Preface

Thanks for using the MD300A series inverter presented by Inovance Technology Co., Ltd.. Developed on the basis of extensive market research, MD300A series inverter is a general-purpose inverter with high performance.

Embodying the features of products offered by Inovance Technology Co., Ltd., the inverter bears two control modes, that is, V/F and open-loop vector, and ensures the best low frequency torque and dynamic response performance.

Many new functions have been added on the basis of the market research and analysis of the customer's function requirements. This series of products are the true high-performance inverters with general-purpose function.

The manual presents the precaution details related to the installation, parameter adjustment, abnormal problems diagnosis and daily maintenance of the inverter. Please carefully read the manual before the installation and keep it safe for future maintenance reference.

Special precautions as follows:

- Do remember to cut off the power supply upon wiring. After cutting off the AC power, do not touch the internal parts and components until at least 5 minutes later, since it takes some time for the electric charge stored in the capacitor of the inverter to discharge.
- Do not touch the PCB or drop foreign material into the inverter, otherwise it may cause short circuit, because many components inside the inverter are static sensitive devices.
- The grounding terminal of the inverter shall be reliably connected to the earth with multicore cable.
- Do not connect AC input power to the output terminals U, V and W of the inverter.
- The external braking resistor can only be connected between terminal P and terminal PB.

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Chapter 1 Delivery inspection and safety cautions

1.1 Unpacking inspection items

The inverter has passed strict inspection before delivery, and is reliably packed. However, it may be damaged during the transportation due to improper handling or loading/unloading. Therefore, perform the following inspection immediately after unpacking the inverter.

1) After opening the packing box, the inverter shall be sealed in plastic bag. The plastic component of the inverter is intact.
2) There is one MD300A inverter in the packing box.
3) Check the nameplate on the side to see if the inverter is delivered according to the order (refer to Chapter 2 for nameplate marks)

1.2 Installation cautions

1) As the environment has great influence on the life of the inverter, the ambient temperature for the operation shall not exceed the allowable range (-10°C to 50°C).
2) Do not use the inverter that is damaged or has defect. Contact the agent or our company for repair as soon as possible, so as to prevent the worsening of the damage or the fault.
3) Mount the inverter on incombustible surface like metal, and keep away from flammable substances! Otherwise it may cause fire!
4) When more than two inverters are to be installed in one cabinet, please pay attention to the installation locations to ensure the cooling effect.
5) The input power cables (R, S, T or L1, L2), DC bus, braking units (+, PB, -) and motor outlet wires (U, V, W) shall be correctly connected, otherwise the inverter will be damaged. Ensure that the wiring meets the EMC requirements and the local safety standard. The wire size shall be determined according to the manual, otherwise accident may occur!
6) Do not try to change the parameter of the inverter set by the manufacturer, or the inverter may not be able to run or may be damaged.
7) Do not approach the equipment when the restart function is enabled, otherwise there will be danger of injury.

1.3 Running and maintenance cautions

1) Only qualified electrical engineer is allowed to repair and maintain the inverter. Do not repair or

maintain the inverter with power on, otherwise there will be danger of injury or damage to the inverter!

2) When the motor is used for the first time, or reused after being stored for a long time, or in regular checkup, the user must check the insulation status of the motor to prevent the damage

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to the inverter because of the poor insulation of the motor. It is recommended to use a 500V Mega-Ohm-Meter for the insulation test and the insulation resistance shall not be less than 5MΩ. The motor connections (U, V and W) must be completely disconnected from the inverter during the insulation test.

3) If the rated capacity of the motor selected does not match that of the inverter, especially when the rated power of the inverter is higher than that of the motor, make sure to adjust the parameters of the inverter for motor protection or install a forestage thermal relay for the motor.
4) The output frequency of this inverter is 0 to 3200Hz. Please consider the capability of the mechanical devices when the inverter is to run at the frequency higher than 50Hz.
5) Because the inverter outputs PWM wave, the capacitor used for improving power factor and varistor used for lightning protection shouldn't be installed at the output side of the inverter, otherwise the inverter may have transient over-current and may be damaged. Since the output voltage of the inverter has some harmonics, it is normal that the temperature may rise, and the noise and vibration may increase compared with the inverter running at main frequency.
6) When the altitude is higher than 1000m, the cooling effect of inverter is deteriorated due to the rarefaction of air, the deration must be adopted.
7) The electrolytic capacitors in the main circuits and on the PCB may explode when they are burned and poisonous gas may be generated when the plastic parts are burned. Please dispose the inverter as industrial rubbish.

1.4 Maintenance

1. Daily checking items

1) Check if there is any vibration of motor;

2) Check if the installation environment of inverter changes;

3) Check if the cooling fan of inverter works normally;

2. Periodical Checking items:

1) Check the fan and clean them periodically

2) Check if the screws are loose

3) Check if the inverter is rusted

4) Check if the connection terminals are loose

Check the insulation in main circuit

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Note: When testing the insulating resistance with Mega-Ohm-Meter (use DC 500V Mega-Ohm-Meter), disconnect the main circuit from the inverter. Connect all the terminals of the main circuit in short circuit, and then test the insulation between the main circuit and the earth/control loop.

3. Storage of inverter

After buying the inverter, the user must pay attention to the following points for temporary/long-term storage of inverter:

1) It is recommended to store the inverter in its original packing box. The storage temperature shall be between -20ºC and +60ºC, with the humidity not more than 95%RH.

2) Long-term storage will cause deterioration of electrolytic capacitor. Therefore, inverters long time not in service must be powered once within 2 years for 5 hours; and the input voltage must be boosted gradually with voltage regulator to the rated value.

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Chapter 2 Product Information

2.1 Name designation rules

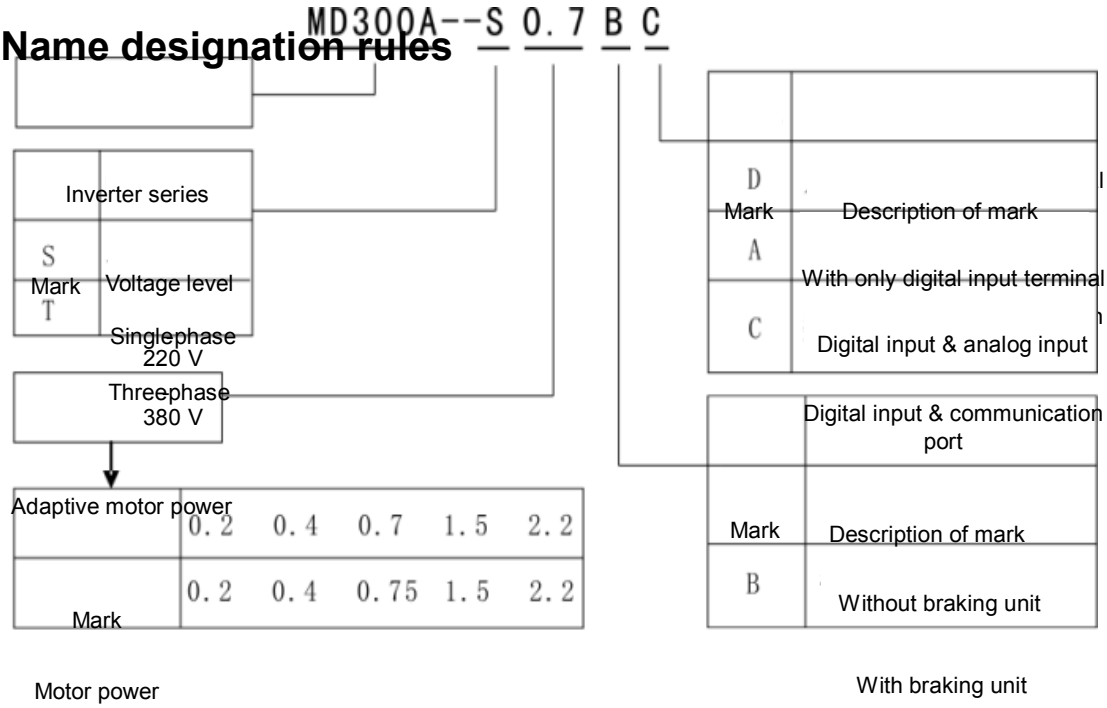

Fig. 2.1 Name designation rules

2.2 Nameplate

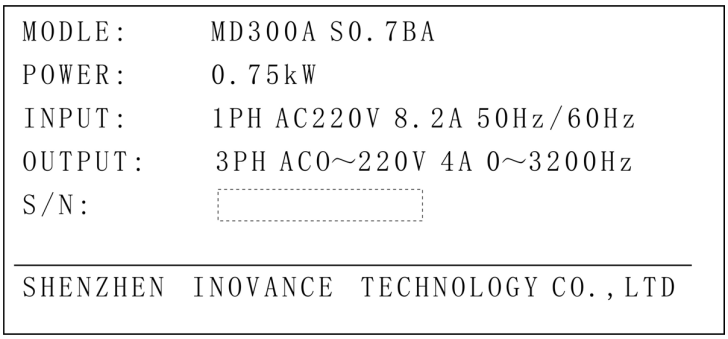

Fig. 2.2 Nameplate

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2.3 MD300A series inverter

Table 2-1 Model and technical data

Inverter model	Input voltage	Rated power capacity (kVA)	Rated input current (A)	Rated output current (A)	Motor (kW)
MD300A-S0.2BA	Single- phase 220V Range: -15% to 20%	0.6	3.2	1.2	0.2
MD300A-S0.4BA		1.0	5.4	2.3	0.4
MD300A-S0.7BA		1.5	8.2	4.0	0.75
MD300A-S1.5BA		3.0	14.2	7.0	1.5
MD300A-S2.2BA		4.0	23.0	9.6	2.2
MD300A-T0.7BA	Three-phase 380V Range: -15% to 20%	1.5	3.4	2.1	0.75
MD300A-T1.5BA		3.0	5.0	3.8	1.5
MD300A-T2.2BA		4.0	7.0	5.1	2.2

2.4 Technical Specification

Table 2-2 Technical specification of MD300A series drive

Item		Specification
Basic specification	Maximum frequency	3200.0Hz
	Carrier frequency	0.5K to 16K (Hz); Carrier frequency can be adjusted automatically according to the temperature rise.
	Frequency resolution	Digital setting: 0.1Hz Analog setting: Maximum frequency ×0.1%
	Control mode	Open loop vector control (SVC), V/F control
	Start torque	0.5Hz/150%
	Speed control range	1:100 (SVC)
	Speed accuracy	± 0.5%(SVC)
	Overload capability	150% rated current for 60s; 180% rated current for 1s
	Torque boost	Auto Torque boost; Manual Torque boost 0.1% to 30.0%
	V/F curve	2 modes: Line, square V/F curve
	DC brake	DC braking initial frequency: 0.0Hz to 50.0Hz, braking time: 0.0 to 36.0s, braking current: 0.0 to 200.0%,Built-in braking unit
Personalized	Jog control	Jog frequency range: 0.0Hz to 50.0Hz; Jog Acc/Dec time: 0.0 to 3000.0s
	Shared DC bus	Several motors can share one DC bus.

function	Command channel	Three channels: operation panel, terminals, communication (optional).

Item		Specification
Input/output characteristic	Frequency source	6 frequency sources: panel potentiometer, digital reference, analog voltage, analog current (optional), pulse, communication (optional).
	Auxiliary frequency sources	Fine tuning and frequency integration can be achieved flexibly with auxiliary frequency.
	Input terminals	Four digital input terminals, one of them can input high speed pulse (Maximum input frequency 50kHz). Additional function port can be selected by ordering: A: An analog input terminal, voltage (DC 0V to 24V or 0V to 10V) or current (0V to 20mA) input (Finally, the analog signal is sent to the equipment with the voltage of 0-10V after the regulation of the internal circuit.) B: 485 communication terminal
	Output terminals	A digital(open collector) output terminal A fault relay output terminal An analog output terminal AO. Output voltage range: 0-10VDC.
Display and keypad operation	LED display	Be able to display 7 parameters :setting frequency, output frequency, output voltage and current, etc.
Protection function		Overcurrent protection; Overvoltage protection; Undervoltage protection; Overheat protection; overload protection and output phase failure protection, etc.
Applicable Situation		Indoor, away from direct sunlight, free of dust, erosive gas.
Environment	Altitude	Lower than 1,000 meters, otherwise deration is required
	Ambient temperature	-10ºC to +40ºC (If the ambient temperature is within 40ºC to 50ºC, deration is required)
	Humidity	Less than 95%RH, without condensation
	Vibration	Less than 5.9m/s^2 (0.6g)
	Storage temperature	-20ºC to +60ºC

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2.5 Outline and installation dimension

1) Outline

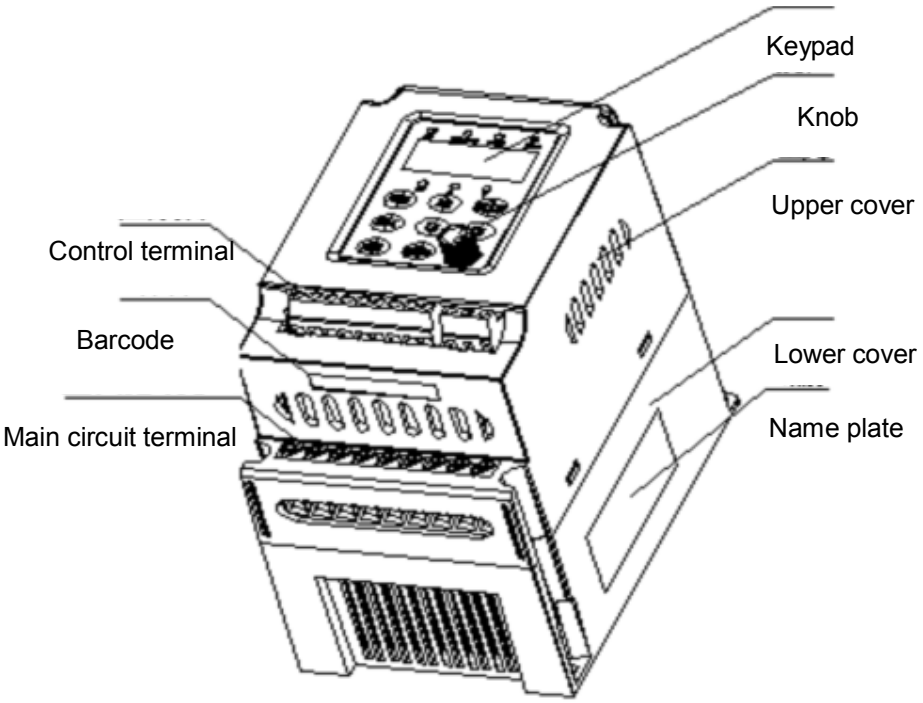

Fig. 2-3 Outline of inverter

2) Dimension of Installation Holes

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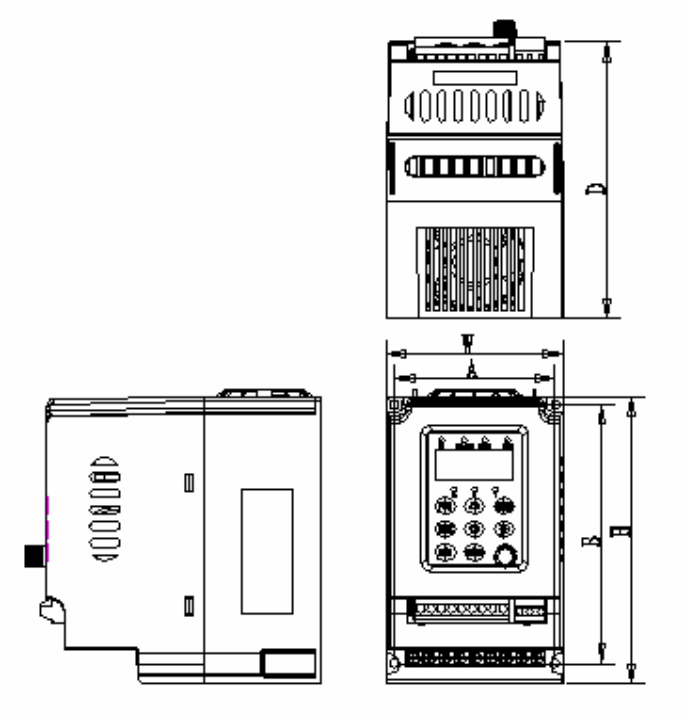

Fig 2-4 Outline and installation dimension of the inverter

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Fig 2-3 Installation Dimension of MD300A inverter (mm)

Inverter Model	Motor (kW)		A	B	H	W	D	Hole diameter	Gross weight (kg)
MD300A S0.2BA	Single-phase 220V	0.2	78	126	139.5	86	134	4.2	0.9
MD300A S0.4BA		0.4							
MD300A S0.7BA		0.75							
MD300A S1.5BA		1.5							
MD300A S2.2BA		2.2							
MD300A T0.7BA	Three-phase 380V	0.75							
MD300A T1.5BA		1.5							
MD300A T2.2BA		2.2							

2.6 Recommended line diameter and peripheral accessories

Recommended circuit breaker, contactor and line diameter of leading wire:

Table 2-4 Instruction for peripheral electric component selection

Inverter model	Circuit breaker (MCCB) (A)	Contactor (A)	Main circuit leading wire at input side (mm^2)	Main circuit leading wire at output side (mm^2)	Control loop leading wire (mm^2)	Grounding wire (mm^2)
MD300A S0.2BA	10	10	2.5	2.5	0.75	2.5
MD300A S0.4BA	16	10	2.5	2.5	0.75	2.5
MD300A S0.7BA	16	10	2.5	2.5	0.75	2.5
MD300A S1.5BA	20	16	4.0	2.5	0.75	2.5
MD300A S2.2BA	32	20	6.0	4.0	0.75	2.5
MD300A T0.7BA	10	10	2.5	2.5	0.75	2.5
MD300A T1.5BA	16	10	2.5	2.5	0.75	2.5
MD300A T2.2BA	16	10	2.5	2.5	0.75	2.5

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Chapter 3 Mechanical and electrical Installation

3.1 Mechanical installation

Installation environment:

1) Mount in the location where vibration is less than 0.6g.The inverter shall be far away from impacting lathe.
2) Do not install the inverter in the place with direct sunlight, high humidity and water.
3) Mount the inverter in the location free of corrosive gas, explosive gas or combustible gas.
4) Mount the inverter in the location free of oil dirt, dust, and metal powder.
5) Install the inverter vertically so that the heat may be expelled from the top. When two inverters are mounted up and down, an airflow diverting plate should be fixed in between, so as to avoid the upper inverter being baked by the lower inverter. The installation bracket must be flame retardant. If the inverter is installed in the area with metal powder, the space inside the sealing cabinet shall be big enough.

