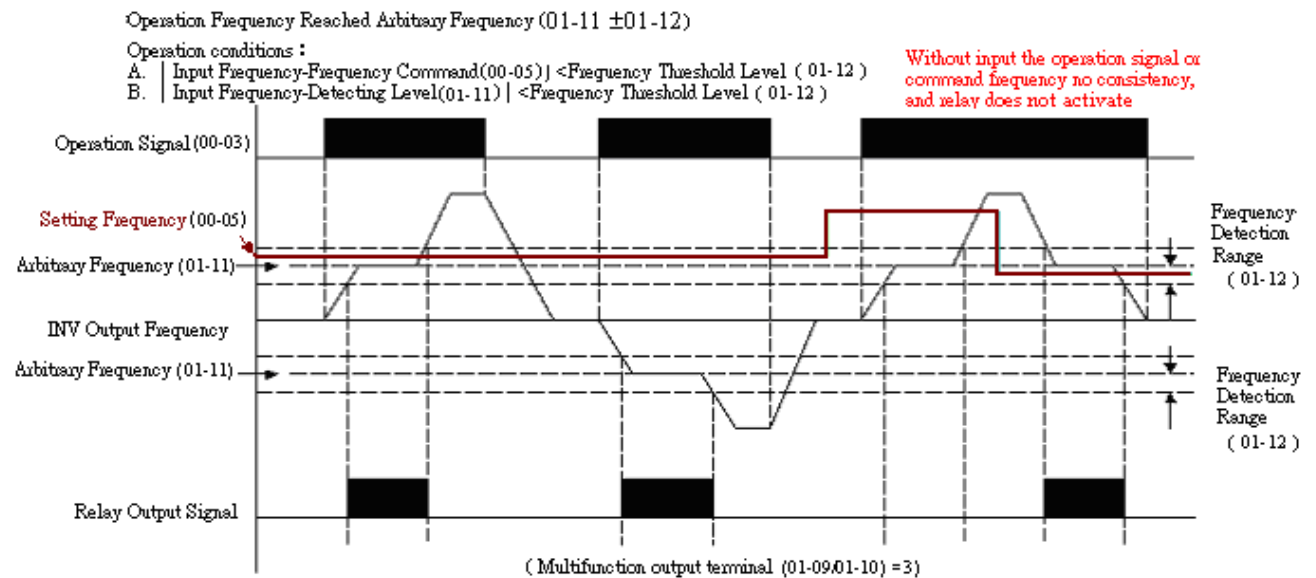


01-08	Up/Down keep Frequency mode
range	When Up/Down is used,, and he inverter stops: 【0】 : The set frequency will be maintained. 【1】 : the preset frequency is reset to 0 Hz 【2】 : The set frequency will be maintained., and the UP/Down is available.

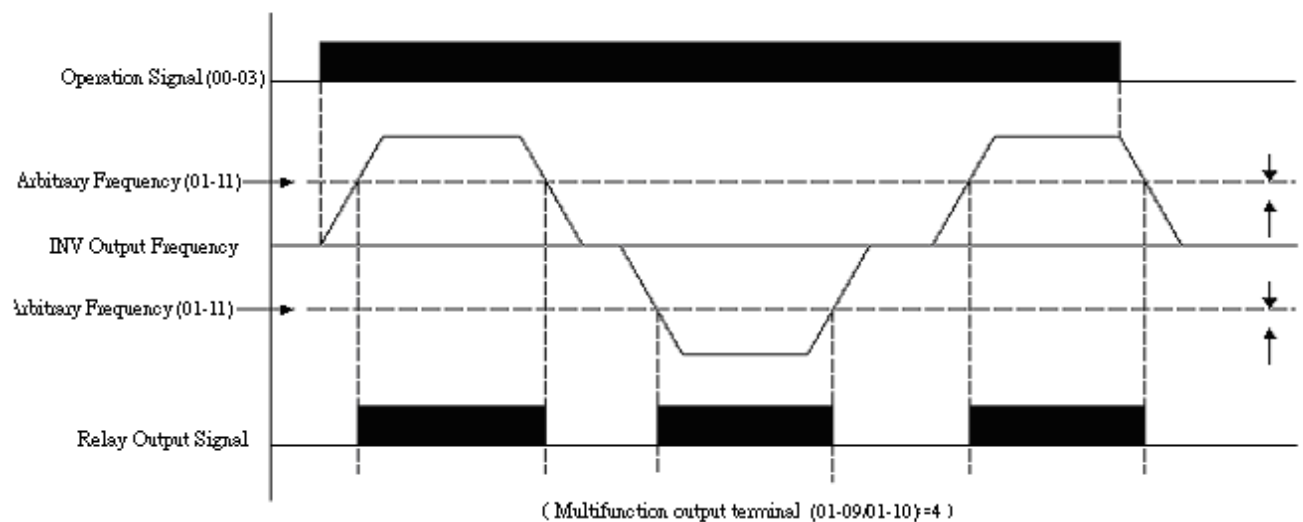
- 1).01-08=0: the inverter will accelerate to the speed set in parameter 03-01 as receiving the Run command and run at such certain speed. The inverter begins to accelerate (decelerate) as the UP (Down) terminal is energized. The inverter will hold the speed as the UP/DOWN command released. When the 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.

01-09	Output Relay RY1 Operation Mode
range	【0】 : Run 【1】 : Frequency Reached 【2】 : Fault 【3】 : Set Frequency (01-11 ±01-12) 【4】 : Frequency Threshold Level (> 01-11) - Frequency Reached 【5】 : Frequency Threshold Level (< 01-11) - Frequency Reached
01-10	Output Relay TR1 Operation Mode
range	【0】 : A contact (NO) 【1】 : B contact (NC)
01-11	Frequency Reached Output Setting
range	【0.00~400.00】 Hz
01-12	Frequency Detection Range
range	【0.00~30.00】 Hz

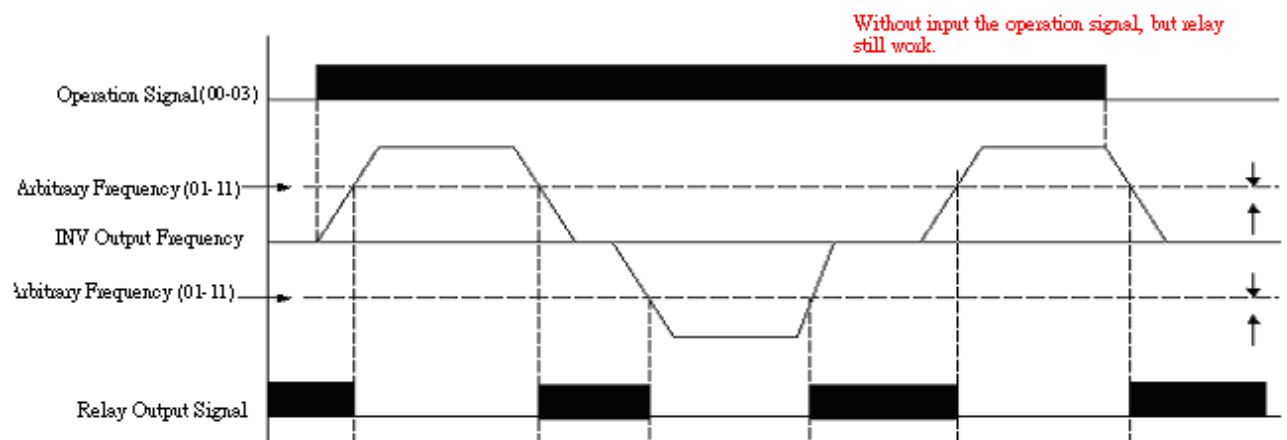
A.01-09/10= 3: Arbitrary frequency consistency $F_{out} = 01-11 \pm 01-12$



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



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



01- 13	s1~s5 switch type select				
range	xxxx0:	s1	NO	xxxx1: s1	NC
	xxx0x:	s2	NO	xxx1x: s2	NC
	xx0xx:	s3	NO	xx1xx: s3	NC
	x0xxx:	s4	NO	x1xxx: s4	NC
	0xxxx:	s5	NO	1xxxx: s5	NC

※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)

01- 14	Input pulse frequency (Pulse width measurement)
range	【0.01~0.20】 kHz
01- 15	Pulse frequency multiple
range	【0.01~9.99】

1、The external terminal S5 is used as the setting parameter for pulse width measurement:

00-05=4 (Pulse Input as Main Frequency Command Source)

01-04=12 (Pulse input - Pulse width measurement (S5))

01-14= 0.01~0.20kHz (Input pulse frequency)

01-15=0.01~9.99 (The frequency is calculated as $F = \text{duty ratio} * \text{frequency upper limit} * (01-15)\text{Hz}$, and maximum frequency is not exceeded)

note: In this mode, the pulse input frequency range: **0.01 kHz ~ 0.20kHz**

2、The external terminal **S5** is used as frequency measurement setting parameter:

00-05=4 (Pulse Input as Main Frequency Command Source)

01-04=13 (Pulse input- Frequency measurement (S5))

01-15=0.01~9.99 (Remember that the input pulse frequency is f Hz, and the frequency of the frequency converter $f = (f/100) * (01-15)$ Hz, and maximum not exceeding the upper limit frequency.)

note: In this mode, the pulse input frequency range: **0.01 kHz ~ 10.00kHz**

Other instructions: the pulse input can only select S5, and when S5 is the pulse input contact, PLC outputs the COM of the external terminal of the converter.

01- 16	Pulse input filtering coefficient
range	1~100
01- 18	Count value reaches the setting value
range	1~100

01-16: When the panel frequency fluctuates appropriately, the set value of this parameter is increased, so that the panel frequency tends to be stable.

01-18: When the speed response of pulse frequency modulation is required, the setting value of this parameter can be reduced appropriately to improve the response speed.

01- 17	Count value reaches the setting value
range	0~9999

When the digital terminal S5 is set to 21 (counter trigger signal input); 01-09 is set to 6 (setting the number to reach the indicator function). When the number of the counter trigger signals reaches the set value of 1-17 parameters, the multi-function output RY1 action.

01- 19	Current reaches the alignment
range	0.1~15.0
01- 20	Current arrives to detect the delay time
range	0.1~15.0

01-09: When set to 7, the output current >1-19, relay action.

01-19: Set value according to motor rated current (06-01).

01-20: Set value per second, the time from the relay from OFF to ON is 01-20, and the delay time

from ON to OFF is fixed to 100ms.

Group 02- External terminal analog signal input function group

02- 00	AVI(AIN) and ACI analog Input signal type select	
range	AVI(AIN)	ACI
	【0】 :0~10V (0~20mA)	0~20mA
	【1】 :0~10V (0~20mA)	4~20mA
	【2】 :2~10V (4~20mA)	0~20mA
	【3】 :2~10V (4~20mA)	4~20mA

Note:



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



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

The models 401,402,403,405 have AVI and ACI analog input, and AVI can only do voltage type simulation nput, ACI can only carry out current analog input.

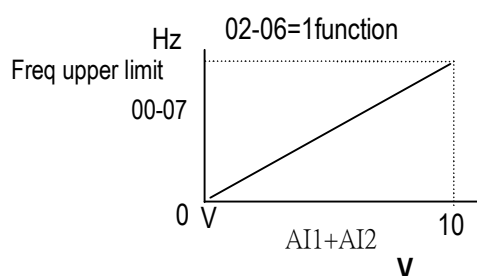
02- 01	AVI(AIN) signal verification Scan Time	
range	【1~200】 2msec	
02- 02	AVI(AIN) Gain	
range	【0 ~ 200】 %	
02- 03	AVI(AIN) Bias	
range	【0.0 ~ 100.0】 %	
02- 04	AVI(AIN) Bias Selection	
range	【0】 : positive 【1】 : Negative	
02- 05	AVI(AIN) Slope	
range	【0】 : positive 【1】 : Negative	
02- 06	ACI function Select	
Range	【0】 : PID feedback signal (terminal ACI)	
	【1】 : ACI Bias signal input (terminal ACI)	

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 (0~20 mA) or 2~10V (4~20mA) .



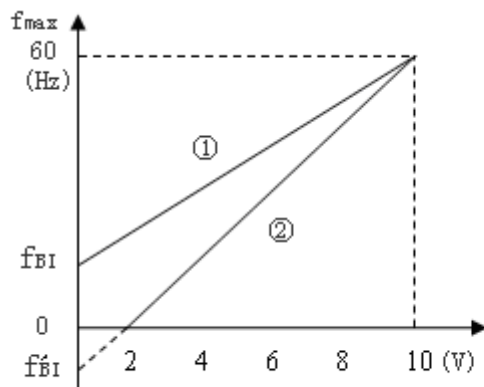
02- 07	ACI signal verification Scan Time
range	【1~200】 2msec
02- 08	ACI Gain
range	【0 ~ 200】 %
02- 09	ACI Bias
range	【0.0 ~ 100.0】 %
02- 10	ACI Bias Selection
range	【0】 : positive 【1】 : Negative
02-11	ACI Slope
range	【0】 : positive 【1】 : Negative

Note: When 02-06 is set to 0 , settings of 02-07~02-11 will not be effective.

1 Parameter Description

1) Bias value

When the given signal is "0", the corresponding frequency called the bias frequency with denotation f_{BI} .



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

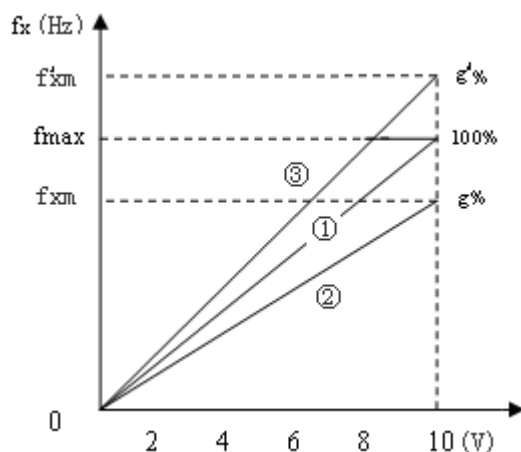
$f_{BI}\%$ —Percentage of Bias Frequency

f_{BI} —Bias Frequency

f_{max} —Max frequency of Inverter output

2) Frequency Gain

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



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

$g\%$ —Percentage of Frequency Gain

f_{max} —The preset maximum frequency of inverter

f_{xm} —Dummy maximum frequency

Here, the maximum for a given frequency “fxm” of inverter not necessarily equal to the maximum frequency f_{max} .

1. $g\% < 100\%$, the maximum frequency for actual output of inverter equal to f_{xm} ,

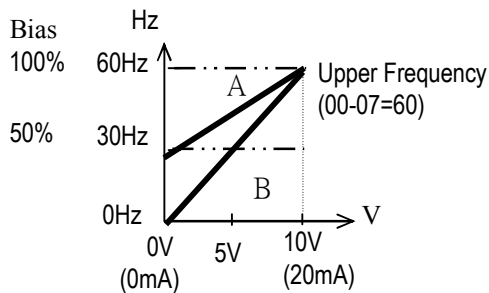
Like the curve ② show in Figure 2 (curve ① as given line for the fundamental frequency)

2. $g\% > 100\%$, the maximum frequency for actual output of inverter equal to f_{max} , like the curve ③ show in Figure 2.

