Contents

Foreword

MD series inverter is a new generation of high-performance modular inverter launched by Shenzhen Inovance Technology Co., Ltd, which represents the future development direction of the inverter. Unlike traditional inverters, MD series inverter creates a customized platform through modular design and flexible combination of multiple modules of single series inverter based on different customer requirements for functions and performances.

MD series inverter creates three new concepts in the future inverter sector:

1. It firstly creates the three-tier modular structure standard for new generation of inverter as shown in Fig.1.

2. It firstly makes the physical standard for distinguishing the main modules, such as motor drive, general function and special function, from the sub-modules as shown in Fig.2.

3. It leads the new industry trend of popularizing the vector control technology.

Such concepts will bring about profound influences on the inverter industry.

The modular structure is described as follows:

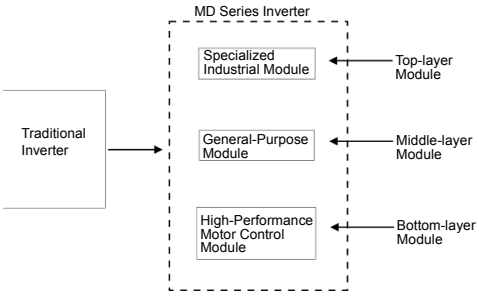


Fig.1 Comparison between Traditional Inverter and MD Series Modular Inverter

1) The bottom-layer module of the MD series inverter is high-performance motor control module and consists of V/F, non-speed sensor vector control (SVC) and vector control. It is mainly responsible for high performance control and overall protection of the motor, controlling the motor through sending running commands to multiple channels or performing close loop vector control through encoder interface.

2) The middle-layer module of MD series inverter is general functional module, which mainly includes some basic functions of the inverter, such as PID control, MS speed, swing frequency and other general functions. According to the degree of complexity of functions, Shenzhen Inovance Technology Co., Ltd provides two sub-modules for options of the customers, namely, MD320 functional module and MD300 functional module. Refer to Table 1 for the difference between the two modules.

Table 1 Difference between MD300 and MD320 Functional Modules

	MD320	MD300
Input/output terminal	5×DI (bidirectional input and one high-speed port),2×AI， 2×DO (one high-speed port), 1×AO， 1×Relay (expandable I/O)	4×DI (single directional input, one high-speed port), 2×AI，1×DO，1×AO， 1×Relay
Control mode	SVC, VC and V/F	SVC and V/F
Analog reference mode	Straight line mode	Multiple-point fold line mode, which is easy to realize the functions of the injection molding machine
MS speed	Be able to realize 16S speed	Be able to realize 4S speed
Simple PLC	Be able to realize 16S timing operation	None
Swing frequency and fixed-length control	Available	None
Main/auxiliary reference	Main/auxiliary reference of any channel	Only A12 can be auxiliary reference
Communication function	Via the expansion card	Via the specialized card
PID control	Available	None
Multiple-point V/F	Available	None

3) The top-layer module of MD series inverter is used special for the industry, which offers solution platform according to the industrial demand. Customers can use the existing solution or perform second development according to their own needs. Refer to Fig.2 for the top sub-module

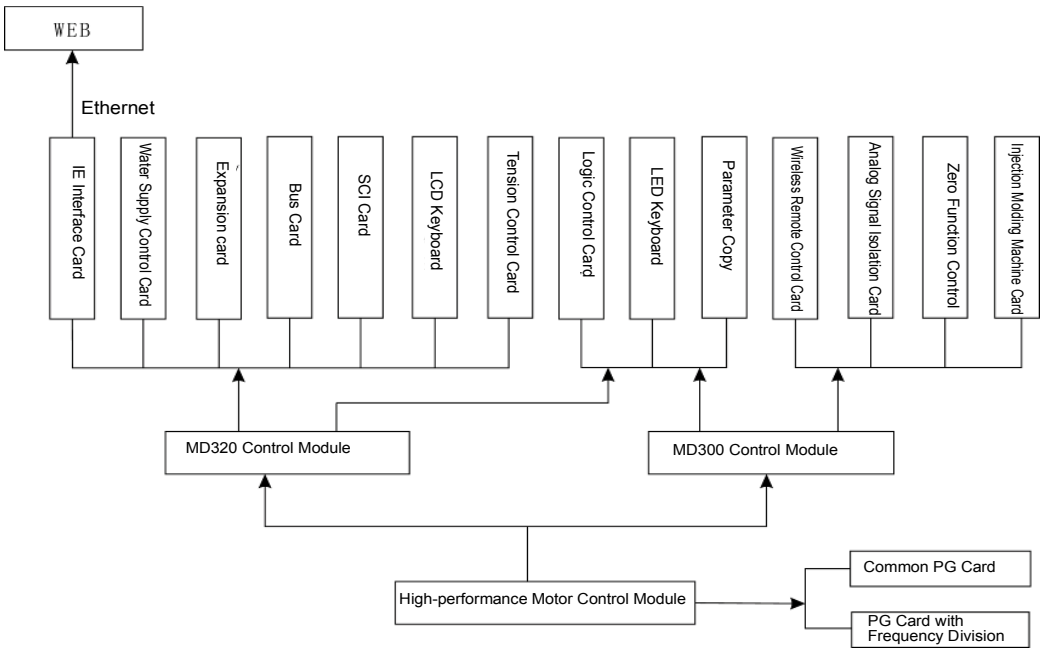


Fig.2 MD Series Inverter Modular Structure Diagram

MD series inverter is particularly unique in respect of easy-to-use performance. It has whole series of independent air duct and heatsink that can be installed inside or outside the cabinet, which is able to provide solution basically meeting IP54 protection requirement; directly input DC bus terminal and DC powered fan that enable the standard products to be compatible with the DC bus running mode; perfect user password protection; shortcut menu design that makes the complex commission easier; standard RJ45 interface applied in the operation panel and the communication port that ensures reliability and greatly reduces the application cost; MOBUS bus protocol and expansion card that can be compatible with PROFIBUS, DeviceNet, CANopen and other bus controls, and functional expansion card with automatic identification function. All these features reflect that the MD series inverter strictly complies with the principle “Respect the Customers" during the design process.

This manual is a guide to the operations of MD series inverter and MD300 control module. For the use of MD320 control module, see the operation manual for details.

This manual provides the user with related precautions and instructions for the prototyping, installation, parameter setting, on-site commissioning, troubleshooting and routine repair and maintenance. In order to

use this series of inverter correctly, please read this manual carefully prior to operation and keep it properly for future use.

The supporting equipment customers shall distribute this manual together with the equipment to the final users.

Unpacking and inspection:

Please confirm carefully when unpacking the box:

1. If the model and inverter rated values on the nameplate are the same as your order. The equipment and user manual will be included in the box.

2. Check if the product is damaged during the transportation. If there is any omission or damage, please contact our company or the supplier immediately.

First time use:

The users who use this product for the first time shall read this manual carefully. For any doubt on certain functions and performances, please contact the technical support personnel of our company for help so as to use this product properly.

With commitment to the constant improvement of the inverter products, our company may change the information provided without additional notice.

4）CE

MD300 series inverter complies with the following international standards and part of products has passed CE certification (safety regulation and EMC):

IEC/EN 61800-5-1：2003 Speed-variable electric driving system safety requirement;

IEC/EN 61800-3：2004 speed-variable electric driving system; Part 3: EMC standard of product and given test method (If it is correctly mounted and used, it shall meet IEC/EN 61800-3 standard according to 7.3.2 and 7.3.6.)

Chapter 1 Safety and Precautions

Safety definition:

In this manual, safety precautions are divided into two types below:

Danger arising due to improper operations may cause severe hurt or even death.

Danger arising due to improper operations may cause moderate hurt or light hurt or equipment damage.

1.1 Safety issues

1.1.1 Before Installation:

Danger

1. Do not use the damaged inverter or inverter with missing parts. Otherwise, there may be risk of injury.
2. Use the motor with Class B or above insulation. Otherwise, there may be risk of electric shock.

1.1.2 During the installation:

Danger

1. Mount the inverter on incombustible surface like metal, and keep away from flammable substances. Otherwise it may cause fire.

Note

2. When more than two inverters are to be installed in one cabinet, due attention shall be paid to the installation locations (refer to Chapter 3 Mechanical and Electrical Installation) to ensure the heat dissipation.
3. Do not drop lead wire stub or screw in the inverter. Otherwise it may damage the inverter!

1.1.3 During wiring:

Danger

1. Operation shall be performed by the professional engineering technician. Otherwise there will be danger of electric shock!
2. There shall be circuit breaker between the inverter and power supply. Otherwise, there may be fire!
3. Make sure the power is disconnected prior to the connection. Otherwise there will be danger of electric shock!
4. The earth terminal shall be earthed reliably. Otherwise there may be danger of electric shock.

Note

5. Do not connect the input power cable to the output ends U, V and W. Otherwise it may damage the inverter.

6. Ensure that the wiring conforms to EMC requirement and local safety standard.

The diameter of the wire shall be determined according to the manual. Otherwise, accident may be caused!

7. The brake resistor cannot be directly connected between terminals (+) and (-) of DC bus. Otherwise it may cause fire.

1.1.4 Before Power-on:

Danger

1. Please confirm whether the power voltage class is consistent with the rated voltage of the inverter and whether the I/O cable connecting positions are correct, and check whether the external circuit is short circuited and whether the wires are firmly connected. Otherwise it may damage the inverter!

2. The cover must be well closed prior to the inverter power-on. Otherwise electric shock may be caused!

Note

3. The inverter is free from dielectric test because this test is performed prior to the delivery. Otherwise accident may occur!

4. Whether all the external fittings are connected correctly in accordance with the circuit provided in this manual. Otherwise accident may occur!

1.1.5 Upon Power-on:

Danger

1. Do not open the cover of the inverter upon power-on. Otherwise there will be danger of electric shock!

2. Do not touch the inverter and its surrounding circuit with wet hand. Otherwise there will be danger of electric shock!

3. Do not touch the inverter terminals (including control terminal). Otherwise there will be danger of electric shock!

4. At the beginning of power-on, the inverter will perform the security check for the external heavy-current circuit automatically. Thus, at this time please do not touch terminals U, V and W, or the terminals of motor, otherwise there will be danger of electric shock.

Note

5. If parameter identification is required, due attention shall be paid to the danger of injury arising from the rotating motor. Otherwise accident may occur!

6. Do not change the factory settings at will. Otherwise it may damage the equipment!

1.1.6 During the operation:

Danger

1. Do not approach the mechanical equipment when selecting the restart function.
Otherwise it may cause injury!
2. Do not touch the heatsink fan or discharge resistor to sense the temperature. Otherwise, you may get burnt!
3. Detection of signals during the operation shall only be conducted by qualified technician. Otherwise, personal injury or equipment damage may be caused!

Note

4. During the operation of the inverter, keep items from falling into the equipment. Otherwise, it may damage the equipment!
5. Do not start and shut down the inverter by connecting and disconnecting the contactor.
Otherwise, it may damage the equipment!

1.1.7 Maintenance

Danger

1. Do not repair and maintain the equipment with power connection. Otherwise there will be danger of electric shock!
2. Conduct repair and maintenance after ensuring that the charge LED indictor of the inverter is OFF. Otherwise, the residual charge on the capacitor may cause personal injury!
3. The repair and maintenance for inverter can only be performed by professional technicians.
Otherwise, it may cause personal injury or equipment damage!

1.2 Precautions

1.2.1 Motor Insulation Inspection

When the motor is used for the first time, or when the motor is reused since the previous use, or when periodical inspection is performed, the motor insulation inspection shall be performed so as to avoid damaging of the inverter due to the insulation failure of the motor windings. The motor wires must be disconnected from the inverter during the insulation inspection. It is recommended to use the 500V megameter, and the insulating resistance measured shall be at least 5MΩ.

1.2.2 Thermal Protection of the Motor

If the ratings of the motor do not match those of the inverter, especially when the rated power of the inverter is higher than the rated power of the motor, the relevant motor protection parameters in the inverter shall be adjusted, or thermal relay shall be mounted to protect the motor.

1.2.3 Running with Frequency higher than Standard Frequency

This inverter can provide output frequency of 0Hz to 300Hz. If the user needs to run the inverter with frequency of more than 50Hz, please take the resistant pressure of

the mechanical devices into consideration.

1.2.4 Motor Heat and Noise

Since the output voltage of inverter is PWM wave and contains certain harmonics, the temperature rise, noise and vibration of the motor will be higher than those when it runs at standard frequency.

1.2.5 Voltage-sensitive Device or Capacitor Improving Power Factor at the Output Side

Since the inverter output is PWM wave, if the capacitor for improving the power factor or varistor for lightning protection is mounted at the output side, it is easy to cause instantaneous over current in the inverter, which may damage the inverter. It is recommended that such devices shall not be used.

1.2.6 Switching Devices like Contactors Used at the Input and Output Ends of Inverter

If a contactor is installed between the power supply and the input end of the inverter, it is not allowed to use the contactor to control the startup/stop of the inverter. If use of such contactor is inevitable, it shall be used with interval of at least one hour. Frequent charge and discharge will reduce the service life of the capacitor inside the inverter. If switching devices like contactor are installed between the output end of the inverter and the motor, it shall ensure that the on/off operation is conducted when the inverter has no output. Otherwise the modules in the inverter may be damaged.

1.2.7 Use under voltage rather than rated voltage

If the MD series inverter is used outside the allowable working voltage range as specified in this manual, it is easy to damage the devices in the inverter. When necessary, use the corresponding step-up or step-down instruments to change the voltage.

1.2.8 Change Three-phase Input to Two-phase Input

It is not allowed to change the MD series three-phase inverter into two-phase one. Otherwise, it may cause fault or damage the inverter.

1.2.9 Lightning Protection

The series inverter has lightning over current protection device to provide certain self-protection capacity against the lightning. In applications where lightning occurs frequently, the user shall install additional protection devices at the front-end of the inverter.

1.2.10 Altitude and Derating Application

In areas with altitude of more than 1,000 meters, the heat dissipation of the inverter may turn poor due to rare air. Therefore, it needs to derate the inverter for use. Please contact our company for technical consulting in case of such condition.

1.2.11 Certain Special Use

If the user needs to use the inverter with the methods other than the recommended wiring diagram in this manual, such as shared DC bus, please consult our company.

1.2.12 Precautions at the time of Inverter Disposal

The electrolytic capacitors on the main circuit and the PCB may explode when they are burnt. Emission of toxic gas may be generated when the plastic parts are burnt.

Please dispose the inverter as industrial wastes.

1.2.13 Adaptable Motor

1) The standard adaptable motor is four-pole squirrel-cage asynchronous induction motor. If such motor is not available, be sure to select adaptable motors according to the rated current of the motor. In applications where drive permanent magnetic synchronous motor is required, please consult our company;

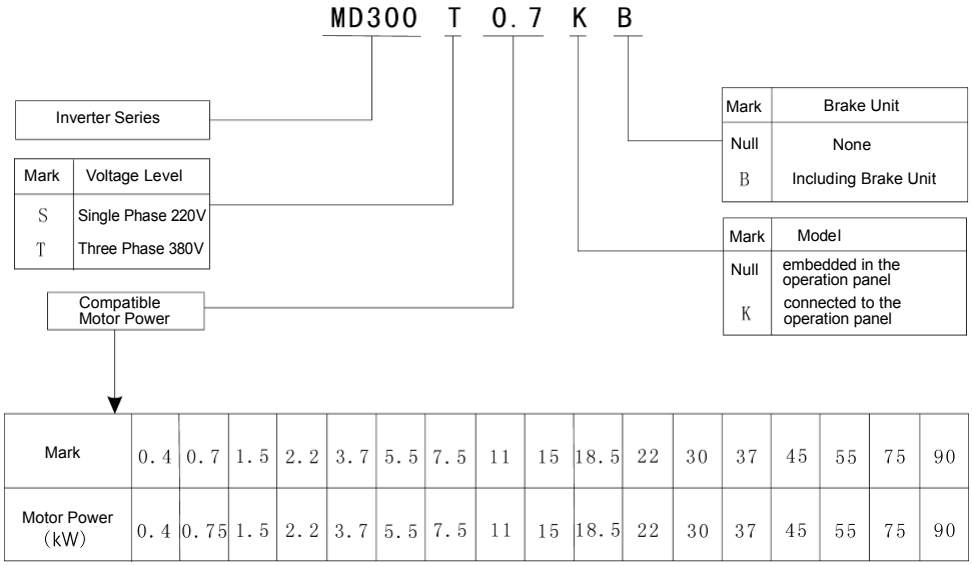
2) The cooling fan and the rotor shaft of the non-variable-frequency motor adopt coaxial connection. When the rotating speed is reduced, the cooling effect will be reduced. Therefore, a powerful exhaust fan shall be installed, or the motor shall be replaced with variable-frequency motor to avoid the over heat of the motor.

3) Since the inverter has built-in standard parameters of the adaptable motors, it is necessary to perform motor parameter identification or modify the default values so as to comply with the actual values as much as possible, or it may affect the running effect and protection performance;

The short circuit of the cable or motor may cause alarm or explosion of the inverter. Therefore, please conduct insulation and short circuit test on the newly installed motor and cable. Such test shall also be conducted during routine maintenance. Please note that the inverter and the test part shall be completely disconnected during the test.

Chapter 2 Product Information

2.1 Designation Rules



Mark	0.4	0.7	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
Motor Power (kW)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90

Fig.2-1 Designation Specification

2.2 Nameplate

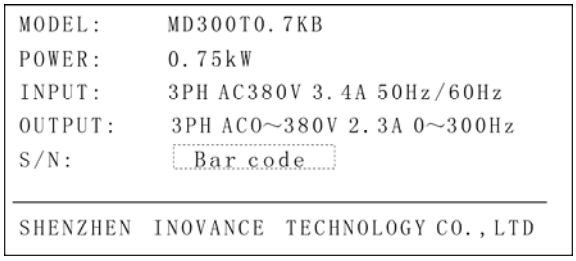


Fig. 2-2 Nameplate

2.3 MD300 Inverter Series

Table 2-1 MD300 Inverter Model and Technical Data

Inverter model	Input voltage	Power supply capacity （kava）	Input current （A）	Output current （A）	Adaptable Motor （kW）
MD300S0.4	Single-phase 220V Range: -15%～20%	1.0	5.4	2.3	0.4
MD300S0.7		1.5	8.2	4.0	0.75
MD300S1.5		3.0	14.2	7.0	1.5
MD300S2.2		4.0	23.0	9.6	2.2
MD300T0.7	Three-phase 380V Range: -15%～20%	1.5	3.4	2.1	0.75
MD300T1.5		3.0	5.0	3.8	1.5
MD300T2.2		4.0	5.8	5.1	2.2
MD300T3.7		5.9	10.5	9.0	3.7
MD300T5.5		8.9	14.6	13.0	5.5
MD300T7.5		11.0	20.5	17.0	7.5
MD300T11		17.0	26.0	25.0	11.0
MD300T15		21.0	35.0	32.0	15.0
MD300T18.5		24.0	38.5	37.0	18.5
MD300T22		30.0	46.5	45.0	22.0
MD300T30		40.0	62.0	60.0	30.0
MD300T37		57.0	76.0	75.0	37.0
MD300T45		69.0	92.0	91.0	45.0
MD300T55		85.0	113.0	112.0	55.0
MD300T75		114.0	157.0	150.0	75.0
MD300T90		134.0	180.0	176.0	90.0

2.4 Technical Specification

Table 2-2 MD300 Inverter Technical Specifications

Item		Specifications
Basic specification	maximum frequency	300Hz
	Carrier frequency	0.5k to 16kHz; the carrier frequency will be automatically adjusted according to the load characteristics.
	Input frequency resolution	Digital setting: 0.01Hz Analog setting: maximum frequency ×0.1%
	Control mode	Open-loop vector control (SVC)， V/F control
	Startup torque	0.5Hz/150％
	Speed adjustment range	1：100 （SVC）
	Speed stabilization precision	±0.5％（SVC）
	Overload capacity	150% rated current 60s; 180 rated current 1s
	Torque boost	Automatic torque boost; manual torque boost 0.1% to 30.0%
	V/F curve	Two types: straight line type, square type V/F curve
	DC brake	DC brake start frequency: 0.00Hz to Max. frequency, braking duration: 0.0s to 36.0s, Braking current: 0.0% to 170.0% (rated current of motor)
	Jog control	Jog frequency range: 0.00Hz to 50.00Hz; jog acceleration/deceleration time: 0.0s to 3000.0s.
Individualized function	Peripherals self-detection upon power-on	It can conduct safety detections on the peripherals upon power-on, including earthing short circuit detections.
	Shared DC Bus Function	It can realize the function that multiple inverters share the DC bus.