3.2 Basic Electrical Installation

1) There are two types of main circuit terminals for the MD300A inverter based on the voltage class, as shown in the following table:

Terminals	Name	Description
L1, L2	Power input terminals for single-phase 220V inverter	To connect to the AC 220V power supply
R, S, T	Power input terminals for three-phase 380V inverter	To connect to the AC 380V three-phase power supply
(+), (-)	Negative and positive terminals of DC bus	The output point of the DC voltage, which can connect to the braking unit, or be used for sharing DC bus
(+), PB	Connecting terminals of braking resistor	To connect to the braking resistor
U, V, W	Output terminals of inverter	To connect to the motor
PE	Grounding terminal	The grounding terminal of the inverter cabinet

2) Notes on Wiring:

- Input power supply terminals L1, L2 or R, S ,T: It is unnecessary to consider the phase sequence.
- DC bus (+) and (-) terminals: They are the output points of the inverter after rectification. There

may exist dangerous voltages on the terminals after power-down because of the power storage of the internal capacitors. Do not operate the terminals and internal components of the inverter unless 5 minutes has passed after power-down.

- For the sake of safety and interference immunity, the grounding terminals of the inverter must

be reliably grounded. It is prohibited to use the single-core cable as the grounding cable. The grounding resistance must be less than 5Ω. The grounding terminal must be exclusively used for grounding. Do not share the grounding terminal and neutral line of the mains supply.

- The configuration of the braking resistor shall be conducted according to the parameters provided in the documents of our company. The wiring distance shall be less than 5m. The MD300A inverter has built-in braking unit, and the external braking resistor shall be connected to the (+) terminal or PB terminal.

3) The following figures are commonly used wiring schemes:

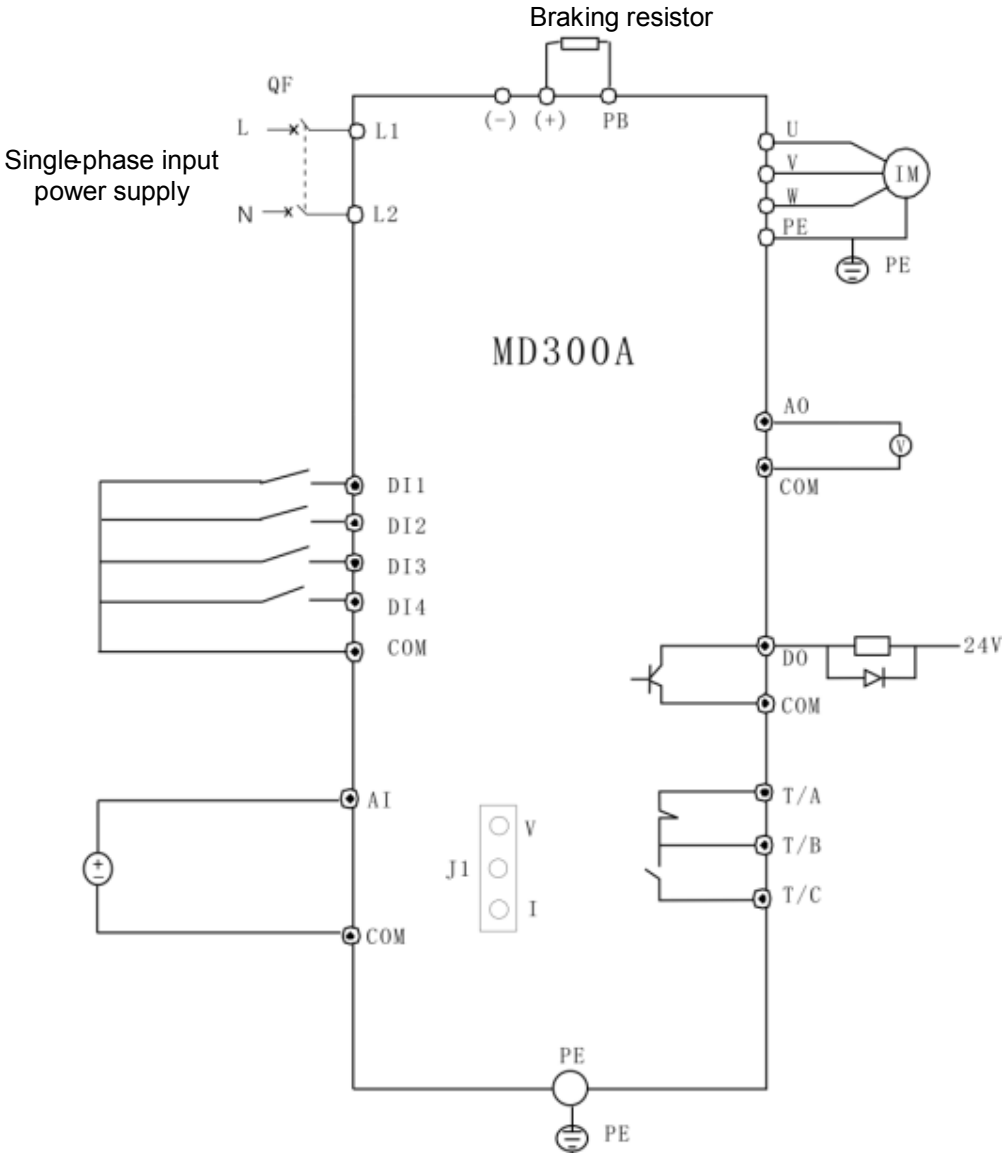


Fig.3-1 Wiring mode with analog input port

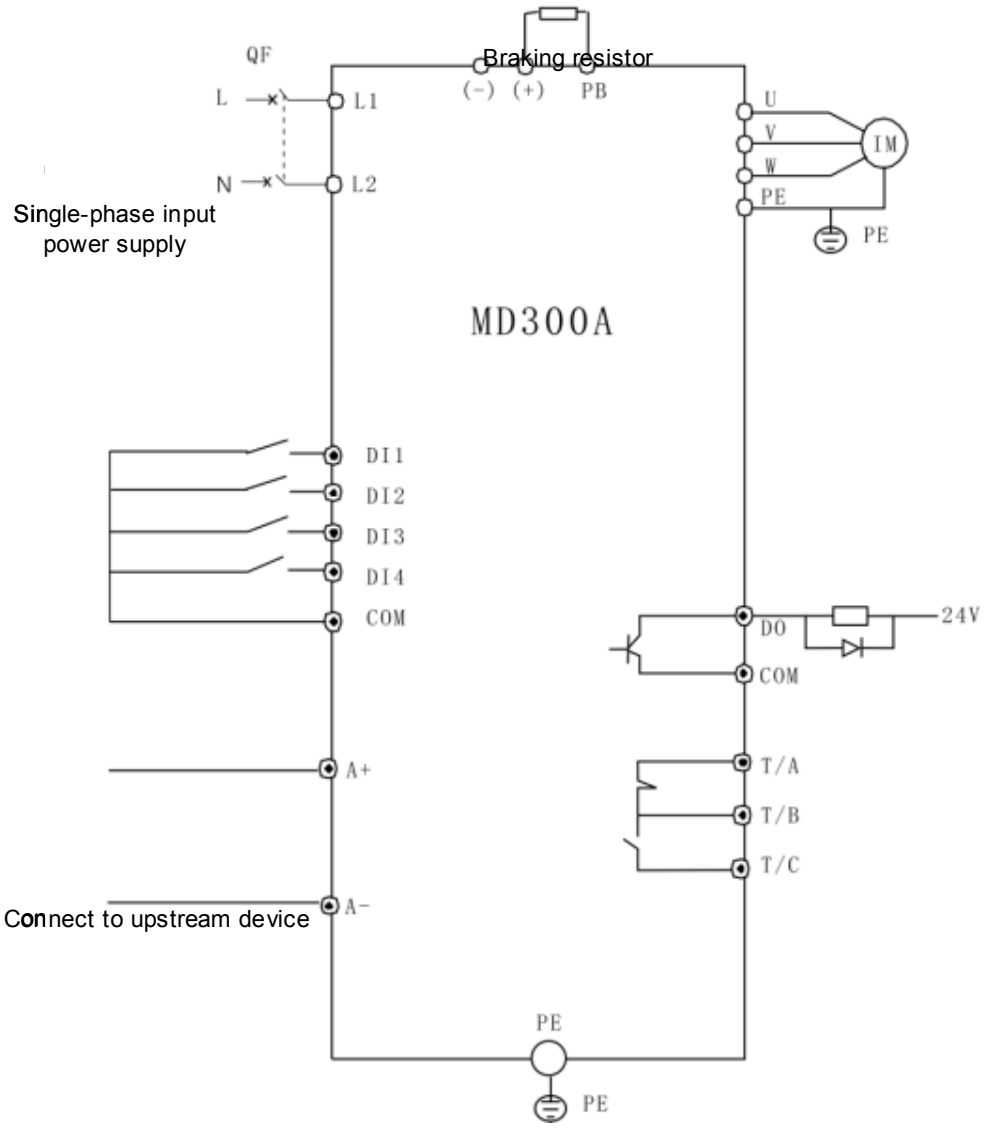


Fig.3-2 Wiring mode with communication input port

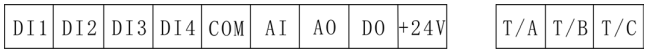
Control terminals

Note: The common reference for the analog and digital terminals is COM, and there is't GND terminal.

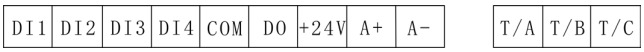
1) The MD300A has two kind of user interface boards, and the customers must select which they want in the order: One is with communication function, and the other with analoge input function.

The control terminals on the boards are arranged as following separately:

Terminals with analog input:



Terminals with communication port:

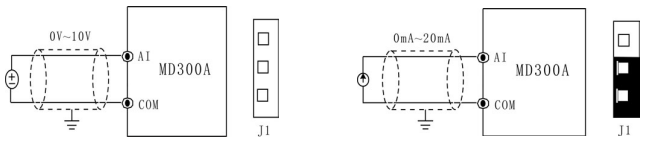


2) Function description of control terminal:

Type	Terminal	Terminal name	Function description
Analog input	AI	Analog input terminal	1. To receive DC 0V ~ 10V or 0V ~ 24V signals or 0mA ~20mA current signal (selected by jumper) The three types of signals will be regulated through the hardware circuit, and they all respond to 0V ~10V voltage. 2. Input resistance of voltage signal: 100kΩ Input resistance of current signal: 200Ω
Digital input and power supply	DI1	Digital input 1	1. Input resistance: 3.3kΩ 2. Input voltage range: 0~ 24V 3: 21 functions available 4: DI4 can be used as high-speed pulse input or common DI.
	DI2	Digital input 2	
	DI3	Digital input 3	
	DI4	Digital input 4	
	COM, +24V	Analog/digital input signal common terminal 24V power supply	COM: The common terminal for all the digital and analog input signals +24V: The power supply for external control system
Analog output	AO	Analog output	The analog output will output 0V ~ 10V. For details, please refer to the function description in F0-14, F3-12 and F3-13.
Digital output	DO	Digital output	Open circuit collector output. 4 digital output modes can be selected. For details, please refer to F0-13.
Communication	A+ A-	Communication terminals	Signal terminals for RS485 communication
Fault relay	TA-TB TA-TC	Fault relay contact	TA-TB is the normally closed contact, while TA-TC is the normally open contact of the fault relay.

3) Wiring of control terminal:

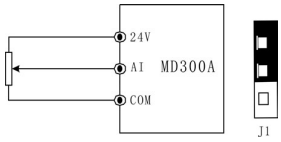
In the case of inputting 0V to 24V, 0V to 10V and 0mA to 20mA signals, the analog input terminal can work normally only when the jumper J1 is selected correctly. The wiring modes are as follows:



Jumper J1 is disabled when inputting 0V ~ 10V analog voltages

the two lower pins of J1 are short circuited when inputting 0mA ~ 10mA signals,

and the two upper pins of J1 are short circuited when 0 ~ 24V signals are inputed.



(The resistance of the potentiometer shall be higher than 3KΩ, and its power rate shall be more than 1/4W. It is recommended to adopt the potentiometer with resistance ranging from 5K to 10KΩ).

Note: In the above three schemes of analog signal input, all the signals will be regulated through the internal circuit. Therefore, all the input signals are converted into voltage signals of 0V ~ 10V.

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Chapter 4 Operation and Display

4.1 Operation and Display Interface

The operation panel can be used to change the function parameters, monitor the working status and control the running (start and stop) of the inverter. The panel and its functional area are shown in Fig. 4-1:

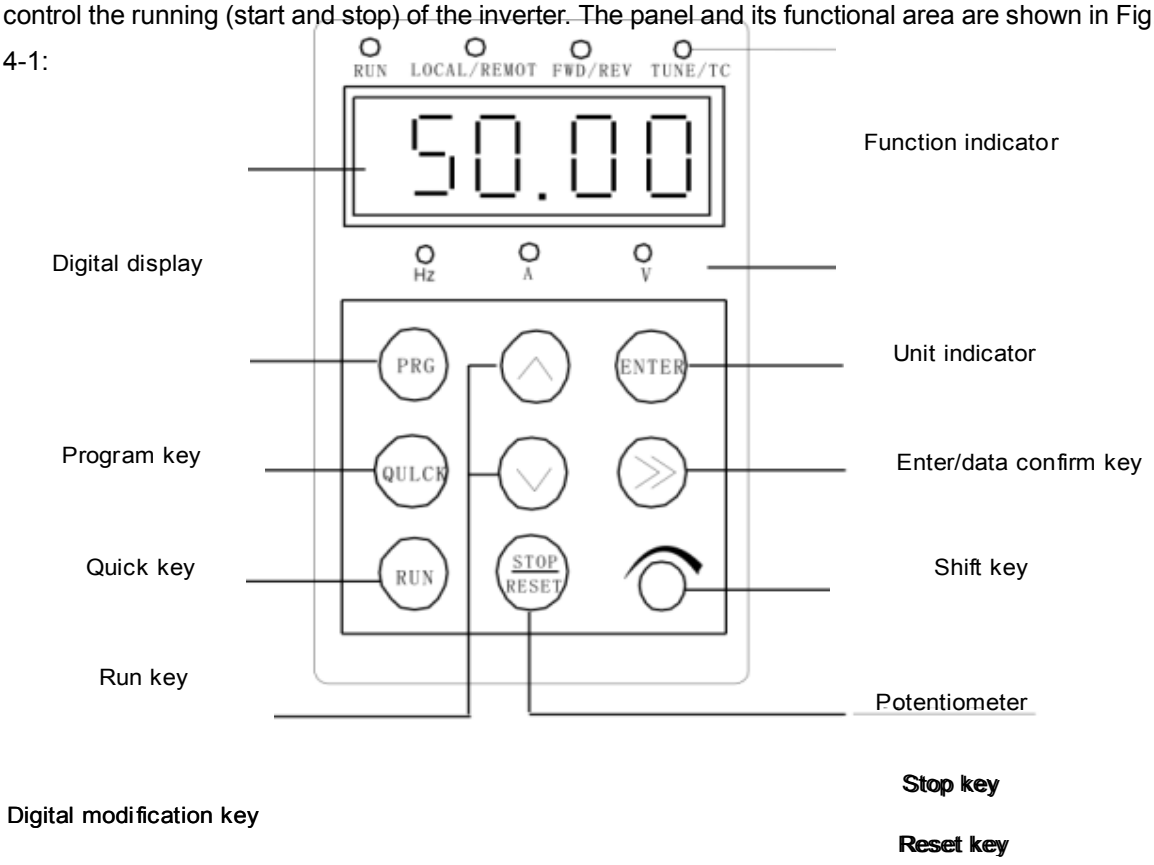

Fig. 4-1 Operation Panel Schematic Diagram

1) Function indicators description:

RUN: If it is ON, it indicates that the inverter is in running status.

LOCAL/REMOT: Keypad and remote operation (terminal and communication control) indicator. If it is ON, it indicates that the inverter is in remote operation and control status.

FWD/REV: It is the forward/reverse running indicator. If it is ON, it indicates that the inverter is in forward running status.

TUNE: It is the tuning indicator. If it is ON, it indicates that the inverter is in tuning status.

2) Unit Indicators Description

Hz: Frequency unit **Hz+A(rpm)**: Rotation speed unit

A: Current unit **A+V**(%): Percentage

V: Voltage unit

3) Digital display area

With 5-bit LED display, it can display frequency setting, output frequency, various monitor data and alarm code, etc.

4) Function Description of Keys

Table 4-1 Key Functions

Keys	Name	Function
PRG	Program key	Enter or exit the parameter menu.
ENTER	Confirm	Enter the menu screen level by level and confirm the parameter settings.
∧	Up	Increase of data or function code
∨	Down	Decrease of data or function code
>>	Shift	It can be used to select the display parameters circularly on the running display interface and the stop display interface. It can also be used to select the modification bit of the parameters when setting the parameters.
QUICK	The key is reserved for function expansion in the future, but now its function is the same as that of the shift key	
RUN	RUN	In the keypad operation mode, it is for running and operating the inverter
STOP/RESET	STOP/RESET	The key is for stopping the running when the inverter is in running state, and for resetting in the faulty status.