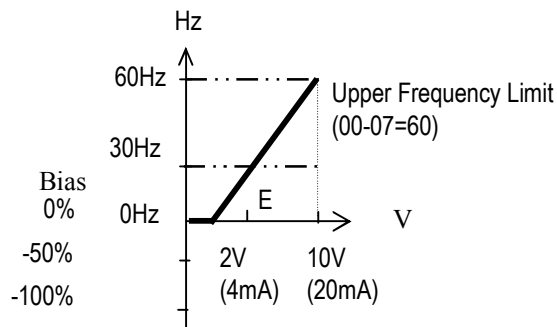
2. Example:

The setting of figure 4-18A:

	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%

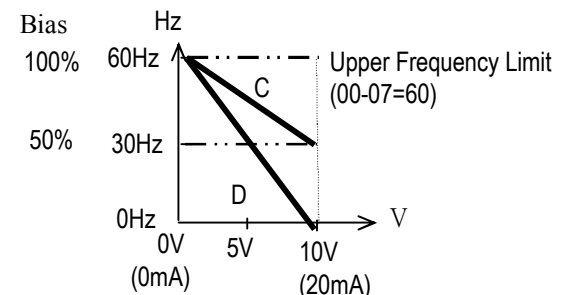


	2-02 /2-08	2-03 /2-09	2-04 /2-10	2-05 /2-11	2-09
E	100%	20%	1	0	100%

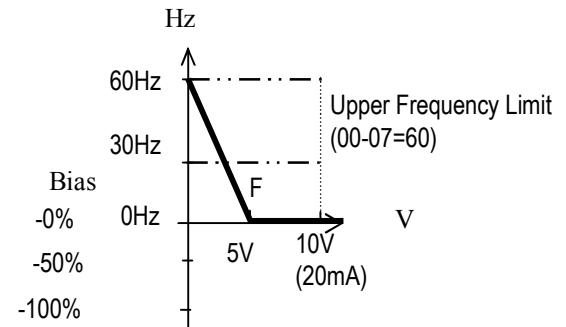


The setting of figure 4-18B:

	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%



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



- 1) The inverter reads the average value of A/D signals once per (02-01/02-07 x 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.

02-12	Analog Output Mode FM+
Range	【0】 : Output frequency 【1】 : Frequency Setting 【2】 : Output voltage 【3】 : DC Bus Voltage 【4】 : Output current
02-13	Analog Output FM+ Gain
Range	【0 ~ 200】 %

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.

02-14	Analog Output filtering coefficient
Range	【1~100】

Group3- preset Frequency function group

03- 00	Acceleration and Deceleration Selection of Multi-Speed
Range	【0】 : Part acceleration and deceleration time are set by acceleration and deceleration time1 【1】 : Part acceleration and deceleration time are set by independently
03- 01~03-08	Frequency Setting of Speed-Stage
Range	Preset Speed 0 ~ Preset Speed 7 (Hz) : =0.00 ~ 400.00
03-17~03-32	Acceleration Time Setting of Multi Speed
Range	Preset Speed 0 ~ 7 Acceleration time (second) : =0.1 ~ 3600.0 Preset Speed 0 ~ 7 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).

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

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

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) ,

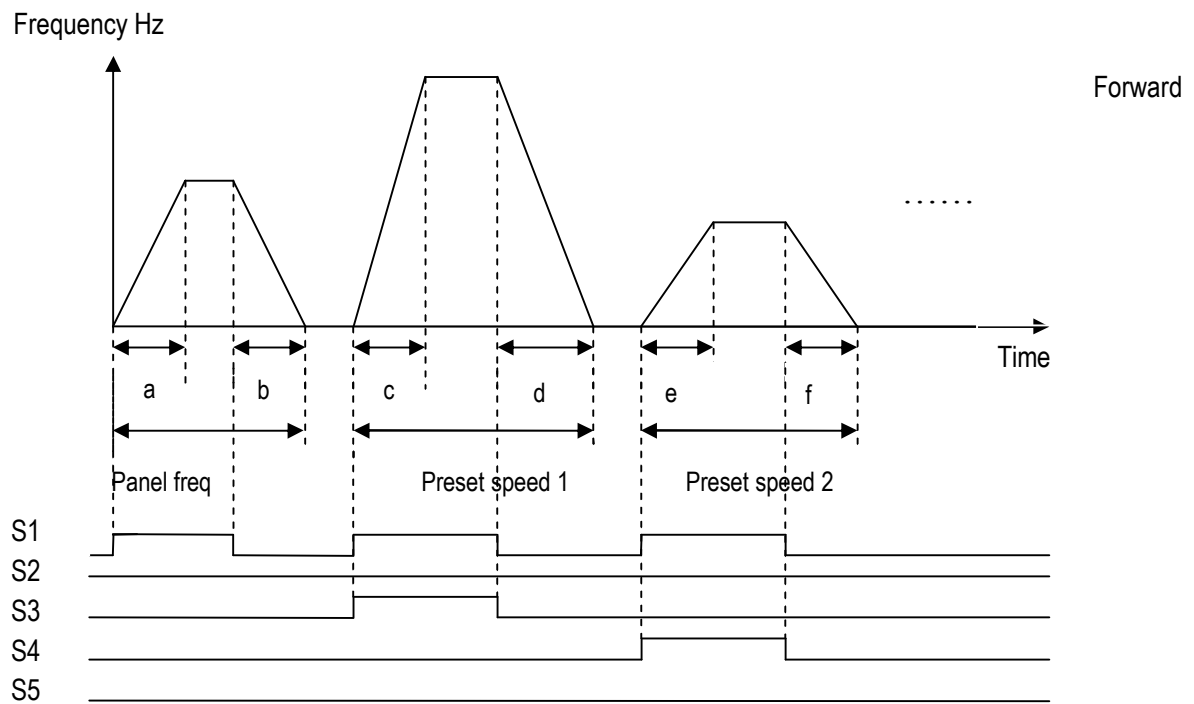
01-01=1 (s2=forward/reserve) ,

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

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

mode1: When the run command is uncontinuous, calculate acceleration and deceleration time of each segment like this

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

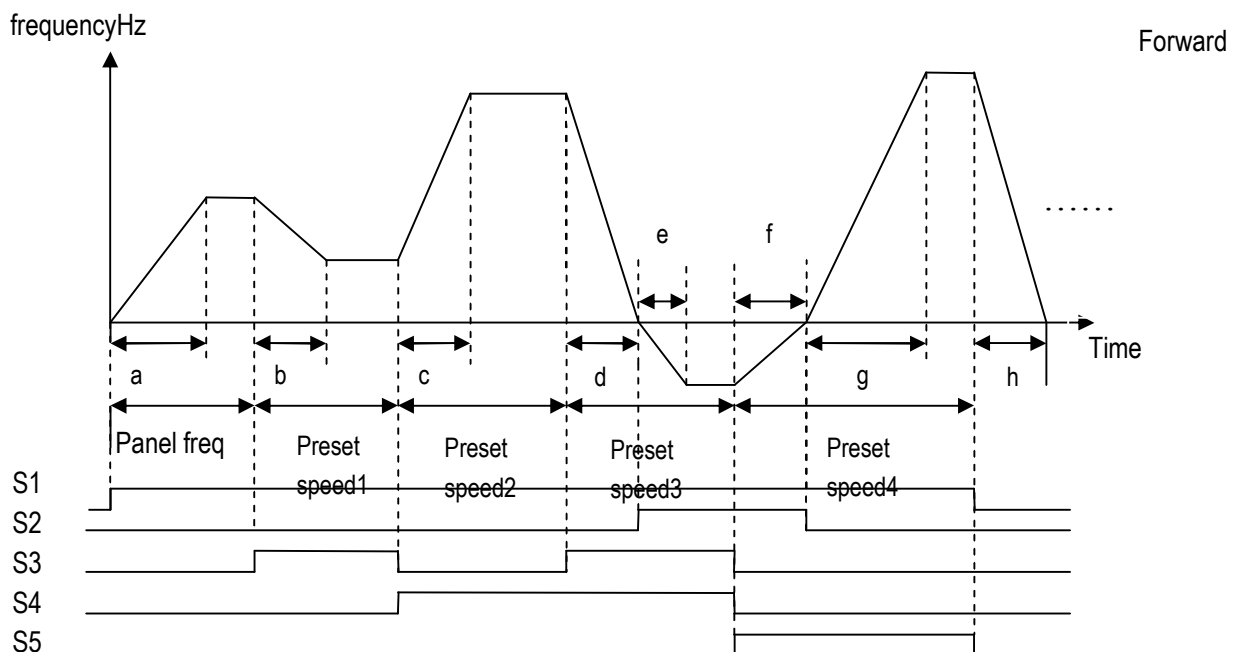


mode2: When the run command is continuous , calculate acceleration and deceleration time of each segment like this

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

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

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



Group4- Start/Stop command group

04-01	Stopping Method Selection
Range	【0】 : Enhanced braking capacity 【1】 : Coast to stop

- 1) **04-01=0**: the inverter will decelerate to 0Hz in preset deceleration time after receiving the stop command.
- 2) **04-01=1**: the inverter will stop output as receiving the stop command. The motor will inertia Coast to stop.

04-03	Momentary power loss and restart
Range	【0】 : Momentary Power Loss and Restart disable 【1】 : Momentary power loss and restart enable

- 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) **04-03=1**: When the CPU is still working normally, the frequency converter is rebooted in a speed search mode, and the number of restarts is not limited. When the CPU stops working, it cannot be restarted.
- 3) If the power failure is too long, the frequency converter will stop running; When the power supply is restored, the operation of the frequency converter is determined according to the setting of 00-03 and the state of the external switch, and the implementation is restarted.

04- 08	Reset Mode Setting
Range	【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
Range	【0】 : Enable Direct running after power up 【1】 : Disable Direct running after power up



Danger:

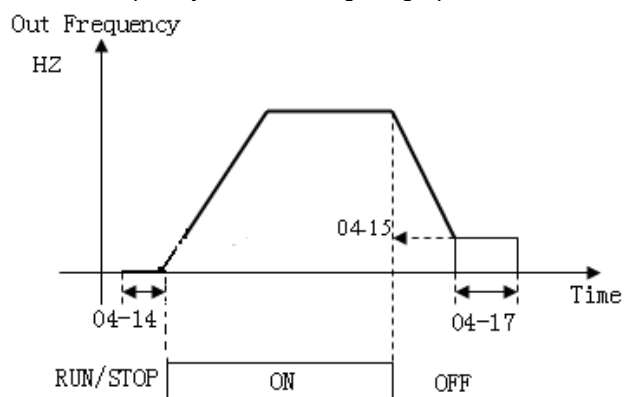
- 1) 04-09=0 and the inverter is set external terminal controlled (00-03/00-04=1), if the run switch is ON as power is supplied, the inverter will auto start. It is recommend that the power is turned off and the run switch is also off to avoid possibility of injury to operators and machines as the power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

※**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 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.

04-15	DC Injection Brake Start Frequency (Hz) @Stopped
Range	【0.1 ~ 10.0】 Hz
04-16	DC Injection Brake Level (%)@Stopped
Range	【0~ 20】 %
04-17	DC Injection Brake Time (Seconds)@stopped
Range	【0.0~25.5】 Sec

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



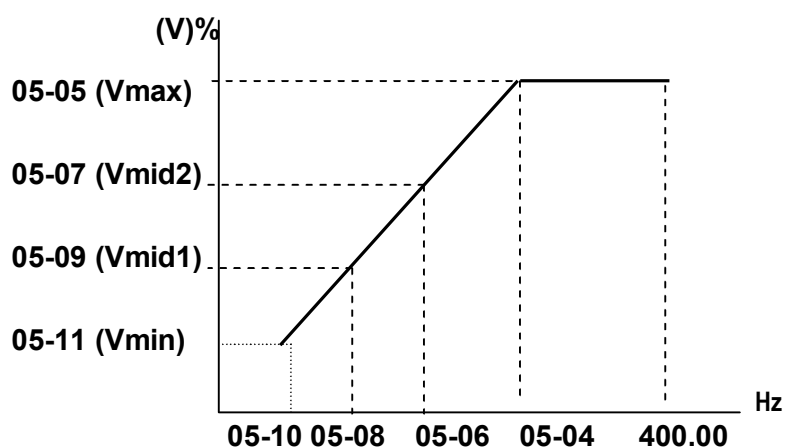
04-18	Over excitation Deceleration Gain
Range	【0】 : DC Injection Brake @running enable 【1】 : DC Injection Brake @ running disable

04-18=0, DC Injection Brake @running enable; **04-18=1**, If the running signal is always in, the frequency is reduced to STP0, and there is a dc brake at run time.

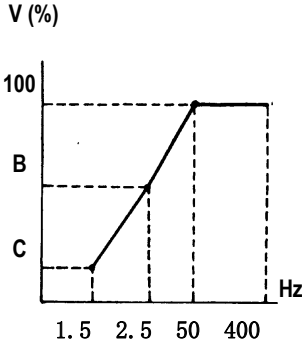
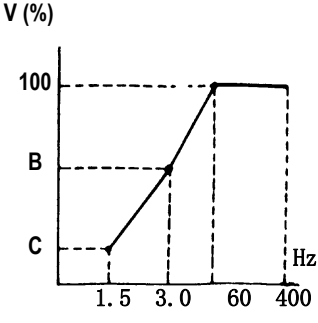
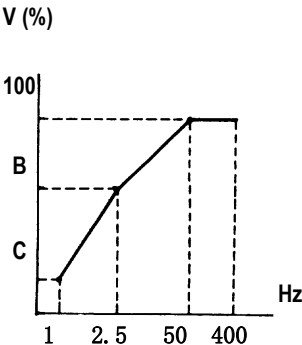
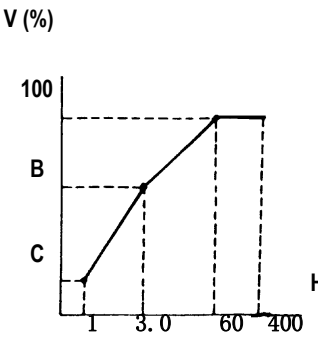
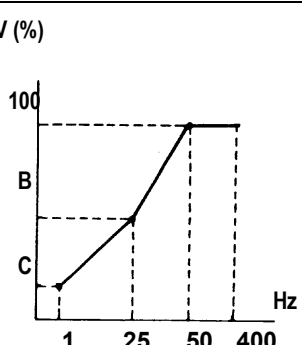
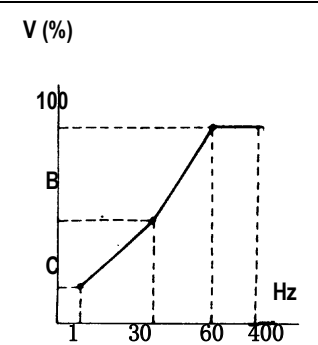
Group5- V/F command group

05- 01	No-load Current of Motor (Amps AC)
Range	
05- 02	Motor rated Slip Compensation
Range	【0.0 ~ 100.0】 %
05- 03	V/f max voltage
Range	【400V:323.0 ~528.0】 Vac
05- 04	Maximum Frequency
Range	【0.20 ~ 400.00】 Hz
05- 05	Maximum Frequency Voltage
Range	【400V:323.0 ~528.0】 Vac
05- 06	Medium Frequency2
Range	【0.10 ~ 400.00】 Hz
05- 07	Medium Frequency Voltage 2
Range	【400V:323.0 ~528.0】 Vac
05- 08	Medium Frequency1
Range	【0.10 ~ 400.00】 Hz
05- 09	Medium Frequency Voltage 1
Range	【400V:323.0 ~528.0】 Vac
05- 10	Minimum Frequency
Range	【0.10 ~ 400.00】 Hz
05- 11	Minimum Frequency Voltage
Range	【400V:323.0 ~528.0】 Vac
05- 13	Slip compensation Low-pass Filter time
Range	【0.05 ~ 10.00】 Hz

1) 00-01=7, set the V/F pattern freely complying with 05-04~05-09 (Refer to following diagram)

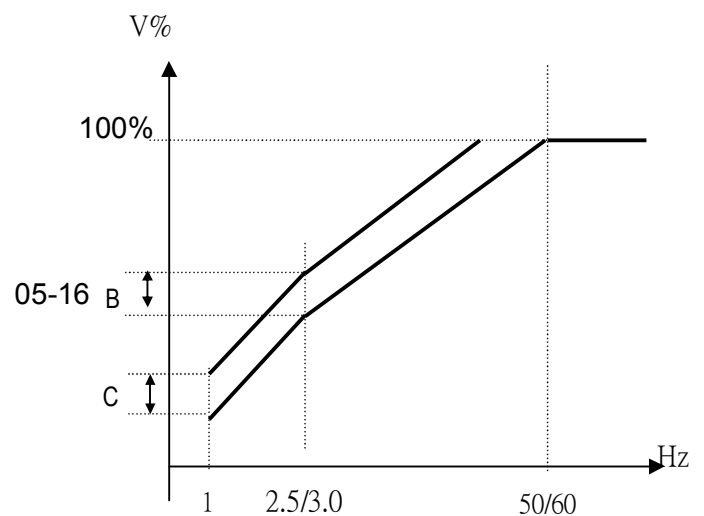


2) 00-01 = 1-6 V / F Pattern (Refer to following list):

type	Function	00-01	V/F pattern	type	Function	00-01	V/F pattern
50 Hz	General Use	1		60 Hz	General Use	4	
	High start torque	2			High start torque	5	
	Decreasing torque	3			Decreasing torque	6	

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.