Item		Specifications
	MF.K Key	Programmable key: Select the command channel switching/forward and reverse rotations/jog operation.
	running command channel	Two kinds of channels: Operation panel reference, control terminal reference
Input output	Frequency source	Multiple frequency sources: digital reference, analog voltage reference, analog current reference and pulse reference. Switching among multiple modes is available.
	Auxiliary Frequency source	It can implement fine tuning and synthesis of auxiliary frequency.
Characteristics	Input terminal	There are four digital input terminals, one of which can be used as high-speed pulse input. There are two analog input terminals, one of which can be used only as voltage input, while the other can be used as voltage or current input.
	Output terminal	One digital output terminal One relay output terminal One analog output terminal; outputs of setting frequency and output frequency are enabled.
Display and Keyboard Operation	LED display	It is able to display multiple parameters, such as setting frequency, output frequency, output voltage and output current.
protection function		It can implement power-on motor short-circuit detection, input/output phase loss protection, over current protection, over voltage protection, under voltage protection, over heat protection and overload protection.
Using Place		Indoor, and being free from direct sunshine, dust, corrosive gas, combustible gas, oil smoke, vapor, drip or salt.
Environment	Protection class	IP20

Item		Specifications
	altitude	If the altitude is lower than 1000m, higher than 1000m, please derate it for use.
	ambient temperature	－10℃ to ＋40℃ (derated when used in the ambient temperature of 40℃ to 50℃)
	Humidity	Less than 95%RH, without condensing
	Vibration	Less than 5.9 m/s^2(0.6g)
	Storage temperature	－20℃ to ＋60℃
	Pollution class	Class 2 (Refer to IEC61800-5-1：4.2.6 for details)

2.5 Configuration and Dimensions

2.5.1 Physical Appearance

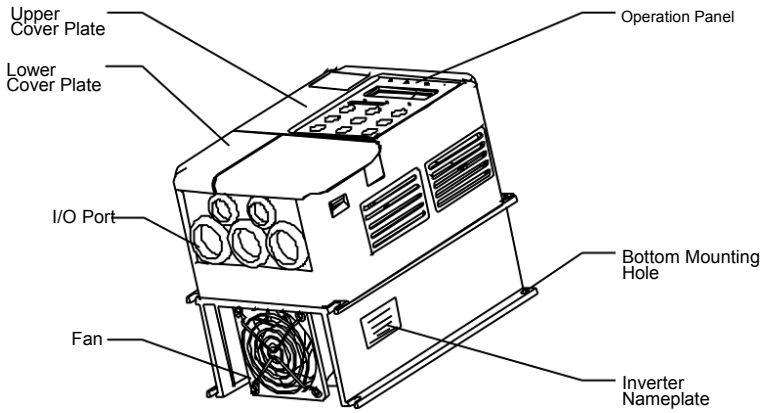
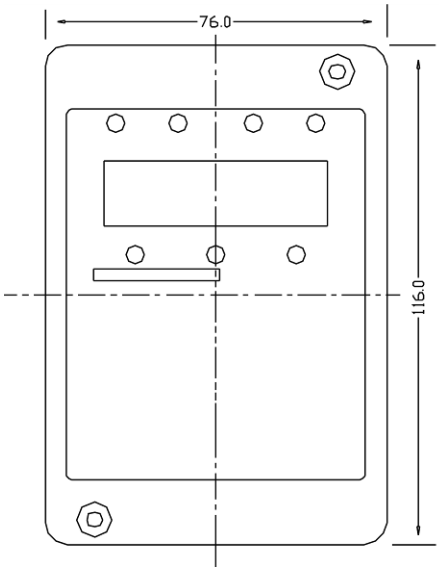


Fig.2-3 Physical Appearance of Inverter

Configuration & dimensions of outer keypad



Mounting hole size of outer keypad

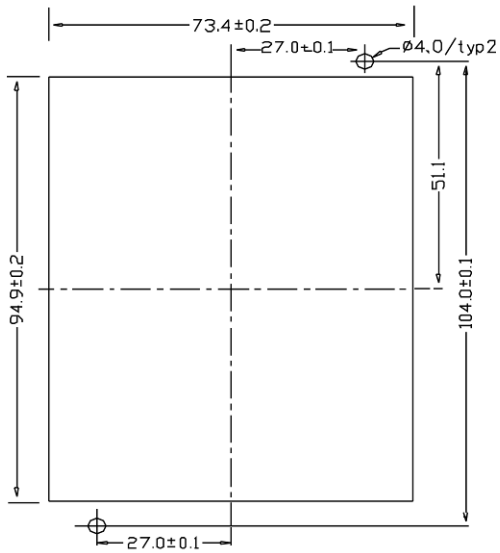


Fig. 2-4 Configuration & dimension of outer keypad

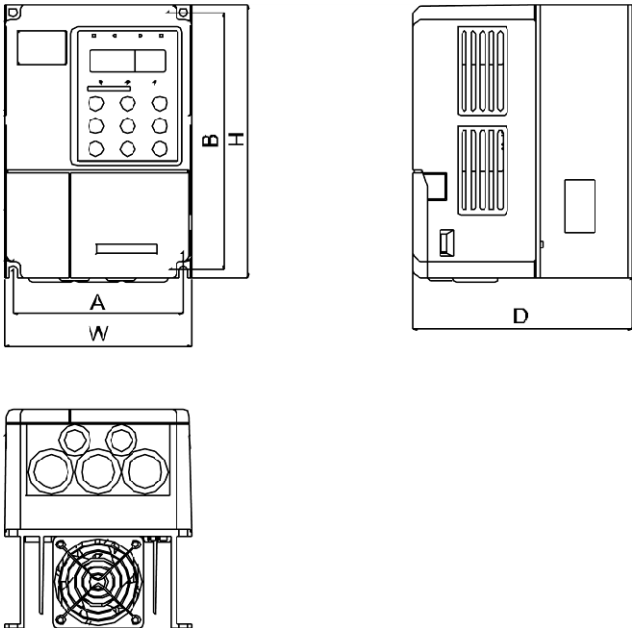


Fig. 2-5 Schematic Diagram for Configuration & Mounting Dimensions of 0.4kW～ 15kW Inverter

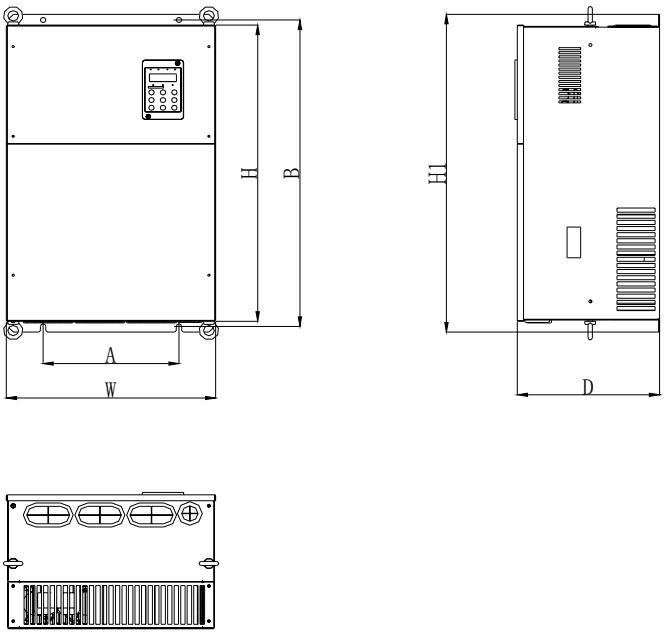


Fig. 2-6 Inverter of 18.5kW～ 90kW

2.5.2 Mounting hole size

Table 2-3 Mounting hole size of MD300 inverter

Model	Adaptable Motor		A (mm)	B (mm)	H (mm)	H1	W (mm)	D (mm)	Diameter of Mounting Hole (mm)	重量 (kg)
MD300S0.4	Single-phase 220V	0.4	113	172	182		123	145	Φ5.4	1.1
MD300S0.7		0.75								
MD300S1.5		1.5								
MD300S2.2		2.2								
MD300T0.7	Three-phase 380V	0.75								
MD300T1.5		1.5								
MD300T2.2		2.2								
MD300T3.7		3.7	148	236	246		158	165	Φ5.4	2.5
MD300T5.5		5.5								
MD300T7.5		7.5	150	335	348		223	177	Φ6	7
MD300T11		11								
MD300T15		15								
MD300T18.5		18.5	235	447	430	460	285	220	Φ6.5	20
MD300T22		22								
MD300T30		30								
MD300T37		37	250	598	573	620	380	262	Φ10	34
MD300T45		45								
MD300T55		55								
MD300T75		75	343	678	660	700	473	307	Φ10	47
MD300T90		90								

2.6 Options and Accessories

Table 2-4 MD300 Inverter Options and Accessories

Name	Model	Function	Remarks
Built-in brake unit	The letter “B” attached behind the product model	Single-phase slave built-in brake unit (0.4kW to 2.2kW), optional three-phase slave from 0.75kW to 2.2kW; optional built-in brake unit from 18.5kW to 30kW	Three-phase slave built-in brake unit of 3.7kW to 15kW is standard configuration.
Injection molding machine card	MD30IN	Change “0A to 1A” or “0 to 24V” of the injection molding machine to “0V to 10V” with output isolation.	Modification of injection molding machine for energy saving
External LED operation panel	MDKE	external LED display and operation keyboard	MD series general-purpose RJ45 interface
extended cable	MDCAB	Standard 8-core network cable, and it can be connected with MDKE.	1m, 3m,5m and 10m are available.

Refer to Fig.2-7 Options and Accessories Installation Diagram for installation of part of options and accessories.

Refer to relevant specification for the detailed function and use of options and accessories.

If the user needs such options and accessories, please specify when placing the order.

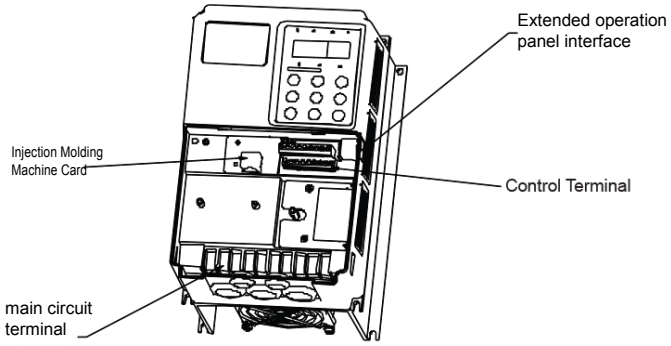


Fig.2-7 Options and Accessories Installation Diagram

2.7 Routine Maintenance of inverter

2.7.1 Routine Maintenance

The influence of the ambient temperature, humidity, dust and vibration will cause the aging of the devices in the inverter, which may cause potential fault of the inverter or reduce the service life of the inverter. Therefore, it is necessary to carry out routine and periodical maintenance on the inverter.

> **Note**
>
> The maintenance cannot be performed immediately because there still is high voltage on the filter capacitor after disconnecting the power. The repair or maintenance can be conducted only after the charge LED indictor is OFF and the bus voltage measured with multimeter is less than 36V.

Routine inspection Items include:

1) Whether there is any abnormal change in the running sound of the motor;

2) Whether the motor has vibration during the running;

3) Whether there is any change to the installation environment of the inverter;

4) Whether the inverter heatsink fan works normally;

5) Whether the inverter has over temperature;

Routine cleaning:

The inverter shall be kept clean all the time.

The dust on the surface of the inverter shall be effectively removed, so as to prevent the dust entering the inverter.

Especially the metal dust is not allowed.

The oil stain on the inverter heatsink fan shall be effectively removed.

2.7.2 Periodic Inspection

Please perform periodic inspection on the places where the inspection is a difficult thing.

Periodic inspection Items include:

Check and clean the air duct periodically;

Check if the screws are loosened;

Check if the inverter is corroded;

Check if the wire connector has arc signs;

Main circuit insulation test

Remainder: When using the megameter (DC 500V megameter recommended) to measure the insulating resistance, the main circuit shall be disconnected with the inverter. Do not use the insulation resistance meter to test the insulation performance of the control loop. It is not necessary to conduct the high voltage test (which has been completed upon delivery).

2.7.3 Replacement of Vulnerable Parts for Inverter

The vulnerable parts of the inverter include cooling fan and filter electrolytic capacitor, whose service life depends on the operating environment and maintenance status. General service life is shown as follows:

Part name	Service Life
fan	2 to 3 years
electrolytic capacitor	4 to 5 years

The user can determine the year of

replacement according to the operating time.

1. Cooling fan

Possible reason for damage: Bearing is worn and blade deteriorates.

Judging criteria: Whether there is crack on the blade and whether there is abnormal vibration noise upon startup.

2. Filter electrolytic capacitor

Possible reason for damage: Input power supply in poor quality, high ambient temperature, frequent load jumping, and electrolyte aging.

Judging criteria: Whether there is liquid leakage and whether the safe valve has projected, and measure the static capacitance, and the insulating resistance.

2.7.4 Storage of Inverter

Upon acquiring the inverter, the user shall pay attention to the following points regarding the temporary and long-term storage of the inverter:

1) Pack the inverter with original package and place back into the packing box of our company.

2) Long-term storage will degrade the electrolytic capacitor. Thus, the product shall be powered up once every 2 years, each time lasting at least five hours. The input voltage shall be increased slowly to the rated value with the regulator.

2.8 Instructions on Warranty of Inverter

Free warranty only applies to the inverter itself.

1. Our company will provide 18-month warranty (starting from the leave-factory date as indicated on the barcode) for the failure or damage under normal use conditions. If the equipment has been used for over 18 months, reasonable repair expenses will be charged.

2. Reasonable repair expenses will be charged for the following situations within 18 months:

1) The equipment is damaged because the user fails to comply with the requirements of the user's manual;

2) Damage caused by fire, flood and abnormal voltage;

3) Damage caused when the inverter is used for abnormal function.

The service expenses will be calculated according to the standard of the manufacturer. If there is any agreement, the agreement shall prevail.

2.9 Prototyping Guide

MD 300 series inverter provides two operation modes: Common V/F and open-loop vector.

When selecting inverter, it must firstly make clear the technical requirements of the system for variable frequency speed adjustment and specific details regarding the applications and load characteristics of the inverter, and select the model and determine the operating mode through taking into overall consideration the adaptable motor, output voltage, rated output current and other factors.

The basic principle is that the rated load current of the motor shall not exceed the rated current of the inverter. Generally, the selection is based on the adaptable motor

capacity as specified in the instruction manual. Due attention shall be paid to the comparison between the rated currents of motor and inverter. The overload capacity of the inverter only affects the startup and brake process. In case short-time overload occurs during the running process, variation of load speed may arise. If the requirement for the speed precision is relatively high, it can consider increasing the level.

Fan and pump type: Their requirements for the overload capacity are relatively low. Since the load torque is proportional to the square of the velocity, the load is relatively light (except Roots fan) when running at low velocity. In addition, this type of load has no special requirements for the rotation precision. Thus, square torque V/F is selected.

Constant torque load: Most of loads have constant toque characteristics, but the requirements for rotation velocity and dynamic performance are low. Extruding machine, agitator, belt conveyer, transporting trolley in the factory, and translational unit of crane are the examples. It can select MS V/F running mode when performing prototyping test.

There are certain static and dynamic index requirements for controlled object: Generally, such load requires strong mechanical characteristics at the low speed so as to meet the dynamic and static index requirements of the control system by manufacturing process.The open-loop vector control mode can be selected.

2.10 Guide to Prototyping of Brake Components

Table 2-5 MD300 Inverter Bake Components Prototyping Table,The data can be used as guidance. The user can select different resistances and powers in accordance with the actual situation (However, the resistance must be larger than the recommended value in the table and the power can be very big.). The selection of braking resistor shall be determined according to the power of the motor in the actual application system, which is also influenced by system inertia, deceleration time, potential energy of load. The larger the system inertia is, the shorter the deceleration time will be and the braking will be more frequent. Therefore, it is required to select the braking resistor with larger power and smaller resistance.

Table 2-5 MD300 Inverter Bake Components Prototyping Table

Inverter model	Recommended Power of Brake Resistor	Recommended Resistance Value of Brake Resistor	Braking unit	Remarks
MD300S0.4	80W	≥200Ω	Built-in, optional	The letter “B” is attached behind the Inverter model.
MD300S0.7	80W	≥150Ω		
MD300S1.5	100W	≥100Ω		
MD300S2.2	100W	≥70Ω		
MD300T0.7	150W	≥300Ω		
MD300T1.5	150W	≥220Ω		
MD300T2.2	250W	≥200Ω		
MD300T3.7	300W	≥130Ω	Built-in as standard	No special specification
MD300T5.5	400W	≥90Ω		
MD300T7.5	500W	≥65Ω		
MD300T11	800W	≥43Ω		
MD300T15	1000W	≥32Ω		
MD300T18.5	1300W	≥25Ω	Built-in, optional	The letter “B” is attached behind the Inverter model.
MD300T22	1500W	≥22Ω		
MD300T30	2500W	≥16Ω		
MD300T37	The power is selected in accordance with the requirements and recommended values of the brake unit.	The power is selected in accordance with the requirements and recommended values of the brake unit.	External equipped：MDBU55	It can select brake units produced by other companies.
MD300T45				
MD300T55				
MD300T75				
MD300T90				

Chapter 3 Mechanical and Electrical Installation

3.1 Mechanical installation

1. Installation environment:

1) Ambient temperature: The ambient temperature exerts great influences on the service life of the inverter and is not allowed to exceed the allowable temperature range (-10℃ to 50℃).

2) The inverter shall be mounted on the surface of incombustible articles, with sufficient spaces nearby for heat dissipation. The inverter is easy to generate large amount of heat during the operation. The inverter shall be mounted vertically on the base with screws.

3) The inverter shall be mounted in the place without vibration or with vibration of less than 0.6g, and shall be kept away from such equipment as punching machine.

4) The inverter shall be mounted in locations free from direct sunlight, high humidity and condensate.

5) 5. The inverter shall be mounted in locations free from corrosive gas, explosive gas or combustible gas.

6) 6. The inverter shall be mounted in locations free from oil dirt, dust, and metal powder.

2. Installation location:

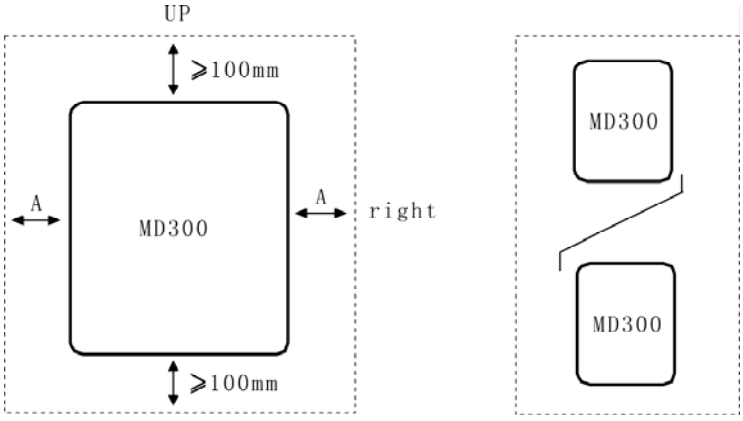


Fig.3-1 MD300 Inverter Installation Diagram

Signle Unit Installation Diagram **Installation Diagram of Upper and Lower Parts**

Note: When the inverter power is not higher than 22kW, the A size can be omitted. When the inverter power is higher than 22kW, the A size shall be higher than 50mm.

Note: When inverters are distributed up and down, mount splitter for heat insulation as shown in the diagram.

Heatsink shall be taken into account during the mechanical installation. Due attention shall be paid to the following items:

1) Install the inverter vertically so that the heat may be expelled from the top. However, the equipment cannot be installed upside down. If there are multiple inverters, parallel installation is a better choice. Fig.3-1 MD300 Inverter Installation DiagramIn applications where the inverter need to be installed up and down, please refer to Fig.3-1 “MD300 Inverter Installation Diagram” for installing heat insulation splitter.

2) The mounting space shall be as indicated as Fig.3-1, so as to ensure the heat dissipation space of the inverter. However, the heat dissipation of other devices in the cabinet shall also be taken into account.

3) The installation bracket must be flame retardant.

4) In the applications where there are metal dusts, it is recommended to mount the heatsink outside the cabinet. In this case, the space in the sealed cabinet shall be large enough.

3. Removal and mount of lower cover plate

For MD series inverter below 15kW, use plastic enclosure. Refer to Fig.3-2 Removing the Lower Cover Plate of Plastic Enclosure for the removal of the lower cover plate.

It can be removed by push the hook of the lower cover plate out towards inside with tools.

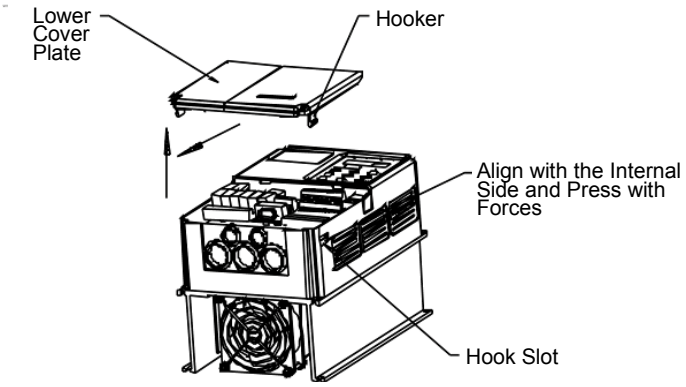


Fig.3-2 Removing the Lower Cover Plate of Plastic Enclosure

For MD series inverter above 18.5kW, use sheet-metal enclosure. Refer to Fig.3-2 Removing the Lower Cover Plate of Sheet-Metal Enclosure for the removal of the lower cover plate. Directly loosen the screws on the lower cover plate with tools.

Danger
When removing the lower cover plate, be sure to avoid the falling of the plate, which may cause human injury or damage to the equipment.