4.2 Parameter Modification, Running Status Display and Switching

1: MD300A inverter's operation panel adopts 3-level menu for parameter settings. It is easy to check and modify the parameters.

3-level menu: function parameter group (first level) → function code (second level) → setting of function code (third level). Operation procedure is shown in Fig. 4-2.

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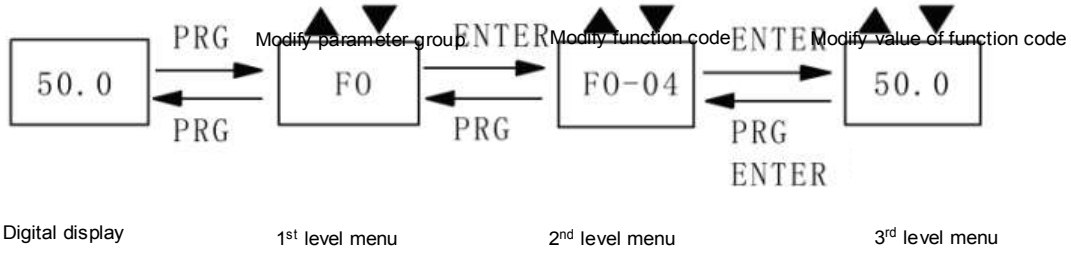

Fig. 4-2 Operation Procedures for 3-level Menu

Note: When operating on the third level menu, press the PRG or ENTER, it can return to the second level menu. The difference is: When pressing ENTER, the parameters will be saved and the screen will return to second level menu and then shift to the next function code. When pressing PRG, it will return to second level menu without saving the parameters, and remain in the position of the current function code.

In third level menu, if the parameter has no flash bit, it means the function code cannot be changed and the possible reasons are:

1) This parameter of the function code cannot be changed, such as the actually detected parameter and running record parameter.

2) This function code cannot be changed in running status and can only be changed when the inverter is stopped;

3) This parameter value is the actually measured value and cannot be modified.

2: Operating method for displaying Status Parameters:

When MD300A inverter is in the stop or running status, several status parameters of the inverter can be displayed on the LED. Press the shift key 》 the stop or running status parameters can be displayed in sequence.MD300A inverter has seven running status parameters to be displayed in sequence by pressing the key 》, namely, running frequency 》setting frequency 》bus voltage 》 output voltage 》output current 》terminal status 》panel potentiometer voltage 》analog input AI.

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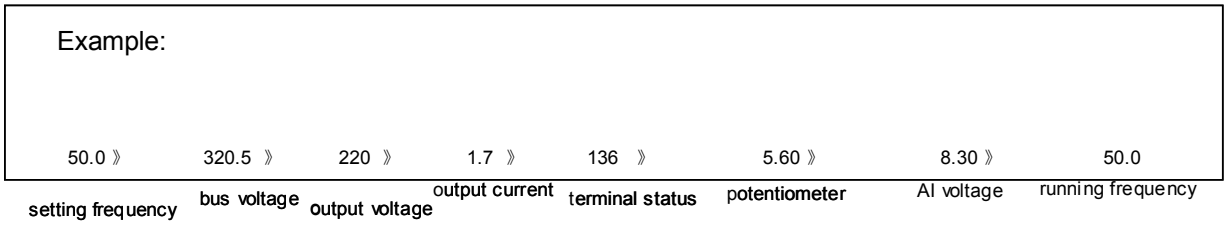

Fig. 4-3 Example for Status Parameter Display Switching

The terminal status is displayed in binary code. The codes for each bit are as follows:

Description of bit	Weight	Description of bit	Weight
BIT0 for DI1	1	BIT1 for DI2	2
BIT2 for DI3	4	BIT3 for DI4	8
BIT4 is reserved		BIT5 is reserved	
BIT6 for RELAY output	64	BIT7 for DO output	128

For example, if DI1 and DI3 input are valid and DI2 and DI4 have no input, the terminal status is indicated as 5.

If the inverter is powered on again after power-off, the parameters displayed are defaulted as those selected before the power-off.

4.3 Auto Tuning of Motor Parameters

Before running the inverter that has selected the vector control mode, accurate motor nameplate parameters must be input. MD300A inverter will configure the standard motor parameters according to the nameplate parameters. Vector control mode is highly dependent on the motor parameters, and correct parameters must be acquired for achieving good control performance. It needs to tune the motor parameters.

Motor auto tuning procedures:

Firstly set F0-01 to 0: set the operation mode to keypad operation mode, and according to the actual type of motor, set F1-00 to 0: general motor or 1: frequency conversion motor

Then input the following parameters according to the actual parameters of motor:

F1-01: Rated power of motor F1-04: Rated frequency of motor

F1-02: Rated voltage of motor F1-05: Rated speed of motor

F1-03: Rated current of motor

If the motor is disconnected from the load completely, select “2” (complete tuning) in F1-11, and press RUN in keypad, the inverter will calculate the parameters below automatically:

F1-06: Stator resistance F1-09: Mutual inductance

F1-07: Rotor resistance F1-10: Excitation current with no load

F1-08: Leakage inductance

Motor tuning is finished automatically.

If the motor cannot disconnect from its load, set F1-11 to 1(static tuning), and then press the RUN in keypad. The inverter will measure the stator resistance, rotor resistance, leakage inductance,mutual inductance and excitation current in sequence.

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Chapter 5 Function Parameters

Note: the symbols in attribute column in the function parameters table are defined as follows:

"○" means that the parameter can be modified when the inverter is running or stops.

"×" means that the parameter cannot be modified when the inverter is running

"*" means that the parameter value is the actually measured value and cannot be modified.

"-" means that this parameter is default and can only be set by the manufacturer, whereas users' operation is forbidden.

F0 Common Parameters						
Func. Code	Name	Setting Range	Min. unit	Default	Modified	Serial No.
F0-00	Control mode	0: Sensorless vector control (SVC) 1: Reserved 2: V/F control	1	2	×	0
F0-01	Command source selection	0: Operation panel (LED On) 1: Terminal (LED Off) 2: Communication control	1	0	○	1
F0-02	Frequency source selection	0: Digital setting (not memorize) 1: Digital setting (memorize) 2: Pulse setting (DI4 input is valid) 3: panel potentiometer setting 4: AI setting 5: Multi-speed 6: Communication reference	1	3	×	2
F0-03	Auxiliary frequency source selection	0: Invalid 1: Valid, related to main reference 2: Valid, related to maximum frequency (the auxiliary frequency source is AI and valid only when F0-02 is selected by 0, 1, 2 or 3)	1	0	×	3
F0-04	Digital preset frequency	0.0Hz ~ Maximum frequency (valid if the frequency source selection mode is digital setup)	0. 1Hz	50.0Hz	○	4

F0-05	Acceleration time	0.1s~3000.0s	0.0	20.0s	○	5
F0-06	Deceleration time	0.1s~3000.0s	0.0	20.0s	○	6

F0-07	V/F curve selection	0: line V/F curve 1: Reserved 2: square V/F curve	1	0	×	7
F0-08	V/F control torque boost	0.0: (automatic) 0.1% ~ 30.0%	0.1%	3.5%	○	8
F0-09	DI1 terminal function selection	0: No function 1: Forward running (FWD) 2: Reverse running (REV) 3: 3-line control mode 4: Forward jog (FJOG) 5: Reverse jog (RJOG) 6: Terminal UP 7: Terminal DOWN 8: Coast to stop 9: Fault reset (RESET) 10: Reserved 11: External fault input 12: Multi-speed terminal 1 13: Multi-speed terminal 2 14: Reserved 15: Acceleration and deceleration time selection 16: frequency reference switching between panel potentiometer and AI 17to 18: Reserved 19: UP/DOWN setting clearance (terminal and keypad) 20: Running command switching terminal (between panel control and terminal) 21: Reserved (When selecting PULSE, any function of DI4 is invalid and can only correspond to PULSE input.)	1	1	×	9
F0-10	DI2 terminal function selection		1	4	×	10
F0-11	DI3 terminal function selection		1	12	×	11
F0-12	DI4 terminal function selection		1	13	×	12
F0-13	DO output selection	0: No output 1: Inverter is running 2: Fault output 3: Preset frequency arrived	1	1	○	13

F0-14	AO output selection	0: Running frequency 1: Setting frequency 2: Output current 3: PULSE input (corresponding to reference) 4: Panel potentiometer (corresponding to reference) 5: AI (corresponding to reference)	1	0	○	14

F0-15	Start mode	0: Direct start 1: Rotation velocity search restart	1	0	×	15
F0-16	Stop mode	0: Deceleration stop 1: Coast to stop	1	0	○	16
F1 Motor Parameter						
F1-00	Motor type selection	0: Common asynchronous motor 1: variable frequency asynchronous motor 2: Permanent magnetic synchronous motor (Reserved)	1	0	×	17
F1-01	Rated power	0.1kW ~ 1000.0kW	0.1	Depending on inverter model	×	18
F1-02	Rated voltage	0V ~ 440V	1	Depending on inverter model	×	19
F1-03	Rated current	0.00A ~ 655.00A	0.01	Depending on inverter model	×	20
F1-04	Rated frequency	0.0Hz ~ 3200.0Hz	1	50.0Hz	×	21
F1-05	Rated speed	0rpm ~ 30000rpm	1	1460	×	22
F1-06	Stator resistance	0.001Ω ~ 65.535Ω	0.001Ω	Depending on inverter model	○	23
F1-07	Rotor resistance	0.001Ω ~ 65.535Ω	0.001Ω	Depending on inverter model	○	24
F1-08	Leakage inductance	0.01 ~ 655.35mH	0.01mH	Depending on inverter model	○	25
F1-09	Mutual inductance	0.1mH ~ 6553.5mH	0.1mH	Depending on inverter model	○	26
F1-10	Excitation current	0.01A ~ 655.35A	0.01A	Depending on inverter model	○	27

F1-11	Tuning selection	0: No tuning 1: Static tuning 2: Complete tuning	1	0	×	28
F2 Vector and VF Control Parameter						

F2-00	Proportional gain 1 of speed regulator	1 ~ 100	1	30	○	29
F2-01	Integration time 1 of speed regulator	0.01s ~ 10.00s	0.01s	0.50s	○	30
F2-02	Switching frequency 1 of vector control parameter PI	0.00 ~ F2-05	0.1Hz	5.0Hz	○	31
F2-03	Proportional gain 2 of speed regulator	1~ 100	1	25	○	32
F2-04	Integration time 2 of speed regulator	0.01s ~ 10.00s	0.01s	1.00	○	33
F2-05	Switching frequency 2 of vector control parameter	F2-02 ~ 50.0Hz	0.1Hz	10.0Hz	○	34
F2-06	Slip compensation coefficient of vector control	50% ~ 200%	1%	100%	○	35
F2-07	Filter time of speed loop (V/F control AVR selection)	0.000s ~ 5.000s	0.001s	0.002s	○	36
F2-08	Torque upper limit of vector control	5.0 ~ 200.0%	0.1%	150.0%	○	37
F2-09	Deceleration over excitation gain	0 ~ 200	1	60	○	38
F2-10	Vibration suppressing gain	0 ~ 100	1	0	○	39
F3 Terminal Input and Output						
F3-00	Terminal control mode (FWD/REV)	0: Two-line mode 1 1: Two-line mode 2 2: Three-line mode	1	0	×	40
F3-01	Terminal UP/DOWN velocity	0.01Hz/s ~ 100.00Hz/s	0.1 Hz/s	1.0 Hz/s	○	41
F3-02	AI minimum input	0.00 ~ F3-04	0.01V	0.05V	×	42
F3-03	Corresponding setting of AI minimum input	-100.0% ~ 100.0%	0.1%	0.0%	×	43

F3-04	AI intermediate 1 input	F3-02 ~ F3-06	0.01V	5.0	×	44

F3-05	Corresponding setting of AI intermediate 1 input	-100.0% ~ 100.0%	0.1%	50.0%	×	45
F3-06	AI intermediate 2 input	0.04 ~ F3-08	0.01V	8.00	×	46
F3-07	Corresponding setting of AI intermediate 2 input	-100.0% ~ 100.0%	8.0	80.0%	×	47
F3-08	AI maximum input	F3-06 ~ 10.00V	0.01V	10.00V	×	48
F3-09	Corresponding setting of AI maximum input	-100.0% ~ 100.0%	0.1%	100.0%	×	49
F3-10	PULSE maximum input frequency	0.00kHz ~ 50.00kHz	0.01Hz	50.00kHz	○	50
F3-11	Input filter time	0.01s ~ 10.00s	0.01s	0.10s	○	51
F3-12	AO zero offset correction	-100.0% ~ 100.0%	0.1	0.5	○	52
F3-13	AO gain correction	-10.00 ~ 10.00	0.01	0.93	○	53
F4 Start/Stop Control Parameters						
F4-00	DC brake initial frequency at stop	0.0Hz ~ 50.0Hz	0.1Hz	0.0Hz	○	54
F4-01	DC brake waiting time at stop	0.0s ~ 36.0s	0.1.0s	0.0.0s	○	55
F4-02	DC brake current at stop	0% ~ 200%	1%	0%	○	56
F4-03	DC brake time at stop	0.0s ~ 36.0s	0.1s	0.0 s	○	57
F4-04	Braking utility rate	0% ~ 100%	1%	100%	○	58

F5 Protection Function						
F5-00	Motor overload protection	0: Disabled 1: Enabled	1	1	○	59
F5-01	Motor overload protection coefficient	0.50 ~ 10.00	0.01	1.00	○	60
F5-02	Overvoltage stall gain	0 (no overvoltage stall) ~ 100	1	0	○	61

F5-03	Overvoltage stall action value	120% ~ 150%	1%	130%	○	62
F5-04	Overcurrent stall gain	0 ~ 200	1	60	○	63

F5-05	Overcurrent stall current value	100% ~ 200%	1%	150%	○	64	
F5-06	automatic fault reset times	0 ~ 3	1	0	○	65	
F5-07	Automatic fault reset interval	0.1s ~ 100.0s	0.1s	1.0s	○	66	
F5-08	Power loss compensation	0: Disabled 1: Enabled	1	0		67	
F5-09	Inverter offload protection	0: Disabled 1: Enabled	1	0	×	68	
F5-10	Fault type	0: 0: No fault 1: Inverter unit protection (ERR01) 2: Acc overcurrent (ERR02) 3: Dec overcurrent (ERR03) 4: Overcurrent at constant speed (ERR04) 5: Acc overvoltage (ERR05) 6: Dec overvoltage (ERR06) 7: Overvoltage at constant speed (ERR07) 8: Control power supply fault (ERR08) 9: Under voltage fault (ERR09) 10: Inverter overload (ERR10) 11: Motor overload (ERR11) 12: Reserved 13: Output phase failure (ERR13) 14: Heatsink overheat (ERR14) 15: External fault (ERR15) 16: Communication fault (EER16) 17: Reserved 18: Current detection failure (ERR18) 19: Motor tuning failure (ERR19) 20: Reserved 21: EEPROM memory fault (ERR21) 22: Hardware failure (ERR22) 23: Reserved 24: Reserved	-	0	*		69
F5-11	Frequency at fault	-	0.1 Hz	0.0Hz	*		70
F5-12	Current at fault	-	0.01A	0.00A	*		71

F5-13	Bus voltage at fault	-	0.1V	0.0V	*	72
F6 Auxiliary Function						

F6-00	Maximum frequency	50.0Hz ~ 3200.0Hz	0.1Hz	50.0Hz	×	73
F6-01	Frequency upper limit	Frequency lower limit ~Maximum frequency	0.1Hz	0.0Hz	○	74
F6-02	Frequency lower limit	0.0 ~ frequency upper limit	0.1Hz	0.0Hz	○	75
F6-03	Carrier frequency	0.5kHz ~ 16.0kHz	0.1kHz	Depending on the inverter model	○	76
F6-04	Jog frequency	0.0Hz ~ 50.0Hz	0.1Hz	2.0Hz	○	77
F6-05	Acceleration time 2 (Jog acceleration time)	0.1s ~ 3000.0 s	0.0	20.0s	○	78
F6-06	Deceleration time 2 (Jog deceleration time, also used as the frequency decrease time during voltage compensation)	0.1s ~ 3000.0s	0.0	20.0s	○	79
F6-07	Run reverse control	0: Run reverse enabled 1: Run reverse disabled	1	0	○	80
F6-08	FWD/REV dead zone time	0.0s ~ 3000.0s	0.1s	0.0s	○	81
F6-09	Restart terminal enable selection	0: Invalid 1: Valid	1	0	○	82
F6-10	Preset frequency arrived checkout value	0.0 ~100.0%(Maximum output frequency)	0.1%	0.0%	○	83
F6-11	Reserved					84
F6-12	Function of STOP/RESET key	RESET function is valid in all status. 0: STOP function is invalid under terminal control 1: Stop function is valid under terminal control	1	0	○	85

F6-13	Reserved					8 6

F6-14	Multi-speed 0	0: Depending on F0-04 1: Depending on PULSE input 2: Depending on panel potentiometer 3: Depending on AI reference	1	0	○	87
F6-15	Multi-speed 1	0 ~Maximum output frequency	0.1Hz	10.0Hz	○	88
F6-16	Multi-speed 2	0 ~ Maximum output frequency	0.1Hz	20.0Hz	○	89
F6-17	Multi-speed 3	0~Maximum output frequency	0.1Hz	40.0Hz	○	90
F6-18	Heatsink temperature	0ºC~150ºC	1ºC		*	91
F6-19	Software version	00.00 ~ 99.99	0.01	Depending on the software version no.	*	92
F7 Communication Functions						
F7-00	Baud rate	0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS	1	5	○	93
F7-01	Data format	0: No parity 1: Even parity 2: Odd parity	1	1	○	94
F7-02	Local address	0~247, 0: broadcasting address	1	1	○	95
F7-03	Response time delay	0ms ~ 20ms	1	2	○	96
F7-04	Communication timeout	0.0 (invalid), 0.1s ~ 100.0s	0.1s	0.0s	○	97
FF Factory Parameters						
FF-00	Factory password	0 ~ 65535	1	-	○	99

FP User Password and Parameter Initialization						
FP-00	User password	0 ~ 65535	1	0	○	10 9

FP-01	Parameter initialization	0: No operation 1: Default recovery 2: Fault clearance	1	0	×	1 1 0

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Chapter 6 Parameter Description

F0 Group: Basic function group

F0-00	Control mode			Default	2
	Setting range	0	Sensorless vector control (SVC)		
		1	Reserved		
		2	V/F control		

0: Sensorless vector control

It refers to the open-loop vector and is applicable to general-purpose high performance application without encoder. One inverter can drive only one motor.