00-01	B	C
1/4	8%	6%
2/5	15%	10.5%
3/6	25%	7.7%



voltage ratio

Fixed **VF** curve **B,C** corresponding output voltage is shown below: (Units: **V**)

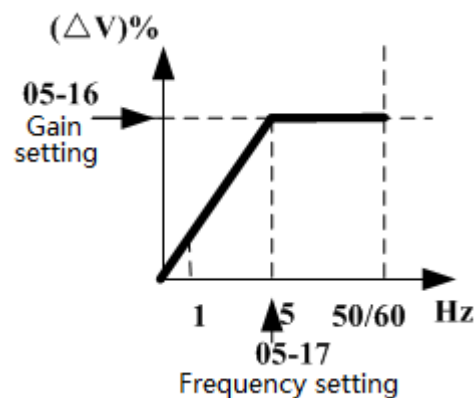
00-01					
	B	C		B	C
	Voltage ratio%			Output voltage	
1/4	8	6		30.4	22.8
2/5	15	10.5		57.0	39.9
3/6	25	7.7		95.0	29.3

Custom VF curve **00-01 = 7**, the default output voltage is shown below:

	400V			
frequency (Hz)	0.50 /0.60	10.00 /12.00	25.00 /30.00	50.00 /60.00
Voltage (V)	3.8	76.0	190.0	380.0

05- 15	Auto-Torque compensation Filter time coefficient
Range	【0.1 ~ 1000.0】
05- 16	Auto-Torque compensation gain
Range	【0~ 200】
05- 17	Auto-Torque compensation frequency
Range	【1.00 ~ 5.00】 Hz

Note: Automatic torque compensation function need to self-learning under the VF mode (automatic torque compensation is only applicable to VF mode), the stator resistance of exact gain value (after 06-06), automatic torque compensation will be more precise, if 16 = 0 05 - not for automatic torque compensation.



Group6- Motor parameter group

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

06- 06	Stator Resistance (Ohms)
Range	-
06- 07	Rotor Resistance (Ohms)
Range	-
06- 08	Equivalent Inductance (mH)
Range	-
06- 09	Magnetizing Current (AmpsAC)
Range	-
06- 10	Ferrite Loss Conductance (gm)
Range	-
06- 11	Deadtime gain
Range	【0~100】

Note: Default setting 100, represents 100% compensation voltage. This coefficient can be changed to a range of 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

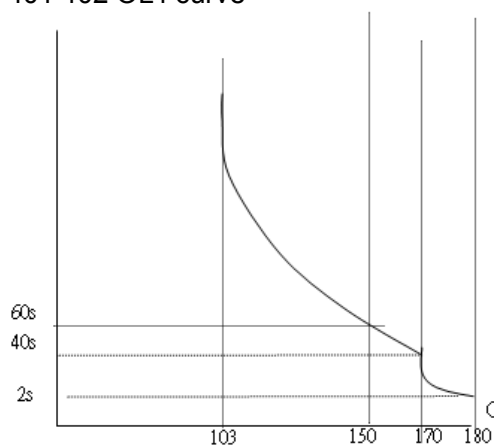
07- 00	Stall Prevention Function
Range	【xxxx0】 : Stall prevention is enabled in acceleration 【xxxx1】 : Stall prevention is disabled in acceleration. 【xxx0x】 : Stall prevention is enabled in deceleration. 【xxx1x】 : Stall prevention is disabled in deceleration. 【xx0xx】 : Stall prevention is enabled in operation. 【xx1xx】 : Stall prevention is disabled in operation. 【x0xxx】 : Enable over voltage Prevention in deceleration. 【x1xxx】 : Disable over voltage Prevention in deceleration.

07- 01	Stall Prevention Level During Acceleration
Range	【50 ~ 200】 %
07- 02	Stall Prevention Level During deceleration
Range	【50 ~ 200】 %
07- 03	Stall Prevention Level In Run Mode
Range	【50 ~ 200】 %
07- 04	Over voltage Prevention Level in Run Mode
Range	【80~100】 %OV

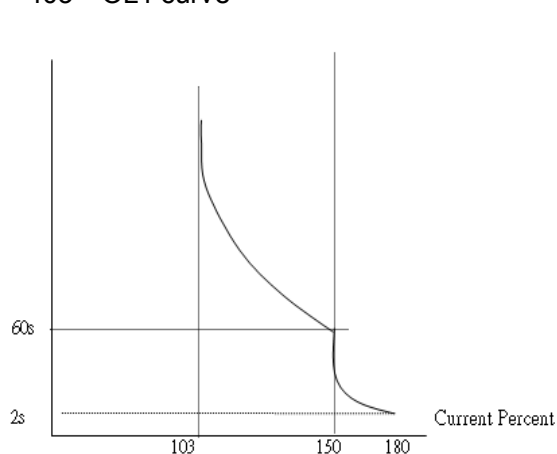
- 1) In acceleration, the inverter will delay the acceleration time if the time is too short resulting in the over current in order to prevent the inverter trips.
- 2) In deceleration, the inverter will delay the deceleration time if the time is too short resulting in the over voltage of DC BUS in order 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 OL1
Range	【0】 : Enable motor Protect by relay 【1】 : Disable motor Protect by relay

401 402 OL1 curve



403 OL1 curve



07- 13	OH over heat Protection (cooling fan control)
Range	【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.

07- 18	OL2 protection reset time
Range	【1.0~10.0】 min

When the fault protection is caused by the overload of the inverter, the duration of the jump is lower than the set value of 07-18, and the manual reset cannot be carried out, so as to prevent the product heat of the frequency converter IGBT module and affect the life of the frequency converter. The frequency converter automatically resets when the duration of the jump is greater than 07-18.

Group8- Communication function group

08- 00	Assigned Communication Station Number
Range	【1 ~ 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
Range	【0】 : RTU code 【1】 : ASCII code
08- 02	Baud Rate Setting (bps)
Range	【0】 : 2400 【1】 : 4800 【2】 : 9600 【3】 : 19200 【4】 : 38400
08- 03	Stop Bit Selection
Range	【0】 : 1 stop bit 【1】 : 2 stop bits
08- 04	Parity Selection
Range	【0】 : no parity 【1】 : odd parity 【2】 : even parity
08- 05	Data Format Selection
Range	【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-232communication: (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 detection time
Range	【0.0~25.5】 Sec
08- 07	Communication time-out operation selection
Range	【0】 : Deceleration to stop and display dot. 【1】 : Coast to stop and display dot. 【2】 : Continue operating and display dot.

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

***Cannot be modified during communication.**

08- 08	Err6 fault tolerance times
Range	【1~20】

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

Group9- PID function group

09- 00	PID operation selection
Range	【0】 : Disable 【1】 : Bias D Control (Fwd/Rev, positive Characteristics) 【2】 : Feedback D Control (Fwd/Rev ,positive Characteristics) 【3】 : Bias D Control (Fwd/Rev, Reversed Characteristics) 【4】 : Feedback D Control (Fwd/Rev, Reversed Characteristics)

09-00 = 1: D is the deviation of (target value – detected value) in the unit time (09-04).

09-00 = 2: D is the deviation of (target value – detected value) in the unit time (09-04).

09-00 = 3: D is the deviation of (target value – detected value) in the unit time (09-04).

positive Characteristics: If the deviation is positive, the output frequency raises, vice versa.

Reversed Characteristics: If the deviation is positive, the output frequency decreases, vice versa.

09-00 = 4: Feedback D: D is the deviation of the detected values in unit time (09-04).

positive Characteristics: If the deviation is positive, the output frequency raises, vice versa.

Reversed Characteristics: If the deviation is positive, the output frequency decreases, vice versa.

09- 01	Feedback Gain coefficient
Range	【0.00~10.00】 %

09-01 is the calibration gain. Deviation = set point – (feedback signal $\times$ **09-01**)

09- 02	Proportional Gain
Range	【0.00~10.00】 %

09-02: Proportion gain for P control.

09- 03	Integration Time
Range	【0.00~100.00】 Sec

09-03: Integrate time for I control

09- 04	Differentiation Time
Range	【0.00~10.00】 Sec

09-04: Differential time for D control

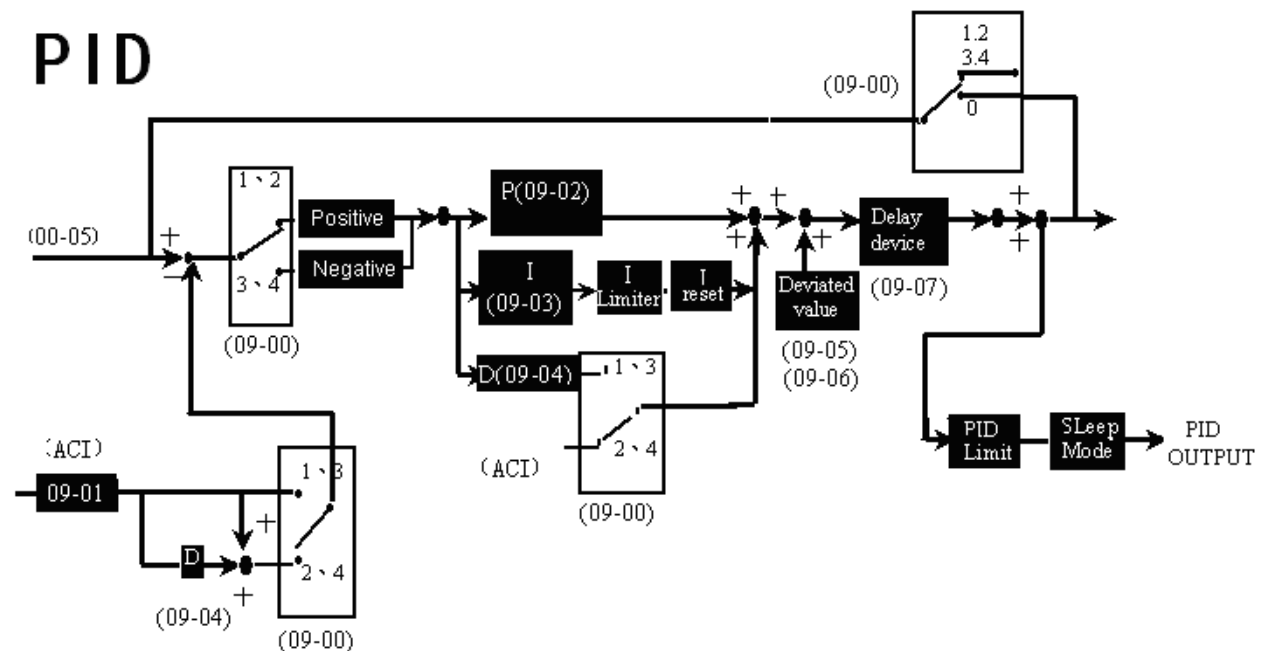
09- 05	PID Offset
Range	【0】 : Positive Direction 【1】 : Negative Direction
09- 06	PID Offset Adjus
Range	【0~109】 %

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
Range	【0.0~2.5】 Sec

09-07: Update time for output frequency.

※**Note:** **PID** is used for the control of output flow of the converter, the control of external fan air volume and temperature control, and the control flow is as follows:



1) When performing **PID** control, please set the terminal ACI on **TM2** as the **PID** feedback signal, i.e. **02-06=0**.

2) The set value described above is the frequency of the input set from **00-05/00-06**.

09- 08	PID Feedback Loss Detection Mode
Range	【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
Range	【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
Range	【0.0~25.5】 Sec

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

09- 11	Integration Limit Value
Range	【0~109】 %

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

09- 14	Sleep Frequency Level
Range	【0.00~400.00】 Hz
09- 15	Sleep Function Delay Time
Range	【0.0~25.5】 Hz
09- 16	Wake up frequency Level
Range	【0.00~400.00】 Hz
09- 17	Wake up function Delay Time
Range	【0.0~25.5】 Hz

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

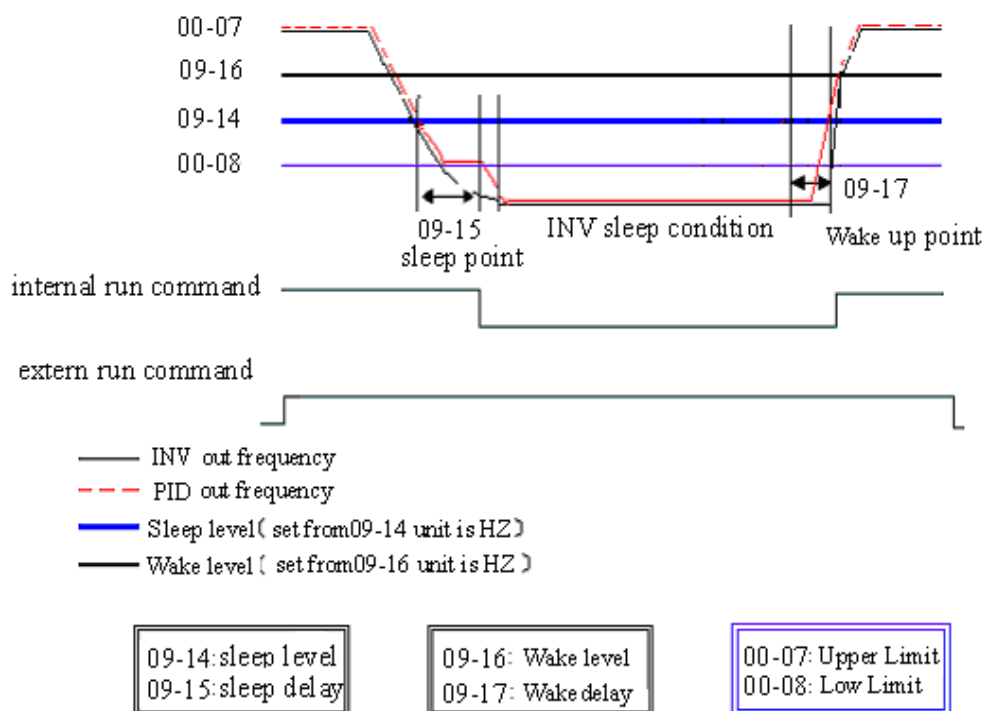
09-15: set the time for sleep delay, Unit: sec

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:



Group10- Assistant function group

10- 01	Reverse operation control
Range	【0】 : Reverse command is enabled 【1】 : Reverse command is disabled

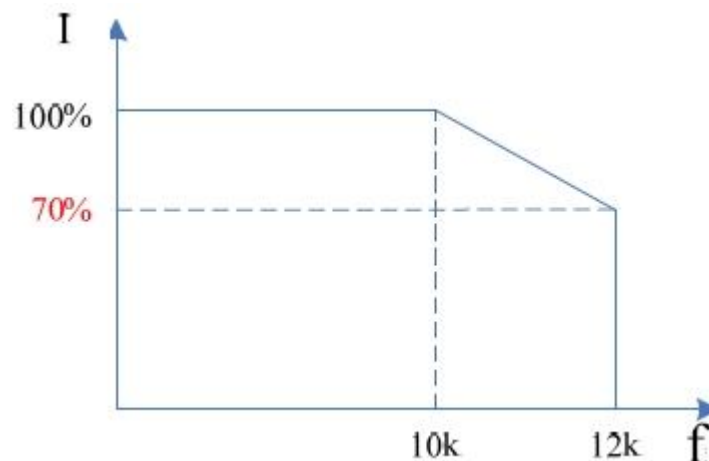
10-01=1, the reverse command is **disabled**.