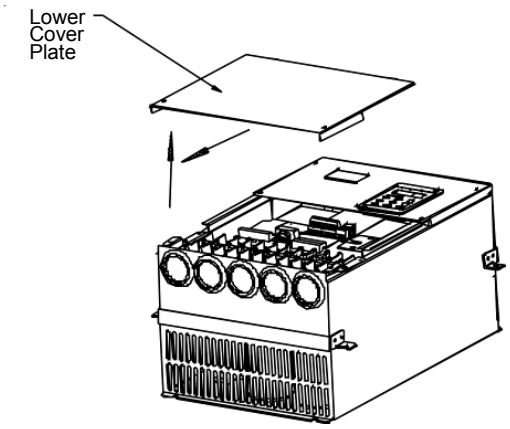


Fig.3-3 Removing the Lower Cover Plate of Sheet-Metal Enclosure

3.2 Electrical Installation

1. Prototyping guidance to the peripheral electrical components:

Table 3-1 Guide to Prototyping of Peripheral Electrical Components of MD300 Inverter

Inverter model	Circuit breaker (MCCB) （A）	Recommended Contactor (A)	Recommended Conducting Wire of Main Circuit at the Input Side (mm)	Recommended Conducting Wire of Main Circuit at the Output Side (mm)	Recommended Conducting Wire of Control Circuit (mm)	Grounding cables （mm²）
MD300S0.4	16	10	2.5	2.5	1	2.5
MD300S0.7	16	10	2.5	2.5	1	2.5
MD300S1.5	20	16	4	2.5	1	2.5
MD300S2.2	32	20	6	4	1	2.5
MD300T0.7	10	10	2.5	2.5	1	2.5
MD300T1.5	16	10	2.5	2.5	1	2.5
MD300T2.2	16	10	2.5	2.5	1	2.5
MD300T3.7	25	16	4	4	1	4
MD300T5.5	32	25	4	4	1	4
MD300T7.5	40	32	4	4	1	4
MD300T11	63	40	4	4	1	4
MD300T15	63	40	6	6	1	6
MD300T18.5	100	63	6	6	1	6
MD300T22	100	63	10	10	1	10
MD300T30	125	100	16	10	1	10
MD300T37	160	100	16	16	1	16
MD300T45	200	125	25	25	1	16
MD300T55	200	125	25	25	1	16
MD300T75	250	160	35	35	1	16
MD300T90	250	160	35	35	1	16

2. Use instruction of peripheral electrical components:

Table 3-2 Instruction for the Use of Peripheral Electrical Components of MD300 Inverter

Part Name	Mounting Location	Function description
Circuit breaker	Front end of input circuit	Disconnect the power supply when the equipment at the lower level is over current.
Contactor	Between the circuit breaker and the inverter input side	Connection and disconnection of inverter. Frequent power-on and power-off operations (Not more than twice each minute) on the inverter or directly startup shall be avoided.
AC input reactor	Input side of the inverter	1） 1) Improve the power factor of the input side; 2） Eliminate the higher harmonics of the input side effectively and prevent other equipment from damaging due to distortion of voltage wave. 3） Eliminate the input current unbalance due to unbalance between the power phases.
EMC Input filter	Input side of the inverter	1） Reduce the external conduction and radiation interference of the inverter. 2） Decrease the conduction interference flowing from the power end to the inverter and improve the anti-interference capacity of the inverter.
DC reactor	MD series inverter adopts DC reactor of more than 7.5kW as standard.	1） 1) Improve the power factor of the input side; 2） Improve the whole efficiency and thermal stability of the inverter. 3） 3) Eliminate the impact of higher harmonics on the input side of the inverter and reduce the external conduction and radiation interference.
AC output reactor	Between the inverter output side and the motor. close to the inverter	The inverter output side generally has higher harmonics. When the motor is far from the inverter, since there are many distributed capacitors in the circuit, certain harmonics may cause resonance in the circuit and bring about the following two impacts: 1） Degrade the motor insulation performance and damage the motor for the long run. 2） Generate large leakage current and cause frequent inverter protection. In general, the distance between the inverter and the motor exceeds 100 meters. Installation of output AC reactor is recommended.

3. Connections

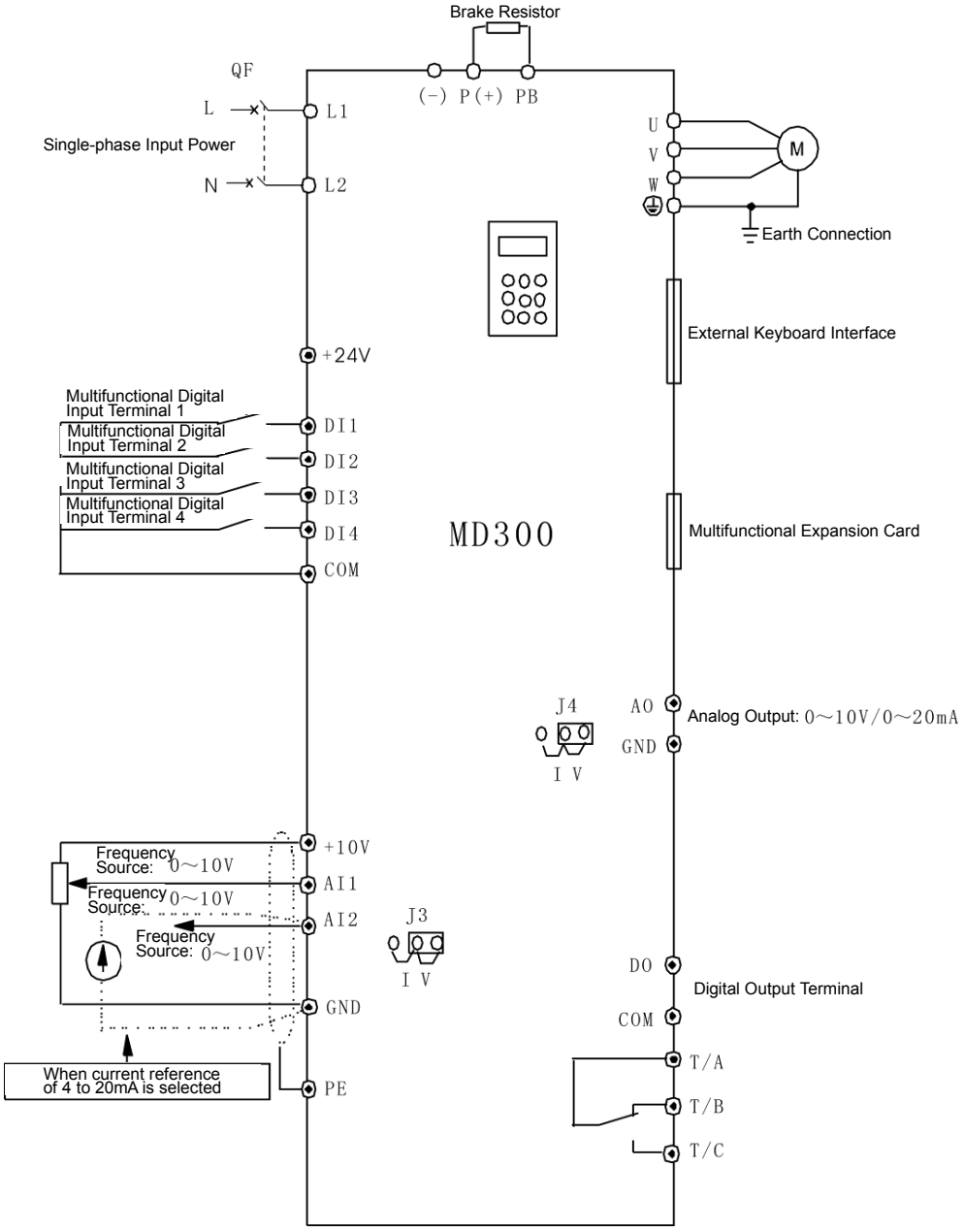


Fig.3-4 Single-phase 220V Inverter Wiring

Note: The figure is applicable to MD300S0.4、MD300S0.7、MD300S1.5、MD300S2.2

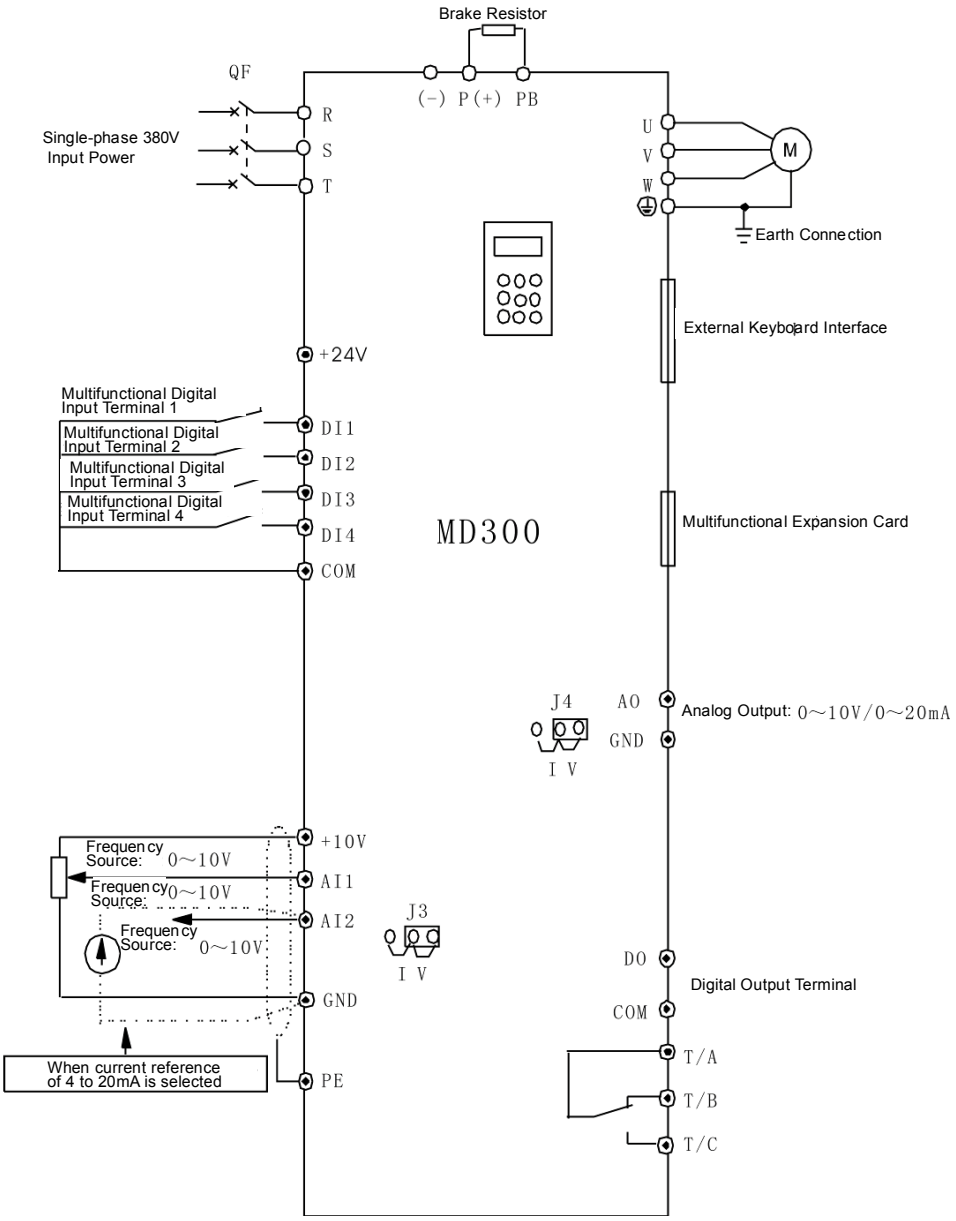


Fig.3-5 Three-phase 380V Inverter Wiring

Note: This figure is applicable to the MD300T0.7 to MD300T30 series inverters.

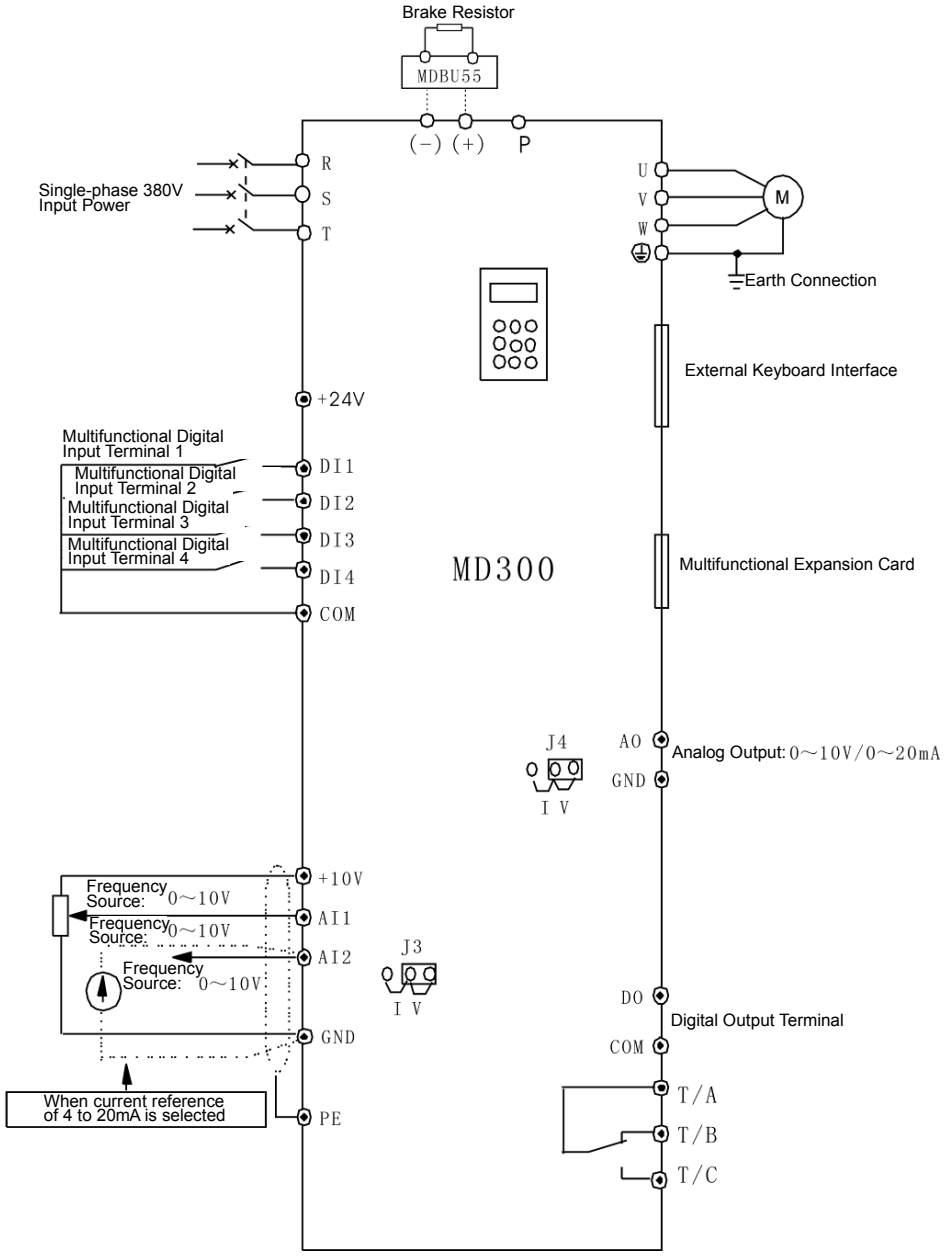


Fig.3-6 37kW/45kW/55kW Inverter Wiring

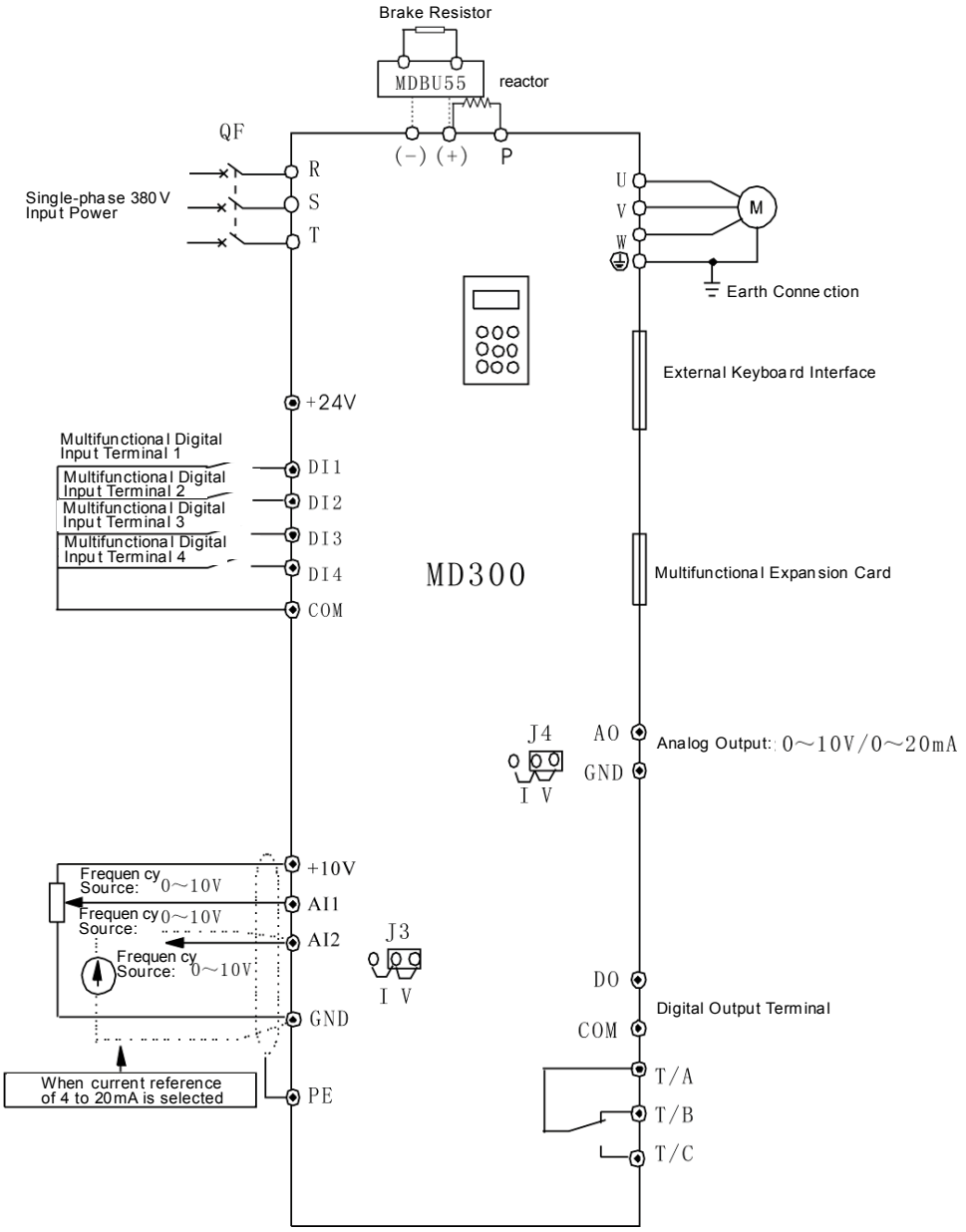


Fig.3-7 75kW/90kW Inverter Wiring

4. Main Circuit Terminals and Connections

Danger
1) The wiring operation is enabled only after confirming that the power switch is OFF. Otherwise, electric shock may be caused! 2) The wiring operation can only be performed by professional technicians. Otherwise, it may cause harm to equipment and human! Reliable grounding is required. Otherwise, it may cause electric shock or fire!

Danger
1) Confirm that the input power is consistent with the rating of inverter. Otherwise, the inverter may be damaged! 2) Confirm whether the motor adapts to the inverter. Otherwise, the motor may be damaged or inverter protection may arise! 3) Don't connect power supply to U, V and W terminal. Otherwise, the inverter may be damaged! 4) Do not directly connect the brake resistor between the DC bus terminals (+) and (-). Otherwise, it may cause fire!

1) Instructions of main circuit terminals of single-phase inverter:

Terminals	Name	Description
L1 and L2	Input terminal of single-phase power supply	AC single-phase 220V power connection point
(+)、(-)	Negative and positive terminals of DC bus	Shared DC Bus input point
(+) and PB	Connecting terminal of brake resistor	Connect the brake resistor
U, V and W	Output terminal of inverter	Connect the three-phase motor
⏚	Earth terminal	Earth terminal

2) Description of main circuit terminals of three-phase inverter

Terminals	Name	Description
R, S and T	Input terminal of three-phase power supply	AC three-phase 380V power connection point
(+)、(-)	Negative and positive	Shared DC Bus input point

Terminals	Name	Description
	terminals of DC bus	
(+) and PB	Connecting terminal of brake resistor	
U, V and W	Output terminal of inverter	Connect the three-phase motor
⏚	Earth terminal	Earth terminal

3) Notes on Wiring:

A. Input power L1, L2 or R, S and T:

The cable connection at the input side of the inverter has no phase sequence requirement.

B. DC bus (+), (-) terminal:

Note that the (+) and (-) terminals of DC bus have residual voltage right after power-on. It needs to make sure that the voltage is less than 42V prior to wiring connection. Otherwise there may be danger of electric shock. Do not connect the brake resistor directly to the DC bus, or it may damage the inverter and even cause fire.

