Foreword

IS300 series servo driver is a servo driver which is specially desiged for Drive permanent magnet synchronous servo motor (PMSM). IS300 series servo driver has a wide capacity range（the rated current is 5A to 300A）.It's able to provide not only servo pump control, but also the general functional requirements.And it is a high-power servo driver which is value-for-money in the present market.

This manual is a guide to the operations of IS300 series servo driver.
This manual provides the user with related precautions and instructions for the prototyping, installation, parameter setup, and on-site commissioning, and routine repair and maintenance of servo driver. In order to use this series of driver correctly, please read this manual carefully prior to operation and keep it properly for future using. 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 driver rated values on the nameplate are the same as your order. The box contains the equipment, certificate of conformity, user manual and warranty card.
2) 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 servo driver, our company may change the information provided without additional notice.

CE

IS300 series servo driver complies with the following international standards, and some products have passed the CE certification.

IEC/EN61800-5-1:2003 “Safety Regulations on Commissionable Electric Drive System” and IEC/EN 61800-3:2004 Commissionable Electric Drive System: The third Part: Electromagnetic Compatibility Standard and Specific Testing Method for the Product (Comply with IEC/EN61800-3 standard under correct installation and use as per Article 7.3.2 and 7.3.6).

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Safety and Precautions

Chapter 1 Safety and Precautions

Safety definition:

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

Danger

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

Note

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

1.1 Safety precautions

1.1.1 Before Installation:

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

1.1.2 During the Installation:

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

Note
● 2. When more than two servo drivers are to be installed in one cabinet, pay attention to the installation locations (refer to Chapter 3 Mechanical and Electrical Installation) to ensure the cooling effect. ● 3. Do not drop the lead wire stub or screw in the servo driver. Otherwise it may damage the servo driver.

1.1.3 During wiring:

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

Note
● 6．Do not connect the input power cable to the output ends U, V and W. Otherwise it may damage the servo driver. ● 7. Ensure the wiring meet the EMC requirements and the local safety standard. The wire size shall be determined according to the manual. Otherwise, accident may be caused! ● 8. The brake resistor cannot be directly connected between the DC bus terminals (+) and (-). Otherwise it may cause fire.

1.1.4 Before Power-on：

Danger
● Before Power-on: ● Please confirm whether the power voltage class is consistent with the rated voltage of the servo driver and whether the I/O cable connecting positions are correct, and check whether the external circuit is short circuited and whether the connecting line is firm. Otherwise it may damage the servo driver! ● The cover must be well closed prior to the servo driver power-on. Otherwise electric shock may be caused!

Note

- 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

- Do not open the cover of the servo driver upon power-on. Otherwise there will be danger of electric shock!
- Do not touch the servo driver and its surrounding circuit with wet hand. Otherwise there will be danger of electric shock!
- Do not touch the servo driver terminals (including control terminal). Otherwise there will be danger of electric shock!
- At power-on, the servo driver r will perform the security check of the external heavy-current circuit automatically. Thus, at this time please do not touch the terminals U, V and W, or the terminals of motor, otherwise there will be danger of electric shock.

Note

- If parameter identification is required, please pay addtation to the danger of injury arising from the rotating motor. Otherwise accident may occur!
- Do not change the factory settings at will. Otherwise it may damage the equipment!

1.1.6 During the operation:

Danger

- Do not approach the mechanical equipment when selecting the restart function. Otherwise it may cause injury!
- Do not touch the 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 servo driver, keep items from falling into the equipment. Otherwise, it may damage the equipment! ● 5. Do not start and stop the servo driver by connecting and disconnecting the contactor. Otherwise, it may damage the equipment!

1.1.7 During Repair

Danger
● Do not repair and maintain the equipment with power connection. Otherwise there will be danger of electric shock! ● be sure to conduct repair and maintenance after the charge LED indictor of the servo driver is OFF. Otherwise, the residual charge on the capacitor may cause personal injury! ● The servo driver shall be repaired and maintained only by the qualified person who has received professional training. 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 after being kept, or when periodical inspection is performed, it shall conduct motor insulation inspection so as to avoid damaging the driver because of the insulation failure of the motor windings. The motor wires must be disconnected from the driver 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 rated capacity of the servo motor does not match those of the driver, especially when the rated power of the driver is higher than the rated power of the motor, the relevant motor protection parameters in the driver shall be adjusted, or thermal relay shall be mounted to protect the motor.