10- 03	Carrier Frequency
Range	【1~12】 kHz

10-03	Carrier Frequency	10-03	Carrier Frequency	10-03	Carrier Frequency		
1	1kHz	5	5kHz	9	9kHz		
2	2kHz	6	6kHz	10	10kHz		
3	3kHz	7	7kHz	11	11kHz		
4	4kHz	8	8kHz	12	12kHz		

※**Note: 1.** In applications where there is excessive audible noise from the motor or it is required to reduce electrical interference (RFI) from the inverter caused by use of long cable then the carrier frequency can be adjusted. To reduce electromagnetic interference due to long cable etc, decrease carrier frequency. To reduce motor audible noise, increase carrier frequency.

2. The carrier frequency of PWM output must be limited to the rated current of the driver; The higher the carrier, the lower the rated current of the drive, is to prevent the drive from heating and prolong the life of IGBT, so such protection technology is a must. Carrier frequency under 10 KHZ inverter current rating of 100%, as the carrier with the decrease of higher rated output current and the rated current and the relationship between the carrier frequency curve of the diagram below (401/402/405 need not fall 403 according to the following curve down load)



10- 04	Carrier mode selection
Range	【0】 : Carrier mode 0 【1】 : Carrier mode 1

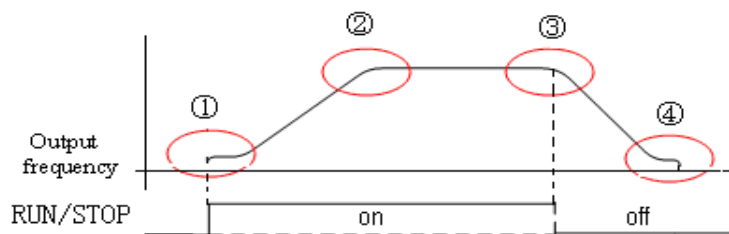
1. **10-04=0**: Carrier mode0 is recommended in environments where low noise is required. Correct ambient temperature and cooling is necessary.

2. **10-04=1**: Carrier mode1 is recommended in locations where fan or pumps is required.

10- 07	S-Curve Acc/Dec 1
10- 08	S-Curve Acc/Dec 2
10- 09	S-Curve Acc/Dec 3
10- 10	S-Curve Acc/Dec 4
Range	【0.0 ~ 4.0】 Sec

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

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



Note:

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

10- 16	Automatic Voltage Regulation (AVR)
Range	【0】 : Enable 【1】 : Disable

When the automatic voltage stabilizing output adjusts the AVR, the example of 00-01=7 is illustrated as follows:

1) 10-16=0, AVR Enable, the output voltage of the inverter is fixed, which is invalid when decelerating.

The data are as follows:

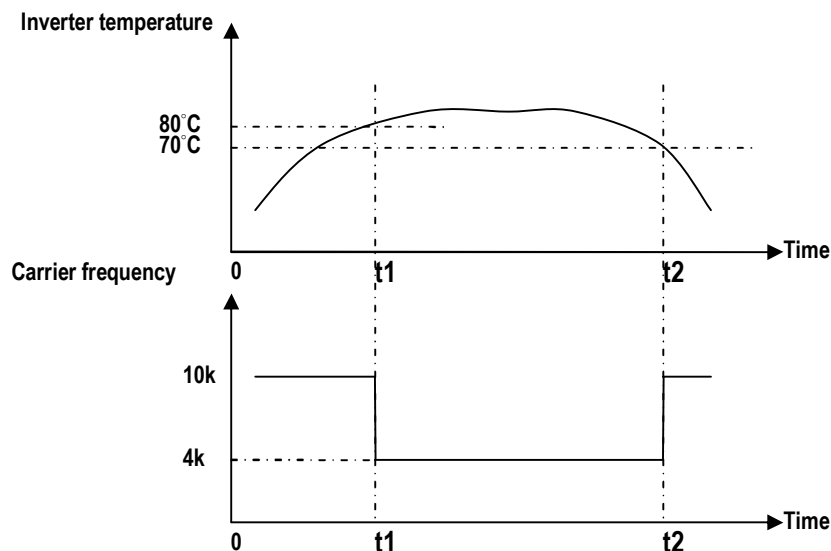
$V_{max}=05-05 \times 05-03$, $V_{mid2}=05-07 \times 05-03$, $V_{mid1}=05-09 \times 05-03$, $V_{min}=05-11 \times 05-03$.

2) 10-16=1 时, AVR Disable, the output voltage of the converter varies with the input voltage, and the data is as follows:

$V_{max}=05-05 \times V_{in}$, $V_{mid2}=05-07 \times V_{in}$, $V_{mid1}=05-09 \times V_{in}$, $V_{min}=05-11 \times V_{in}$.

10- 17	Carrier Output Tuning with temperature
Range	【0】 : Disable 【1】 : Enable

When the keypad shows the frequency of the frequency converter (11-00=01000), the carrier frequency is reduced to 4k. When the temperature of the converter has dropped below 70 °C, and then restore the original set of carrier frequency.



Group11-keypad display group

11- 00	Display Mode
Range	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
11- 01	Custom Units (Line Speed) Value
Range	【0~65535】 Rpm

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

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

11-08	Keypad frequency flashing when stop
Range	【0】 : Enable 【1】 : Disable

Group12- User parameter group

12- 00	Drive Horsepower Code
Range	----

12-00	Inverter Model	
401	S310+	401
402		402
403		403
405		405

12- 01	Software Version
Range	----

Note:Read only

12- 02	Fault Log (Latest 3 times)
Range	----

1) 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.

2) 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.

3) 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. ---.

4) 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)
Range	【0~23】 Hours
12- 04	Accumulated Operation Time 2 (Days)
Range	【0~65535】 Days
12- 05	Accumulated Operation Time Mode
Range	【0】 : Power on time 【1】 : Operation tim

1) When the operation time is to 23 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 Default Settings
Range	【1150】 : Reset to the 50Hz factory setting 【1160】 : Reset to the 60Hz factory setting
12- 07	Parameter lock
Range	【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

Group13- Auto Run (Auto Sequencer) function group

13- 00	Auto Run(sequencer) mode selection:
Range	【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).

Frequency Command 0 is set by parameter 05-01.	
13- 01~13-07	Frequency Command 1~7 speed setting.
Range	【0.00 ~ 650.00】 Hz
13- 16~13-23	Set the running time of Frequency Command 0 and 7
Range	【0.00 ~ 3600.0】 Sec
13- 32~13-39	Set the direction of Frequency Command 0 and 7
Range	【0】 : stop 【1】 : foreward 【2】 : backward

Note: when the multi-function terminal is set to 9, and terminal conduct, this function enables.

1) Auto Run(sequencer) mode selection (13-00)

2) Auto Run(sequencer) mode setting (13-01~13-39)

- 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 1~7 as required can be set by parameters (13-01~13-7).
 - b. Setting multi-step run time, by parameters (13-16~13-23 for each required step.
 - c. FWD/REV direction can be selected by setting of parameters (13-32~13-39).

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:

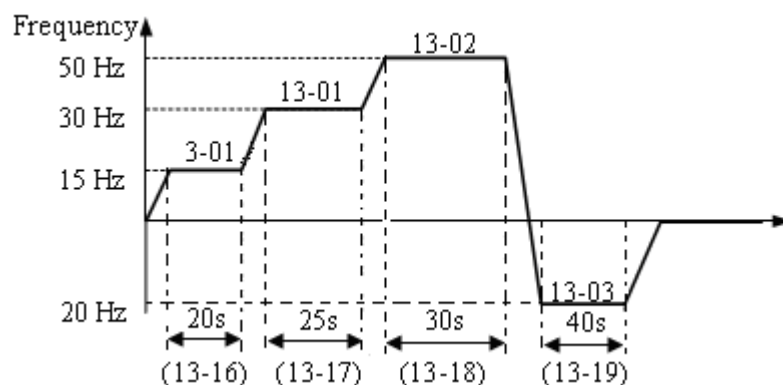
13-00=1 (or 4)

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)

13-04~13-07=0Hz, 13-20~13-23=0s, 13-36~13-39=0



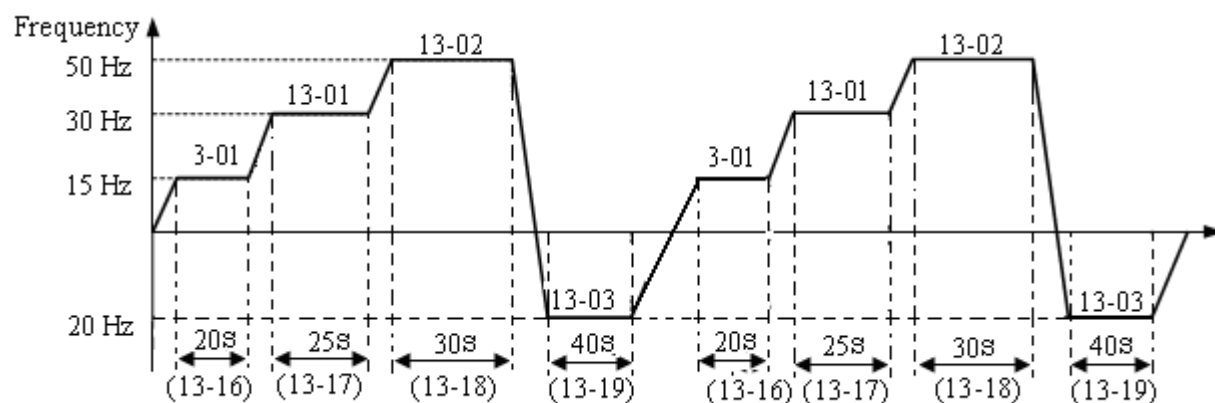
(B) Periodic cycle Running (13-00=2, 5)

The inverter will repeat the same cycle periodically.

For example:

13-00=2 (or 5)

13-01~13-03, 13-08~13-11, 13-16~13-19: Same setting as the example (A)



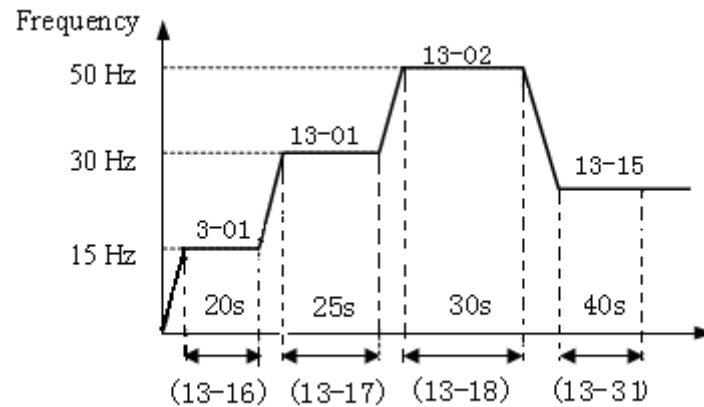
(C) Auto_Run Mode for Single Cycle (13-00 = 3, 6)

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 13-23=40s
 13-32=1 13-33=1 13-34 = 1 13-39=1(FWD)
 13-03~13-06=0Hz , 13-19~13-22=0s , 13-35~13-39 = 0



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

	1~3	4~6
Run Command	run stop run	run stop run
Output Frequency	Continue running from unfinished step	begin a new cycle
	time	time

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

Note: 13-16, and 13-32, need to cooperate with panel frequency (3-01) as the 0th speed of automatic program operation.

Chapter 5 Troubleshooting and Maintenance

5.1 Error Display and Corrective Action

5.1.1 Error Display and Corrective Action

Faults which can not be recovered manually			
Display	Fault	Cause	Corrective Action
-OV-	Voltage too high when stopped	Detection circuit malfunction	Return the inverter
-OU-			
-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
-LU-			
-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
-OH-			
EPr	EEPROM error	Faulty EEPROM	Replace EEPROM
EP-			
COt	Communication error	Communication interruption	Cheak communication circuit
COt			
cder	Current Sensor detection error	Current sensor error or circuit malfunction	Return the inverter
CDER			
Err0	IGBT Effective level judge abnormal	IGBT Effective level judge abnormal	Return the inverter
Err0			
Err4	CPU work abnormal	Noise interference	Please contact us if it happens frequently.
Err4			
Faults which can be recovered manually and automatically			
Display	Fault	Cause	Corrective Action
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-A			
OC-C	Over-current at fixed speed	1.Transient load change 2.Transient power change	1.Increase the capacity of the inverter 2. Add DCL on input side.
OC-C			
OC-d	Over-current at	The preset deceleration	Set a longer deceleration

OC-d	deceleration	time is too short.	time
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-5			
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
OU-C			
OH-C	Heat sink temperature TooHigh during operation	1.Heavy load 2.Ambient temperature too high or bad ventilation	1. Check if there are any problems with the load 2. Increase inverter capacity 3. Improve ventilation conditions
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
OL			
OL1	Motor overload	1. Excessive load 2. Incorrect settings for 07-05	1. Increase the motor capacity. 2. set 07-05.
OL2			
OL2	Inverter overload	Excessive Load	Increase the inverter capacity
CL	Inverter over-current	Inverter warning: the Inverter current reaches the current protection level.	Check the load size and cycle time.
CL			
LV-C	Voltage too low when running	1. Power voltage too low 2.The power supply voltage ranges much.	1. Improve power quality 2.. Set a longer acceleration time 3. Add DCL on input side 4. Replace a larger inverter.
LU-C			

5.1.2 Operation errors

Display	Fault	Cause	Corrective Action
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.
Err 1			
Err2	Parameter	The parameter setting value	Reset the parameters

Err2	setting error	is beyond the actual allowable range.	according to the specified range
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
Err5			
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
Err6			
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.
Err7			

5.1.3 Special conditions

Display	Fault	Cause
StP0	Zero speed at stop	Occurs when preset frequency <0.1Hz
StP0		
StP1	Fail to start directly On power up.	1. If the inverter is set for external terminal control mode (00-03=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). 2. Direct start is possible when 04-09=0.
StP1		
StP2	Keypad Stop Operated when inverter in external Control mode.	1. With the function of Stop key enabled by And if the Stop key is pressed while the inverter is set to external control mode (00-03=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. 2. If the inverter is in communication mode and the Stop key is enabled, the inverter will stop in the way set by 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.
StP2		
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.
E.S.		
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.
b.b.		