Connecting terminals (+) and PB of brake resistor:

The connecting terminals of the brake resistor are effective only for the inverter of less than 30kW with built-in brake unit.

The prototype of brake resistor can refer to the recommended value and the wiring length shall be less than 5 meters. Otherwise it may damage the inverter.

Terminals U, V, W at the output side of the inverter:

The inverter output side cannot connect to the capacitor or surge absorber. Otherwise, it may cause frequent inverter protection and even damage the inverter.

In case the motor cable is too long, it may generate electrical resonance easily due to the impact of distributed capacitance, thus damaging the motor insulation or generating higher leakage current to invoke over current protection of the inverter. If it is over 100m, AC output reactor is required.

E. Earthing terminal ⏚:

This terminal shall be earthed reliably, with resistance of earthing cable of less than 5Ω. Otherwise, it may cause fault or damage the inverter. Do not share the earth terminal and zero line of the power supply.

5. Control terminals and connection:

1) The control circuit terminals are arranged as follows:

+10V	AI1	AI2	GND	AO	DI1	DI2	DI3	DI4	COM	DO	-24V	T/A	T/B	T/C

Fig.3-8 Layout of Control Circuit Terminals

2. Description of Control Terminal Function:

Type	Terminal Symbol	Terminal name	Function description
Power supply	+10V-GND	External 10V power supply	Provide +10V power supply for external units, and the maximum output current is 10mA. It is generally used as the operating power of external potentiometer.
	+24V-COM	External 24V power supply	Provide +24V power supply for external units. It is generally used as the operating power supply for digital input/output terminal and the external sensor. The maximum output current is 200mA.
Analog input	AI1-GND	Analog input terminal 1	1 Input Voltage range: DC 0V to 10V 2. Input resistance: 100kΩ
	AI2-GND	Analog input terminal 2	1. Input range: DC 0V to 10V/4mA to 20mA, which is determined by j3 jumper on the control board. 2. Input impedance: It is 100kΩ at the time of voltage input and 500Ω at the time of current input.
Function Digital input terminal	DI1	Digital input 1	2. Input impedance: 3.3kΩ
	DI2	Digital input 2	
	DI3	Digital input 3	
	DI4	High-speed pulse input terminal	In addition to the characteristics of DI1 to DI3, DI4 can also be used as the high-speed pulse input channel. Maximum input frequency is 50kHz.
Analog output	AO-GND	Analog output	The voltage or current output is determined by the J4 jumper on the control board.
Digital output	DO-COM	Digital output 1	Output voltage range: 0V to 24V Output current range: 0mA to 50mA
Relay output	T/A-T/B	normally closed terminal	Contact driving capacity: AC250V，3A，COSφ=0.4 DC 30V，1A
	T/A-T/C	normally open terminal	

3) Wiring of control terminal:

A. Analog input terminal:

Generally, it is required to use shielding cable and the wiring distance shall be as shorter as possible (not longer than 20m), as the weak analog signal is especially prone to the external interference. As shown in the following figure:

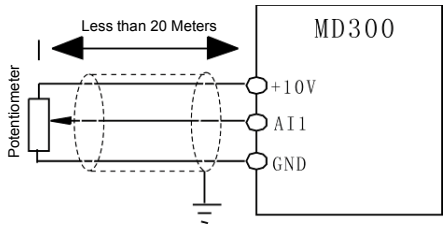


Fig.3-9 Schematic Diagram for Connection of Input Terminal of Analog SignalIf there is severe interference in the analog signal, filter capacitor or ferrite magnetic ring shall be added to the analog signal side. As shown in Fig.3-10 Wiring diagram for adding filter to analog input terminal

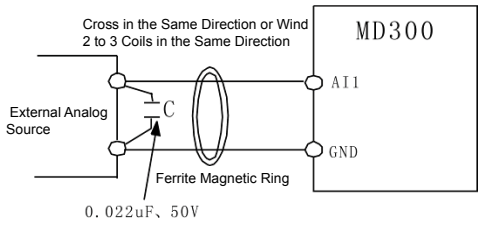


Fig.3-10 Wiring diagram for adding filter to analog input terminal

B. Digital input terminal:

The ON/OFF statuses of these terminals are judged by the received digital signal of inverter. Hence, the external contact shall be the connection point with high reliability for conducting weak signal.

If the ON/OFF signals to the digital input terminal of inverter are provided by open collector output, it is necessary to take the error acts caused by power interference into consideration. It is recommended to use the contact control mode.

C. Digital output terminal:

When the digital output terminal needs the drive relay, absorption diode shall be installed at the two sides of the relay coil. Otherwise it may damage DC 24 power supply easily.

Note: The absorption diode shall be installed with correct polarity, as shown in Fig.3-11. as shown the following figure. Otherwise, when there the digital output terminal has output, the DC 24V power supply and output circuit will be damaged immediately.

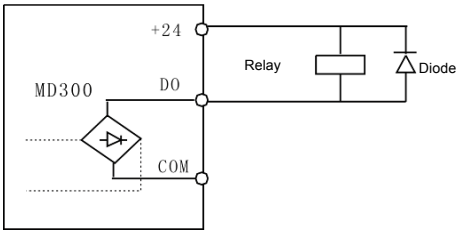


Fig.3-11 Schematic diagram for connection of digital output terminal

Chapter 4 Operation and Display

4.1 Introduction to Operation and Display Interface

Change to the functional parameters, operating status monitoring and running control (startup, stop) of the inverter can be realized on the operation panel. The outline and functional area are shown as Fig.4-1:

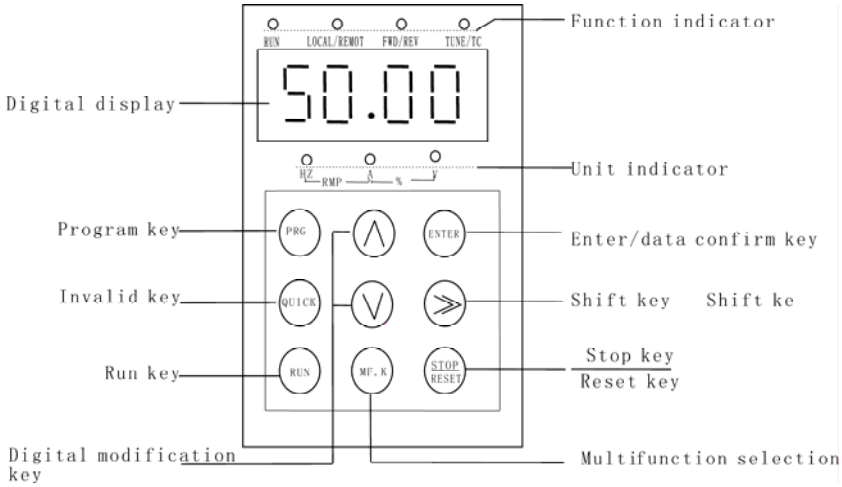


Fig.4-1 Operation Panel Diagram

1) Description of Function LED Indictor:

RUN: When it is OFF, it indicates the inverter is in stop status; when it is ON, it indicates the inverter is running.

LOCAL/REMOT: For keypad operation, terminal operation and remote operation (communication control) LEDs, if the LED is OFF, It shows the keypad operation control status; otherwise, it is under the terminal operation control status.

FWD/REV: It is the LED indictor for forward/reverse rotation. When it is OFF, it indicates the inverter is in forward rotation status; when it is ON, it indicates the inverter is in reverse rotation status.

TUNE/TC: It is the LED indictor for tuning. When it is ON it indicates the torque control status; when it is OFF, it indicates the speed control status.

2) Unit LED indictor description:

Hz refers to frequency unit.

A refers to current unit.

V refers to voltage unit.

RPM refers to rotation velocity unit.

% refers to percentage

3) Digital display zone:

Five-digit LED display, able to display setup frequency, output frequency, various monitoring data and alarm code.

4) Keyboard button description

Table 4-1 MD300 inverter keypad button description

Button	Name	Function
PRG	programming key	Enter into/ exit from level 1 menu
ENTER	confirmation key	enter the menu interfaces level by level, and confirm the set parameters.
∧	Increase key	increase of the data or function code
∨	decrease key	decrease of the data or function code
》	shift key	Select the displayed parameters in turn on the stop display interface and running display interface, and select the modification digit of parameters when modifying parameters.
RUN	Running key	It is used to start the inverter under keyboard control mode.
STOP/RESET	Stop/reset	Press this button to stop in the running status and reset the operation in the fault alarm status. This button characteristics are limited by the function code F7-02.
MF.K	Multi-function selection key	In case F6-11=0, it can not be used; In case F6-11=1, it serves as the key switching between local operation and remote operation. In case F6-11=2, it serves as forward/reverse rotation switching key; In case F6-11=3, it serves as forward rotation Jog key; Refer to F6-11 for the detailed operation.

4.2 Description of Function Code Viewing and Modification Methods

The operation panel of the MD300 inverter adopts three-level menu structure to carry out operations such as parameter setting.

The three-level menu includes function parameter set (level 1 menu)→Function code (level 2 menu)→Function code setup value (level 3 menu). Fig.4-2 Operation Procedure of Three-level Menu,Refer to Fig.4-2 for the operation procedure.

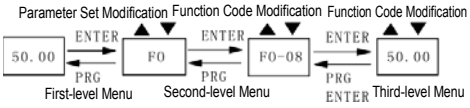


Fig.4-2 Operation Procedure of Three-level Menu

Note: When operating on level 3 menu, press PRG key or ENTER key to return to level 2 menu. The difference between PRG key and ENTER key is described as follows: Pressing ENTER KEY will save the setup parameter to control board and return to the level 2 menu and automatically shift to the next function code, while pressing PRG key will directly return to level 2 menu without saving the parameter, and it will return to the current function code.

Example: Modify the function code F2-05 from 10.00Hz to 15.00Hz. (Characters in bold shows the flashing)

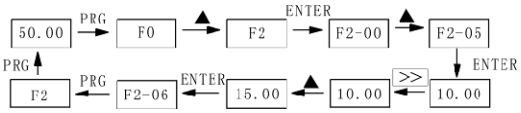


Fig.4-3 Example of parameter editing operation

In level 3 menu, if the parameter has no flashing bit, it indicates that the function code cannot be modified. The possible reasons include:

1) The function code is an unchangeable parameter, such as actual detection parameter, running record parameter, etc.

2) The function code cannot be modified in running status. It can be modified only after the unit is stopped.

4.3 Method of Viewing Status Parameter

For MD300 inverter, under the stop or operating status, the status parameters of the inverter can be displayed by LED digital tube. The status parameters under the stop/running statuses can be cyclically displayed through pressing shift key. Under the stop status, there are five status parameters of MD300 inverter can be displayed cyclically through shift key, they are as follows: setup frequency, bus voltage, DI input status, analog input AI1 voltage and analog input AI2 voltage.

Under the running status, there are seven status parameters of MD300 inverter can be displayed cyclically through shift key, they are as follows: setup frequency, bus voltage, output voltage, output current, DI input status, analog input AI1 voltage and analog input AI2 voltage.

Show the terminal status (displayed in decimal system) in accordance with bit, that is

BIT0 refers to 1, showing effective DI1 input

BIT1 refers to 1, showing effective DI2 input

BIT2 refers to 1, showing effective DI3 input

BIT3 refers to 1, showing effective DI4 input

BIT4 to BIT5: retained

BIT6 refers to 1, showing effective RELAY output

BIT7 refers to 1, showing effective DO output

When the inverter is restarted upon power shutdown, the displayed parameters are the parameters selected before the power shutdown.

4.4 Password Setting

The inverter provides user password protection function. When FP-00 is set to non-zero value, it indicates the user password, and the password protection turns valid after exiting from the function code editing status. When pressing PRG key again, "------"will be displayed, and common menu cannot be

entered until user password is entered correctly.

To cancel the password protection function, enter with password and set FP-00 to “0”.

4.5 Automatic Tuning of Motor Parameters

If selecting vector control operation, the nameplate parameter of motor must be correctly entered before the running of the inverter, and MD300 inverter will select the matched standard motor parameter according to nameplate parameter. The vector control mode is greatly depending on the motor parameter. To get good control performance, the parameters of the controlled motor must be acquired.

The procedures for the automatic tuning of motor parameters are described below:

Firstly, Set F0-01 to 0: Set the operation mode to keypad operation

Secondly, input the following parameters in accordance with the actual motor parameters:

F1-01: motor rated power

F1-02: motor rated voltage

F1-03: motor rated current

F1-04: motor rated power

F1-05: motor rated rotation speed

If the motor is completely disconnected from the load, select “2” (complete tuning) in F1-11, and press RUN key on the keyboard panel, then the inverter will automatically calculate the following parameters:

F1-06: stator resistance

F1-07: rotor resistance

F1-08: leakage inductive reactance

F1-09: mutual inductive reactance

F1-10: No-load excitation current

Finally, complete the automatic tuning of motor parameters.

If the motor cannot be completely disconnected with the load, select “1” for F1-11 (static tuning), and then press RUN key on the keyboard panel.

The inverter measures rotor resistance, rotor resistance and leakage inductive reactance in sequence but does not measure the mutual inductive reactance and no-load current of the motor, which can be calculated by the user based on the motor nameplate. The motor nameplate parameters used in the calculation include rated voltage U, rated current I, rated frequency f and power factor η:

The calculation methods of the no-load current and mutual inductive reactance of the motor are described below. “L_σ” refers to leakage inductive reactance of the motor.

No-load Current $I_o = I \cdot \sqrt{1-\eta^2}$

Mutual Inductance Calculation $L_m = \frac{U}{2\sqrt{3}\,\pi f \cdot I_o} - L_\sigma$

Where, Io refers to no-load current, Im refers to mutual inductance, while I_σ refers to leakage inductance.

Chapter 5 Function Parameter Table

If FP-00 is set to non-zero value, it means parameter protection password is set, and the parameter menu cannot be opened until correct password is entered. To cancel the password, it needs to set FP-00 to "0".

The symbols of the function code are described as follows:

"○": It indicates that the parameter setup value can be modified when the inverter is in stop status and running status.

"×": It indicates that the parameter setup value cannot be modified when the inverter is in the running status.

"*": it indicates the parameter is the actual tested value, which cannot be modified.

"—": It indicates this parameter is "Factory default parameter" and can be set only by the manufacturer.

Function Parameter Table

Code	Name	Setup range	Minimum unit	Factory default value	Cha-nge
Group F0 Basic Function Group					
F0-00	Control mode	0: None-speed sensor vector control (SVC) 1: Reserved 2: V/F control	1	0	×
F0-01	Command Source Selection	0: Operation panel running command channel (LED OFF) 1: terminal operation command channel (LED ON)	1	0	○
F0-02	Frequency source selection	0: Digital setup (without memory) 1: Digital setup (with memory) 2: Pulse setup (effective DI4 input) 3: AI1 4: AI2 5: MS speed	1	0	×

Code	Name	Setup range	Minimum unit	Factory default value	Cha-nge
F0-03	Auxiliary Frequency source Y selection	0: invalid 1: valid (auxiliary frequency source AI2, which can be 0, 1 and 2 only corresponding with F0-02)	1	0	×
F0-04	Digital preset frequency	0.00 to upper limit frequency (It is valid when the frequency source is digital set)	0.00 Hz	50.00Hz	○
F0-05	Acceleration time 1	0.0s～ 3000.0.0s	0.1	20.0s	○
F0-06	Deceleration time 1	0.0s ～ 3000.0.0s	0.1	20.0s	○
F0-07	V/F curve selection	0: Straight line V/F curve 1: Reserved 2: Square V/F curve	1	0	×
F0-08	V/F control torque boost	0.0: (automatic) 0.0%～30.0%	0.1%	0.0%	○
F0-09	DI1 terminal function selection	0: No function 1: Forward rotation (FWD) 2: Reverse rotation (REV) 3: three-line control 4: Forward rotation Jog (FJOG) 5: Reverse rotation Jog (RJOG)	1	1	×
F0-10	DI2 terminal function selection		1	4	×
F0-11	D13 terminal function selection		1	12	×

Code	Name	Setup range	Minimum unit	Factory default value	Cha-nge
F0-12	DI4 terminal function selection	6: Terminal UP 7: Terminal DOWN 8: coast to stop 9: Fault reset (RESET) 10: Reserved External fault normally open input 12: MS speed terminal 1 13: MS speed terminal 2 14: External fault normally closed input 15: Reserved 16: AI1 and AI2 reference switch 17-18: Reserved 19: UP and DOWN setup clear (terminal and keyboard) 20: Running command switching terminal 21: Reserved （If the input selects PULSE, all DI4 functions are disabled, and the input can only corresponds to PULSE.）	1	13	×
F0-13	DO output selection	0: no output 1: Inverter is running 2: Fault output 3: Frequency arrival	1	1	○

Code	Name	Setup range	Minimum unit	Factory default value	Cha-nge
F0-14	AO output selection	0: Running frequency 1: Setup frequency 2: Output current 3: PULSE input (corresponding setup) 4: AI1 (corresponding setup) 5: AI2 (corresponding setup)	1	0	○
F0-15	Start mode	0: Direct start 1: Rotation speed tracking restart	1	0	×
F0-16	Stop mode	0: Deceleration to stop 1: Coast to stop	1	0	○
Group F1 Motor Parameters					
F1-00	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor Permanent magnetic synchronous motor (reserved)	1	0	×
F1-01	Rated power	0.1kW～ 1000.0kW	0.1	model dependent	×
F1-02	Rated voltage	0V～440V	1	380V	×
F1-03	Rated current	0.00A～655.35A	0.01	model dependent	×
F1-04	Rated frequency	0.00Hz～ maximum frequency	1	50.00Hz	×
F1-05	Rated Rotation speed	0rpm～ 30,000rpm	1	1460rpm	×
F1-06	Stator resistance	0.001Ω～65.535Ω	0.001Ω	model dependent	○
F1-07	Rotor resistance	0.001Ω～65.535Ω	0.001Ω	model dependent	○
F1-08	Leakage inductive reactance	0.01mH～655.35mH	0.01 mH	model dependent	○

Code	Name	Setup range	Minimum unit	Factory default value	Cha-nge
F1-09	Mutual inductive reactance	0.01mH～655.35mH	0.1 mH	model dependent	○
F1-10	No-load current	0.0A～650.00A	0.01A	model dependent	○
F1-11	Tuning selection	0: no operation 1: static tuning 2. Complete tuning	1	0	×
Group F2 Vector and VF Control Parameters					
F2-00	Vector control speed loop proportion gain 1	1～100	1	30	○
F2-01	Vector control speed loop integration time 1	0.01s～ 10.00s	0.01s	0.50s	○
F2-02	Vector control PI parameter switch frequency 1	0.00 ～ F2-05	0.01Hz	5.00Hz	○
F2-03	Vector control speed loop proportion gain 2	1～100	1	25	○
F2-04	Vector control speed loop integration time 2	0.01s～ 10.00s	0.01s	1.00	○
F2-05	Vector control PI parameter switch frequency 2	F2-02～50.00Hz	0.01Hz	10.00Hz	○
F2-06	Vector control slip compensation factor	50%～200%	1%	100%	○
F2-07	Vector control speed loop filter time / VF control AVR selection	0.000s ～ 0.100s	0.001s	0.002s	○

Code	Name	Setup range	Minimum unit	Factory default value	Cha-nge
F2-08	Vector control torque upper limit	5.0%～200.0%	0.1%	150.0%	○
F2-09	V/F control slip compensation factor	0.0%～200.0%	0.1%	0.0%	○
F2-10	V/F control vibration suppression gain	0～100	1	0	○
Group F3 Terminal Input and Output					
F3-00	Terminal control mode (FWD/REV)	Two-line mode 1 Three-line mode 2	1	0	×
F3-01	Terminal UP/DOWN Velocity	0.01Hz/s～100.00Hz/s	0.01Hz/s	1.00Hz/s	○
F3-02	AI minimum input	0.00V to 10.00V	0.01V	0.00V	×
F3-03	AI minimum input corresponding setup	-100.0%～100.0%	0.1%	0.0%	×
F3-04	AI middle 1 input	0.00V ～ 10.00V	0.01V	5.00V	×
F3-05	AI middle 1 input corresponding	-100.0%～100.0%	0.1%	50.0%	×
F3-06	AI middle 2 input	0.00V～10.00V	0.01V	8.00V	×
F3-07	AI middle 2 input corresponding	-100.0%～100.0%	0.1%	80.0%	×
F3-08	AI maximum input	0.00V～10.00V	0.01V	10.00V	×
F3-09	AI maximum input corresponding setup	-100.0%～100.0%	0.1%	100.0%	×

Code	Name	Setup range	Minimum unit	Factory default value	Cha-nge
F3-10	PULSE (pulse) input maximum frequency	0.00kHz～50.00kHz	0.01Hz	50.00kHz	○
F3-11	input filter time	0.01s～ 10.00s	0.01s	0.01s	○
F3-12	AO zero offset coefficient	-100.0%～100.0%	0.1%	0.1%	○
F3-13	AO gain	-10.00～10.00	0.01	1.00	○
Group F4 Startup/stop Control Parameters					
F4-00	DC brake beginning frequency at stop	0.00Hz～50.00Hz	0.01Hz	0.00Hz	○
F4-01	DC brake waiting time at stop	0.0s～ 36.0.0s	0.1s	0.0s	○
F4-02	DC brake current at stop	0%～100%	1%	0%	○
F4-03	DC brake time at stop	0.0s ～ 36.0.0s	0.1s	0.0s	○
F4-04	Brake use ratio	0%～100%	1%	100%	○
Group F5 Protection Function					
F5-00	Motor overload protection selection	0: Disabled 1: Enabled	1	1	○
F5-01	Motor overload protection coefficient	0.50～10.00	0.01	1.00	○
F5-02	Stall gain over voltage	0(no stall over voltage) ～ 100	1	0	○
F5-03	Stall point over voltage	120%～150%	1%	130%	○