1: Reserved

2: V/F control

It is applicable to the application that does not have high performance requirement and the application where one inverter drives multiple motors.

Note: motor parameters must be identified if SVC is selected. Refer to Section 4.3 for details.

F0-01	Command source selection			Default	0
	Setting range	0	Keypad control (LED On)		
		1	Terminal control (LED Off)		
		2	Communication control (LED flashes)		

Select the command channels of the inverter.

The On/Off of FWD/REV LED on the panel indicates forward rotation or reverse rotation.

0: Keypad control (LOCAL/REMOT LED is On)
Press the buttons such as RUN, STOP/RES on the keypad panel to perform the running command control.

1: Terminal control (LOCAL/REMOT LED is Off)
Perform the running command control via the multifunctional input terminals such as FWD, REV, JOGF, JOGR, etc.

2: Communication control (LOCAL/REMOT LED is flashing)

The running command is provided by upstream device. This option is valid only when a model with

communication function is selected.

F0-02	Frequency source selection			Default	3
	Setting range	0	Digital setting UP/ DOWN (not memorize)		
		1	Digital setting UP/ DOWN (memorize)		
		2	Pulse setting (DI4)		
		3	Panel potentiometer setting		
		4	AI setting		
		5	Multi-speed setting		
		6	Communication setting		

Select the input channels of the main reference frequency for the inverter. There are six main reference frequency channels:

0: Digital setting (not memorize)

The initial value is equal to the value of F0-04 (Digital preset frequency).

The setting frequency of the inverter can be modified with the ▲ and ▼key (or UP/DOWN button of the multifunctional input terminal).

“Not memorize” means that the setting frequency value can recover to the value of F0-04 (Digital setup preset frequency) when the inverter is shut down.

1: Digital setting (memorize)

The initial value is equal to the value of F0-04 (Digital preset frequency).

The setting frequency of the inverter can be modified with the ▲ and ▼ key (or UP/DOWN button of the multifunctional input terminal).

“memorize” means that current setting frequency can be stored when the inverter is shut down, and the stored value is used as preset frequency when the inverter is repowered.

2: Pulse setting (DI4)

The frequency reference is set via the terminal pulse (it may come from external pulse signal or pulse output signal of another inverter).

Pulse reference signal specifications: On/Off signal and pulse frequency range (0 ~ F3-10). The method to achieve this is similar to the relation matching of the AI (analog input). That is, 0Hz

corresponds to 0V and frequency greater than/equal to F3-10 corresponds to 10V.Convert the DI4 input frequency into 0-10V voltage signal and work out the frequency reference according to the corresponding relation of F3-02 ~ F3-09.

Note: the pulse reference can only be set via DI4.

3: Panel potentiometer setting

The frequency can be set by adjusting the potentiometer on the panel. The rightmost position of the potentiometer represents 10V and the leftmost position represents 0V. The relation between the regulation voltage and the reference frequency is similar to that between the AI and the voltage signal.

4: AI setting

The setup frequency is determined by the analog input terminal AI.0V ~ 24V/0V ~ 10V or 0mA ~ 20mA can be selected for AI. Make the selection via J1 jumper. For details, please refer to the electrical wiring diagram in Section 3.2

Note: The input (0V ~ 24V/0V ~ 10V/0mA ~ 20mA) will be converted by hardware circuit into 0V ~ 10V voltage signal before it is fed into the equipment. After the analog signal is converted into 0 ~ 10V voltage signal, the relation between the analog input and the setup frequency is determined via the eight function codes (F3-2 ~ F3-09).

5: Multi-speed setting

If this parameter is selected, the inverter will be in Multi-speed running mode. To determine the relation between the reference signal and the reference frequency, F0-09 ~ F0-12 (input terminals) and parameter F6-14 ~ F6-17 shall be defined.

6: Communication setting

It means that the frequency is set by the outside control system via communication means.

F0-03	**Auxiliary frequency source selection**			Default	0
	Setting range	0	Invalid		
		1	The adjustment range of the auxiliary frequency source corresponds to the main reference frequency		
		2	The adjustment range of the auxiliary frequency source corresponds to the maximum output frequency		

The auxiliary frequency source can compliment the main frequency when frequency fine adjustment/fine tuning is needed. The auxiliary frequency source can be AI only and is valid only when items 0, 1, 2 and 3 are selected in F0-F02. Its range and direction are determined by the

corresponding main reference frequency, maximum output frequency and F3-06 ~ F3-09.

Note: When the auxiliary frequency source is enabled and the main frequency is digital reference,

the main frequency source can be adjusted to a negative value through the UP/DOWN button. However, the final frequency shall range from 0 to the maximum output frequency. In this way, the main frequency and the auxiliary frequency can be flexibly adjusted between 0 and maximum output frequency.

F0-04	**Digital preset frequency**	Default	50.0
	Setting range	0.0 ~ maximum frequency (valid when the frequency source adopts digital setting)	
F0-05	**Acceleration time 1**	Default	20.0
F0-06	**Deceleration time 1**	Default	20.0
	Setting range	0.0s ~ 3000.0s	

Acceleration time refers to the time required for the inverter to accelerate from 0Hz to the maximum output frequency (F6-00).

Deceleration time refers to the time required for the inverter to decelerate from maximum output frequency (F6-00) ~ 0Hz.

When the setup frequency is equal to the maximum output frequency, the actual acceleration/deceleration time is the same with the set acceleration/deceleration time.

When the set frequency is less than the maximum output frequency, the actual acceleration/deceleration time is less than the set acceleration/deceleration time.

Actual acceleration/deceleration time = set value ×(set frequency/maximum output frequency)

F0-07	**V/F curve setting**			Default	0
	Setting range	0	V/F curve		
		1	Reserved		
		2	Square V/F curve		

0: Line V/F curve, applicable to loads with ordinary constant torque

1: Reserved

2: Square V/F curve, applicable to centrifugal loads, such as fan and pump.

F0-08	**V/F control torque boost**		Default	3.5%
	Setting range	0% ~ 30.0%		

To compensate the effect caused by low frequency stator resistance, boost compensation is made to the inverter output voltage. The startup performance under the V/F mode can be improved when

the boost is set appropriately. When the boost is 0, the inverter will automatically make the compensation according to the motor parameters.

F0-09	DI1 terminal function selection	Default	1 (Forward running)
F0-10	DI2 terminal function selection	Default	4 (Forward jog)
F0-11	DI3 terminal function selection	Default	12 (Multi-speed 1)
F0-12	DI4 terminal function selection	Default	13 (Multi-speed 2)

This parameter is used to set the functions of the digital multifunctional input terminal. The range is as shown in the table below:

(When pulse input is selected for the frequency source, any function selected via DI4 will be invalid and the pulse input will automatically be used.)

<table>
<tr><th>Setting value</th><th>Function</th><th>Description</th></tr>
<tr><td>0</td><td>No function</td><td>The inverter does not run even when there is signal. The unused terminals can be set as “No function” to prevent error operation.</td></tr>
<tr><td>1</td><td>Forward running (FWD)</td><td rowspan="2">The forward rotation and reverse rotation are controlled via external terminal.</td></tr>
<tr><td>2</td><td>Reverse running (REV)</td></tr>
<tr><td>3</td><td>Three-line running control</td><td>This terminal is used to confirm that the running mode of inverter is three-line control mode. Refer to F3-00 for details on the introduction of the three-line control mode.</td></tr>
<tr><td>4</td><td>Forward jog (FJOG)</td><td rowspan="2">FJOG refers to jog forward running and RJOG refers to jog reverse running. Refer to F6-04, F6-05 and F6-06 for details on the jog running frequency and jog acceleration/deceleration time.</td></tr>
<tr><td>5</td><td>Reverse jog (RJOG)</td></tr>
<tr><td>6</td><td>Terminal UP</td><td rowspan="2">When the frequency reference is digital reference, increment command and decrement command are modified via the external terminal. The speed change is determined by F3-01 parameter and is similar to the function of “▲” and “▼” keys on the keypad. The selection of “0” and “1” via F0-02 determines whether the inverter will store the setting.</td></tr>
<tr><td>7</td><td>Terminal DOWN</td></tr>
<tr><td>8</td><td>Coast to stop</td><td>If the inverter output is locked, the motor stop is beyond the control of inverter. It is often employed for the loads with high inertia and when there is no requirement for the stop time.

This mode is the same as that described in F0-16.</td></tr>
<tr><td>9</td><td>Fault reset (Reset)</td><td>The external fault reset function. It is identical with the RESET key and can be used to implement remote fault reset.</td></tr>
<tr><td>11</td><td>External fault input</td><td>When the external fault signal is sent to the inverter, the inverter stops and reports fault.</td></tr>
<tr><td>12</td><td>Multi-speed terminal 1</td><td rowspan="2">The combination of digital status of the two terminals can realize 4 Multi-speed settings. Refer to the following chart for details on the combination.
<table>
<tr><th>K1</th><th>K_0</th><th>Frequency setting</th><th>Corresponding Parameter</th></tr>
<tr><td>OFF</td><td>OFF</td><td>Multi-speed 0</td><td>F6-14</td></tr>
<tr><td>OFF</td><td>ON</td><td>Multi-speed 1</td><td>F6-15</td></tr>
<tr><td>ON</td><td>OFF</td><td>Multi-speed 2</td><td>F6-16</td></tr>
<tr><td>ON</td><td>ON</td><td>Multi-speed 3</td><td>F6-17</td></tr>
</table></td></tr>
<tr><td>13</td><td>Multi-speed terminal 2</td></tr>
</table>

15	Acceleration/deceleration time1 AND time2 switching	When the acceleration/deceleration switching function is selected, the acceleration/deceleration time is 1 under normal condition. The acceleration/deceleration time is 2 when the terminal is closed. The acceleration time/deceleration time 2 also acts as the jog acceleration time/deceleration time.
16	Potentiometer and AI reference switching	Valid when potentiometer or AI reference is selected in F0-02.In this situation, the switching between potentiometer and external analog reference can be achieved.

Setting value	Function	Description
19	UP/DOWN setting clearance (terminal and keypad)	When the frequency reference is digital frequency reference, this terminal may be used to clear the frequency value changed by the UP/DOWN button and restore the reference frequency to the value set in F0-04.
20	Switching terminal for running commands	When F0-01 is set as “1”, this terminal can be used to switch between the terminal control and the key control.

F0-13	**DO selection (Open collector output terminal)**		Default	1 (the invert is running)
Setting value	Function	Description		
0	No output	The output terminal has no function		
1	Invert is running	It indicates that the inverter is running with output frequency. At this point, there is ON signal output.		
2	Fault output	When the inverter is faulty, ON signal will be output.		
3	Preset frequency arrived	See the details of the function code F6-10.		
F0-14	**AO output selection**		Default	0
	The AO terminal is used as the analog voltage output terminal, and the common potential is COM. The output voltage ranges from 0 ~ 10VDC.			
Setting value	Function	Range		
0	Running frequency	0 ~ maximum output frequency		
1	Setting frequency	0 ~ maximum output frequency		
2	Output current	0 ~ 2×rated current of inverter		
3	PULSE input	0.0 ~ F3-10		
4	Panel potentiometer	0V ~ 10V		
5	AI	0V ~ 10V/0V ~ 24V/(0mA ~ 20mA)		
F0-15	**Start mode**		Default	0
	Setting range	0	Direct start (when the DC braking start time is not “0”, the DC braking is enabled prior to the start)	
		1	The rotational speed search is enabled prior to the start	

0: Direct start

Start with start frequency

1: The rotational speed search is enabled prior to the start

The inverter first judges the rotational speed and direction of the motor and then outputs voltage corresponding to the direction and speed of the motor. In this way, the motor can be started in a smooth mode. It is applicable to restart for motor with high inertia after momentary power-off.

F0-16	**Stop mode**		Default	0
	Setting range	0	Deceleration stop	
		1	Coast to stop	

0: Deceleration stop

Once the stop command is enabled, the inverter will reduce the output frequency according to the deceleration mode and the defined acceleration/deceleration time. When the frequency is

decreased to “0”, the inverter will power off.

1: Coast to stop

After the stop command is enabled, the inverter will terminate the output immediately and the loads will coast to stop with the mechanical inertia.

F1 Group: Motor Parameters

F1-00	**Motor type selection**			Default	0
	Setting range	0	Common asynchronous motor		
		1	Variable frequency asynchronous motor		
		2	Synchronous motor		
F1-01	**Rated power**			Default	Depending on inverter model
	Setting range		0.4kW ~ 1000.0kW		
F1-02	**Rated voltage**			Default	Depending on inverter model
	Setting range		0V ~ 440V		
F1-03	**Rated current**			Default	Depending on inverter model
	Setting range		0.00A ~ 655.00A		
F1-04	**Rated frequency**			Default	Depending on inverter model
	Setting range		0Hz ~ 3200.0Hz		
F1-05	**Rated rotation Velocity**			Default	1460
	Setting range		0rpm ~ 30000rpm		
F1-06	**Stator resistance**			Default	Depending on inverter model
	Setting range		0.001 ~ 65.535Ω		
F1-07	**Rotor resistance**			Default	Depending on inverter model
	Setting range		0.001Ω~ 65.535Ω		
F1-08	**Leakage inductance**			Default	Depending on inverter model
	Setting range		0.01 ~ 655.35mH		
F1-09	**Mutual inductance**			Default	Depending on inverter model
	Setting range		0.1mH ~ 6553.5mH		
F1-10	**Excitation current**			Default	Depending on inverter model
	Setting range		0.01A ~ 650.00A		

If the automatic tuning of the motor is completed normally, the values in F1-06 to F1-10 will be updated automatically. The motor parameters will remain unchanged when recovering the factory parameter setting with FP-01.

Each time the motor rated parameters (F1-01 to F1-05) are changed, the inverter will set the parameters (F1-06 to F1-10) as default standard motor parameters (quadrupole Y series induction motor).

F1-11	Tuning selection		Default	0
	Setting range	0	No tuning	
		1	Static tuning	
		2	Complete tuning	

The tuning can work only when the command source is set as keypad control mode.

0: No tuning. Tuning is forbidden

1: Static tuning, it is applicable to the situation in which the rotation tuning cannot be performed because it is difficult to separate the motor from the load.

Operation description: Set the function code as “1”, press the ENTER button to confirm and press the RUN button for the inverter to conduct the static tuning.

2: Complete tuning

To ensure the dynamic control performance of the inverter, please select the rotation tuning. To perform the rotation tuning, the motor must be separated from the load (no-load).

After selecting the rotation tuning, the inverter will first perform the static tuning. When the static tuning is completed, the motor will be accelerated to 80% of the motor rated power according to the set acceleration time. It will maintain this status for a period of time and will be decelerated to zero according to the set deceleration time. At this point, the rotation tuning is then over

Operation description: Set the function code as “2”, press the ENTER button to confirm and press the RUN button for the inverter to conduct the rotation tuning.

Note: The nameplate parameters of the motor must be correctly set before the parameter tuning.

F2 Group: Vector control and V/F control parameters

F2-00	Proportional gain 1 of speed regulator		Default	30
	Setting range	0 ~ 100		
F2-01	Integration time 1 of speed regulator		Default	0.50S
	Setting range	0.01s ~ 10.00s		
F2-02	Switching frequency 1 of vector control		Default	5.0Hz
	Setting range	0.0 ~ F2-05		
F2-03	Proportional gain 2 of speed regulator		Default	25
	Setting range	0 ~ 100		
F2-04	Integration time 2 of speed regulator		Default	1.00S
	Setting range	0.01s ~ 10.00s		

F2-05	**Switching frequency 2 of vector control**	Default	10.0Hz
	Setting range	F2-02 ~ maximum output frequency	

The parameters of F2-00 and F2-01 refer to the PI adjustment parameters when the running

frequency is lower than the switching frequency 1 (F2-02), while the parameters of F2-03 and F2-04 refer to the PI adjustment parameters when the running frequency is higher than the switching frequency 2 (F2-05). The PI adjustment parameter between the switching frequency 1 and switching frequency 2 refers to the linear switching between two sets of PI parameters. It is as shown in the figure below:

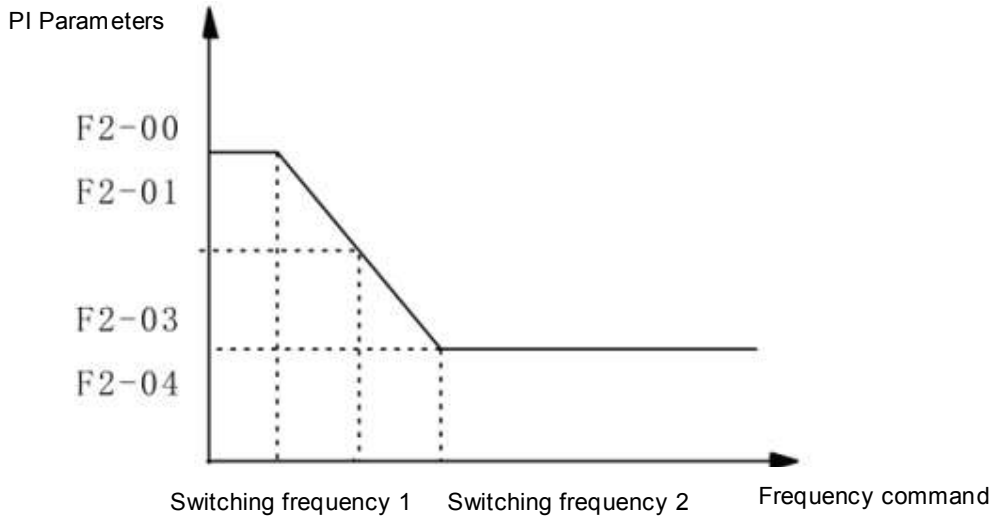

Fig. 6-1 PI Parameters Schematic Diagram

We can regulate the speed dynamic response characteristic of the vector control by setting the proportional coefficient and integration time of the speed regulator. The dynamic response of the speed loop can be accelerated by increasing the proportional gain or decreasing the integration time. Excessive proportional gain or too small integration time will cause the system to vibrate.