5.1.4 The instructions for the Power and Alarm LED of the inverter:

1. When the inverter have mistakes which cannot be reseted, such as: CTER, EPR, OH, LV, OV, OC, the Alarm LED flashes quickly.

you can cut off the power of inverter, then turn it on again., if Alarm flashes the same as before, the inverter is faulted, please Return the inverter.

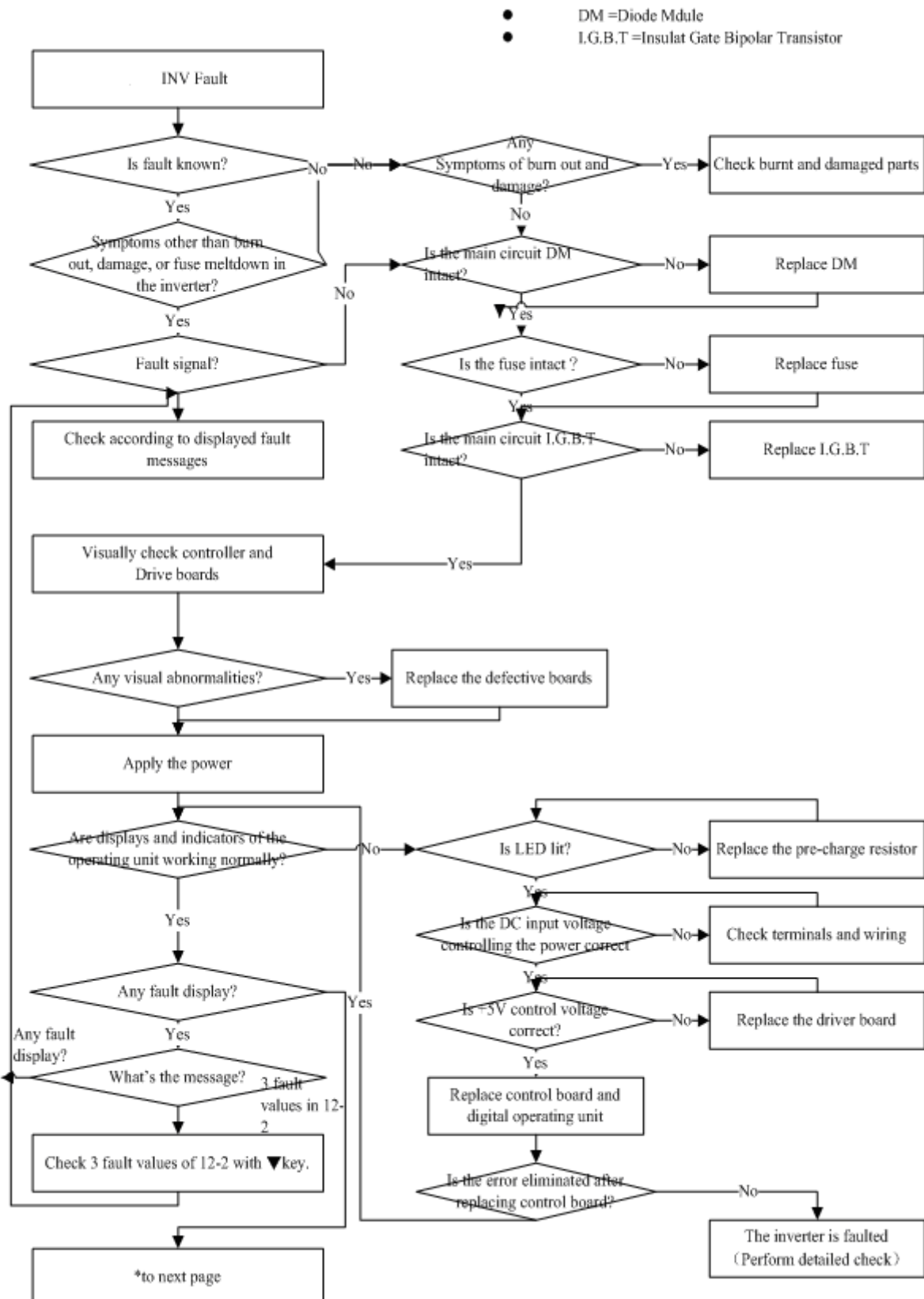
2. When the inverter have mistakes which can be reseted, such as:

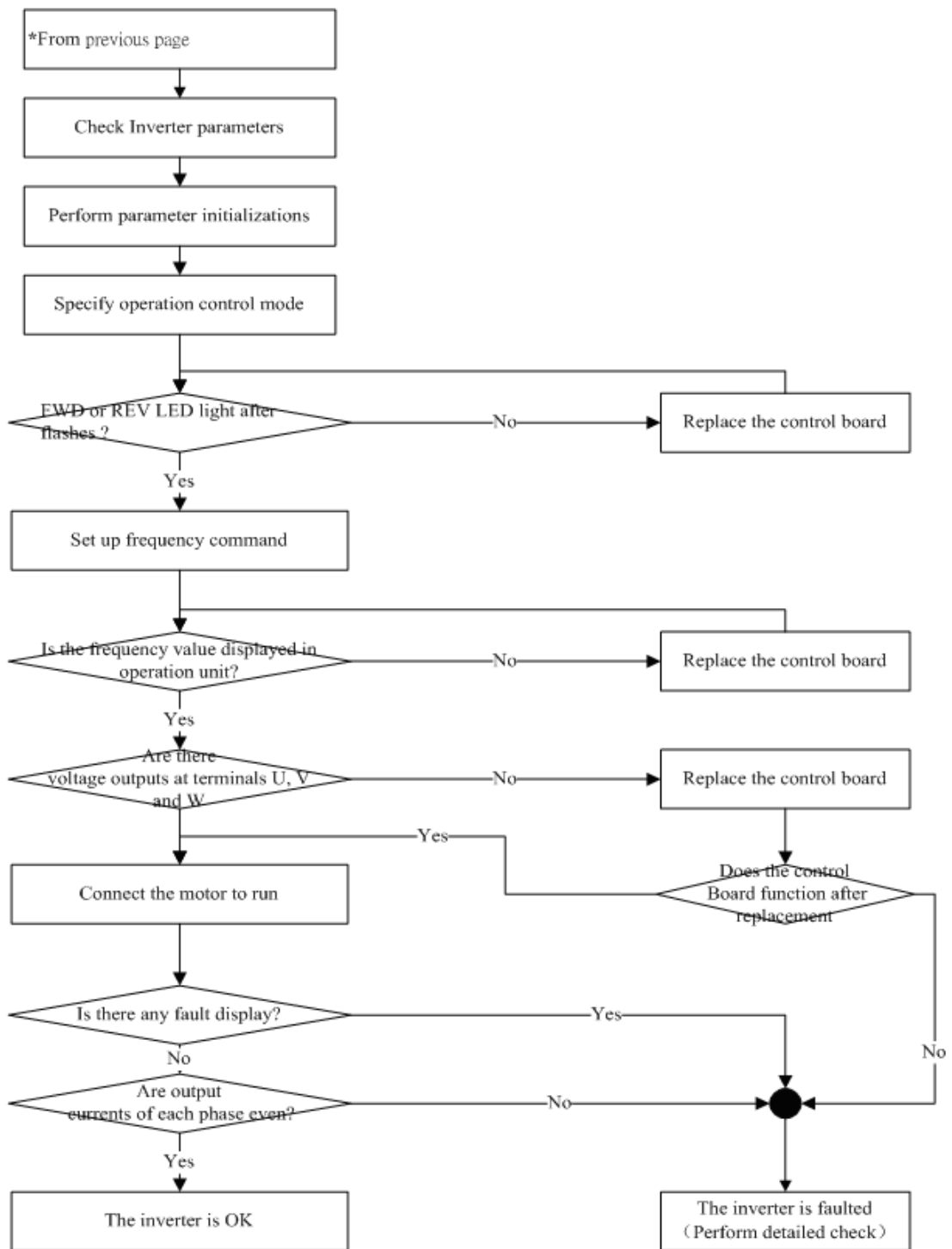
OH-C, OV-C, OC-S, OC-d, OC-C, OC-a, OL2, OL1, the Alarm LED flashes slowly.
In order to release from the alarm, you can cut off the power of inverter, then turn it on again.

5.2 General troubleshooting

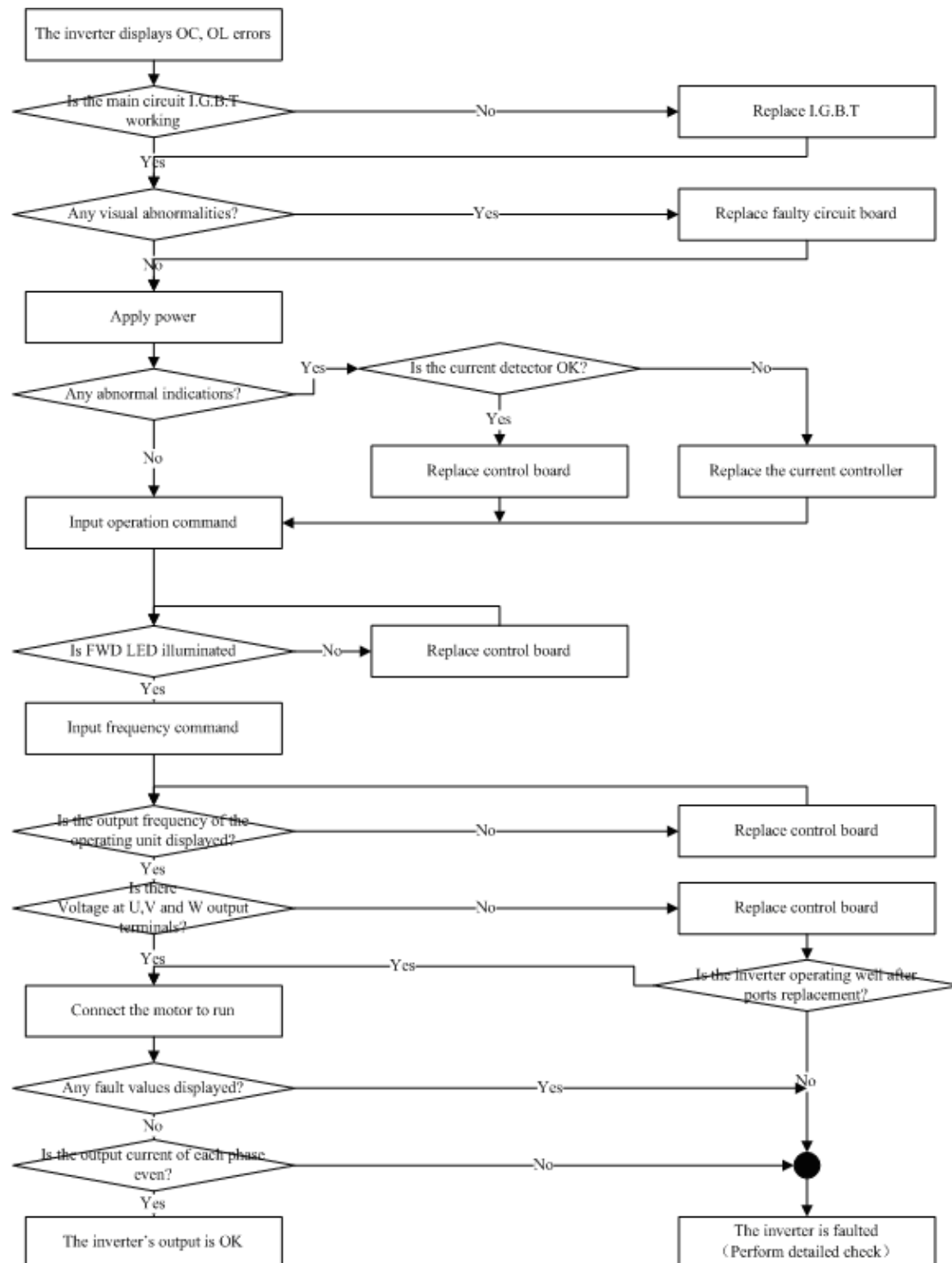
Status	Checking point	Remedy
Motor runs in wrong direction	Are wiring for output terminals U, V, and W correct?	Wiring must match U, V, and W terminals of the motor.
	Are wiring for forward and reverse signals correct?	Check for correct wiring.
The motor speed can not be regulated	Is the wiring for the 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.
Motor can not run	Is power applied to terminals (is the charging indicator lit)?	1. Is the power applied? 2. Turn the power OFF and then ON again. 3. Make sure the power voltage is correct. 4. Make sure screws are secured firmly. •
	Is there voltage across the output terminals U, V, and W?	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?	1. Is analog frequency input signal wiring correct? 2. Is voltage of frequency input correct?
	Is the operation mode setting correct?	Operate through the digital keypad .