Code	Name	Setup range	Minimum unit	Factory default value	Cha-nge
F5-04	Stall gain over current	0(no stall over voltage) ～ 100	1	20	○
F5-05	Stall point over current	100%～200%	1%	150%	○
F5-06	Fault auto reset times	0～3	1	0	○
F5-07	Fault auto reset interval J	0.1s to 100.0s	0.1s	1.0s	○
F5-08	Input phase loss protection selection	0: Disabled 1: Enabled	1	1	○
F5-09	Inverter load lost protection selection	0: Disabled 1: Enabled	1	1	×

Code	Name	Setup range	Minimum unit	Factory default value	Cha-nge
F5-10	Fault record type	0: No fault 1: Inverter unit protection (ERR01) 2: Acceleration over current (ERR02) 3: Deceleration over current (ERR03) 4: Constant speed over current (ERR04) 5: Acceleration over voltage(ERR05) 6: Deceleration over voltage(ERR06) 7: Constant speed over voltage(ERR07) 8: Control power supply fault(ERR08) 9: Under voltage failure (ERR09) 10: Inverter overload (ERR10) 11: Motor overload (ERR11) 12: Input phase loss (ERR12) 13: Output phase loss (ERR13) 14: Heatsink over heat(ERR14) 15：External fault(ERR15) 16: Reserved 17: Reserved 18: Current detection fault(ERR18) 19: Motor tuning fault (ERR19) 20: Reserved 21：EEPROM（ERR21） 22: Inverter hardware fault(ERR22) 23: Motor to earth short circuit fault(ERR23) 24: Reserved	-	0	*

Code	Name	Setup range	Minimum unit	Factory default value	Cha-nge
F5-11	Frequency upon fault	-	0.01Hz	0.00Hz	*
F5-12	Current upon fault	-	0.01A	0.00A	*
F5-13	Bus voltage upon fault	-	0.1V	0.0V	*
Group F6 Auxiliary Function					
F6-00	maximum output frequency	50.00Hz～300.00Hz	0.01Hz	50.00Hz	×
F6-01	Frequency upper limit	Frequency lower limit – maximum output frequency	0.01Hz	50.00Hz	○
F6-02	Frequency lower limit	0.00 - Frequency upper limit	0.01Hz	0.00Hz	○
F6-03	Carrier frequency	0.5kHz～ 16.0kHz	0.1kHz	Model dependent	○
F6-04	Jog frequency	0.00Hz～50.00Hz	0.01Hz	2.00Hz	○
F6-05	Jog acceleration time	0.0s ～3000.0.0s	0.1	20.0s	○
F6-06	Jog deceleration time	0.0s～3000.0.0s	0.1	20.0s	○
F6-07	Reverse control	0: Reverse rotation enabled 1: Reverse rotation disabled	1	0	○
F6-08	Forward/reverse rotation dead-zone time	0.0s～ 3000.0s	0.1s	0.0s	○
F6-09	Start protection function	0: Protection 1: No Protection	1	0	○
F6-10	Frequency arrival detection width	0.0% ～ 100.0% (maximum output frequency)	0.1%	0.0%	○

Code	Name	Setup range	Minimum unit	Factory default value	Cha-nge
F6-11	MF.K Key function selection	0: No function 1: Switching between local operation and remote operation 2: Switching between forward rotation and reverse rotation 3: jog	1	0	×
F6-12	STOP/RESET key function	The RESET function for all statuses is available 0: STOP key disabled in the terminal control mode 1: STOP key enabled in the terminal control mode	1	0	○
F6-13	Earth short circuit protection detection upon power-on	0: Disabled 1: Enabled	1	1	×
F6-14	MS speed 0	Negative maximum output frequency to maximum output frequency	0.1Hz	0.0Hz	○
F6-15	MS speed 1	Negative maximum output frequency to maximum output frequency	0.1Hz	5.0Hz	○
F6-16	MS speed 2	Negative maximum output frequency to maximum output frequency	0.1Hz	10.0Hz	○
F6-17	MS speed 3	Negative maximum output frequency to maximum output frequency	0.1Hz	15.0Hz	○
F6-18	heatsink temperature	0℃～150℃	1℃		*
F6-19	Software version No	00.00～99.99	0.01	Version No. of current software	*

Code	Name	Setup range	Minimum unit	Factory default value	Cha-nge
Group FF Factory Parameters					
FF-00	Manufacturer password	0～65535	1	-	○
FP User password and parameter initialization					
FP-00	user password	0～65535	1	0	○
FP-01	Parameter initialization	0: no operation 1: Restore factory default setup value 2: Clear the fault record	1	0	×

Chapter 6 Parameter Description

Group F0 Basic parameters

F0-00	**Control mode**		Factory default value	0
	Setup range	0	Non-speed sensor vector control	
		1	Reserved	
		2	V/F control	

0: None-speed sensor vector control (SVC) refers to open-loop vector.

It is applicable to the general high-performance control applications where one inverter can only drive one motor. The examples include machine tool, centrifugal machine, wire drawing machine and injection molding machine.

V/F control

It is applicable to the site with low requirement for control precision, such as fan, pump load. It can be used in the applications where one inverter drives multiple motors.

Prompt: Motor parameter identification must be conducted when selecting the vector control mode. Refer to 4.5 for details.

F0-01	**Command Source Selection**		Factory default value	0
	Setup range	0	Operation panel command channel (LED OFF)	
		1	Terminal command channel (LED ON)	

Select the channel for inverter control command.

The inverter control command includes start, stop, forward rotation, reverse rotation and Jog.

0: Keypad control ("LOCAL/REMOT" LED OFF)

Perform running command control with keys on the keypad panel, such as RUN, STOP/RES keys. If set multi-functional key MF.K to FWD/REV switching function (set F6-11 to 2), the running direction can be changed by pressing the key.

1: Terminal control ("LOCAL/REMOT" LED ON)

Perform running command control by the multifunctional input terminals such as FWD, REV, JOGF, JOGR, etc.

F0-02	**Main frequency source X selection**		Factory default value	0
	Setup range	0	Digital setup UP and DOWN (without memory)	
		1	Digital setup UP and DOWN (with memory)	
		2	2: Pulse setup (effective DI4 input)	
		3	AI1	
		4	AI2	
		5	MS speed	

Select the input channel for main reference

frequency of the inverter. There are six types of main reference frequency channels:

0: Digital setup (without memory)

The initial value is the value of F0-04 “Digital Setup Preset Frequency”.

It can change the setup frequency value of the inverter through the keys “▲” and “▼” of the keyboard (or UP and DOWN of multifunctional input terminals).

“Without memory” means that the setup frequency value is recovered to the value of F0-04 “Digital Setup Preset Frequency” in case of inverter power failure.

1: Digital setup (with memory)

The initial value is the value of F0-04 “Digital Setup Preset Frequency”.

It can change the setup frequency value of the inverter through the keys “▲” and “▼” of the keyboard (or UP and DOWN of multifunctional input terminals).

“With memory” means that the setup frequency upon restart of inverter due to power failure remains the same.

2: Pulse reference (DI4)

The frequency reference is given by the terminal pulse.

Pulse reference signal specification: pulse voltage range of 9V to 30V and pulse frequency range of 0 kHz to 50 kHz.

Note: Pulse reference can only be input from the multifunctional input terminal DI4.

3: AI1 4: AI2

It means that the frequency is determined by the analog input terminal. MD300 series inverter standard unit provides two analog input terminals, where AI1 is 0V-10V voltage input, but AI2 can be 0V-10V voltage input or 0-20mA current input depending on J3 jump on the control board.

5: MS speed

Select MS speed running mode. It is necessary to set the parameters of DI input terminal and “F6-14 to F6-17”to confirm the corresponding relationship of reference signal and reference frequency.

F0-03	**Auxiliary Frequency source selection**		Factory default value	0
	Setup range	0	Disabled	
		1	Enabled, auxiliary frequency source AI2, it is enabled only when set F0-02 to 0, 1 and 2.	

Auxiliary frequency source AI2 only has one channel AI2. It is enabled only when set F0-02 to 0, 1 and 2.

F0-04	**Digital preset frequency**	Factory default value	0
	Setup range	0.00 to upper limit frequency (It is valid when the frequency source is digital set)	

When the main frequency source is selected as “Digital setup”, this function code is the initial value of frequency digital setup of the inverter.

F0-05	**Acceleration time**	Factory default value	20.0
F0-06	**Deceleration time**	Factory default value	20.0
	Setup range	0.0～3000.0s	

Acceleration time refers to the time “t1” required for the inverter to accelerate from 0Hz to the maximum output frequency （F6-00）.

Deceleration time refers to the time “t2” required for the inverter to decelerate from the maximum output frequency （F6-00）to 0Hz, as shown the following figure.

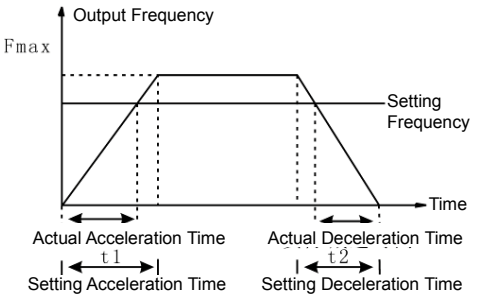


Fig.6-1 Schematic diagram for acceleration/deceleration time

Due attention shall be paid to the difference between the actual acceleration/deceleration time and the setup acceleration/deceleration time.

F0-07	**V/F curve setup**		Factory default value: 0
	Setup range	0	Straight line V/F curve
		1	Reserved
		2	Square V/F curve

The fan and pump loads may select square V/F control.

0: Straight V/F curve. It is suitable for common constant torque load.

2: Square V/F curve. It is suitable for the centrifugal loads such as fan and pump.

F0-08	**V/F control torque boost**	Factory default value	0.0%
	Setup range	0.0：(automatic) 0.1%～30%	

To compensate the low frequency torque characteristics of V/F control, it can boost the output voltage of the inverter at the time of low frequency.

If the torque boost is set to be too large, the motor may be over heat, and the inverter may be over current. In general, the torque boost shall not exceed 8%.

Adjusting this parameter effectively can avoid over current upon startup. For the relatively large loads, it is recommended to increase this parameter. For the small loads, this parameter value may be reduced.

When the torque boost is set to 0, the inverter will adopt auto torque boost.

F0-09	**DI1 terminal function selection**	Factory default value	1 (Forward rotation)
F0-10	**DI2 terminal function selection**	Factory default value	4 (Forward rotation Jog)
F0-11	**DI3 terminal function selection**	Factory default value	12 (MS speed 1)
F0-12	**DI4 terminal function selection**	Factory default value	13 (MS speed 2)

This parameter is used to set the functions of the multifunctional digital input terminals. If the input selects PULSE, all DI4 functions are disabled, and the input can only corresponds to PULSE.

Set up value	Function	Description
0	No function	Even when there is signal input, the inverter still has no action. The no operation function can be set on the unused terminals so as to prevent error action.
1	Forward rotation (FWD)	Control the forward rotation and reverse rotation of the inverter via the external terminals.
2	Reverse rotation (REV)	
3	Three-line mode running control	This terminal is used to confirm that the inverter running mode is three-line control mode For detailed description, please refer to F3-00 three-line control mode function code.
4	Forward rotation Jog (FJOG)	FJOG refers to Jog forward rotation, while RJOG refers to Jog reverse rotation. For details regarding frequency and Jog acceleration/deceleration time during the Jog running, refer to F6-04, F6-05 and F6-06 function codes.
5	Reverse rotation Jog (RJOG)	
6	Terminal UP	When the frequency is given by the external terminals, it is used as gain and decrement commands of frequency modification. When the frequency source is set to digital setup, it can be used to adjust the setup frequency.
7	Terminal DOWN	
8	Coast to stop	The inverter locks the output, and the motor stop process is beyond

Set up value	Function	Description
		the inverter control. It is the general method adopted when there is huge load and no requirement for the stop time. This mode is the same as the meaning of coast to stop as described in F6.10.
9	Fault reset (RESET)	External fault reset function. It is the same as the function of RESET key on the keyboard. Using this function can realize long-distance fault reset.
11	External fault normally open input	After the external fault signal is sent to the inverter, the inverter reports fault and stops.
12	MS terminal 1	It can realize 16S speed through the combination of digital status of these two terminals. Refer attached table 1 for the MS speed function description.
13	MS terminal 2	
14	External fault normally closed input	After the external fault signal is sent to the inverter, the inverter reports fault and stops.
16	Reference switch between AI1 and AI2	It is enabled only when F0-02 frequency source selects AI1 or AI2.
19	UP and DOWN setup clear (terminal and keyboard)	When the frequency reference is digital frequency reference, this terminal can be used to clear the frequency value modified by UP/DOWN and thus restore the reference frequency to the setup value of F0.04.
20	Running command switching terminal	When the command source (F0-01) is set to 1, it performs switching between terminal control and keyboard control via this terminal.

K_2	K_1	Frequency Setup	Corresponding Parameter
OFF	OFF	MS speed 0	MS speed 0
OFF	ON	MS speed 1	MS speed 1
ON	OFF	MS speed 2	MS speed 2
ON	ON	MS speed 3	MS speed 3

F0-13	DO output selection (collector open output terminal)	Factory default value	1: Inverter is running
	Setup range	0～3	

Set up value	Function	Description
0	no output	The output terminals does not have any function.
1	Inverter is running	It indicates the inverter is running, and there is output frequency, and ON signal will output at this time.
2	Fault output	When the inverter is faulty, it outputs ON signal.
3	Frequency arrival	Please refer to F6-10 for details.

F0-14	output selection (Analog output terminal	Factory default value	0
	Setup range	0～5	

The standard for analog output is from 0mA to 20mA (or from 0V to 10V).

The corresponding value range that it indicates is shown in the table below:

Set up value	Function	Description
0	running frequency	0～ to maximum output frequency
1	Setup frequency	0～ to maximum output frequency
2	Output current	0-2 times of inverter rated current
3	PULSE input	0.1kHz～50.0kHz
4	AI1	0V～10V
5	AI2	0V ～ 10V/0mA ～ 20mA

F0-15	Start mode		Factory default value	0
	Setup range	0	Direct startup	
		1	Rotation speed tracking restart	

0: Direct start

Start up with the start frequency.

1: Rotation speed tracking restart

The inverter judges the rotation speed and direction of the motor firstly and then starts at the frequency of the tracked rotation speed of the motor. The rotating motor will be started smoothly without surge (The trace frequency is taken as frequency before stopping by default).

It is applicable to the restart upon transient power failure of large loads.

To ensure the performance of Rotation speed tracking restart, it needs to set the motor parameters accurately. (Group F1)

F0-16	**Stop mode**		Factory default value	0
	Setup range	0	Deceleration to stop	
		1	Coast to stop	

0: Deceleration to stop

After the stop command is enabled, the inverter reduces the output frequency in accordance with the deceleration mode and the defined acceleration/deceleration time, and will stop after the frequency reduces to zero.

1: Coast to stop

After the stop command is enabled, the inverter will terminate the output immediately. The load will coast to stop according to the mechanical inertia.

Group F1 Motor Parameters

F1-00	**Motor type selection**		Factory default value	0
	Setup range	0	common asynchronous motor	
		1	Variable frequency asynchronous motor	
		2	permenant magnetic synchronous motor	

F1-01	**Rated power**	Factory default value	model dependent
	Setup range :0.4kW～ 1000.0kW		
F1-02	**Rated voltage**	Factory default value	380V
	Setup range :0V～440V		
F1-03	**Rated current**	Factory default value	model dependent
	Setup range :0.00A～655.35A		
F1-04	**Rated frequency**	Factory default value	50.00Hz
	Setup range :0.00 to maximum output frequency		
F1-05	**Rated Rotation speed**	Factory default value	1460rpm
	Setup range :0rpm to 30,000rpm		

Note
1. Please set the parameters according to the nameplate parameters of the motor. Accurate motor parameters shall be provided to ensure good vector control performance. Accurate parameter identification relies on correct setting of motor rated parameter. To ensure the control performance, please configure the motor in accordance with approved inverter standard motor. If the motor frequency is greatly different from that of the approved standard motor, it will obviously reduce the control performance of the inverter.

F1-06	**Stator resistance**	Factory default value	model depend-ent
	Setup range: 0.001Ω～65.535Ω		
F1-07	**Rotor resistance**	Factory default value	model depend-ent
	Setup range :0.001Ω～65.535Ω		
F1-08	**Leakage inductive reactance**	Factory default value	model depend-ent
	Setup range :0.01mH～655.35mH		
F1-09	**Mutual inductive reactance**	Factory default value	model depend-ent
	Setup range :0.1mH～6553.5mH		
F1-10	**No-load current**	Factory default value	model depend-ent
	Setup range :0.01mm～650.00A		

When the automatic tuning of the motor is normally completed, the setup values of F1-06 to F1-10 will be automatically updated.

Each time when the rated power of the motor F1-01 is changed, the inverter will automatically recover the parameter values of "F1-06 to F1-10" to the default standard motor parameters. (Four-pole Y series asynchronous motor)

If it is impossible to tune the motor on the site, the user can manually input the parameters by referring to the known parameters of the motors of the same type.

F1-11	**Tuning selection**		Factory default value	0
	Setup range	0	No operation	
		1	Static tuning	
		2	Complete tuning	

Prompt: Correct motor ratings (F1-01 to F1-05) must be set before tuning.

0: No operation, i.e. tuning is disabled.

1. Static tuning. It is applicable to the applications where rotary tuning cannot be conducted because it is not easy to disconnect the motor from the load.

Action description: Set the function code to 1 and press RUN key for confirmation, and then the inverter will conduct static tuning.

2. Complete tuning

To ensure the dynamic control performance of the inverter, please select rotary tuning. During the rotary tuning, the motor must be disconnected with the loads (i.e. no-load).

Upon selection of rotary tuning, the inverter will conduct static tuning at first. Upon completion of static tuning, the motor will accelerate to 80% of the rated motor frequency in accordance with the setup

acceleration time of F0-05 and maintain for certain period of time. Then the motor will decelerate to zero speed in accordance with the setup acceleration time of F0-06, and by this time the rotary tuning is completed.

Action description: Set the function code to 2 and press RUN key for confirmation, and then the inverter will conduct rotary tuning.

Tuning operation description:

When F1-11 is set to 1 or 2, press ENTER key and “TUNE” will be displayed and flashes. Press RUN key to conduct parameter tuning, and at this time the displayed “TUNE” stops flashing, “TUNE/TC” LED flash. After the tuning is completed, the display will return to the stop status interface. When “TUNE” flashes, press PRG to exit from tuning status. The tuning process can be stopped by pressing the STOP key. When the tuning is completed, the value of F1-11 will automatically restore to 0.

Group F2 Vector and VF Control Parameters

Function codes from F2-00 to F2-08 are only enabled to the vector control, that is, it is valid when F0 – 00 = 0.

Function codes from F2-09 to F2-10 are only enabled to the V/F control, that is, it is valid when F0 – 00 = 2.

F2-00	**Vector control speed loop proportion gain 1**	Factory default value	30
	Setup range	0～100	
F2-01	**Vector control speed loop integration time 1**	Factory default value	0.50s
	Setup range	0.01 s～10.00 s	
F2-02	**Vector control switch frequency 1**	Factory default value	5.00 Hz
	Setup range	0.00～ F2-05	
F2-03	**Vector control speed loop proportion gain 2**	Factory default value	25
	Setup range	0～100	
F2-04	**Vector control speed loop integration time 2**	Factory default value	1.00s
	Setup range	0.01s～ 10.00s	
F2-05	**Vector control switch frequency 2**	Factory default value	10.00 Hz
	Setup range	F2-02～ maximum output frequency	

F2-00 and F2-01 are PI adjustment parameters when the running frequency is lower than switching frequency 1 (F2-02).

F2-03 and F2-04 are PI adjustment parameters when the running frequency is higher than switching frequency 2 (F2-05).

PI adjustment parameter between the switching frequency 1 and switching

frequency 2 is linear switching between two groups of PI parameters.

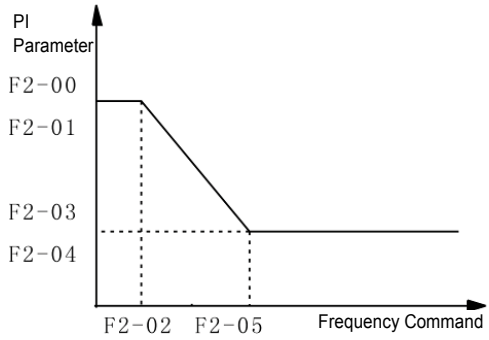


Fig.6-2 Schematic diagram of PI parameter

The speed dynamic response characteristics of the vector control can be adjusted by setting the proportional coefficient and integration time of the speed regulator. Increasing the proportional gain or reducing the integration time can accelerate the dynamic response of the speed loop. However, if the proportional gain is too large or the integration time is too short, it will cause the oscillation of the system.