Perform fine tuning if the factory parameters cannot fulfill the requirements: increase the proportional gain first to prevent the system from vibrating and reduce the integration time to ensure the system has fast response characteristic and the overshoot is small.

Note: If the PI parameters are set inappropriately, it will cause large overshoot speed or even voltage fault when it returns from the overshoot to the normal level.

F2-06	**Slip compensation coefficient of vector control**		Default	100%
	Setting range	50% ~ 200%		

This parameter is effective for sensorless vector control mode and can be used to regulate the

steady speed precision. Increase the parameter when the motor speed is obviously lower than the setup frequency after load is applied to the motor. Reduce the parameter when the motor speed is higher than the setup frequency after load is applied to the motor.

F2-07	Filter time of speed loop of vector control V/F control and AVR selection		Default	0.002s
	Setting range	0.00s ~ 0.100s		

Under the vector control mode, the speed regulator outputs the torque current command of the inverter. The filter time of speed loop refers to the filter time for the torque current command. Generally, this parameter does not need adjustment. Appropriately increase the filter time when the speed fluctuates dramatically and reduce it if the motor vibrates.

Under the VF control mode, this parameter is used for the function selection of AVR.

Under 0.000: VF control, AVR is invalid.

Under 0.001: VF control, AVR is always valid.

Under 0.002: VF control, AVR is only invalid at deceleration time (If the function code value is greater than 0.002, it will be treated as 0.002.)

The selection of “InValid only at deceleration time” can greatly reduce the possibility of the occurrence of overvoltage when the system is under the VF control and when a quick stop is needed but there is no braking resistor. Select “AVR is always valid” when there is braking resistor but there is no strict requirement for the deceleration time.

F2-08	Upper limit for torque		Default	150%
	Setting range	5.0% ~ 200%		

When the system is under the vector control, the upper limit for torque refers to the maximum output torque. When the limit is set at 100%, the maximum torque will be the rated torque of the motor.

F2-09	Deceleration overexcitation gain of motor		Default	60
	Setting range	0 to 200		

When a quick stop is needed, to prevent the overvoltage fault caused by the energy generated during the motor acceleration, we shall increase the value of the parameter so that the energy will be consumed in the motor windings. In this way, a quick stop can be achieved.

F2-10	Vibration suppressing gain		Default	0
	Setting range	0 ~ 100		

This parameter is useful only in VF mode.

When the motor has no vibration, please select the gain as “0”. This gain shall be appropriately increased only when the motor cannot run normally due to obvious vibration. The higher the gain is, the more effective the vibration is suppressed. To avoid the impact on the VF running, this gain shall

be at the minimum value on the condition that the vibration is effectively suppressed.

F3 Group: Terminal input and output

F3-00	Terminal mode setting (FWD/REV)		Default	0
	Setting range	0	Two-line mode 1	
		1	Two-line mode 2	
		2	Three-line mode	

Din, FWD and REV in the Figure below are multifunctional input terminals of DI1 to DI4. Please define the corresponding functions for the terminals.

This parameter defines two different running modes for controlling the inverter via external terminal.

0: Two-line running mode 1: the rotation direction of the motor is determined by the FWD and REV terminal commands.

1: Two-line running mode 2

The FWD is the enable terminal and the rotation direction is controlled by REV. When the FWD is closed and the REV is opened, forward rotation is enabled. When the REV is closed, reverse rotation is enabled. The FWD shall be opened when a stop is needed.

2: Three-line running mode: The DIn of this mode is enable terminal. The direction is controlled by the FWD and REV. As the pulse is valid, the Din terminal signal must be disconnected to enable a stop.

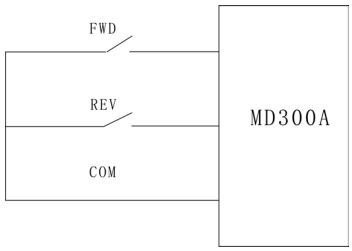

Fig. 6-2 Two-line Running Mode

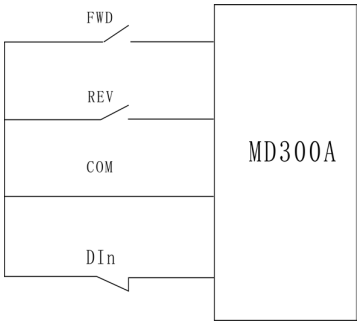

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Fig. 6-3 Three-line Running Mode

Where: Din: Stop button FWD: Forward rotation button REV: Reverse rotation button

As for the two-line running mode, if the FWD/REV is valid and the inverter is stopped because of the stop command generated by other sources, the inverter will not run after the stop command disappears, even though the control terminal FWD/REV is still valid. To run the inverter, you shall retrigger the FWD/REV. If the inverter stops when fault alarm is produced, the situation is different. At this point, we shall check if the running of the inverter is controlled by the function code F6-09 when the terminal FWD/REV is valid.

F3-01	**Terminal UP/DOWN rate**	Default	1.00Hz/s
	Setting range	0.01Hz/s ~ 100.00Hz/s	

When the input frequency change rate is set via DI terminal UP/DOWN button,

F3-02	**AI minimum input**	Default	0.05V
	Setting range	0.00 ~ F3-04	
F3-03	**Setting corresponding to the minimum input**	Default	0%
	Setting range	-100.00% to 100.0%	
F3-04	**AI intermediate input 1**	Default	5.00V
	Setting range	F3-02 ~ F3-06	
F3-05	**Setting corresponding to the AI intermediate input 1**	Default	50%
	Setting range	-100.00% ~ 100.0%	
F3-06	**AI intermediate input 2**	Default	8.00V
	Setting range	F3-04 ~ F3-08	
F3-07	Setting corresponding to the AI intermediate input 2	Default	80.0%
	Setting range	-100.00% ~ 100.0%	
F3-08	**AI maximum input**	Default	10.00V
	Setting range	F3-06 ~ 10.00V	
F3-09	**Setting corresponding to the maximum input**	Default	100.0%
	Setting range	-100.00% ~ 100.0%	

The above function defines the setting relations among the external analog signal and the potentiometer (on the keypad) input and their corresponding frequencies. All the input signals shall be converted into 0 to 10V signals.100% corresponds to the maximum output frequency. The relation between the analog input and the frequency can be flexibly set via the corresponding relation.

F3-10	**PULSE input maximum frequency**	Default	50.00kHz
	Setting range	0.00kHz ~ 50.00kHz	
F3-11	**PULSE input filter time**	Default	0.010s
	Setting range	0.00s ~ 10.00s	

This group of function code defines the corresponding relations when the pulse is used for the frequency setting. The pulse frequency can only be input via the DI4 terminal. When the pulse input

frequency is greater than/equal to F3-10, it corresponds to 10V voltage signal of the AI port. When the pulse input frequency is 0.00KHz, it corresponds to 0V voltage signal of the AI port. Convert them into corresponding frequencies via F3-06, F3-07, F3-08 and F3-09.

F3-12	**AO output zero offset calibration**	Default	0.5
	Setting range	-100.0% ~ +100.0%	
F3-13	**AO output gain**	Default	0.93
	Setting range	-10.00 ~ +10.00	

If using letter “b” to indicate the zero offset coefficient, “k” to indicate the gain, “y” to indicate the actual output and “x” to indicate the standard output ,than the actual output equals as follow:

y=Kx+b

The AO zero offset coefficient 100% corresponds to 10V

The standard output means that the output 0~10V corresponds to the analog output 0~Maximum

It is generally applied to modify the zero drift and the deviation of the output swing .It can also be defined as any needed curve itself.

For example .If the analog output content is the running frequency,It is expected to output 8V When the frequency equals to zero and to output 3V .when the frequency reaches Maximum ,then the gain shall be as “-0.50”,and the zero offset coefficient shall be set as “80%”.

F4 Group: Start and stop control parameters

F4-00	**DC brake initial frequency at stop**		Default	0.00Hz
	Setting range	0.0 ~ maximum frequency		
F4-01	**DC brake waiting time at stop**		Default	0.0s
	Setting range	0.0s ~ 36.0s		
F4-02	**DC brake current at stop**		Default	0%
	Setting range	0% ~ 200%		
F4-03	**DC brake time at stop**		Default	0.0s
	Setting range	0.0s ~ 36.0s		

DC brake initial frequency at stop: In the process of deceleration, if this frequency is achieved, the DC braking process starts.

DC brake waiting time at stop: it refers to the interval between the moment when the running frequency reaches the brake initial frequency (F4-00) and the moment when the DC brake starts. In this period, there is no output from the inverter. This function can effectively prevent the current impact arising from the DC brake.

DC Brake Current at Stop: It refers to the added DC brake quantity. The greater the current is, the

better the DC brake effect is.

DC Brake Time at Stop: It refers to the time when the DC brake quantity is added. If this value is

equal to “0”, it indicates the DC brake process does not exist and the inverter stops according to the setup acceleration stop process.

Example:

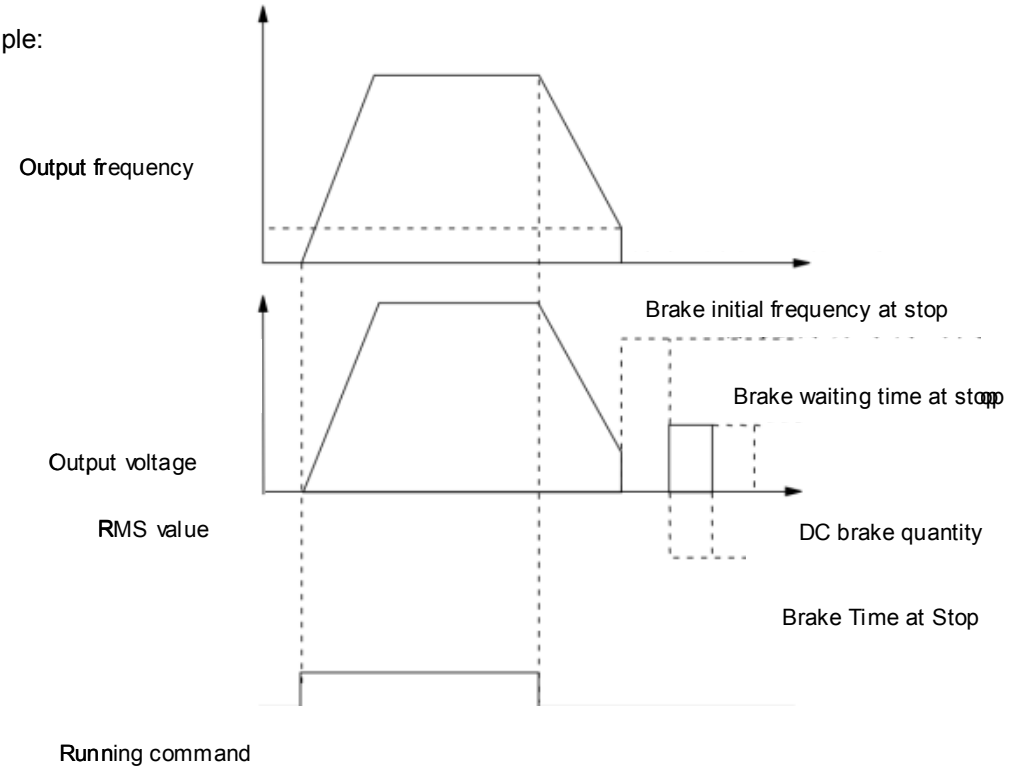

Fig.6-4 DC brake time at stop

F4-04	Brake utility ratio		Default	100%
	Setting range	0% to 100%		

This parameter is valid for the inverter with built-in brake unit. It can regulate the dynamic braking effect.

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F5 Group: Fault and Protection

F5-00	Motor overload protection selection		Default	1
	Setting range	0: Disabled 1: Enabled	0: The inverter has no overload protection for the motor and the thermal relay shall be installed; 1: the inverter has motor overload protection function and the protection value is shown in F5-01.	

F5-01	Motor overload protection coefficient		Default	1
	Setting range	0.20~ 10.00	This value is the ratio of motor over temperature action point to motor rated current, if the output current is larger than F5-01×motor rated current, it will enter into the inverse time-lag protection status. The inverter will alarm that the motor is overloaded after 60 minutes has passed if the output current is equal to 150%×F5-01×motor rated current.	

F5-02	Overvoltage stall gain		Default	0
	Setting range	0 (no overvoltage stall) ~ 100	Adjust the overvoltage stall capacity of the inverter to avoid overvoltage fault. The bigger is the value, the more powerful the suppressing capacity is. For the load with small inertia, the small value is recommended, or it will slow down the system adjustment. For the load with large inertia, the big value is recommended; otherwise there will be a poor suppressing effect.	

F5-03	Overvoltage stall action value			Default	130.0%
	Setting range	120% ~ 150%	Select the protection value of the overvoltage stall function. The inverter starts executing the voltage stall protection function when this value is surpassed.		
F5-04	Overcurrent stall gain			Default	60

	Setting range	0 ~ 200	Adjust the overcurrent stall capacity of the inverter to avoid overcurrent fault. The bigger is the value, the more powerful the suppressing capacity is. For the load with small inertia, the small value is recommended, or it will slow down the system adjustment. For the load with large inertia, the big value is recommended; otherwise there will be a poor suppressing effect.		
F5-05	**Overcurrent stall action value**			Default	150.0%

	Setting range	100% ~ 200%	Select the protection value of the overcurrent stall function. The inverter starts executing the overcurrent stall protection function when this value is surpassed.	
F5-06	**Automatic fault reset times**		Default	0
	Setting range	0 ~ 3	When the fault automatic reset function is selected for the inverter, the times when the inverter can be automatically reset is set. If this value is surpassed, the inverter is faulty and stops, waiting for maintenance.	
F5-07	**Automatic fault reset interval**		Default	1.0S
	Setting range	0.1s ~ 100.0s	The time interval between the beginning of the fault and the implementation of automatic reset.	

F5-08	**Power loss compensation**		Default	0
	Setting range	0: Invalid 1: Invalid	If invalid, when the voltage decreases transiently to the undervoltage point, the inverter will alarm directly. If valid, when the voltage decreases to the undervoltage point, the inverter will decelerate until the voltage recovery.	
F5-09	**Inverter offload protection selection**		Default	1
	Setting range	0: Disabled 1: Enabled	Select whether to protect when the offload occurs or not. When selecting the offload protection function and there is no load at the output end of the inverter, the output frequency of the inverter will automatically reduce to 2Hz.	
F5-10	**Fault type**		0 ~ 24	
F5-11	**Frequency at fault**		Indicating the frequency when the latest fault occurs	
F5-12	**Current at fault**		Indicating the current when the latest fault occurs	
F5-13	**Bus voltage at fault**		Indicating the bus voltage when the latest fault occurs	

F6 Group: Auxiliary Function

F6-00	**Maximum frequency**		Default	50.0Hz
	Setting range	50.0Hz ~ 3200.0Hz		

It is used to set the maximum output frequency of the inverter.

F6-01	**Frequency upper limit**		Default	50.0Hz
	Setting range	Frequency lower limit F6-02 ~ Maximum frequency F6-00		

It refers to the output frequency upper limit of the inverter.

F6-02	**Frequency lower limit**		Default	0.0Hz
	Setting range	0.0 Hz ~ Frequency upper limit F6-01		

It refers to the output frequency lower limit of the inverter.

When the inverter starts running from the starting frequency, if the reference frequency is lower than the frequency lower limit during the running process, then the inverter will always be running with frequency lower limit till it stops or the reference frequency is higher than the frequency lower limit.

Of which, maximum output frequency ≥ frequency upper limit ≥ frequency lower limit

F6-03	**Carrier frequency**		Default	Depending on the inverter model
	Setting range	0.5kHz ~ 16.0kHz		

Adjusting the carrier frequency may have influences on the following performances:

Carrier frequency	Low → High
Motor noise	High → Low
Output current wave performance	Poor → Good
Motor temperature rise	High → Low
Inverter temperature rise	Low → High
Inverter load capacity	Large → Small
Leakage current	Small → Large
Radiation interference	Small → Large

The inverter derates the load capacity by 5% for every 1kHz above the default carrier wave frequency.

F6-04	**Jog frequency**		Default	2.0Hz
	Setting range	0.0 Hz ~ maximum frequency		

It is used to define the reference frequency and acceleration time of the inverter when jogging. Follow the start mode 0(F0-15, direct start) and the stop mode 0 (F0-16, deceleration stop) to start and stop the jogging process.

F6-05	**Jog acceleration time (acceleration time 2)**		Default	20.00s
	Setting range	0.00s ~ 3000.0s		
F6-06	**Jog deceleration time (deceleration time 2)**		Default	20.00s
	Setting range	0.00s ~ 3000.0s		

The jog acceleration time refers to the time required for the inverter to accelerate from 0Hz to the maximum output frequency (F6-00).

The jog deceleration time refers to the time required for the inverter to decelerate from the maximum frequency (F6-00) to 0Hz. The jog acceleration/deceleration time is also used as the

acceleration/deceleration time 2 and the deceleration time of Low voltage compensation.