5.3 Quick troubleshooting of S310+ series

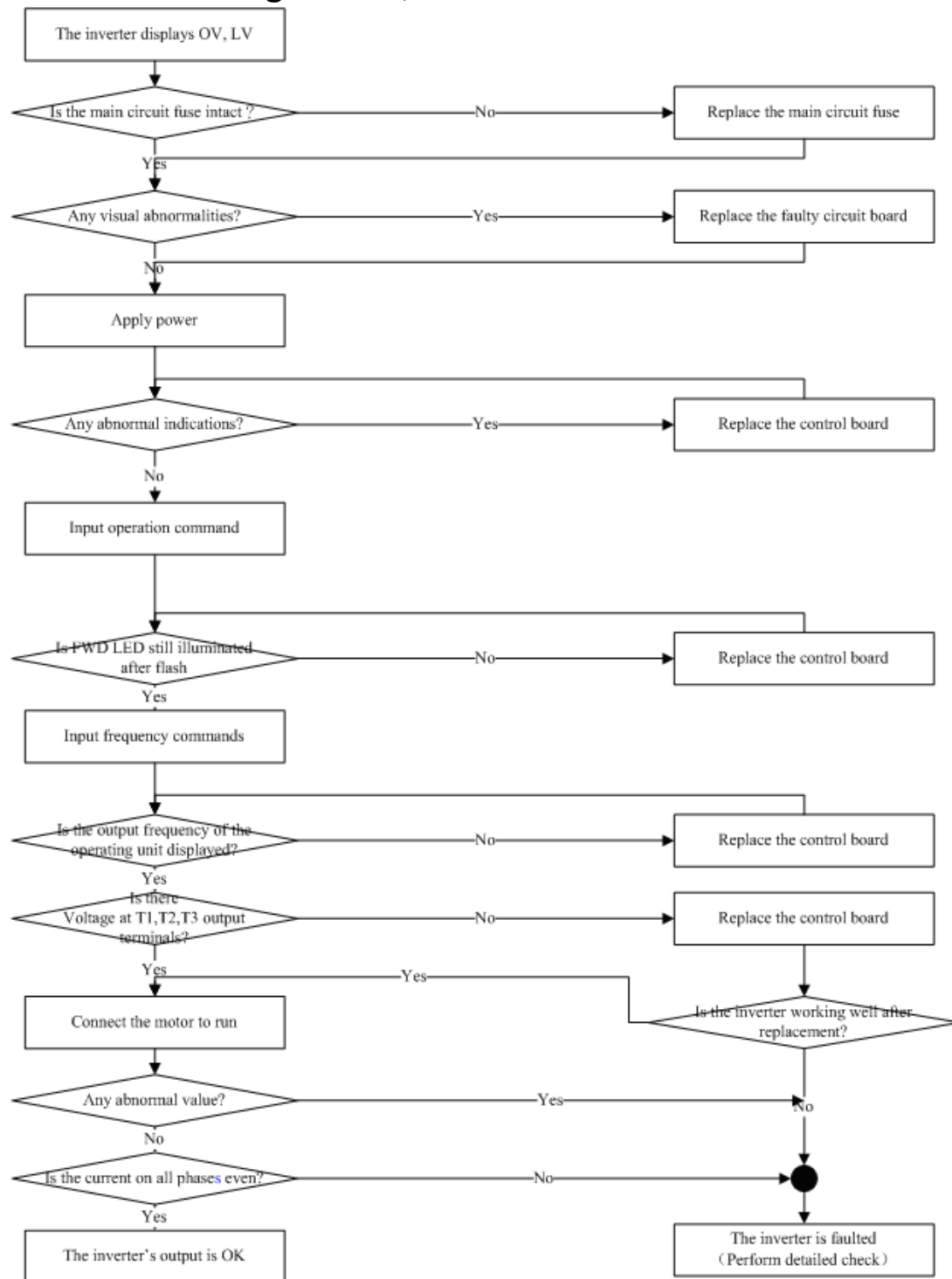




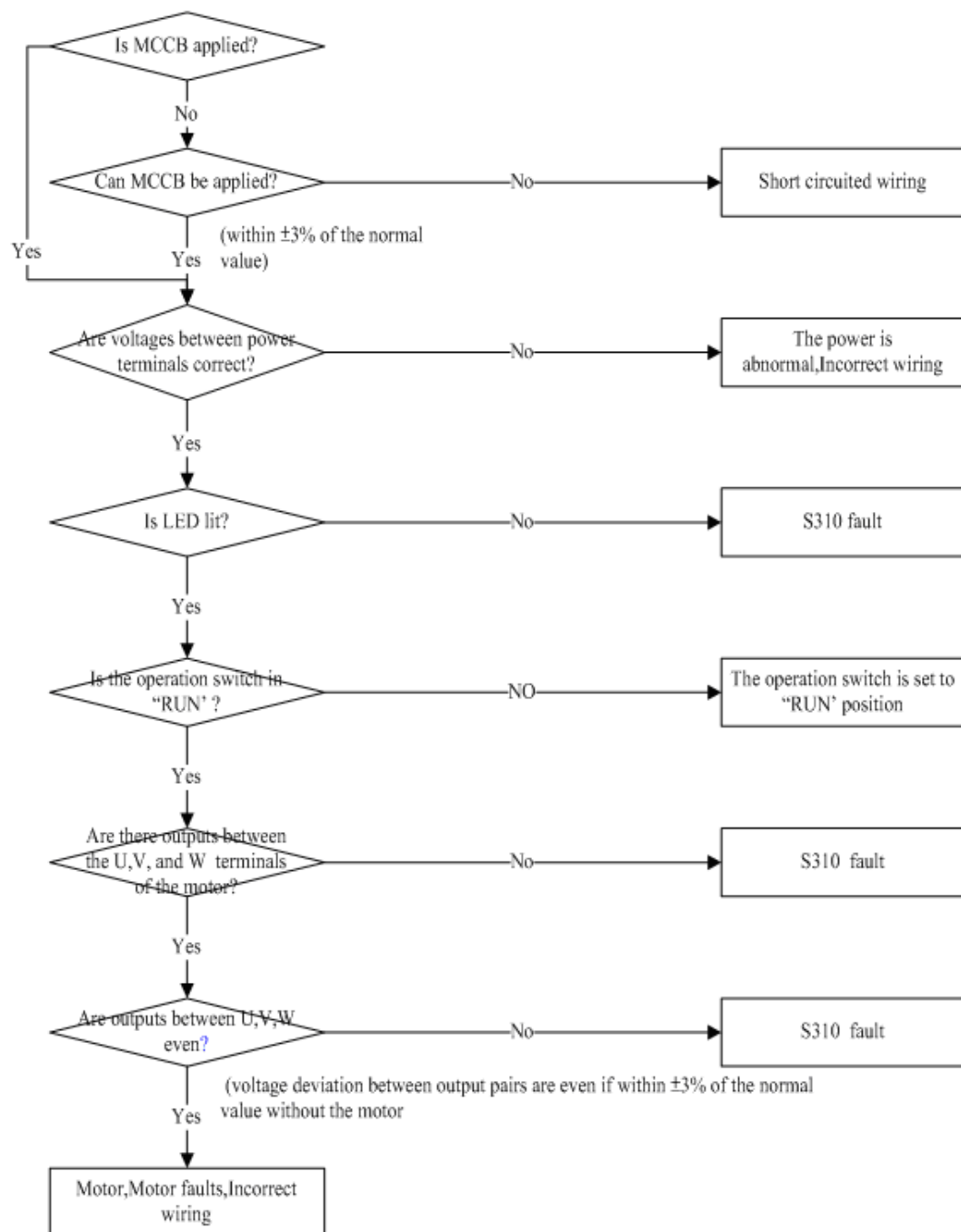
Troubleshooting for OC, OL error displays



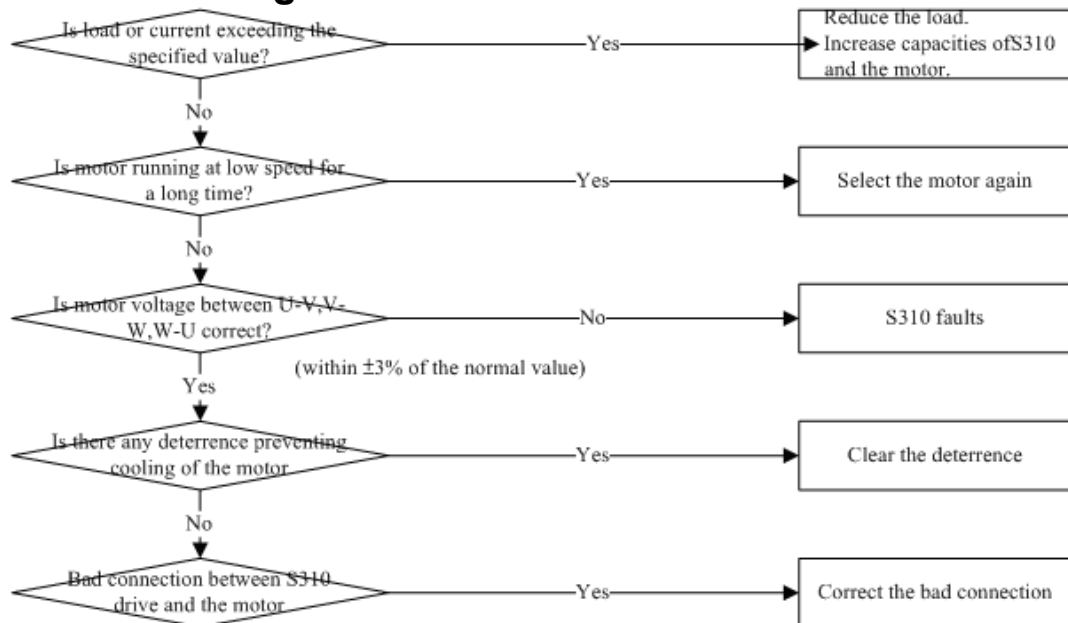
Troubleshooting for OV, LV error



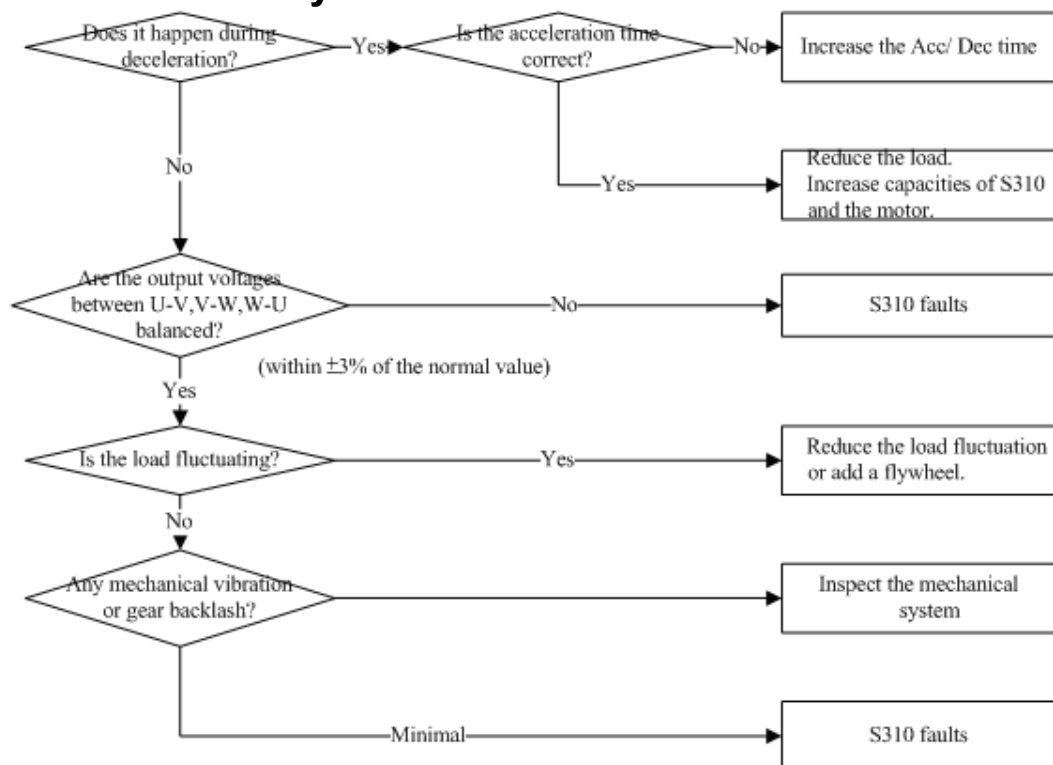
The motor can not run



Motor Overheating



Motor runs unevenly



5.4 Routine and periodic inspection

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

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

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

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

5.5 Maintenance and Inspection

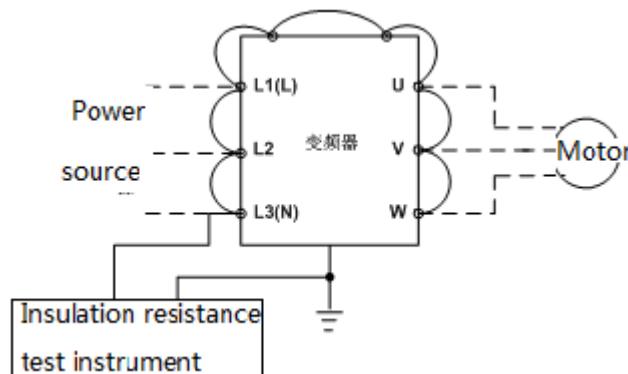
To ensure long-term reliability, follow the instructions below to perform regular inspection. Turn the power off and wait for the charge indicator (LED) to go out before inspection to avoid potential shock hazard from the charge stored in high-capacity capacitors.

1、The maintenance project is as follows:

➤	Ensure the temperature and humidity around the inverter are suitable, and have good ventilation, and keep away from heat source.
➤	Check the inside of the inverter and replace the old or damaged parts in time.
➤	Clean up the accumulation of any dust inside the inverter.
➤	Check grounding to ensure proper grounding.
➤	Check if there are any loose terminal screws and tighten them.

2、Insulation pressure test diagram

Models 401/402/403/405:



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

Chapter 6 Peripherals Components

6.1 AC reactor and DC reactor specification at input side

Model	AC inductance at input side		Braking resistor Specification			Braking resistor Duty Cycle (%)	Braking torque (%)
	Current (A)	Inductance (mH)	(W)	(Ω)	Number used		
S310+-401-H3XXX	5.0	8.4	150	750	1	10	123
S310+-402-H3XXX	5.0	4.2	200	400	1	10	116
S310+-403-H3XXX	7.5	3.6	350	250	1	10	125
S310+-405-H3XXX	10.0	2.2	400	150	1	10	124

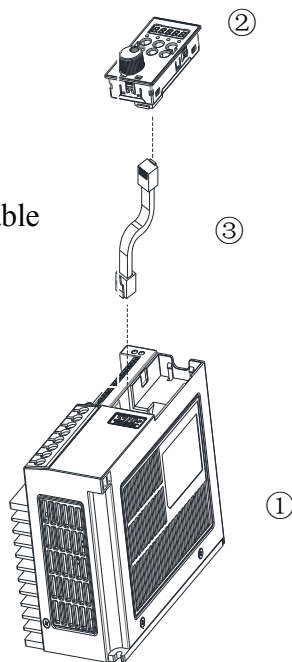
6.2 Digital operator and extension cable

S310+-401/402/403/405-H3:

A. Content

1. ① Inverter
2. ② LED Keypad (S31DOP-02)
3. ③ Remote Cable for Keypad

Note: ③ Using standard network cable connection.

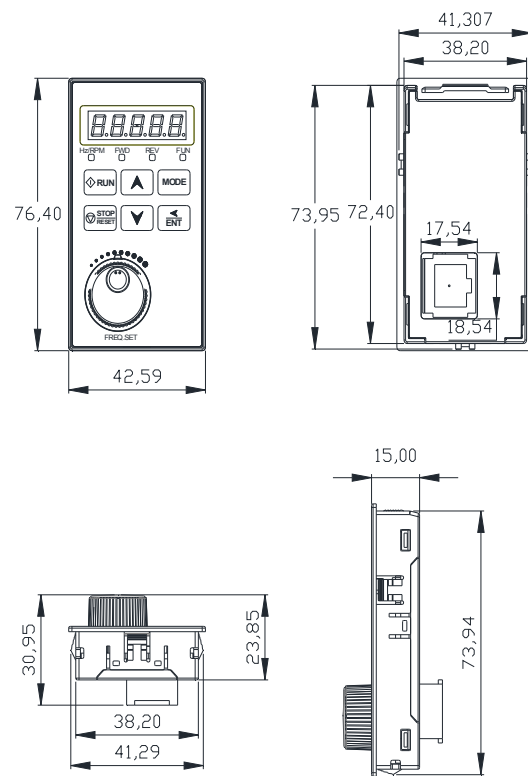


B. Operation procedure:

1. Turn off the power Supply; the following procedures should be performed after there is no display on the keypad.
2. Remove the keypad.
3. Connect the inverter and the keypad with REMOTE cable.