Recommended adjustment method:

If the factory default parameters cannot meet the requirements, the relevant parameter values can be subject to fine tuning.

Increase the proportional gain while ensuring no oscillation to the system, and then reduce the integration time to ensure that the system has quick response characteristics and small overshoot.

Note: Improper PI parameter setting may cause too large speed overshoot. Voltage fault may occur when the overshoot drops.

F2-06	**Vector control slip compensation factor**	Factory default value	100%
	Setup range	50%～200%	

The parameter is used to adjust steady speed precision when loading to the motor: When the motor is heavy loaded, the speed is lower, the parameter shall be increased, otherwise, decrease the parameter.

F2-07	**Vector control speed loop filter time / V/F control AVR selection**	Factory default value	0.002 s
	Setup range :0.000s ～ 0.100s		

In the vector control mode, the output of speed loop regulator is torque current command. This parameter is used to filter the torque command. This parameter needs no adjustment generally and this filter time can be increased in case of huge speed fluctuation. In case of oscillation of motor, this parameter shall be reduced properly.

Under VF control, the parameter is the AVR selection function code of VF.

0.000: Under VF control, AVR is always disabled.

0.001: Under VF control, AVR is always disabled.

0.002: Under VF control, AVR is disabled on at the time of deceleration.

If the value of the function code is over 0.002, handle it as 0.002.

In the V/F control mode, when it needs fast stop and there is no brake resistor, selecting

"Disabled only at the time of deceleration" can greatly reduce the possibility of over voltage fault alarm. When there is brake resistor or it has not need for fast deceleration, select AVR "Always Enabled".

F2-08	**Vector control torque upper limit**	Factory default value	150.0%
	Setup range	5.0%～200.0%	
F2-08	**Vector control torque upper limit**	Factory default value	150.0%
	Setup range	5.0%～200.0%	

Set rated output torque of 100% matched motor of inverter is enabled for V/F control.

F2-09	**V/F control slip compensation factor**	Factory default value	150.0%
	Setup range	0.0%～200.0%	

Setting this parameter can compensate the slip in the V/F control mode due to load and reduce the change of rotation speed of the motor following the load change. In general, 100% corresponds to the rated slip of the motor with rated load. Slip coefficient adjustment can refer to the following principles: When the load is rated load and the slip compensation coefficient is set to 100%, the rotation speed of the motor in the inverter is close to the reference speed.

F2-10	**V/F control oscillation suppression gain**	Factory default value	0
	Setup range	0～100	

Select "0" for this gain when the motor has no oscillation. Only when the motor has obvious oscillation and cannot run normally can this gain be properly increased. The bigger the gain is, the better oscillation suppression result will be. The method of selecting this gain is to select the smallest one on the premise that there is effective oscillation suppression measure, so as to ease the negative effect on the VF operation.

Group F3 Terminal input/output

F3-00	**Terminal command mode**		Factory default value	0
	Setup range	0	Two-line type	
		1	Three-line type	

This parameter defines two different modes of controlling the operation of the inverter via the external terminals.

0: Two-line operation mode: The forward/reverse rotation of the motor is decided by the commands of FWD and REV terminals.

K_1	K_2	Running Command
0	0	Stop
1	0	Forward Rotation
0	1	Reverse Rotation
1	1	Stop

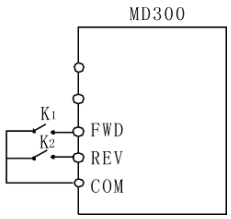


Fig.6-3 Three-line Running Mode

2: Three-line running mode : In this mode, DIn is enabled terminal, and the direction is controlled by FWD and REV respectively. However, the pulse is enabled through disconnecting the signal of DIn terminal when the inverter stops.

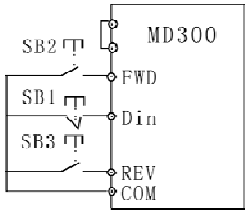


Fig.6-4 Three-line Running Mode

Where,

SB1: Stop button SB2: FWD button SB3: REV button

Din is the multifunctional input terminal of DI1 to DI4. In this case, the function of the corresponding terminal shall be defined as “three-line running control”.

Prompt: For two-line operation mode, when FWD/REV terminals are enabled and the inverter stops due to the command from other sources, the inverter will not operates after the canceling of the stop command even though the control terminals FWD/REV are still enabled. Retrigger FWD/REV will make the inverter run. Such as the valid STOP key in the operation command channel (See F6-12). However, if the inverter stops when fault alarm occurs, the running of the inverter is controlled by function code F6-09.

F3-01	**Terminal UP/DOWN Speed**	Factory default value	1.00 Hz/s
	Setup range	0.01Hz/s～100.00Hz/s	

Terminals UP/DOWN is used to adjust the change rate when setting the frequency.

F3-02	**AI minimum input**	Factory default value	0.00V
	Setup range	0.00～10.00V	
F3-03	**AI minimum input corresponding setup**	Factory default value	0.0%
	Setup range	-100.0%～100.0%	
F3-04	**AI middle 1 input**	Factory default value	5.00V
	Setup range	0.00V～10.00V	
F3-05	**AI middle 1 input corresponding setup**	Factory default value	50.0%
	Setup range	-100.0%～100.0%	
F3-06	**AI middle 2 input**	Factory default value	8.00V
	Setup range	0.00V～10.00V	
F3-07	**AI middle 2 input corresponding setup**	Factory default value	80.0%
	Setup range	-100.0%～100.0%	
F3-08	**AI maximum input**	Factory default value	10.00 V
	Setup range	0.00V～10.00V	

F3-09	**AI maximum input corresponding setup**	Factory default value	100.0%
	Setup range	-100.0%～100.0%	

The above function codes define the relationship between the analog input voltage and analog input setup value. When the analog input voltage exceeds the setup maximum input or minimum input range, the excess part will be calculated as maximum input or minimum input.

When the analog input is current input, 1mA current equals to 0.5V voltage.

In difference applications, 100% of analog input corresponds to different nominal values. Refer to all the application parts for details.

Several setting examples are shown in the following figures:

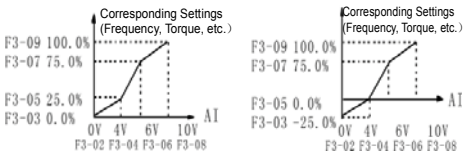


Fig.6-5 Corresponding Relationship between Analog Reference and Setting Value

AI1 and AI2 have the same corresponding relationship.

MD300 inverter standard unit provides two analog input ports.

F3-10	**PULSE (pulse) input maximum frequency**	Factory default value	50.00kHz
	Setup range	0.00kHz～50.00kHz	

F3-11	**input filter time**	Factory default value	0.01s
	Setup range	0.01s to 10.00s	

This group of function code defines the corresponding relationship when the pulse is used as frequency setup mode.

The pulse frequency input can only be input via DI4 channel.

F3-12	**AOzero offset coefficient**	Factory default value	0.00%
	Setup range	-100.0%～100.0%	
F3-13	**AO gain**	Factory default value	1.00
	Setup range	-10.00～10.00	

If “b” represents zero offset, k represents gain, Y represents actual output, and X represents standard output, the actual output is: Y=kX＋b;

AO zero offset coefficients 100% corresponds to 10V（20mA）.

Standard output refers to 0 to maximum analog output corresponding to the output of 0 to10V（20mA）.

It is generally used to correct the zero drift of the analog output and the output amplitude deviation. It can also be defined as any necessary output curve.

For example, If the analog output is the running frequency, it is expected to output 8V（16mA）when the frequency is 0, and output 3V（6mA）at the maximum frequency, the gain shall be set to “- 0.50”, and the zero offset shall be set to “80%”.

Group F4 Start/Stop Control Parameters

F4-00	**DC brake beginning frequency at stop**	Factory default value	0.00 Hz
	Setup range	0.00Hz～ maximum frequency	
F4-01	**DC brake waiting time at stop**	Factory default value	0.0s
	Setup range	0.0s～ 36.0s	
F4-02	**DC brake current at stop**	Factory default value	0%
	Setup range	0.00V～10.00V	
F4-03	**DC brake time at stop**	Factory default value	0.0s
	Setup range	0.0s～ 36.0s	

DC brake beginning frequency at stop: During the acceleration to stop, when it reaches this frequency, the DC brake process at stop begins.

Brake waiting time at stop: Prior to the beginning of DC brake at stop, the inverter stops output and starts DC brake upon this delay. It is used to prevent the over current fault caused by DC brake beginning when the velocity is relatively high.

DC brake current at stop: It refers to the added DC brake quantity. The higher this value is, the better the DC brake effect is.

DC brake time at stop: It refers to the added time of the DC brake quantity. When this value is zero, it indicates there is no DC brake process, and the inverter will stop according to the setup decoration to stop process.

F4-04	**Brake use ratio**	Factory default value	%
	Setup range	0%～100%	

It is enabled for the inverter with built-in brake unit. It can be used to adjust the brake effect of the bake unit.

Group F5 Fault and Protection

F5-00	**Motor overload protection selection**	Factory default value	1
	Setup range ： 0: Disabled 1: Enabled	0: The inverter has no overload protection for the motor, and thermal relay is installed before the motor. 1: The inverter has overload protection function for the motor. Refer to F5-01 for the protection value.	

F5-01	**Motor overload protection coefficient**	Factory default value	1.00
	Setup range： 0.20～10.00	The motor overload protection is inverter time-lag curve; (220%) × (F5-01) × (rated motor current): one minute; (150%) ×(F5-01)× (rated motor current): 60 minutes.	

F5-02	**Stall gain over voltage**	Factory default value	0
	Setup range： 0(no stall over voltage) to 100	It adjusts the inverter's capacity in suppressing the stall over voltage. The bigger the value is, the stronger the suppressing capacity is. For the load with small inertia, the value should be small. Otherwise, the dynamic response of the system will be slow. For the load with large inertia, the value should be large. Otherwise, the suppressing result will be poor, and over voltage fault may occur.	

F5-03	**Stall point over voltage**	Factory default value	130%
	Setup range： 120～150%	Select the protection point for function of stall over voltage. When the value is exceeded, the inverter starts executing the protection function for stall over voltage.	

F5-04	**Stall gain over current**	Factory default value	20
	Setup range: 0～100	It adjusts the inverter's capacity in suppressing the stall over current. The bigger the value is, the stronger the suppressing capacity is. For the load with small inertia, the value should be small. Otherwise, the dynamic response of the system will be slow. For the load with large inertia, the value should be large. Otherwise, the suppressing result will be poor, and over current fault may occur.	
F5-06	**Fault auto reset times**	Factory default value	0
	Setup range: 0～3	When the inverter selects fault auto reset, it is used to set the times of auto reset. If this value is exceeded, the inverter will stop because of failure and wait for maintenance.	

F5-07	**Fault auto reset interval**	Factory default value	1.0s
	Setup range: 0.1s～ 100.0s	Select time interval between fault occurring and automatic reset	

F5-08	**Input phase loss protection selection**	Factory default value	1
	Setup range: 0: Disabled 1: Enabled	Select whether to provide protection for input phase loss. Only the MD series inverter over 18.5kW can have input phase loss protection function, and the inverter below 18.5kW has not such function no matter whether F5-8 is set to 0 or 1.	

F5-09	**Inverter load lost protection selection**	Factory default value	1
	Setup range： 0: Disabled 1: Enabled	Select whether to provide protection for load loss. When selecting load loss protection and no load is added to the output end of inverter, the output frequency of inverter will automatically reduced to 2Hz.	
F5-10	**Fault type**	0～24	1

F5-11	**Frequency upon fault**	Display the frequency upon fault for the most recent one time.	
F5-12	**Current upon fault**	Display the current upon fault for the most recent one time.	
F5-13	**Bus voltage upon fault**	Display the bus voltage upon fault for the most recent one time.	

Group F6 Auxiliary Function

F6-00	**maximum output frequency**	Factory default value	50.0Hz
	Setup range	50.00Hz～300.00Hz	

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

F6-01	**Frequency upper limit**	Factory default value	50.0 Hz
	Setup range	frequency lower limit F0-11 to maximum frequency F6-00	

Upper limit of inverter output frequency

F6-02	**Frequency lower limit**	Factory default value	00.0Hz
	Setup range	0.00Hz ～ upper limit F6-01	

When the inverter starts to run, the inverter will not output if the reference frequency is less than the lower limit frequency. During the running process, if the reference frequency is less than the lower limit frequency, the inverter will keep running at the lower limit frequency until the stop of the inverter or the reference frequency over lower limit frequency.

F6-03	**Carrier frequency**	Factory default value	Model dependent
	Setup range :0.5kHz to 16.0kHz		

This function is used to adjust the carrier frequency of the inverter. By adjusting the carrier frequency, the motor noise can be

reduced, and the resonance of the mechanical system can be avoided, so that the leakage current to the earth and the interference of the inverter can be reduced.

When the carrier frequency is low, the output current higher harmonic component will increase, the motor loss will increase, and the motor temperature rise will also increase.

When the carrier frequency is high, the motor loss is reduced, and the motor temperature is decreased, but the inverter loss and temperature rise will increase and so will the interference.

The adjustment of carrier frequency will have influences on the following performances:

Carrier frequency	Low to high
Motor noise	high to low
Output current waveform	poor to good
Motor temperature rise	high to low
inverter temperature rise	Low to high
leakage current	low to high
External radiation interference	low to high

F6-04	**Jog running frequency**	Factory default value	2.00Hz
	Setup range	0.00Hz～ maximum frequency	

It is the reference frequency of the inverter when defining the jog. The Jog process is started and stopped according to the start mode 0 (F0-15, direct start) and the stop mode 0 (F0-16, deceleration time to stop).

F6-05	**Jog acceleration time**	Factory default value	20.0s
	Setup range	0.0s ～3000.0s	
F6-06	**Jog deceleration time**	Factory default value	20.0s
	Setup range	0.0s～ 3000.0s	

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

The Jog deceleration time means the time required for the inverter to decelerate from the maximum output frequency （F6-00）to 0Hz.

F6-07	**Reverse control**		Factory default value	0
	Setup range	0	Reverse rotation enabled	
		1	Reverse rotation disabled	

When this parameter is set to 0, it can perform reverse rotation control on the inverter with the keyboard or terminal.

When the parameter is 1: The reverse rotation control function is disabled under keypad or terminal control.

F6-08	**Forward/reverse rotation dead-zone time**	Factory default value	0.0s
	Setup range	0.0s～3000.0s	

During the setting of forward/reverse rotation of the inverter, the transition time when

outputting zero frequency.

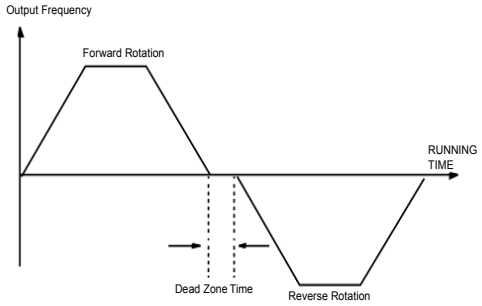


Fig.6-6 Schematic diagram for Forward/ Reverse Rotation Dead-zone Time

F6-09	**Start protection selection**		Factory default value	0
	Setup range	0	protection	
		1	no protection	

The function code is used for improve safety protection factor. If it is set to 0, it has two functions:

Firstly, if the running command exists upon inverter power on, it must cancel the running command to remove the running protection status.

Secondly, if the running command exists upon inverter fault reset, it must cancel the running command to remove the running protection status.

In this way, it can prevent the automatic running of the motor under unexpected conditions.

F6-10	**Frequency arrival detection amplitude**	Factory default value	0.0 %
	Setup range	0.0%～100.0%	

When the output frequency of the inverter reaches the setup frequency, this function can be used to adjust the detection amplitude, as shown in the following figure.

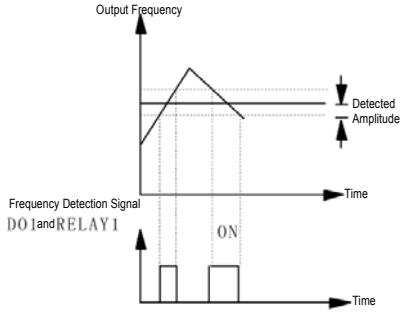


Fig.6-7 Schematic Diagram for Detection Amplitude of Frequency

F6-11	**MF.K Key function selection**		Factory default value	2
	Setup range	0	MFK key disabled	
		1	Switching between operation panel command channel and remote command channel (terminal command channel)	
		2	Switching between forward rotation and reverse rotation	
		3	Forward rotation Jog command	

MF.K Key refers to multifunctional key. It can set and define the function of MF.K key on the keyboard via this parameter. It can perform switching via this key both in the stop and running process.

0: This key has no function.

1: Switching between keyboard command and

remote operation. It refers to switching of command source, switching from the current command source to the keyboard control (local operation). If the current command source is keyboard control, this command is disabled.

2: Switching between forward rotation and reverse rotation

It can switch the direction of the frequency command via the MF.K key on the keyboard. It is enabled only in the operation panel command channel.

3: Forward rotation Jog

It can realize forward rotation Jog (FJOG) via the MF.K key on the keyboard.

F6-12	**STOP/RESET key function**		Factory default value	0
	Setup range	0	STOP key disabled in the terminal control mode	
		1	STOP key enabled in the terminal control mode	

The RESET function is enabled in all statuses.

F6-13	**Earth short circuit protection detection upon power-on**	Factory default value	1
	Setup range	0: Disabled 1: Enabled	

It can select whether the inverter checks the motor for earth short circuit failure upon power-on. If this function is enabled, the inverter has short-time output at the instance of power-on.

F6-14	**MS speed 0**	Factory default value	0.0 Hz
	Setup range	Negative maximum frequency to maximum frequency	
F6-15	**MS speed 1**	Factory default value	0.0 Hz
	Setup range	Negative maximum frequency to maximum frequency	
F6-16	**MS speed 2**	Factory default value	0.0 Hz
	Setup range	Negative maximum frequency to maximum frequency	
F6-17	**MS speed 3**	Factory default value	0.0 Hz
	Setup range	Negative maximum frequency to maximum frequency	

When selecting MS speed as frequency source (F0-02=5), it is required to set the value from F6-14 to F6-17.

F6-18	**heatsink temperature**		Factory default value	1℃
	Setup range	0℃～150℃	Display heatsink temperature	
F6-19	**Software version No.**		Factory default value	Version No. of current software

Group FF Factory Parameters (Reserved)

Group FP User Password

FP-00	**user password**	Factory default value	0
	Setup range	0～65535	

Any non-zero number can be set, and then the password protection function will be enabled.

0000：Password protection function disabled

Upon setup and validation of the user password, when the user enters the parameter setting status again, the user can view the parameters only and cannot modify the parameter if the password is incorrect. Please remember the setup user password correctly. If the password is set wrongly or forgotten, please contact the manufacturer.

FP-01	**Parameter initialization**		Factory default value	0
	Setup range	0	No operation	
		1	Restore the factory default setup value	
		2	Clear the fault record	

1：The inverter will recover all parameters to the factory default ones.

2: The inverter clears the recent fault records.

Chapter 7 EMC (Electromagnetic Compatibility)

7.1 Definition

Electromagnetic compatibility is the ability of the electric equipment to run in the electromagnetic interference environment and implement its function stably without interferences on the electromagnetic environment.

7.2 EMC Standard Description

In accordance with the requirements of the national standard GB/T12668.3, the inverter needs to comply with electromagnetic interference and anti- electromagnetic interference requirements.

The existing products of our company apply to the latest international standard—IEC/EN61800-3：2004 (Adjustable speed electrical power drive systems——part 3:EMC requirements and specific test methods), which is equivalent to the national standard GB/T12668.3.

IEC/EN61800-3 assesses the inverter in terms of electromagnetic interference and anti-electronic interference. Electromagnetic interference mainly tests the radiation interference, conduction interference and harmonics interference on the inverter (required for the inverter for civil use) Anti-electromagnetic interference mainly tests the conduction interference rejection, radiation interference rejection, surge interference rejection, fast and mutable pulse group interference rejection, ESD interference rejection and power low frequency end interference rejection (specific test items including: 1. Interference rejection tests of input voltage sag, interrupt and change; 2. Phase conversion notch interference rejection test; 3. Harmonic input interference rejection test; 4. Input frequency change test; 5. Input voltage unbalance test; 6. input voltage fluctuation test).

The tests shall be conducted strictly in accordance with the above requirements of IEC/EN61800-3, and the products of our company are installed and used according to Section 7.3 and have good electromagnetic compatibility in general industry environment.

7.3 EMC Introduction

7.3.1 Harmonic Effect

Higher harmonics of power supply may damage the inverter. Thus, at some places where mains quality is rather poor, it is recommended to install AC input reactor.

7.3.2 Electromagnetic Interference and Installation Precautions

There are two kinds of electromagnetic interferences, one is interference of electromagnetic noise in the surrounding environment on the inverter, and the other is interference of inverter on the surrounding equipment.

Installation precautions:

1、 The earth wires of the Inverter and other electric products shall be well grounded;

2、The power input and output power cables of the inverter and weak current signal cables (e.g. control line) shall not be arranged in parallel and vertical arrangement is preferable.

3、It is recommended that the output power cables of the inverter employ shield cables or steel pipe shielded cables and that the shielding layer be earthed reliably. The lead cables of the equipment suffering interferences are recommended to employ twisted-pair shielded control cables, and the shielding layer shall be earthed reliably.

4、 When the length of motor cable is longer than 100 meters, it needs to install output filter or reactor.