F6-07	Run reverse control		Default	0
	Setting range	0	Run reverse enabled	
		1	Run reverse disabled	

0: Reverse is permitted.

1: Reverse is forbidden.

F6-08	FWD/REV dead zone time		Default	0.00.0s
	Setting range	0.00s ~ 3000.0s		

It is the interval at the zero output frequency when the motor changes rotation direction, shown in Fig. 6-6:

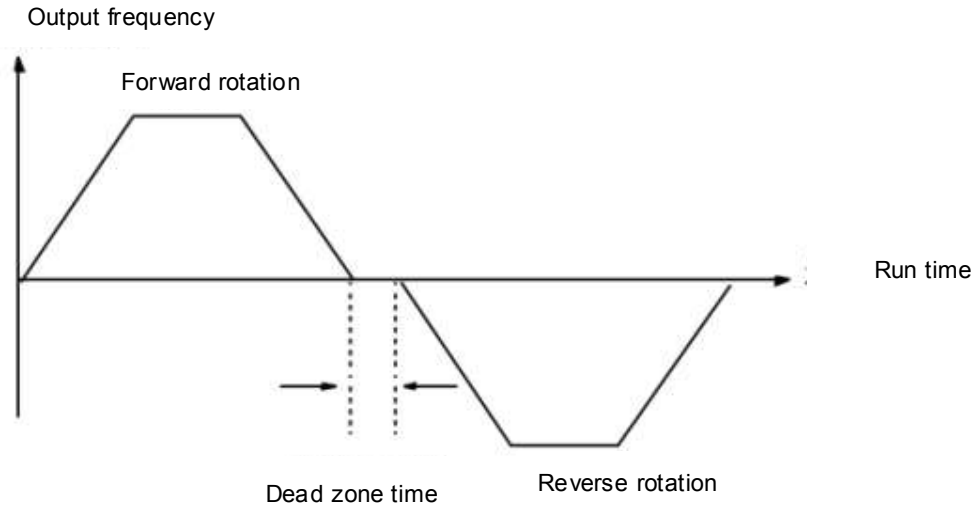

Fig 6-1 FWD/REV dead zone time

F6-09	Restart terminal enable selection		Default	0
	Setting range	0	Enabled	
		1	Disabled	

This function code is used to enhance the security of the system.

If it is set as “0”, it has two functions: **First**, if the running command exists when the inverter is powered on, it must delete the running command to exit the running protection status. **Second**, if the running command still exists when the inverter implements fault reset, it must delete the running command to exit the running protection status. This function can prevent the danger resulting from

the unexpected running of the inverter.

F6-10	**Preset frequency arrived checkout value**		Default	0.00Hz
	Setting range	0.00 Hz ~ maximum frequency		

When the output frequency of the inverter reaches the setting frequency value, this function can adjust the detection amplitude value, as shown in the figure below:

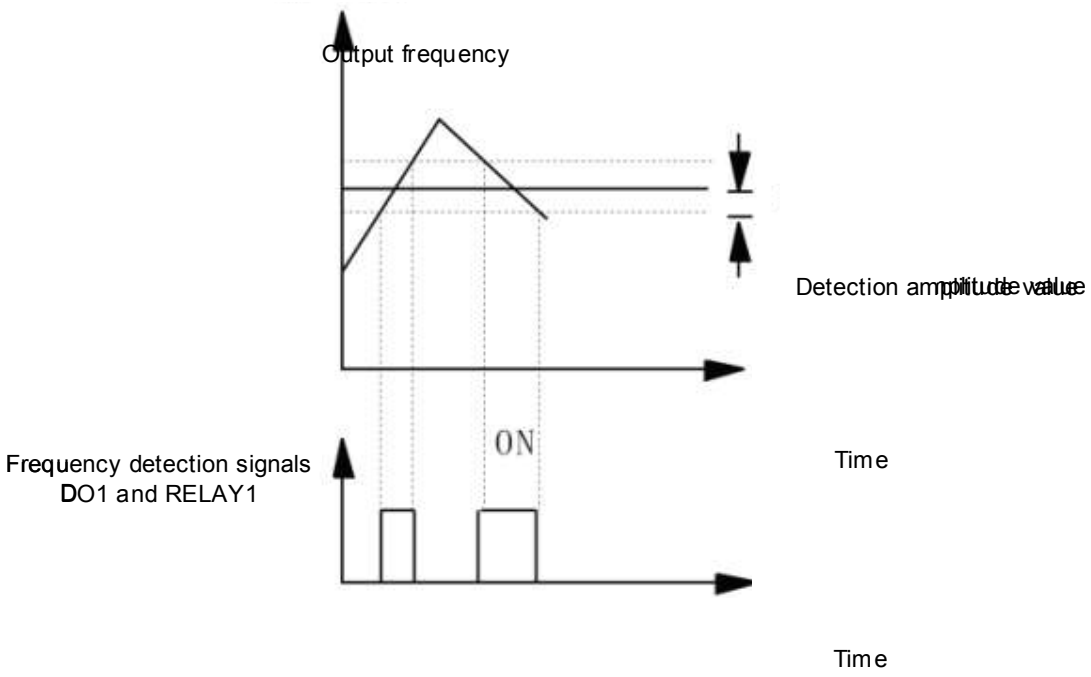

Fig. 6-2 Frequency Reaching Checkout Amplitude Value

F6-11	**Reserved**	Default	0

F6-12	**STOP/RESET function**		Default	0
	Setting range	0	The STOP function is invalid under the terminal control.	
		1	The STOP function is valid under the terminal control.	

The RESET function is valid under any status.

F6-13	Reserved	Default	0

F6-14	**Multi-speed 0**		Default	0
	Setting range	0	Multi-speed 0 is the value of F0-04	
		1	Multi-speed 0 depends on PULSE value	
		2	Multi-speed 0 depends on panel potentiometer	
		3	Multi-speed 0 depends on AI	
F6-15	**Multi-speed 1**		Default	20.0Hz

	Setting range	0 Hz ~ maximum frequency		
F6-16	**Multi-speed 2**		Default	40.0Hz
	Setting range	0 Hz ~ maximum frequency		
F6-17	**Multi-speed 3**		Default	50.0Hz

Setting range 0 Hz ~ maximum frequency

When the frequency source is selected as F0-02=5, the values of F6-14 to F6-17 must be set.

F6-18	Heatsink temperature		Default	
	Displaying range	Displaying the actual temperature of the heatsink		

F6-19	Software version No.	Displaying the software version.

F7 Group: Communication Parameter

This parameter must be set when the inverter needs to be controlled by the upstream device through serial communication ports.

F7-00	Baud rate			Default	5
	Setting range	0	300BPS		
		1	600BPS		
		2	1200BPS		
		3	2400BPS		
		4	4800BPS		
		5	9600BPS		
		6	19200BPS		
		7	38400BPS		

This parameter is used for determining the rate of the serial communication.

F7-01	Data format			Default	0
	Setting range	0	No parity		
		1	Even parity		
		2	Odd parity		

The data formats set by the upstream device and inverter must be consistent, otherwise it cannot communicate.

F7-02	Local address		Default	1
	Setting range	0 ~ 247, 0: broadcasting address		

When the local address is set to 0, i.e. broadcasting address, it enables the broadcasting function of the upstream device.

The local address is unique (except for the broadcasting address), which is the basis of realizing point to point communication between the upstream device and the inverter.

F7-03	**Response time delay**		Default	2ms
	Setting range	0ms~20ms		

The response time delay refers to the interval from the time when the inverter finishes receiving the data to the time when it sends the data to the upstream device. If the response time delay is shorter than the processing time of the system, it is subject to the latter; if the response time delay is longer than the latter, it will be still in the waiting status after the data are processed by the system, and will not send the data to the upstream device until it is up to the response time delay.

F7-04	Communication timeout		Default	0.0
	Setting range	0.0 (invalid), 0.1s ~ 100.0s		

When the function code is set at 0.0 s, the communication timeout time parameter is invalid.

When it is set as valid value, if the interval between a communication and the next one surpasses the communication timeout time, the inverter deems that communication fault occurs (Err16). In general, it is set at invalid. Setting this parameter in the continuous communication system may monitor the communication status.

FF Group: Manufacturer Parameter (reserved)

Note: The manufacturer parameter maintains the important parameter information on the inverter. The inverter cannot run normally or may be damaged permanently resulting from the unauthorized modification of such parameters, it is strongly recommended that the user shall not attempt to enter into the manufacturer parameter area.

FP Group: User Password

FP-00	User password		Default	0
	Setting range	0 ~ 65535		

When the password is set as any non-zero number, the password protection function is enable.

0000: Remove user password set previously, and the password protection function is invalid.

Upon the setting and validation of user password, enter the parameter setting status again, it will prompt you to enter the user password. You cannot view and modify the parameter if the user password is incorrect. Remember the user password.

FP-01	Parameter initialization			Default	0
	Setting range	0	No operation		
		1	Recover the default		
		2	Clear the fault records		

1: The inverter will restore all the parameters to the default value.

2: The inverter will remove the latest fault records.

Chapter 7 Fault Diagnosis and Countermeasures

7.1 Fault Alarm and Countermeasures

The MD300A inverter has 21 pieces of alarm information and protection functions in total. Once the fault occurs, the protection function starts, the inverter stops output, the fault relay contact is activated, and the fault code will be displayed on the display panel of the inverter. Before seeking for services, the user may conduct the self-check according to the instructions given in this section, analyze the fault causes, and find out the solutions. If relevant service is needed, please contact the inverter agent or directly contact our corporation.

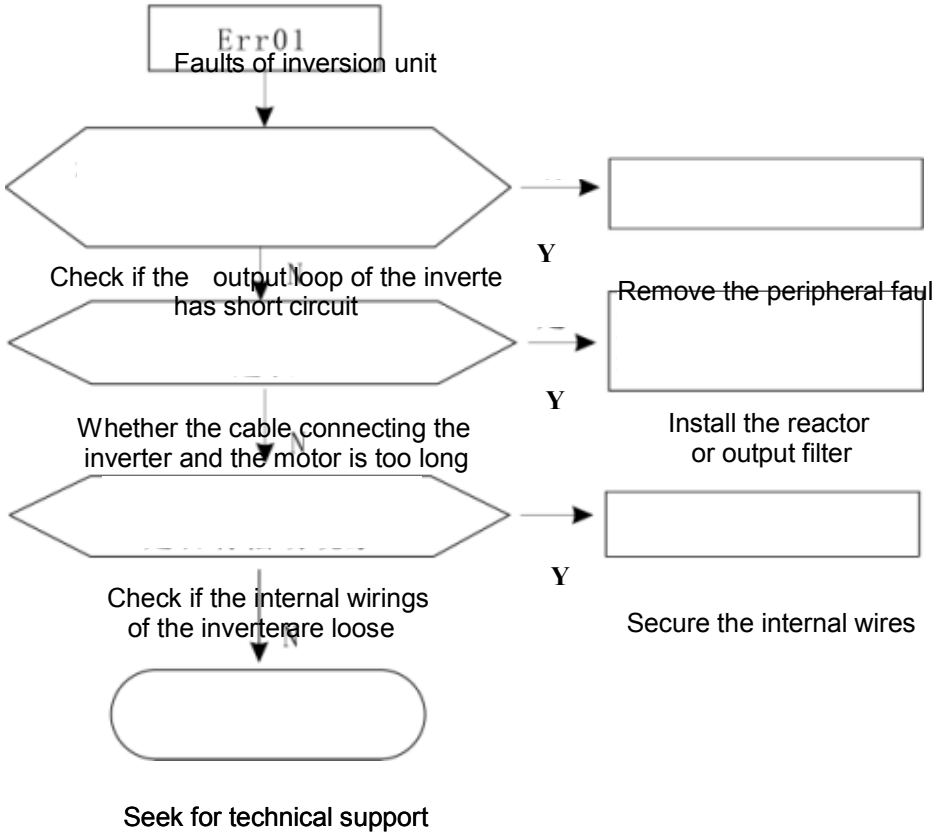

Figure 7-1 Faults of inversion unit (ERR01)

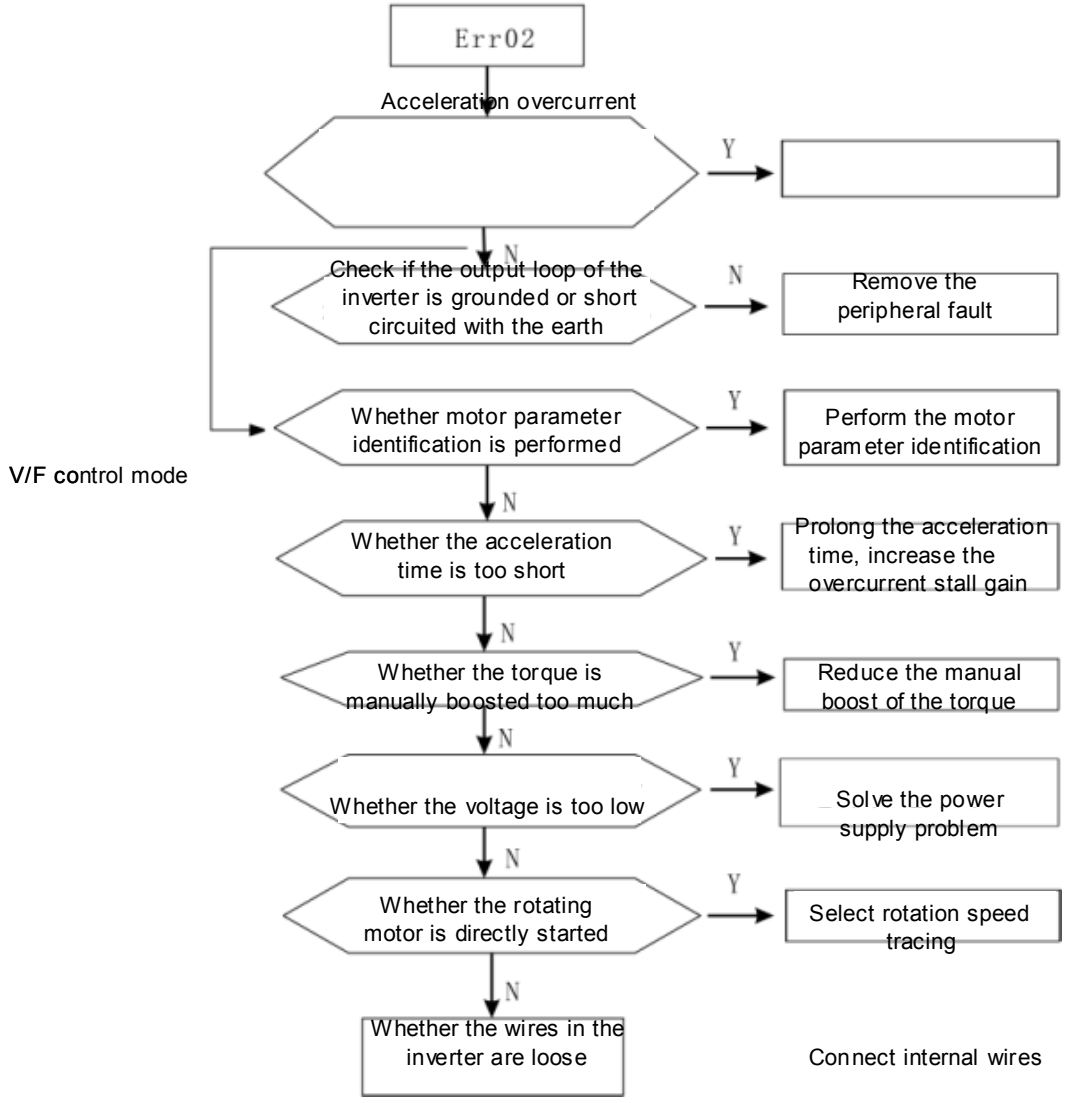

Fig. 7-2 Acceleration overcurrent

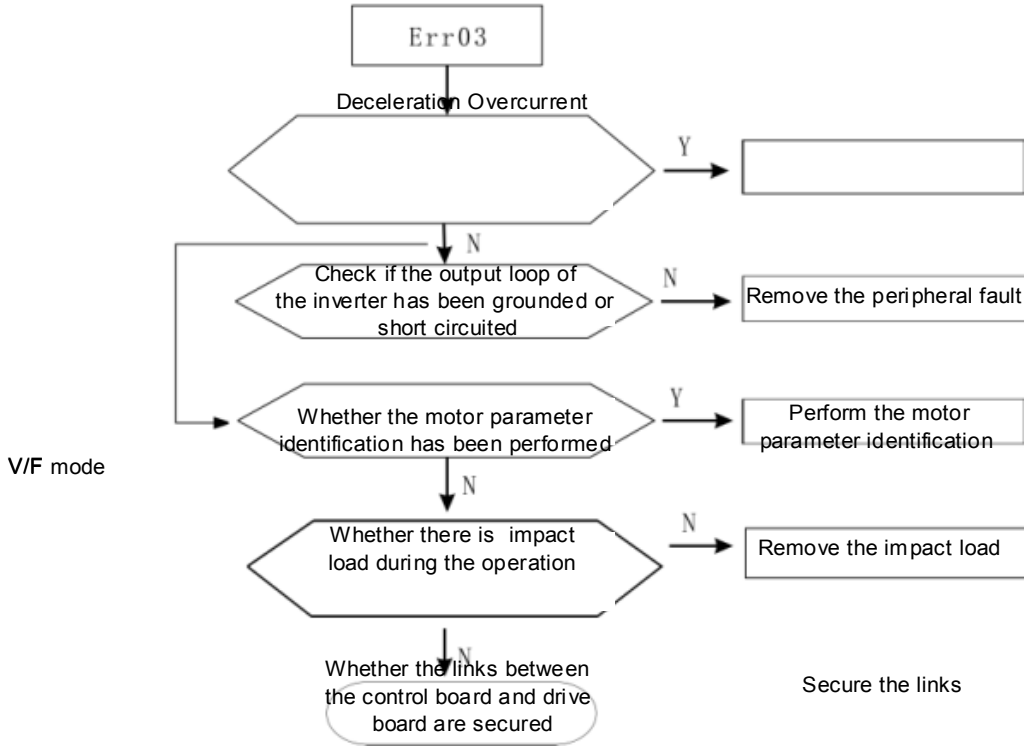

Fig. 7-3 Deceleration overcurrent (ERR03)