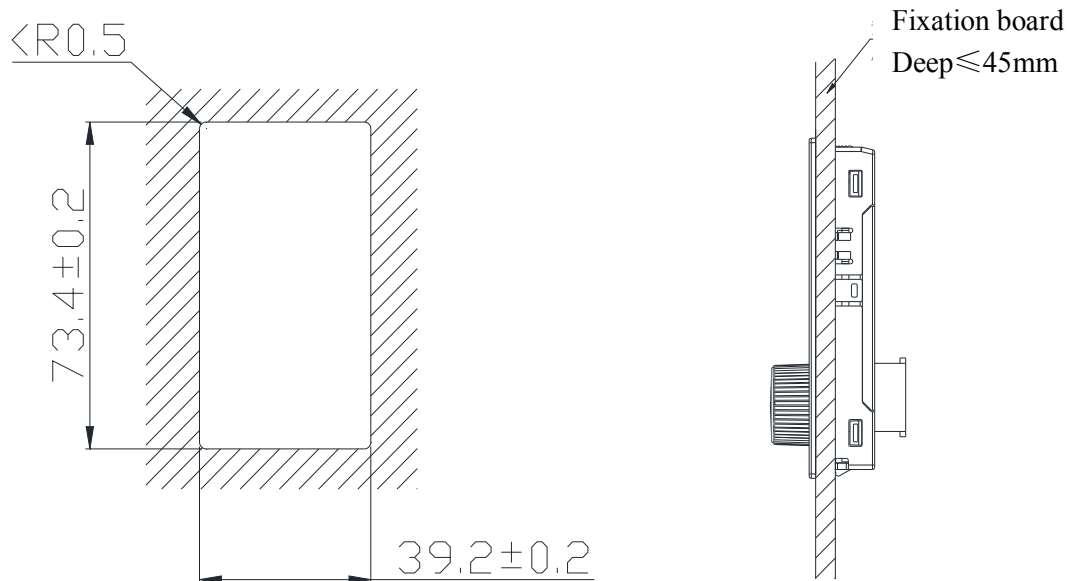
C. Keypad Installation Dimension Unit : mm

1. Keypad Installation Dimension



2. Dimension for remote keypad

a. Keypad hatch Installation Dimension



Appendix 1: S310+parameter setting list

Customer				Inverter Model			
Site Location				Contact Phone			
Address							
Parameter code	Setting content	Parameter code	Setting content	Parameter code	Setting content	Parameter code	Setting content
00-00		02-12		05-05		10-03	
00-01		02-13		05-06		10-04	
00-02		02-14		05-07		10-07	
00-03		03-00		05-08		10-08	
00-05		03-01		05-09		10-09	
00-07		03-02		05-10		10-10	
00-08		03-03		05-11		10-16	
00-09		03-04		05-13		11-00	
00-10		03-05		05-15		11-01	
00-11		03-06		05-16		11-02	
00-12		03-07		05-17		11-08	
00-13		03-08		06-00		12-00	
00-14		03-17		06-01		12-01	
01-00		03-18		06-02		12-02	
01-01		03-19		06-03		12-03	
01-02		03-20		06-04		12-04	
01-03		03-21		06-05		12-05	
01-04		03-22		06-06		12-06	
01-05		03-23		06-07		12-07	
01-06		03-24		06-08		13-00	
01-07		03-25		06-09		13-01	
01-08		03-26		06-10		13-02	
01-09		03-27		06-11		13-03	
01-10		03-28		07-00		13-04	
01-11		03-29		07-01		13-05	
01-12		03-30		07-02		13-06	
01-13		03-31		07-03		13-07	
01-14		03-32		07-04		13-16	
01-15		04-01		07-05		13-17	
02-00		04-03		07-13		13-18	
02-01		04-08		07-18		13-19	
02-02		04-09		08-00		13-20	
02-03		04-15		08-01		13-21	
02-04		04-16		08-02		13-22	
02-05		04-17		08-03		13-23	
02-06		04-18		08-04		13-32	
02-07		05-00		08-05		13-33	
02-08		05-01		08-06		13-34	
02-09		05-02		08-07		13-35	
02-10		05-03		08-08		13-36	
02-11		05-04		10-01		13-37	

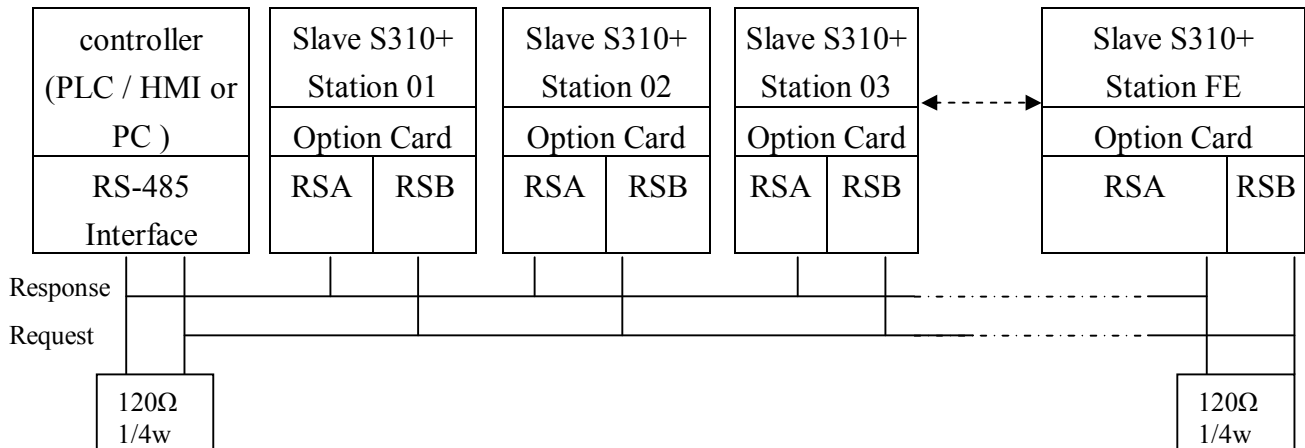
Appendix 2: S310+ MODBUS Communication protocol

1. Communication Data Frame

S310++ series inverter can be Communication controlled by the PC or other controller with the Communication protocol, Modbus ASCII Mode & Mode RTU, RS485 or RS232.

Frame length maximum 80 bytes.

1.1 Hardware installation



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

1.2 Data format frame

1.2.1 FOR ASCII MODE

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

1.2.2 FOR RTU MODE

MASTER(PLC etc.)send request to SLAVE, whereas SLAVE response to MASTER.The signal receiving is illustrated here.

The data length is varied with the command(Function).

SLAVE Address
Function Code
DATA
CRC CHECK
Signal Interval

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

1.3 SLAVE Address

00H : Broadcast to all the drivers

01H : to the No.01 Drivers

0FH : to the No.15 Drivers

10H : to the No.16 Drivers

and so on,Max to 32(20H)

1.4 Function Code

03H : Read the register contents

06H : write a WORD to register

08H : Loop test

10H : write several data to register(complex number register write)

2.CMS (Checksum and time-out definition)

2.1 LRC

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

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

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

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

- (2) Exclusive OR the first 8-bit byte of the message with the low-order byte of the 16-bit CRC register, putting the result in the CRC register.
- (3) Shift the CRC register one bit to the right (toward the LSB), Zero-filling the MSB, Extract and examines the LSB.
- (4) (If the LSB was 0): Repeat Steps(3)(another shift). (If the LSB was 1): Exclusive OR the CRC register with the polynomial value A001 hex (1010 0000 0000 0001), putting the result in the CRC register.
- (5) Repeat Steps (3) and (4) until 8 shifts been performed. When this is done, a complete 8-bit byte
Will be processed.
- (6) Repeat Steps (2) through (5) for next 8-bit byte of the message, Continue doing this until all bytes have been processed. The final content of the CRC register is the CRC value.
Placing the CRC into the message: When the 16-bit CRC (2 8-bit bytes) is transmitted in the message, the Low-order byte will be transmitted first, followed by the high-order byte, For example, if the CRC value is 1241 hex, the CRC-16 Upper put the 41h, the CRC-16 Lower put the 21h.

●**CRC calculation application program**

```

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

```

3. Error code

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

RTU Mode		
SLAVE Address		02H
Function		83H
Exception code		52H
CRC-16	High	C0H
	Low	CDH

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

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

4. Inverter Control

4.1 Command Data (Readable and Writable)

Register No.	Content																																																																								
2500/A000H	Reserved																																																																								
2501/A001H	<table><tr><th colspan="4">Operation Signal</th></tr><tr><th>Bit</th><th>Description</th><th>1</th><th>0</th></tr><tr><td>0</td><td>Operation Command</td><td>Run</td><td>Stop</td></tr><tr><td>1</td><td>Reverse Command</td><td>Reverse</td><td>Forward</td></tr><tr><td>2</td><td>Reserved</td><td></td><td></td></tr><tr><td>3</td><td>Fault Reset</td><td>Reset</td><td></td></tr><tr><td>4</td><td>Jog Command</td><td>Jog</td><td></td></tr><tr><td>5</td><td>Reserved</td><td></td><td></td></tr><tr><td>6</td><td>Multi-function Command S1</td><td>ON</td><td>OFF</td></tr><tr><td>7</td><td>Multi-function Command S2</td><td>ON</td><td>OFF</td></tr><tr><td>8</td><td>Multi-function Command S3</td><td>ON</td><td>OFF</td></tr><tr><td>9</td><td>Multi-function Command S4</td><td>ON</td><td>OFF</td></tr><tr><td>A</td><td>Multi-function Command S5</td><td>ON</td><td>OFF</td></tr><tr><td>B</td><td>Reserved</td><td></td><td></td></tr><tr><td>C</td><td>Multi-function Command R1A</td><td>ON</td><td>OFF</td></tr><tr><td>D</td><td>Reserved</td><td></td><td></td></tr><tr><td>E</td><td>Reserved</td><td></td><td></td></tr><tr><td>F</td><td>Reserved</td><td></td><td></td></tr></table>	Operation Signal				Bit	Description	1	0	0	Operation Command	Run	Stop	1	Reverse Command	Reverse	Forward	2	Reserved			3	Fault Reset	Reset		4	Jog Command	Jog		5	Reserved			6	Multi-function Command S1	ON	OFF	7	Multi-function Command S2	ON	OFF	8	Multi-function Command S3	ON	OFF	9	Multi-function Command S4	ON	OFF	A	Multi-function Command S5	ON	OFF	B	Reserved			C	Multi-function Command R1A	ON	OFF	D	Reserved			E	Reserved			F	Reserved		
	Operation Signal																																																																								
	Bit	Description	1	0																																																																					
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	4	Jog Command	Jog																																																																						
	5	Reserved																																																																							
	6	Multi-function Command S1	ON	OFF																																																																					
	7	Multi-function Command S2	ON	OFF																																																																					
	8	Multi-function Command S3	ON	OFF																																																																					
	9	Multi-function Command S4	ON	OFF																																																																					
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	C	Multi-function Command R1A	ON	OFF																																																																					
	D	Reserved																																																																							
	E	Reserved																																																																							
F	Reserved																																																																								
2502/A002H	Frequency Command																																																																								
2503/A003H	Reserved																																																																								
2504/A004H	Reserved																																																																								
2505/A005H	Reserved																																																																								
2506/A006H	Reserved																																																																								
2507/A007H	Reserved																																																																								
2508/A008H	Reserved																																																																								
2509/A009H	Reserved																																																																								

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

4.2 Monitor Data(Only for reading)

Register No.	Content																																																																																				
2520/A020H	<table><tr><th>Bit</th><th>Description</th><th>1</th><th>0</th></tr><tr><td>0</td><td>Operation state</td><td>Run</td><td>Stop</td></tr><tr><td>1</td><td>Direction state</td><td>Reverse</td><td>Forward</td></tr><tr><td>2</td><td>Inverter operation prepare state</td><td>ready</td><td>unready</td></tr><tr><td>3</td><td>Abnormal</td><td>Abnormal</td><td></td></tr><tr><td>4</td><td>DATA setting error</td><td>Error</td><td></td></tr><tr><td>5</td><td>Reserved</td><td></td><td></td></tr><tr><td>6</td><td>Reserved</td><td></td><td></td></tr><tr><td>~</td><td>Reserved</td><td></td><td></td></tr><tr><td>F</td><td>Reserved</td><td></td><td></td></tr></table>	Bit	Description	1	0	0	Operation state	Run	Stop	1	Direction state	Reverse	Forward	2	Inverter operation prepare state	ready	unready	3	Abnormal	Abnormal		4	DATA setting error	Error		5	Reserved			6	Reserved			~	Reserved			F	Reserved																																														
Bit	Description	1	0																																																																																		
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2521/A021H	abnormity <table><tr><th>Code</th><th>Description</th><th>Code</th><th>Description</th></tr><tr><td>00</td><td>Reserved</td><td>01</td><td>OH(Inverter over heat)</td></tr><tr><td>02</td><td>OC(Over current at stop)</td><td>03</td><td>LV(Under voltage)</td></tr><tr><td>04</td><td>OV(Over voltage)</td><td>05</td><td>B.B.(External bb)</td></tr><tr><td>06</td><td>CTER</td><td>07</td><td>Reserved</td></tr><tr><td>08</td><td>EPR(EEPROM error)</td><td>09</td><td>OL2(Inverter over load)</td></tr><tr><td>10</td><td>OL1(Motor over load)</td><td>11</td><td>E.S.(Emergency stop)</td></tr><tr><td>12</td><td>Reserved</td><td>13</td><td>OC-C (Over current at constant speed)</td></tr><tr><td>14</td><td>OC-A(Over current during accelerating)</td><td>15</td><td>OC-D (Over current during decelerating)</td></tr><tr><td>16</td><td>OC-S</td><td>17</td><td>LV-C (Under voltage during running)</td></tr><tr><td>18</td><td>OV-C(Over voltage at constant speed)</td><td>19</td><td>OH-C (Inverter over heat during running)</td></tr><tr><td>20</td><td>STP0(stop at 0 Hz)</td><td>21</td><td>STP1(Direct start disable)</td></tr><tr><td>22</td><td>STP2(Control panel emergency stop)</td><td>23</td><td>ERR1(Keypad operation error)</td></tr><tr><td>24</td><td>ERR2(Parameter setting error)</td><td>25</td><td>Reserved</td></tr><tr><td>26</td><td>ERR5(Communication failure)</td><td>27</td><td>ERR6 Communication failure</td></tr><tr><td>28</td><td>ERR7</td><td>29</td><td>ERR8</td></tr><tr><td>30</td><td>Reserved</td><td>31</td><td>Reserved</td></tr><tr><td>32</td><td>Reserved</td><td>33</td><td>Reserved</td></tr><tr><td>34</td><td>Reserved</td><td>35</td><td>Reserved</td></tr><tr><td>36</td><td>LOC(parameter Locked)</td><td>37</td><td>Reserved</td></tr><tr><td>38</td><td>Reserved</td><td>39</td><td>Reserved</td></tr></table>	Code	Description	Code	Description	00	Reserved	01	OH(Inverter over heat)	02	OC(Over current at stop)	03	LV(Under voltage)	04	OV(Over voltage)	05	B.B.(External bb)	06	CTER	07	Reserved	08	EPR(EEPROM error)	09	OL2(Inverter over load)	10	OL1(Motor over load)	11	E.S.(Emergency stop)	12	Reserved	13	OC-C (Over current at constant speed)	14	OC-A(Over current during accelerating)	15	OC-D (Over current during decelerating)	16	OC-S	17	LV-C (Under voltage during running)	18	OV-C(Over voltage at constant speed)	19	OH-C (Inverter over heat during running)	20	STP0(stop at 0 Hz)	21	STP1(Direct start disable)	22	STP2(Control panel emergency stop)	23	ERR1(Keypad operation error)	24	ERR2(Parameter setting error)	25	Reserved	26	ERR5(Communication failure)	27	ERR6 Communication failure	28	ERR7	29	ERR8	30	Reserved	31	Reserved	32	Reserved	33	Reserved	34	Reserved	35	Reserved	36	LOC(parameter Locked)	37	Reserved	38	Reserved	39	Reserved
Code	Description	Code	Description																																																																																		
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36	LOC(parameter Locked)	37	Reserved																																																																																		
38	Reserved	39	Reserved																																																																																		

Register No.	Content				
2522/A022H	Bit		Description	1	0
	Sequence input status	0	Terminal S1	On	OFF
		1	Terminal S2	On	OFF
		2	Terminal S3	On	OFF
		3	Terminal S4	On	OFF
		4	Terminal S5	On	OFF
		5	reserved		
		6	Multi-function Output1 (RELAY1)	On	OFF
		7	reserved		
		8	reserved		
		9	reserved		
	Contact output	A	reserved		
		B	reserved		
		C	reserved		
		D	reserved		
		E	reserved		
		F	reserved		
2523/A023H	frequency command (100/1Hz)				
2524/A024H	Output frequency (100/1Hz)				
2525/A025H	Output voltage command (10/1V)				
2526/A026H	DC voltage command (10/1V)				
2527/A027H	Output current (10/1A)				
2528/A028H	reserved				
2529/A029H	reserved				
252A/A02AH	reserved				
252B/A02BH	reserved				
252C/A02CH	TM2 AIN input value (1024 / 10V) *1				
252D/A02DH	Keypad AIN input value (1024 / 10V) *1				
252E/A02EH	reserved				
252F/A02FH	reserved				
2530/A030H	reserved				

(Note) 1、 Do not write in data for the reserved register.