7.3.3Handling method for the interferences of the surrounding magnetic equipment on the inverter:

The electromagnetic interference on the inverter is generated because plenty of relays, contactors and electromagnetic brakes are installed near the inverter. When the inverter has error action due to the interferences, the following measures can be taken:

1、 Install surge suppressor on the devices generating interference;

2、 Install filter at the input end of the inverter. Refer to Section 7.3.6 for the specific operations.

3、 The lead cables of the control signal cable of the inverter and the detection line employ shielded cable and the shielding layer shall be earthed reliably.

7.3.4 Handling method for the interferences of inverter on the surrounding magnetic equipment:

These interferences include two types: one is radiation interference of the inverter, and the other is conduction interference of the inverter. These two types of interferences cause the surrounding electric equipment to suffer electromagnetic or electrostatic induction. The surrounding equipment hereby produces error action. For different interferences, it can be handled by referring to the following methods:

1、 For the measuring meters, receivers and sensors, their signals are generally weak. If they are placed nearby the inverter or together with the inverter in the same control cabinet, they are easy to suffer interference and thus generate error actions. It is recommended to handle with the following methods: Put in places far away from the interference source; do not arrange the signal cables in parallel with the power cables and never bind them together; both the signal cables and power cables employ shielded cables and are well earthed; install ferrite magnetic ring (with suppressing frequency of 30 to 1,000MHz) at the output side of the inverter and wind it 2 to 3 turns; install EMC output filter if the situation is terrible.

2、When the equipment suffering interferences and the inverter use the same power supply, it may cause conduction interference. If the above methods cannot remove the interference, it shall install EMC filter between the inverter and the power supply (refer to Section 7.3.6 for the prototyping operation);

3、The surrounding equipment is separately earthed, which can avoid the interference caused by the leakage current of the inverter's earth wire when common earth mode is adopted.

7.3.5Leakage current and handling

There are two forms of leakage current when using the inverter. One is leakage current to the earth, and the other is leakage current between the cables.

1. Factors influencing the leakage current to the earth and the solutions:

There are distributed capacitance between the lead cables and the earth. The larger the distributed capacitance is, the larger the leakage current will be. The distributed capacitance can be reduced by effectively reducing the distance between the inverter and the motor. The higher the carrier frequency is, the larger the leakage current will be. The leakage current can be reduced by reducing the carrier frequency. However, reducing the carrier frequency may result in addition of motor noise. Note that additional installation of reactor is also an effective method to remove the leakage current.

The leakage current may increase following the addition of circuit current. Therefore, when the motor power is high, the corresponding leakage current will be high too.

2. Factors of producing leakage current between the cables and solutions:

There is distributed capacitance between the output cables of the inverter. If the current passing the lines has higher harmonic, it may cause resonance and thus result in leakage current. If thermal relay is used, it may generate error action.

The solution is to reduce the carrier frequency or install output reactor. It is recommended that thermal relay not be installed before the motor when using the inverter, and that electronic over current protection function of the inverter be used instead.

7.3.6 Precautions for Installing EMC input filter at the input end of power supply

1、When installing the EMC input filter at the input end of the power supply, it is recommended to use the EMC filter produced by Shanghai Eagtop Electronic Technology Co., Ltd.

2、 

When using the inverter, please follow its rated values strictly. Since the filter belongs to Classification I electric appliances, the metal enclosure of the filter shall contact with the metal ground of the

installing cabinet in large area and have good conduction continuity. Otherwise there may be danger of electric shock and the EMC effect may be greatly affected.

3、 Through the EMC test, it is found that the filter ground must be connected with the PE end of the inverter at the same public earth. Otherwise the EMC effect may be greatly affected.

4、 The filter shall be installed at a place close to the input end of the power supply as much as possible.

5、 The input wire of the filter shall not close to the output wire.

Chapter 8 Troubleshooting and Countermeasures

8.1 Fault Alarm and Countermeasures

MD300 inverter has 20 pieces of warning information and protection function. In case of abnormal fault, the protection function will be invoked, the inverter will stop output, and the faulty relay contact of the inverter will start, and the fault code will be displayed on the display panel of the inverter. Before consulting the service department, the user can perform self-check according to the prompts of this chapter, analyze the fault cause and find out t solution. If the fault is caused by the reasons as described in the dotted frame, please consult the agents of inverter or our company directly.