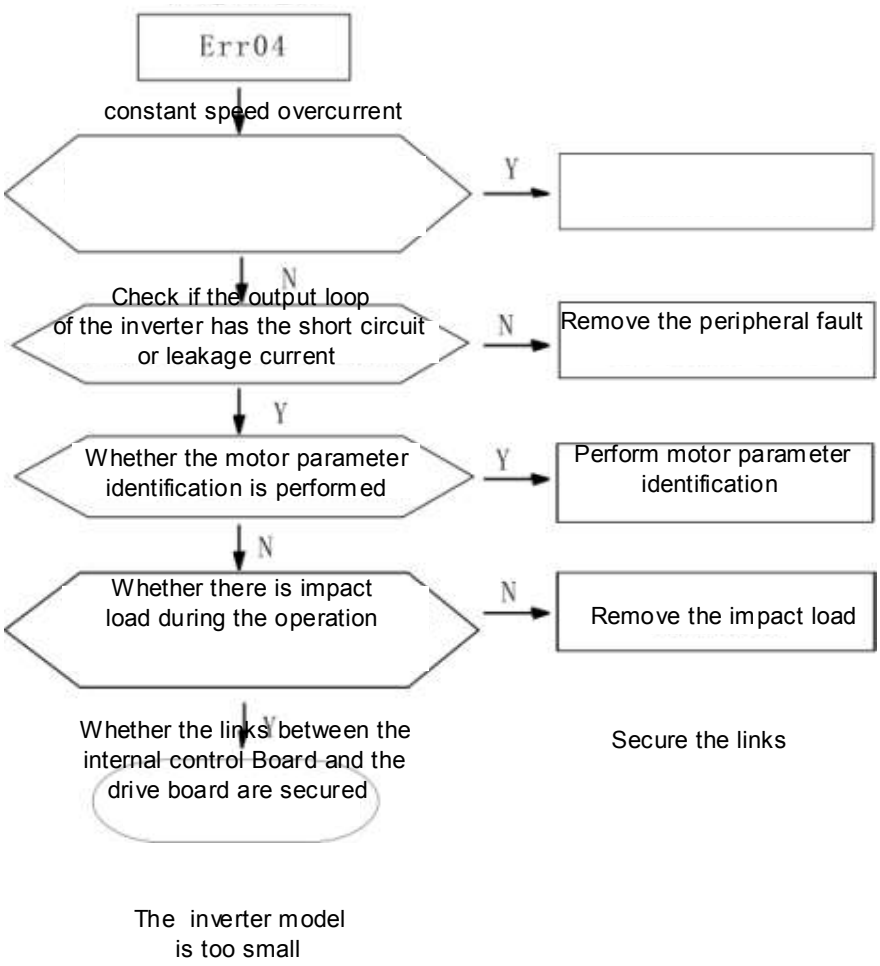

Fig. 7-4 Constant speed overcurrent (ERR04)

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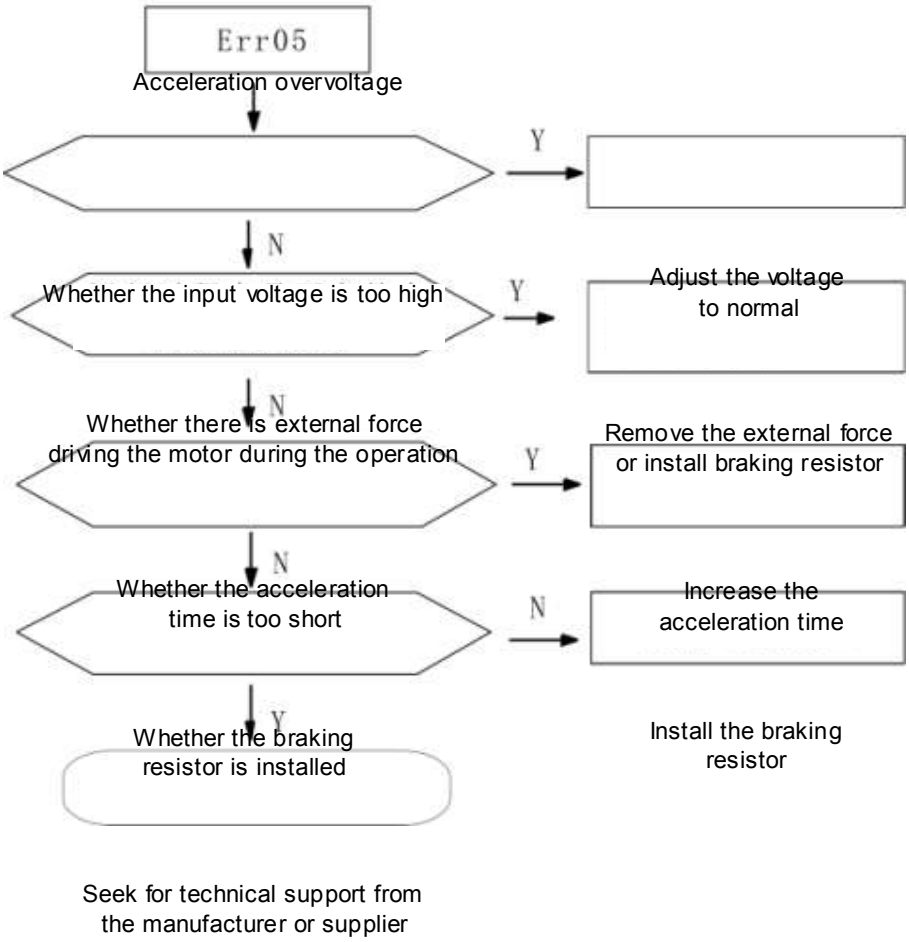


Figure 7-5 Acceleration overvoltage (ERR05)

54

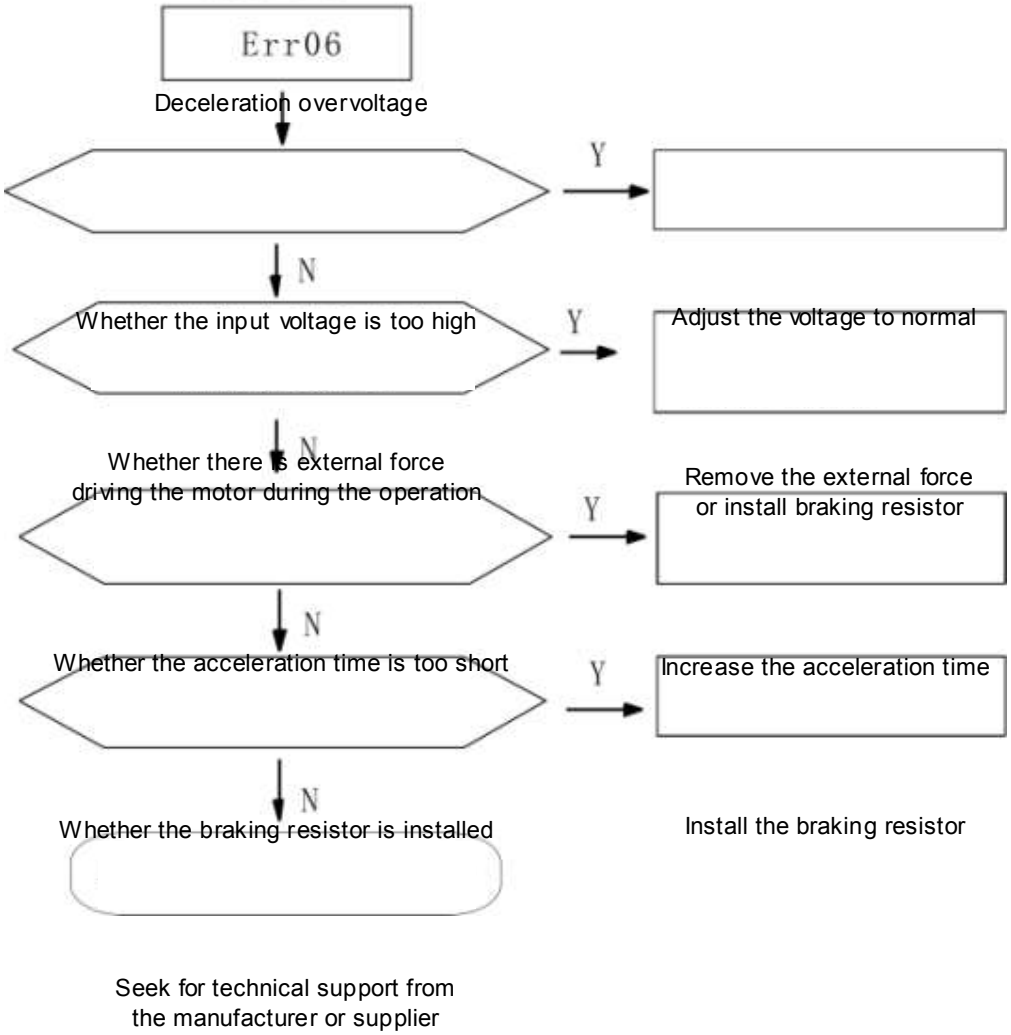


Figure 7-6 Deceleration overvoltage (ERROR06)

55

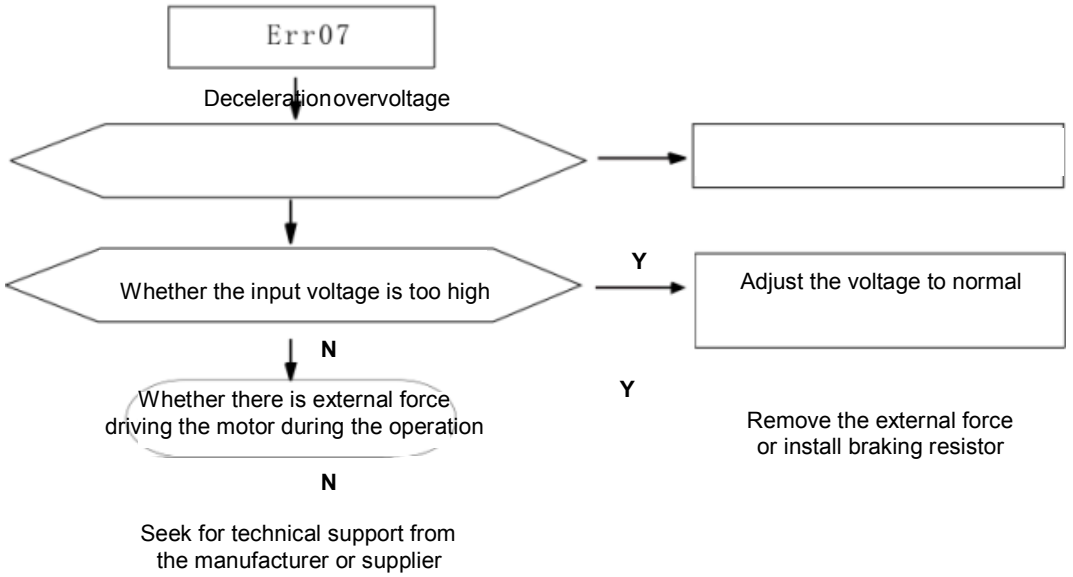


Figure 7-7 Constant speed overvoltage (ERR07)

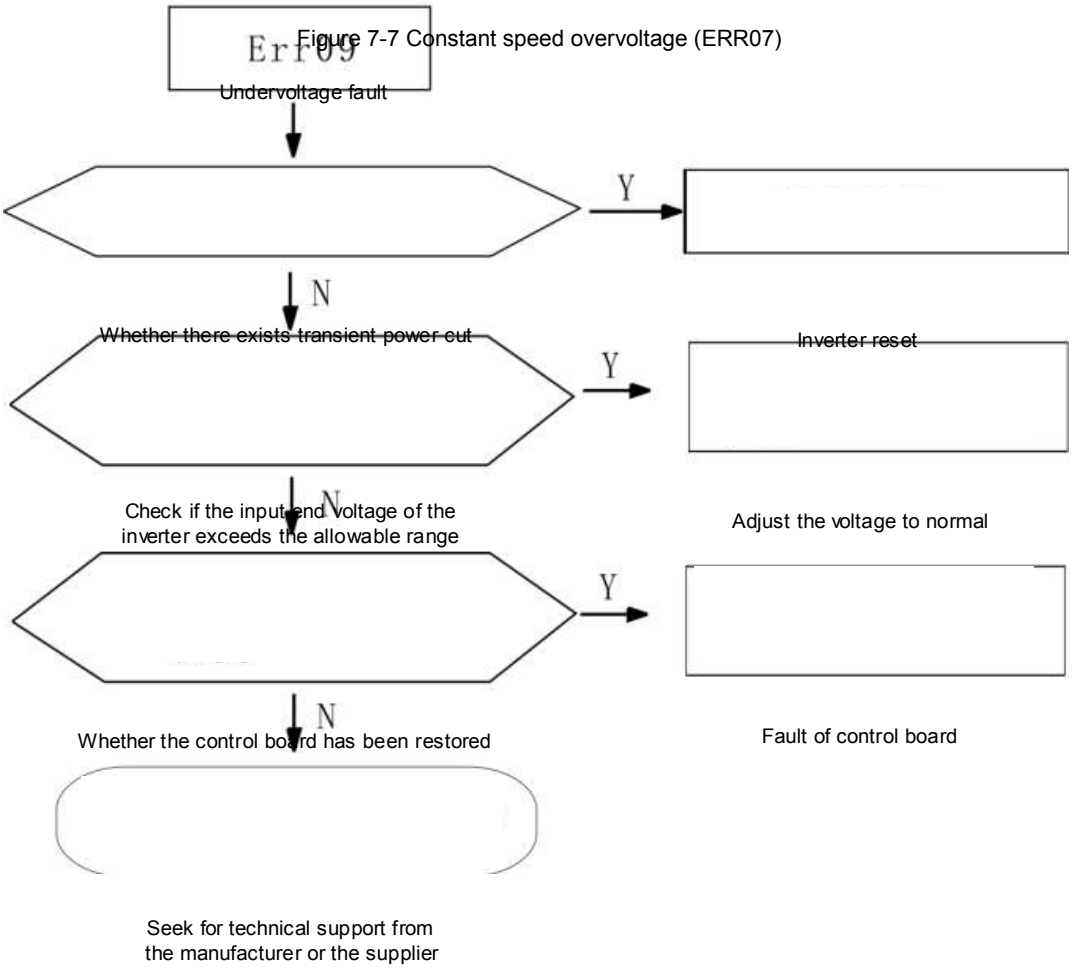


Fig. 7-8 Undervoltage fault (ERR09)

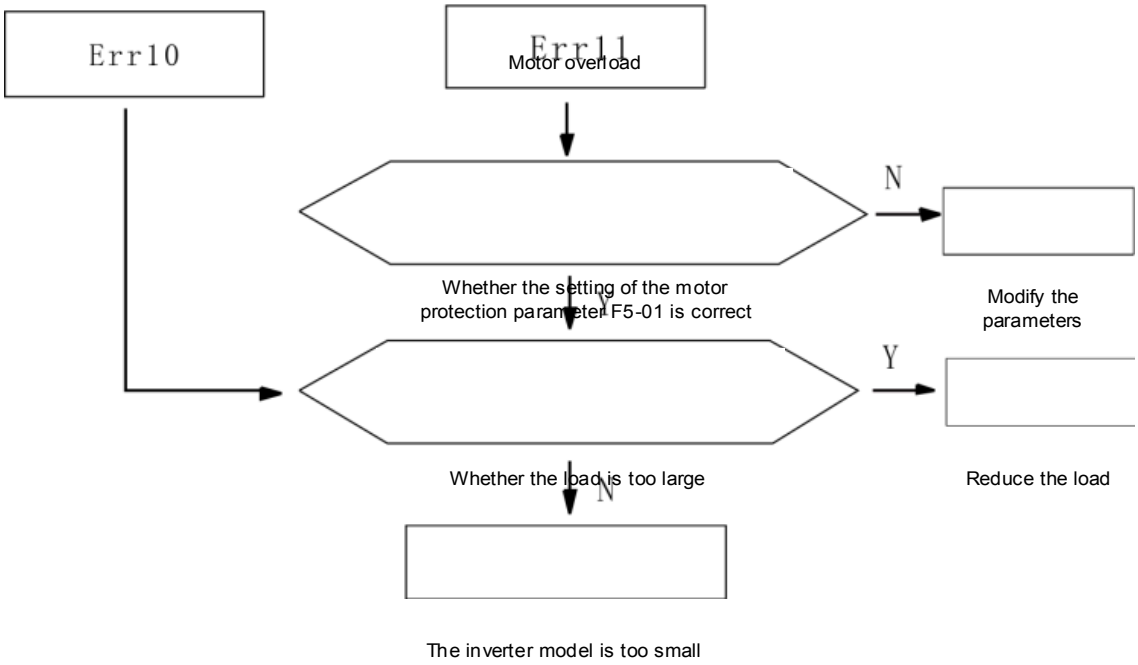


Figure 7-9 Motor overload (ERR10, ERR11)