5.Function Code

5.1Read the data in the holding register [03H]

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

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

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

3、Read data Quantity ≥ 1 .

(Example) Read the SLAVE station No:01 ,S310+ drive's frequency command.

ASCII Mode

Instruction Message		Response Message (Normal)		Response(Fault)	
STX	3AH	STX	3AH	STX	3AH
SLAVE Address	30H	SLAVE Address	30H	SLAVE Address	30H
	31H		31H		31H
Function Code	30H	Function Code	30H	Function Code	38H
	33H		33H		33H
Start Address	32H	DATA number	30H	Error Code	35H
	35H		32H		32H
	32H	First holding register	31H	LRC CHECK	32H
	33H		37H		41H
Quantity	30H		37H	END	0DH
	30H		30H		0AH
	30H	LRC CHECK	37H		
	31H		33H		
LRC CHECK	42H	END	0DH		
	33H		0AH		
END	0DH				
	0AH				

RTU Mode

Instruction Message			Response Message (Normal)			Response(Fault)		
SLAVE Address		01H	SLAVE Address		01H	SLAVE Address		01H
Function Code		03H	Function Code		03H	Function Code		83H
Start Address	High	25H	DATA number		02H	Error Code		52H
	Low	23H	First holding register	High	07H	CRC-16	High	C0H
Quantity	High	00H		Low	D0H		Low	CDH
	Low	01H	CRC-16	High	BBH			
CRC-16	High	7EH		Low	E8H			
	Low	CCH						

5.2 LOOP BACK testing [08H]

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

ASCII Mode

Instruction Message			Response Message (Normal)			Response(Fault)		
STX		3AH	STX		3AH	STX		3AH
SLAVE Address		30H	SLAVE Address		30H	SLAVE Address		30H
		31H			31H			31H
Function Code		30H	Function Code		30H	Function Code		38H
		38H			38H			38H
Test Code		30H	Test Code		30H	Error Code		32H
		30H			30H			30H
		30H			30H	LRC CHEC		37H
		30H			30H			35H
DATA		41H	DATA		41H	END		0DH
		35H			35H			0AH
		33H			33H			
		37H			37H			
LRC CHECK		31H	LRC CHECK		31H			
		42H			42H			
END		0DH	END		0DH			
		0AH			0AH			

RTU Mode

Instruction Message			Response Message (Normal)			Response(Fault)		
SLAVE Address		01H	SLAVE Address		01H	SLAVE Address		01H
Function Code		08H	Function Code		08H	Function Code		88H
Test Code	High	00H	Test Code	High	00H	Error Code		20H
	Low	00H		Low	00H	CRC-16	High	47H
DATA	High	A5H	DATA	High	A5H		Low	D8H
	Low	37H		Low	37H			
CRC-16	High	DAH	CRC-16	High	DAH			
	Low	8DH		Low	8DH			

5.3 Write holding register [06H]

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

(Example)Set SLAVE station No:01,Write S310+ drive frequency reference 60.0HZ.

ASCII Mode

Instruction Message		Response Message (Normal)		Response(Fault)	
STX	3AH	STX	3AH	STX	3AH
SLAVE	30H	SLAVE	30H	SLAVE	30H
Address	31H	Address	31H	Address	31H
Function	30H	Function	30H	Function	38H
Code	36H	Code	36H	Code	36H
Start Address	32H	Start Address	32H	Error Code	35H
	35H		35H		32H
	30H		30H	LRC CHECK	32H
	32H		32H		37H
DATA	31H	DATA	31H	END	0DH
	37H		37H		0AH
	37H		37H	LRC CHECK	34H
	30H		30H		42H
LRC CHECK	34H	LRC CHECK	34H	END	0DH
	42H		42H		0AH
END	0DH	END	0DH	END	0DH
	0AH		0AH		0AH

RTU Mode

Instruction Message			Response Message (Normal)			Response(Fault)		
SLAVE Address		01H	SLAVE Address		01H	SLAVE Address		01H
Function Code		06H	Function Code		06H	Function Code		86H
Start Address	High	25H	Start Address	High	25H	Error Code		52H
	Low	02H		Low	02H	CRC-16	High	C3H
DATA	High	17H	DATA		High		17H	Low
	Low	70H		Low	70H			
CRC-16	High	2DH	CRC-16		High	2DH		
	Low	12H		Low	12H			

5.4 Write in several holding registers [10H]

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

Note: 1、 Limit number of read data, RTU: 35, ASCII:15.

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

3、Read data Quantity $\geq$ 1.

(Example)Set SLAVE station No:01, S310+ drive as forward run at frequency reference 60.0HZ.

ASCII Mode

Instruction Message		Response Message (Normal)		Response(Fault)	
STX	3AH	STX	3AH	STX	3AH
SLAVE Address	30H	SLAVE Address	30H	SLAVE Address	30H
	31H		31H		31H
Function Code	31H	Function Code	31H	Function Code	39H
	30H		30H		30H
Start Address	32H	Start Address	32H	Error Code	35H
	35H		35H		32H
	30H		30H	LRC CHECK	31H
	31H		31H		44H
Quantity	30H	Quantity	30H	END	0DH
	30H		30H		0AH
	30H		30H		
	32H		32H		
DATA Number*	30H	LRC CHECK	43H		
	34H		37H		
First DATA	30H	END	0DH		
	30H		0AH		
	30H				
	31H				
Next DATA	31H				
	37H				
	37H				
	30H				
LRC CHECK	33H				
	42H				
END	0DH				
	0AH				

RTU Mode

Instruction Message			Response Message (Normal)			Response(Fault)		
SLAVE Address		01H	SLAVE Address		01H	SLAVE Address		01H
Function Code		10H	Function Code		10H	Function Code		90H
Start Address	High	25H	Start Address	High	25H	Error Code		52H
	Low	01H		Low	01H			
Quantity	High	00H	Quantity	High	00H	CRC-16	High	CDH
	Low	02H		Low	02H		Low	FDH
DATA Number *		04H	CRC-16		High			
First DATA	High	00H			Low			
	Low	01H						

Next DATA	High	17H
	Low	70H
CRC-16	High	CBH
	Low	26H

* DATA Numbers are the actual number timers 2

6.Comparison list between parameter and register

Note:

Parameter register No.: GGnnH, “GG”means Group number , “nn” means Parameter number
for example: the address of Pr 08-03 is 0803H. the address of Pr 10-11 is 0A0BH

Register No.	Function	Register No.	Function	Register No.	Function
Group00		Group01		Group02	
0000H	Reserved	0100H	01-00	0200H	02-00
0001H	00-01	0101H	01-01	0201H	02-01
0002H	00-02	0102H	01-02	0202H	02-02
0003H	00-03	0103H	01-03	0203H	02-03
0004H	Reserved	0104H	01-04	0204H	02-04
0005H	00-05	0105H	01-05	0205H	02-05
0006H	Reserved	0106H	01-06	0206H	Reserved
0007H	00-07	0107H	Reserved	0207H	Reserved
0008H	00-08	0108H	Reserved	0208H	Reserved
0009H	00-09	0109H	01-09	0209H	Reserved
000AH	00-10	010AH	Reserved	020AH	Reserved
000BH	00-11	010BH	01-11	020BH	Reserved
000CH	00-12	010CH	01-12	020CH	02-12
000DH	00-13	010DH	01-13	020DH	02-13
000EH	00-14				

Register No.	Function	Register No.	Function	Register No.	Function
Group03		Group04		Group05	
0300H	Reserved	0400H	Reserved	0500H	05-00
0301H	03-01	0401H	04-01	0501H	Reserved

0302H	03-02	0402H	Reserved	0502H	05-02
0303H	03-03	0403H	04-03	0503H	05-03
0304H	03-04	0404H	Reserved	0504H	05-04
0305H	03-05	0405H	Reserved	0505H	05-05
0306H	03-06	0406H	Reserved	0506H	05-06
0307H	03-07	0407H	Reserved	0507H	05-07
0308H	03-08	0408H	04-08	0508H	05-08
0309H	Reserved	0409H	04-09	0509H	05-09
030AH	Reserved	040AH	Reserved	050AH	05-10
030BH	Reserved	040BH	Reserved	050BH	05-11
030CH	Reserved	040CH	Reserved		
030DH	Reserved	040DH	Reserved		
030EH	Reserved	040EH	Reserved		
030FH	Reserved	040FH	04-15		
0310H	Reserved	0410H	04-16		
0311H	03-17	0411H	04-17		
0312H	03-18	0412H	04-18		
0313H	03-19				
0314H	03-20				
0315H	03-21				
0316H	03-22				
0317H	03-23				
0318H	03-24				
0319H	03-25				
031AH	03-26				
031BH	03-27				
031CH	03-28				
031DH	03-29				
031EH	03-30				
031FH	03-31				
0320H	03-32				

Register No.	Function	Register No.	Function	Register No.	Function
Group06 (Reserved)		Group07		Group08	
		0700H	07-00	0800H	08-00
		0701H	07-01	0801H	Reserved
		0702H	07-02	0802H	08-02
		0703H	07-03	0803H	08-03

		0704H	07-04	0804H	08-04
		0705H	07-05	0805H	08-05
		0706H	07-06	0806H	08-06
		...	...	0807H	08-07
		070CH	Reserved	0808H	08-08
		070DH	07-13		

Register No.	Function	Register No.	Function	Register No.	Function
Group09 (Reserved)		Group10		Group11	
		0A00H	Reserved	0B00H	11-00
		0A01H	10-01	0B01H	11-01
		0A02H	Reserved	0B02H	11-02
		0A03H	10-03		
		0A04H	10-04		
		~	Reserved		
		0A0FH	10-16		

Register No.	Function	Register No.	Function	Register No.	Function
Group12		Group13			
0C00H	12-00	0D00H	13-00		
0C01H	12-01	0D01H	13-01		
0C02H	12-02	0D02H	13-02		
0C03H	Reserved	0D03H	13-03		
0C04H	Reserved	0D04H	13-04		
0C05H	Reserved	0D05H	13-05		
0C06H	12-06	0D06H	13-06		
0C07H	12-07	0D07H	13-07		
		0D08H	Reserved		
		0D09H	Reserved		
		0D0AH	Reserved		
		0D0BH	Reserved		
		0D0CH	Reserved		
		0D0DH	Reserved		
		0D0EH	Reserved		
		0D0FH	Reserved		

		0D10H	13-16		
		0D11H	13-17		
		0D12H	13-18		
		0D13H	13-19		
		0D14H	13-20		
		0D15H	13-21		
		0D16H	13-22		
		0D17H	13-23		
		0D18H	Reserved		
		0D19H	Reserved		
		0D1AH	Reserved		
		0D1BH	Reserved		
		0D1CH	Reserved		
		0D1DH	Reserved		
		0D1EH	Reserved		
		0D1FH	Reserved		
		0D20H	13-32		
		0D21H	13-33		
		0D22H	13-34		
		0D23H	13-35		
		0D24H	13-36		
		0D25H	13-37		
		0D26H	13-38		
		0D27H	13-39		

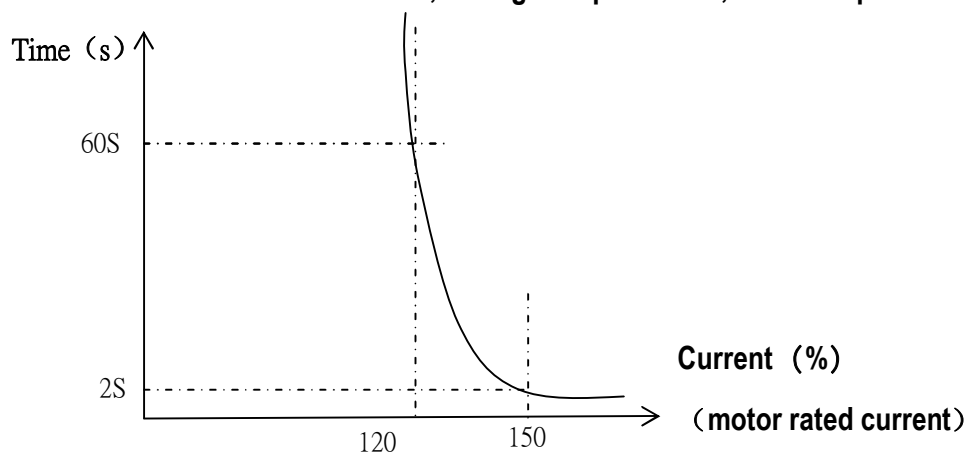
Appendix 3 :S317+ Parameters Description

1、 Add parameters and modify Defult values as follows :

Code	Description	Range	Defult	NOTE
07-05	Electronic Motor Overload Protection Operation Mode OL1	0: Enable motor Protect by relay 1: Disable motor Protect by relay	0	
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	2	
07-14	Motor overload protection OL3	0: Enable 1: Disable	0	
07-15	OL3 Manual reset time	0.0~5.0min	0min	

07-14 Description:

OL3 curve is as follows: running at 120% motor rated current 1 min,turning OL3 protection , running at 150% motor rated current 2 sec,turning OL3 protection, motor stops running.



2、 Manual reset but not automatic reset failure indication, modified as follows :

Display	Description	reason	measures
OL3	Motor overload OL3 protection. Manual reset time is determined by 07-15.	1.Excessive load 2.Incorrect settings for 06-01.	1. Increase the motor capacity. 2. set 06-01.

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