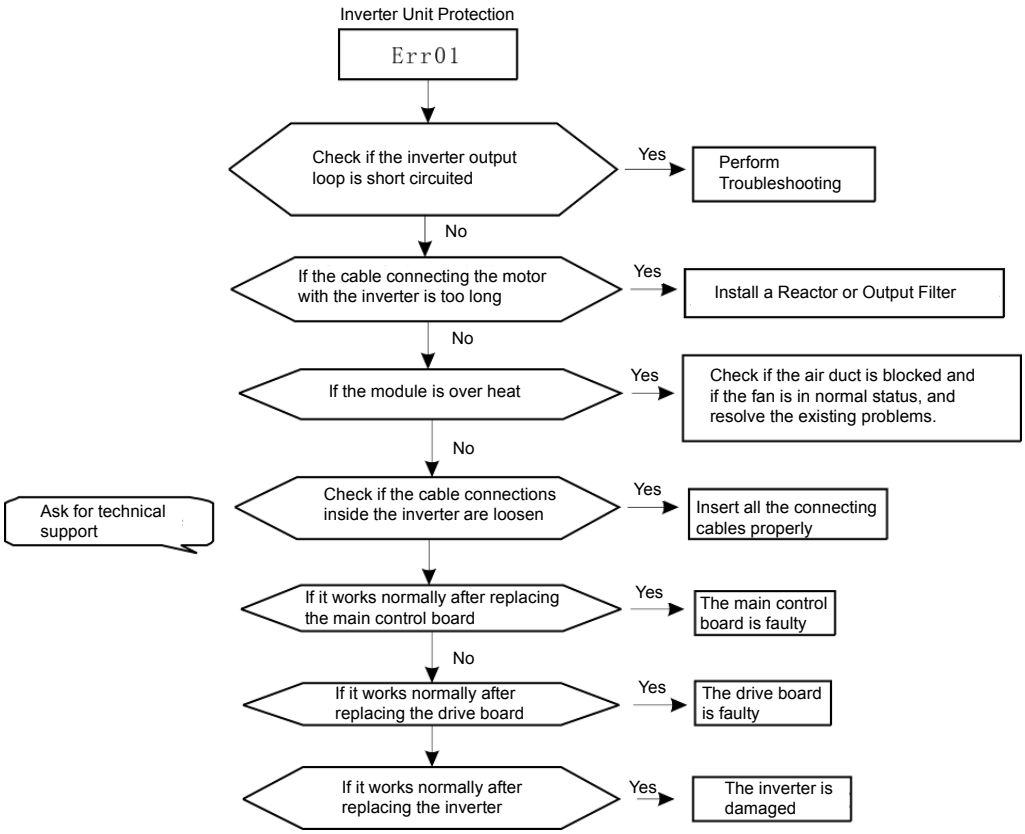


Fig.8-1 Inverter unit protection （ERR01）

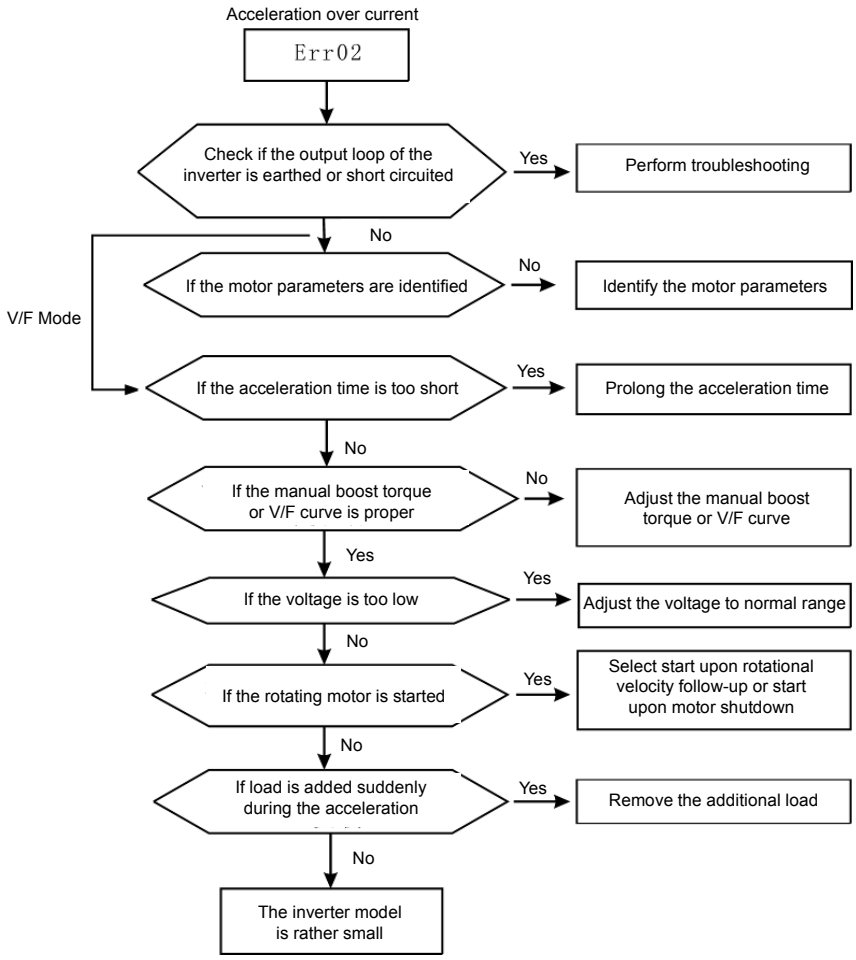


Fig.8-2 Acceleration over current （ERR02）

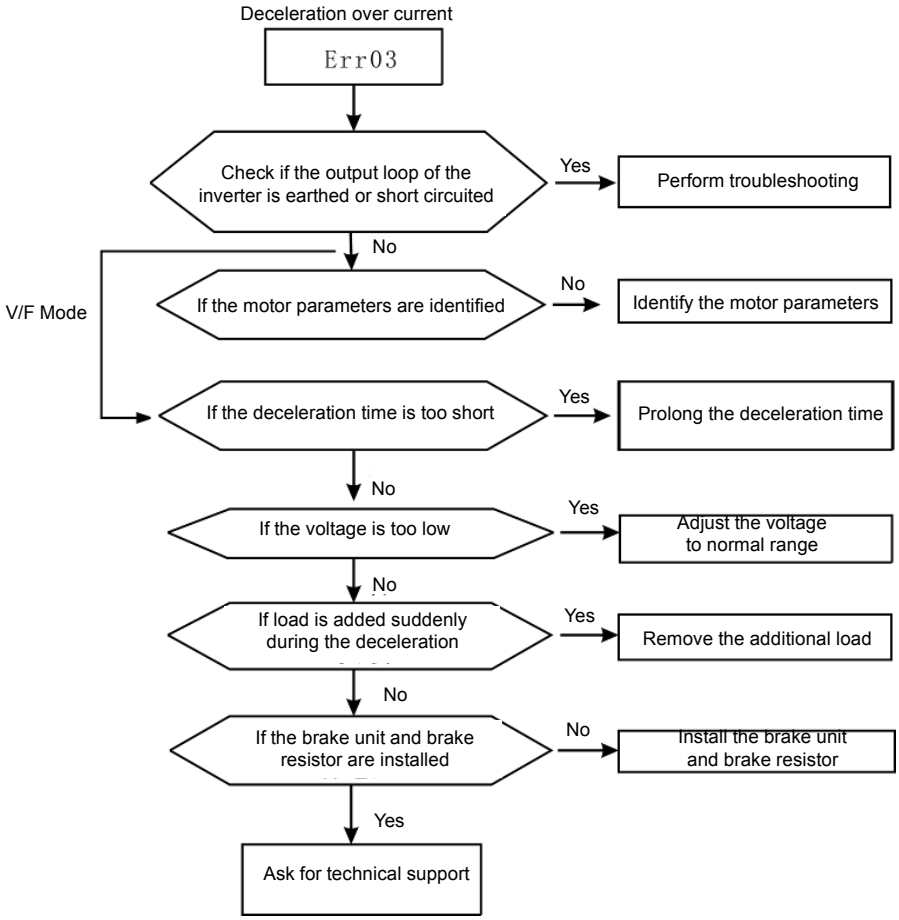


Fig.8-3 Deceleration over current （ERR03）

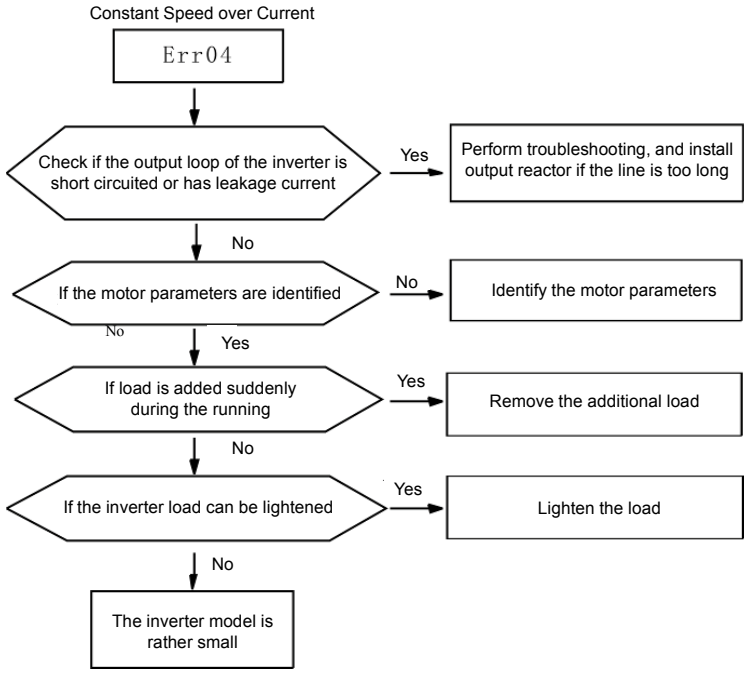


Fig.8-4 Constant speed over current （ERR04）

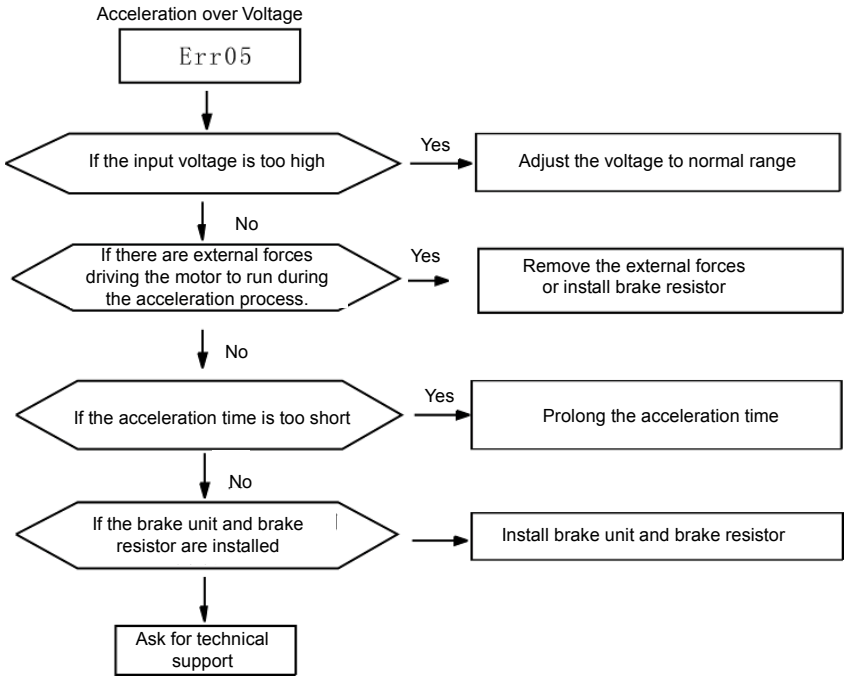


Fig.8-5 Acceleration over voltage（ERR05）

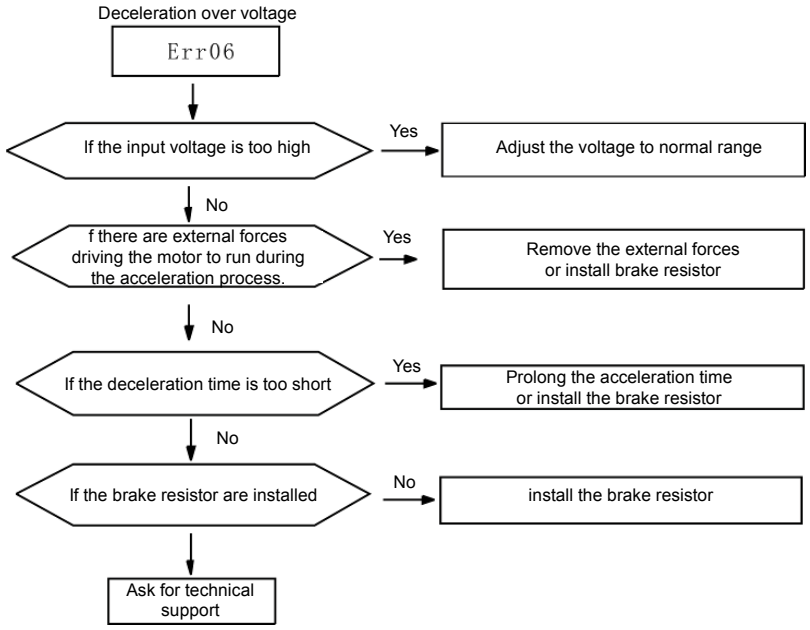


Fig.8-6 Deceleration over voltage （ERR06）

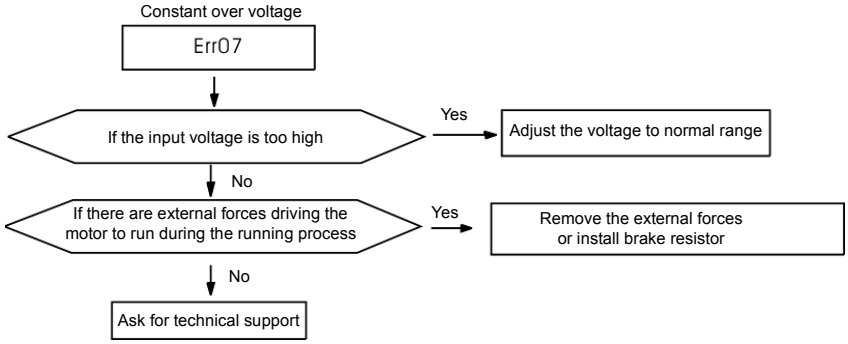


Fig.8-7 Constant Speed over voltage（ERR07）

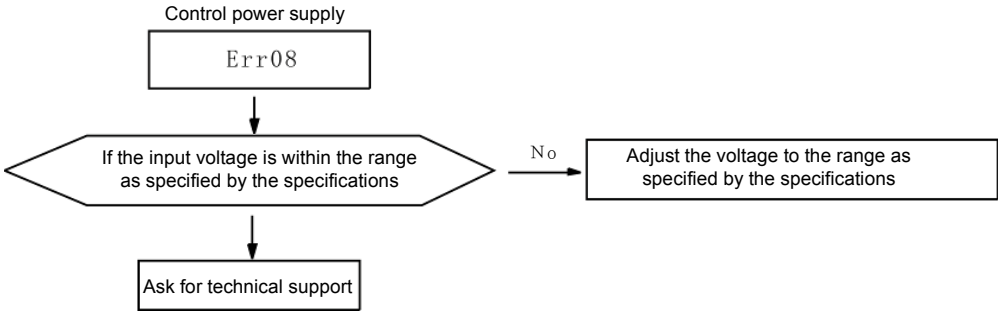


Fig.8-8 Control power supply fault（ERR08）

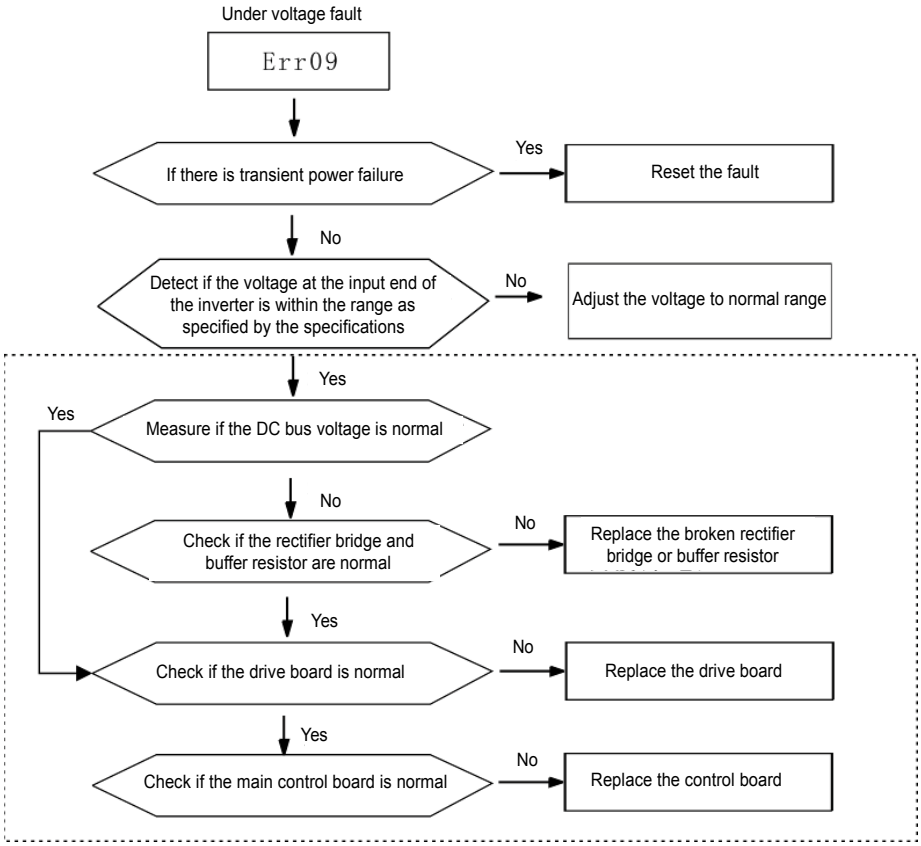


Fig.8-9 Under Voltage Fault（ERR09）

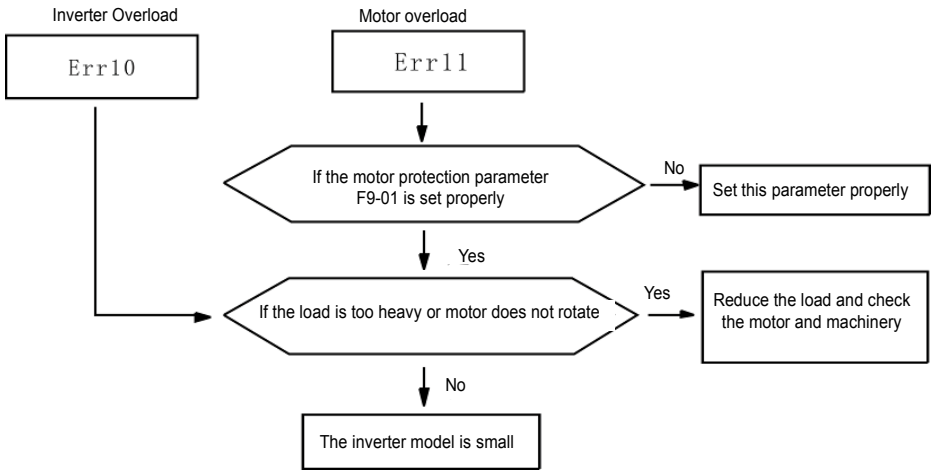


Fig.8-10 Inverter/Motor Overload （ERR10/ERR11）

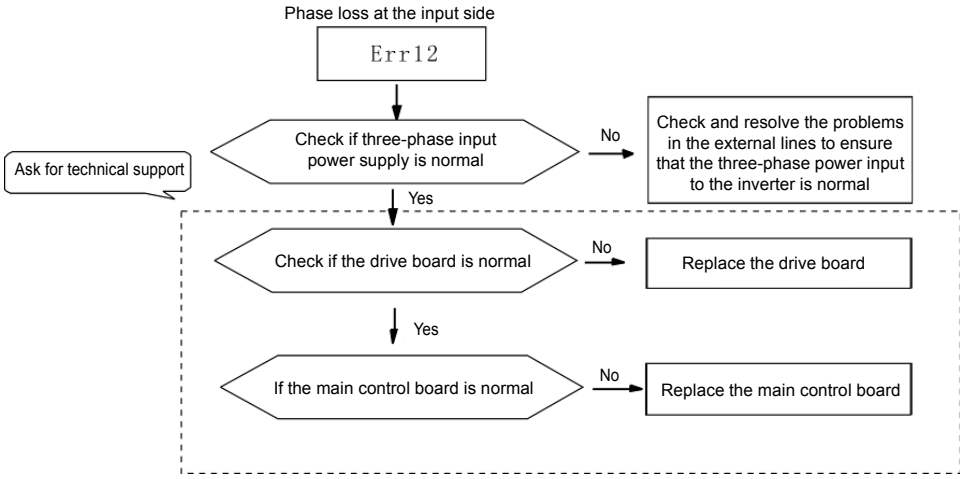


Fig.8-11 Phase Loss at Input Side（ERR12）

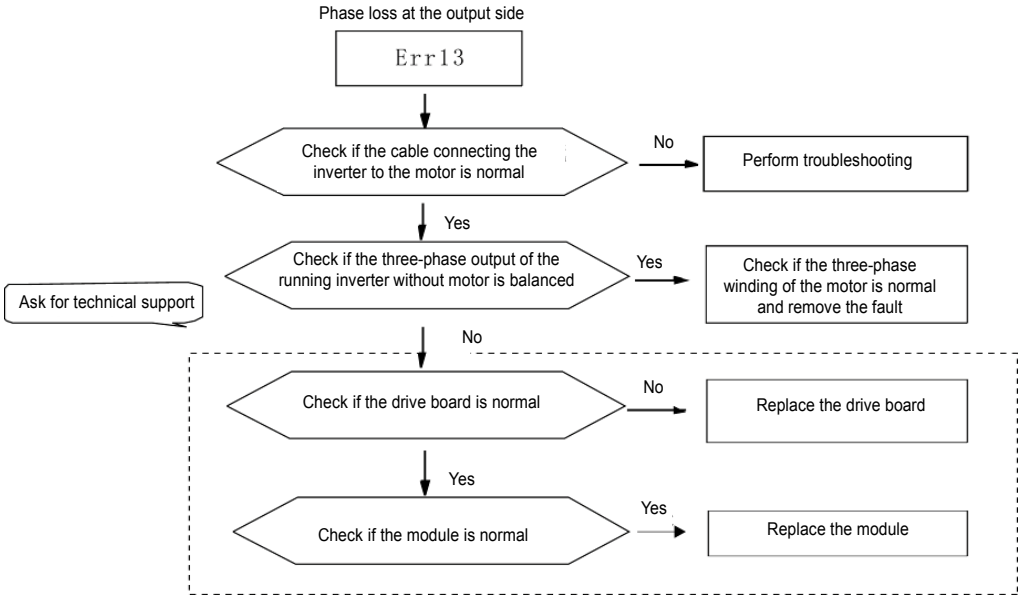


Fig.8-12 Phase Loss at Output Side（ERR13）

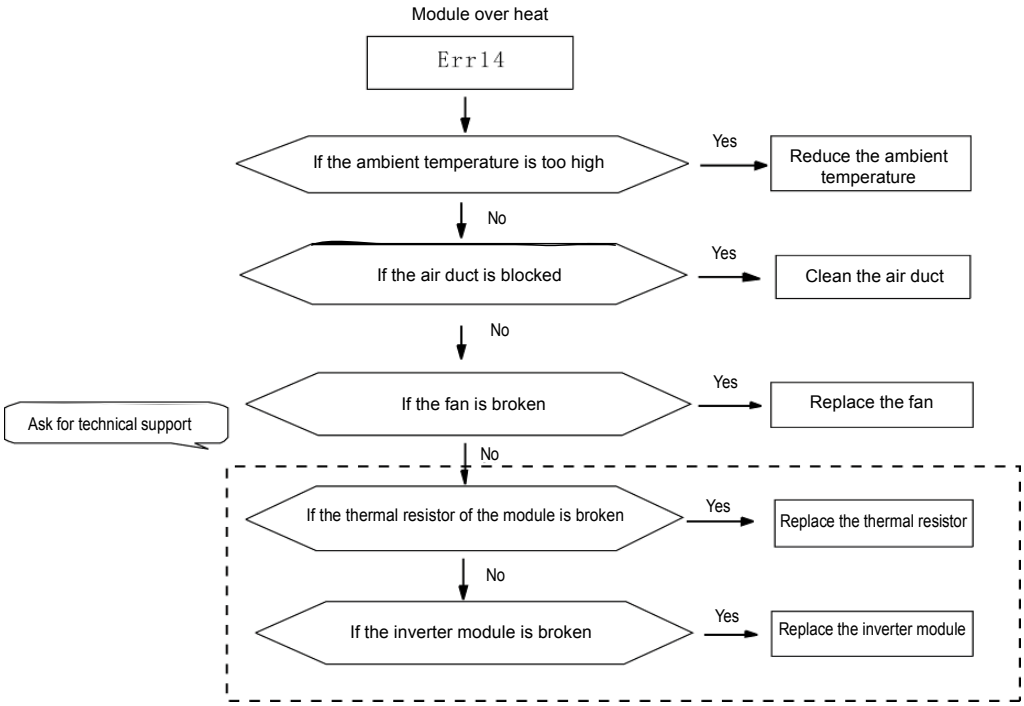


Fig.8-13 Module over heat（ERR14）

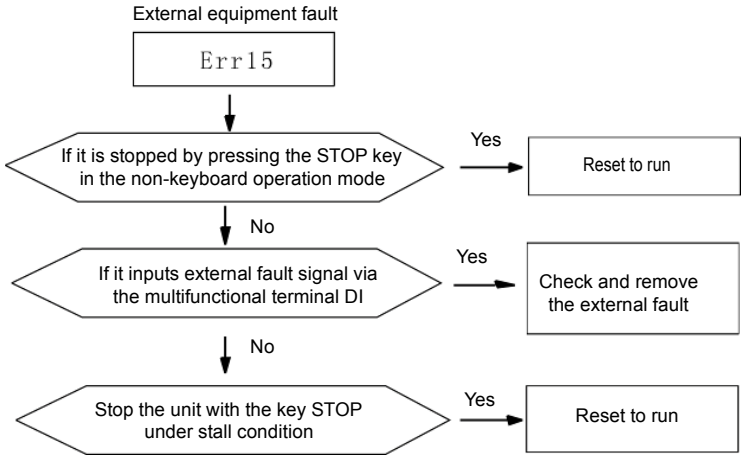


Fig.8-14 External Equipment Fault（ERR15）

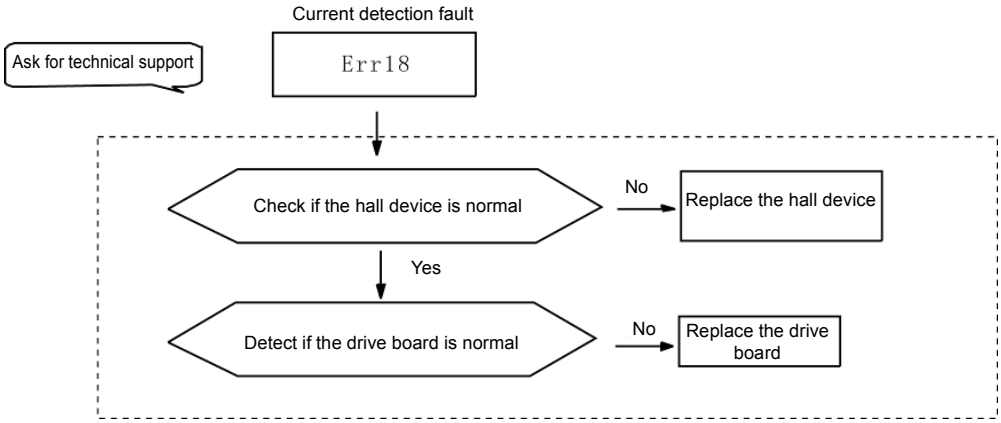


Fig.8-15 Current detection fault（ERR18）

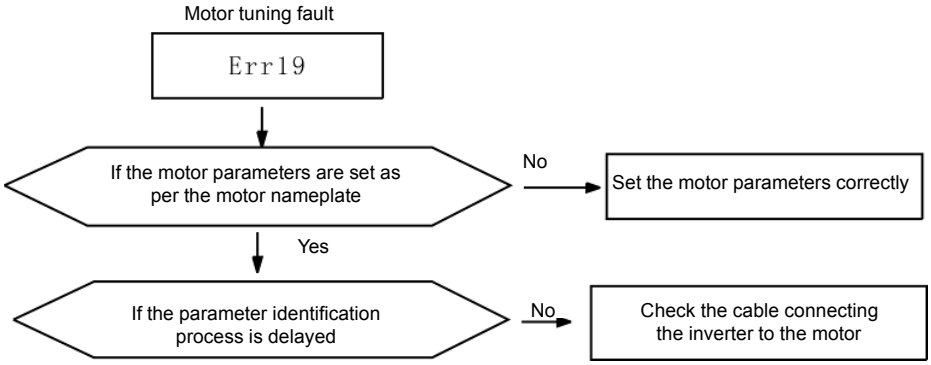


Fig.8-16 Motor Tuning Fault（ERR19）

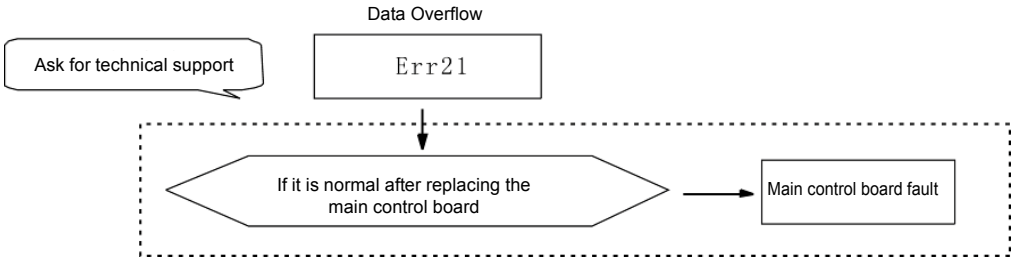


Fig. 8-17 EEPROM saving abnormal (Err21)

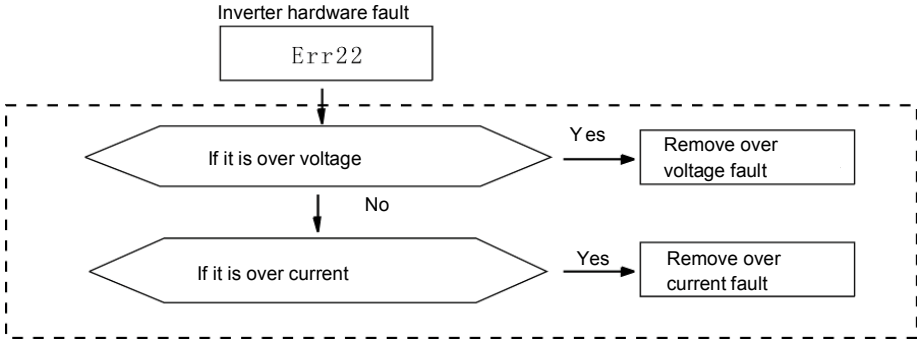


Fig.8-18 Inverter Hardware Fault（ERR22）

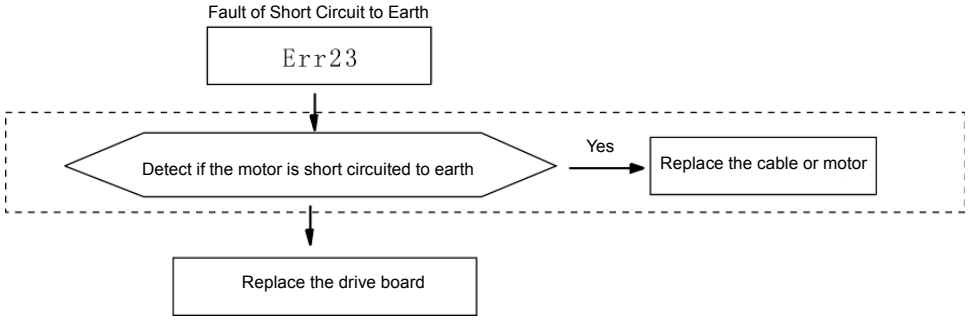


Fig.8-19 Earth short circuit fault（ERR23）

8.2 Common Fault and Resolutions

During the inverter using process, the following faults may occur. Please conduct simple fault analysis by referring to the methods below:

1. No display upon power-on

1) Check whether the inverter input power supply is consistent with the inverter rated voltage with universal meter. If there is any fault of power supply occurs, please check the power supply and eliminate the fault.

2) Check if the three-phase rectifier is intact. If the rectifier cracks, please seek for service.

2. The power supply circuit breaker trips off upon power on.

1) Check if the input power supplies are grounded or there is short circuit, solve the problem.

2) Check if the rectifier is breakdown. If it is damaged, please seek for service.

3. The motor does not rotate upon Inverter running.

1) Check if there is balanced three-phase output among U, V and W. If there is, it is caused by motor circuit or motor damage, or blacked due to mechanical reasons. Please eliminate the fault.

2) If there is output, but the three phases are not balance, it shall be caused by the damage of inverter drive board or output module, please seek for service.

3) If there is no output voltage, it may be caused by the damage of drive board or output module, please seek for service.

4. The inverter displays normal upon power on, but the circuit breaker of power supply trips off during the running process:

1) Check if there is short circuit among the output modules. If there is, please seek for service.

2) Check if there is short circuit among the motor lead wires, or they are grounded. If there is, please eliminate the fault.

3) If the trip occurs sometimes and the motor is far away from the inverter, adding output AC reactor shall be considered.

Attachment Non-standard Specification

Attachment A: MD300 Frequency Switching – Line Speed Displaying Non-standard Function Specification

The non-standard products have two modifications based on general-purpose MD300:

1. Modification to the frequency source setup: When set frequency source to analog value, the frequency source can be switched between analog value and digital setting F0-04 through external terminal.

If it is necessary to switch between analog value and digital setting, due attention shall be paid to the following two points: 1) It is required to set frequency source F0-03=3 or 4, that is, select frequency source as analog value. 2) It is required to select one terminal function of DI1-DI4 in Group F0 function code as frequency switching terminal. The terminal function switched by frequency source is 16(For general-purpose product, 16 refers to “reference switch between AI1 and AI2”), such as select DI2 as switching terminal of frequency source, then F0-10=16.

When disconnecting DI terminal input, the frequency source is set to analog value; when closing DI terminal, frequency source is the set frequency of F0-04.

2. Add display function of line speed

F6-20 is defined as the display factor of line speed with a range of 0.01 to 100.00, and 1.00 is the factory default value. The user shall set the parameter in accordance with the needs. F6-21 reserved.

Display set line speed under stop status of inverter and actual line speed under running status.

Attachment B: MD300 with FDT Function Non-standard Specification

The product is the non-standard inverter of MD300 with frequency detection value satisfied FDT function, it outputs ON/OFF signal for showing whether FDT is satisfied through DO terminal.

Hence, the following changes are made based on MD300 general products:

1、 AI sets curve with two points F3-02~F3-05.

F3-02 and F3-03 are the minimum input voltage and the corresponding setting of the voltage set by AI.

F3-04 and F3-05 are the maximum input voltage and the corresponding setting of the voltage set by AI.

As non-standard function code, F3-06~F3-09 are not the setting function codes of AI.

2、 F3-06 is FDT electrical level.

Setting range: 0 ~ Upper limit frequency

Factory default value 50.00Hz

3、 F3-07 is FDT width.

Setting range：0～100.0%

Factory default value 5.0%

4、 Change the setting range of F0-13 (DO output selection) to “0~4” and the factory default value to 4, that is “FDT output”

Once the running frequency of inverter reaches the frequency value set by F3-06, DO terminal outputs ON signal. When inverter runs at any frequency over F3-06 setting, DO terminal always outputs ON signal.

IF Do output is in the status of ON, the running frequency is less than F3-06 and the difference is over F3-07, Do terminal will exit from On status.

5、 F3-08~F3~09 are reserved function codes.

Warranty Agreement

1. The warranty period of the product is 18 months (refer to the barcode on the equipment body). During the warranty period, if the product fails or is damaged under the condition of normal use by following the instruction, Our Company will be responsible for free maintenance.
2. Within the warranty period, maintenance will be charged for the damages caused by the following reasons:
   a. The damage caused by improper use or repair/modification without prior permission;
   b. The damage caused by fire, flood, abnormal voltage, other disasters and second disaster;
   c. The hardware damage caused by dropping or transportation upon the procurement.
   d. The damage caused by the improper operation;
   e. The damage or failure caused by the trouble out of the equipment (e.g. external device)
3. If there is any failure or damage to the product, please correctly fill out the Product Warranty Card in detail.
4. The maintenance fee is charged according to the newly adjusted Maintenance Price List by our company.
5. In general, the warranty card will not be re-issued. Please keep the card and present it to the maintenance personnel when asking for maintenance.
6. If there is any problem during the service, please contact the agent of our company or our company directly.
7. This agreement shall be interpreted by Shenzhen Inovance Technology Co., Ltd.

Shenzhen Inovance Technology Co., Ltd.
Service Department
Address: Block E, Hongwei Industry Park, Liuxian Road, Baocheng No. 70 Zone, Bao'an District, Shenzhen
Tel: 086-755-29619910 P.C.: 518101
Website: www.inovance.cn

Inovance

Product Warranty Card

<table>
<tr><td rowspan="3">Customer information</td><td colspan="2">Add. of unit:</td></tr>
<tr><td rowspan="2">Name of unit:
P.C.:</td><td>Contact person:</td></tr>
<tr><td>Tel.:</td></tr>
<tr><td rowspan="3">Product information</td><td colspan="2">Product model:</td></tr>
<tr><td colspan="2">Body barcode (Attach here):</td></tr>
<tr><td colspan="2">Name of agent:</td></tr>
<tr><td>Failure information</td><td colspan="2">(Maintenance time and content):

Maintenance personnel:</td></tr>
</table>