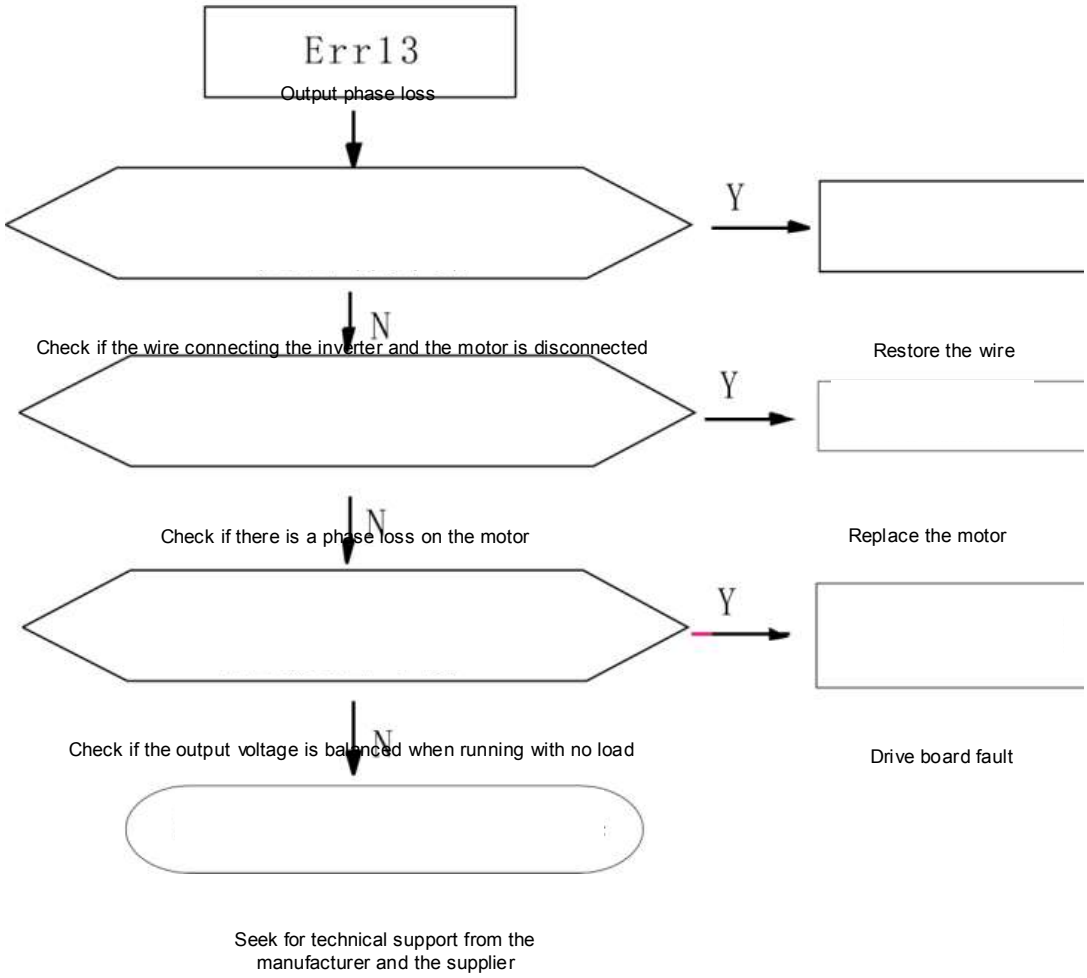


Fig.7-10 Output defect (ERR13)

58

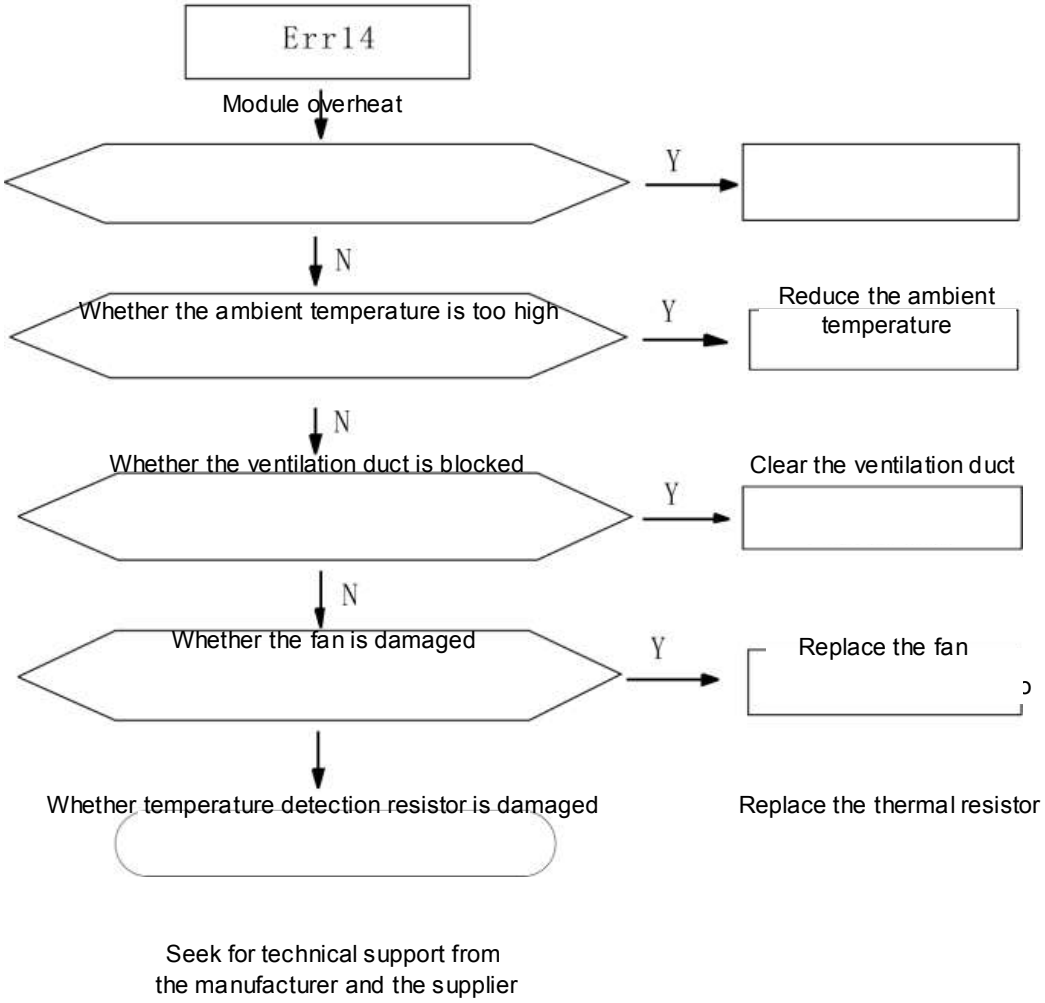


Figure 7-11 Module overheat (ERR14)

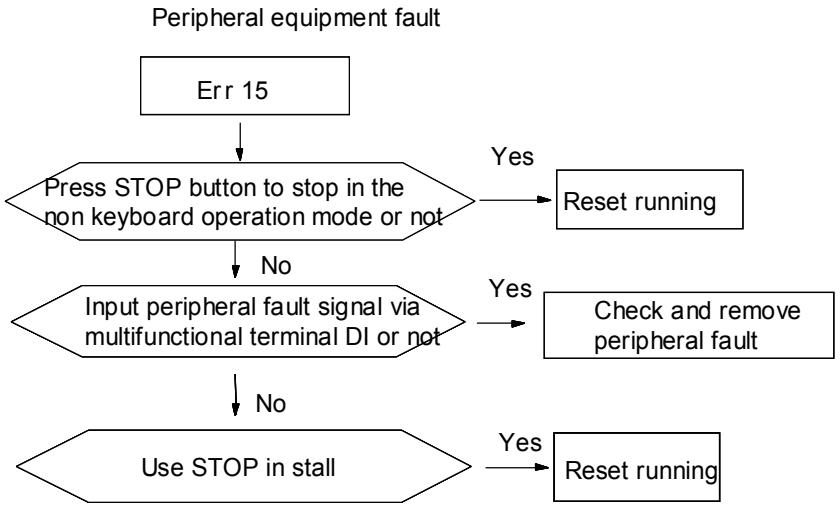


Figure 7-12 Peripheral equipment fault (ERR15)

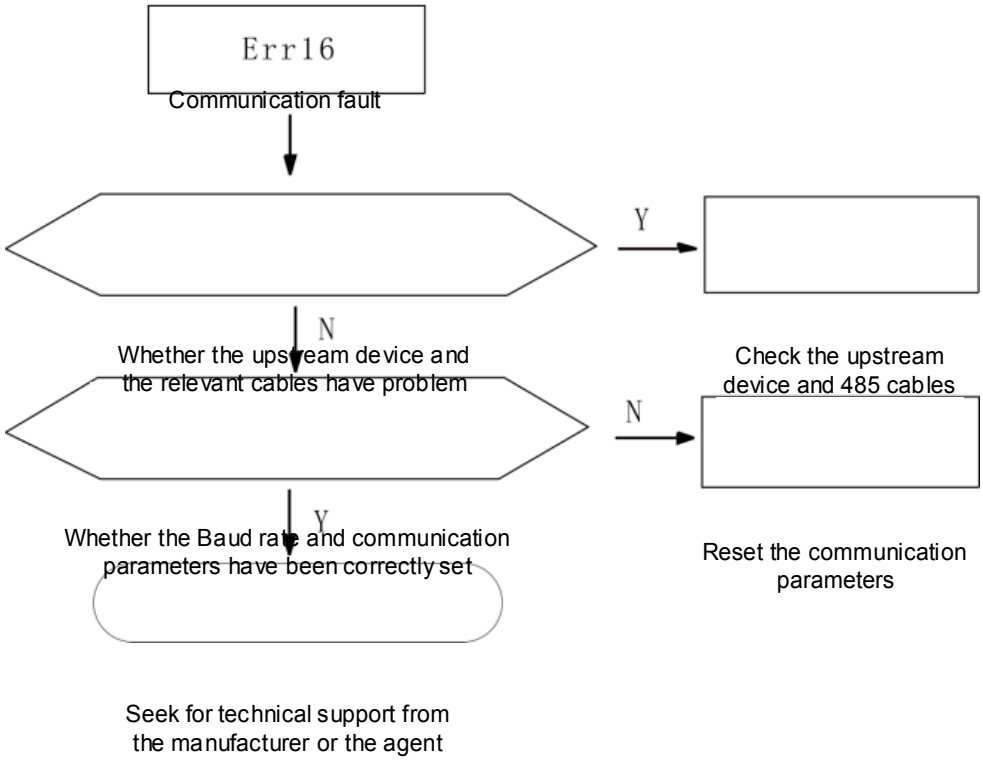
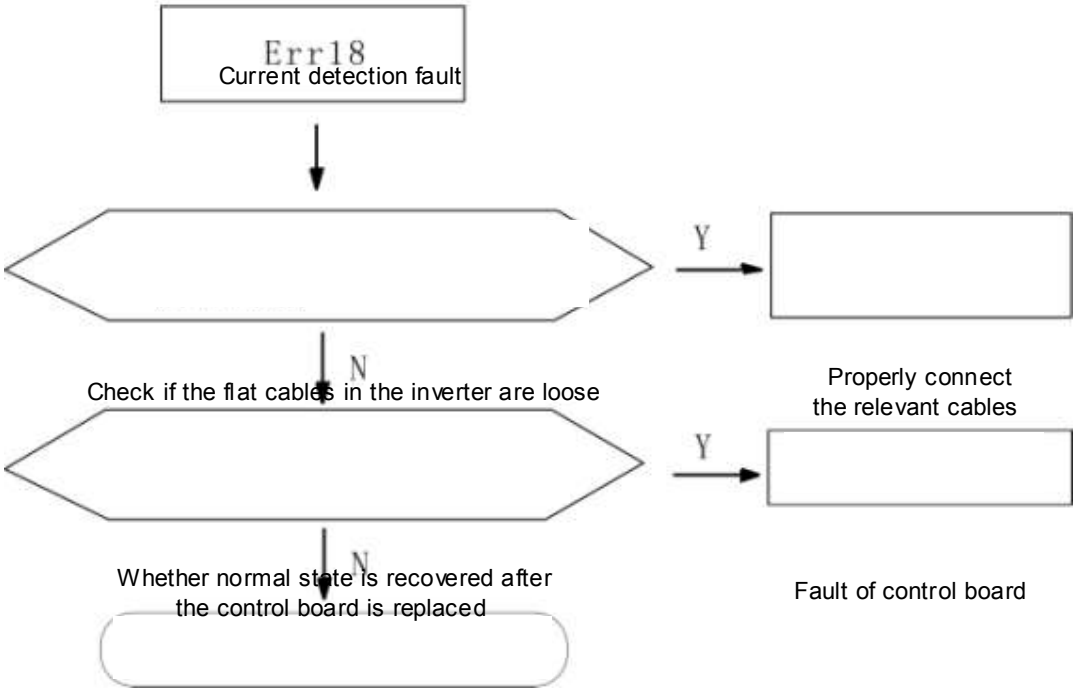


Fig. 7-13 Communication fault (ERR16)



case of driver board fault

Fig. 7-14 Current detection fault

60

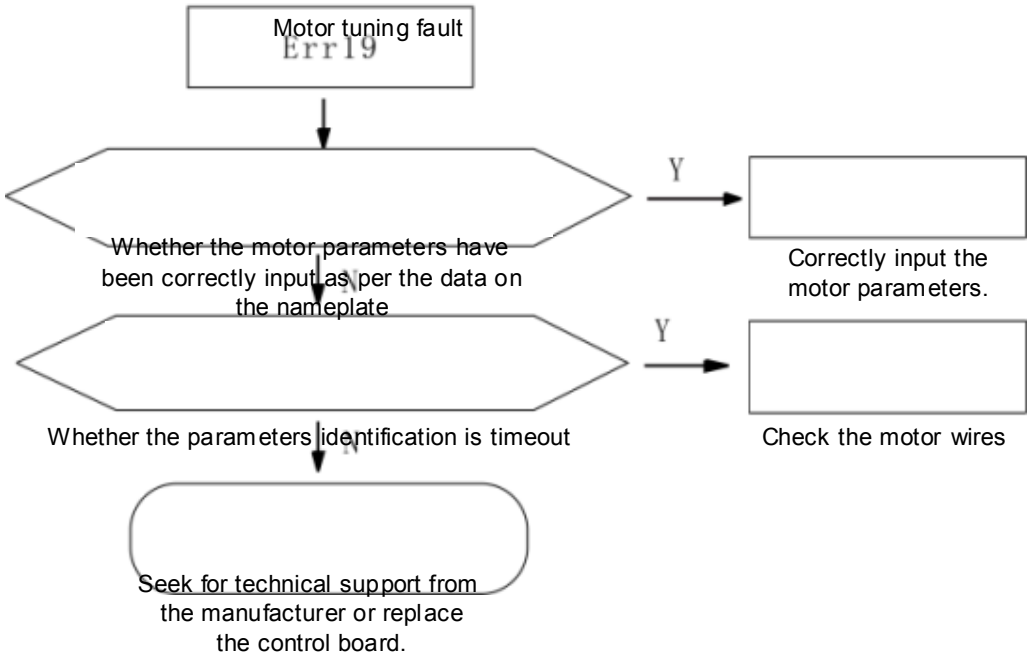


Fig. 7-15 Motor tuning fault (ERR19)

7.2 Common Faults and the Fault Diagnosis

The following faults may probably occur during the use of the inverter, please refer to the methods described below to perform the fault analysis:

1. No Display after power-on

1) Check with multimeter if the input power supply of the inverter is consistent with its rated voltage. If there is something wrong with the power supply, please check and remove it.

2) Check if the bus voltage is normal, if not, the problem may generally occur at the rectifying bridge; If the voltage is normal, the problem may occur at the switching power supply. Seek for technical support.

2. The Circuit breaker Trips After Power-on:

1) Check if there exists earthing or short circuit between the input power supplies and then remove the problem.

2) Check if the rectifying bridge has been broken down. If so, seek for technical support.

3. The Motor Does not Run After the Inverter Starts to Run:

1) Check if there is balanced three-phase output between U, V and W.If yes, the motor circuit or itself may have been damaged, or the motor may have stopped running for mechanical reason. Please remove it.

2) If there is output but the three phases are not balanced, the inverter drive board or the output module may have been damaged. Please seek for technical support.

3) If there is no output voltage, the drive board or output module may have been damaged. Please seek for technical support.

4. Upon power-on, it is displayed that the inverter is normal, but after it starts running, the circuit breaker of the power supply trips

1) Check if short circuit occurs between the output modules. If yes, seek for technical support.

2) Check if there exists short circuit or earthing between the motor lead wires. If yes, please remove it.

3) If the tripping occurs only occasionally and the distance between the motor and the inverter is big, it is acceptable to install output AC reactor for troubleshooting

Inovance

Warranty Agreement

1) Our company provides 18 months of warranty service (based on the bar code on the equipment) during which you can enjoy the service free of charge if the product is faulty or damaged when it is properly used following the instructions of the operation manual.
2) Reasonable fees should be charged for the maintenance for the damage caused by the following reasons within the warranty period.

a. Damages caused due to improper use, unauthorized disassembling and refitment;
b. Damages caused because of fire, flood, abnormal voltage, and other natural disasters and secondary disasters.
c. Hardware damages caused by falls or transportation.
d. Damages caused by improper operations against the user's manual;
e. Faults or damages caused due to external obstacles (for instance, resulting from peripheral equipment);

3) Once problems or damages arise, please fill out the "Warranty Card" correctly and in detail.
4) Fees are charged according to the latest "Service Rate Sheet" of our company.
5) Generally, the warranty card will not be reissued, please keep it safe and present it to the maintenance staff when requesting for service.
6) For any problems you have during the service, please contact our company or our agents promptly.
7) This agreement shall be interpreted by Inovance Technology Co., Ltd.

Service Department of Shenzhen Inovance Technology

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Inovance

Warranty Card

Customer Information	Add.:	
	Name:	Contact person:
	Post Code:	Tel:
Product Information	Product Model:	
	Bar code (pasted here)	
	Name of agent:	
Faults Description	(Maintenance time and details)	