1.2.3 Motor Heating and Noise

Since the output voltage of servo driver 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.

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

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

1.2.5 Switching Devices like Contactors Used at the Input and Output terminal

If a contactor is installed between the power supply and the input terminal of the driver, it is not allowed to use the contactor to control the startup/stop of the driver. If use of such contactor is unavoidable, 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 driver. If switching devices like contactor are installed between the output end of the driver and the motor, it shall ensure that the on/off operation is conducted when the driver has no output. Otherwise the modules in the driver may be damaged.

1.2.8 Use under voltage rather than rated voltage

If the driver is used outside the allowable working voltage range as specified in this manual, it is easy to damage the devices in the driver.

When necessary, use the corresponding step-up or step-down instruments to change the voltage.

1.2.7 Change Three-phase Input to Two-phase Input

It is not allowed to change the IS300 series three-phase servo driver into two-phase one. Otherwise, it may cause fault or damage to the servo driver.

1.2.8 Lightning Protection

Servo driver of the series has lightning over current protection device, and has 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 driver.

1.2.9 Altitude and Derating

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

1.2.10 Certain Special Use

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

1.2.11 Precaution of Driver 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 servo driver as industrial wastes.

1.2.12 Adaptable Motor

1) The standard adaptable Permanent-Magnet Synchronous Motor
2) Since the servo driver 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;
3) The short circuit of the cable or motor may cause alarm or explosion of the driver. 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 servo driver and the test part shall be completely disconnected during the test.

Product Information

Chapter 2 Product Information

2.1 Designation Rules

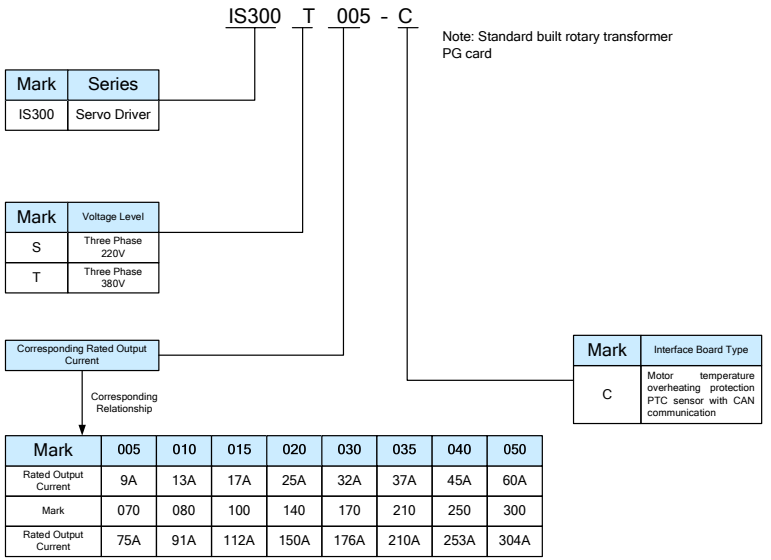


Fig. 2-1 Designation Specification

2.2 Nameplate

MODEL： IS300T005-C
INPUT： 3PH AC380V 10.5A 50/60Hz
OUTPUT： 3PH AC0～ 380V 9.0A 0Hz～ 300Hz
S/N: Barcode

Shenzhen Inovance Technology Co.,Ltd.

Fig.2-3 Nameplate

2.3 IS300 Servo Driver Series

Servo Driver Model	Input voltage	（kVA） Power supply capacity (kVA)	（A） Input current (A)	（A） Output current (A)	（kgf） system pressure of Adaptable Injection Moulding Machine （kgf）	（L/min） Maximum Flow Rate of Adaptable Injection Moulding Machine （kgf）
IS300T005	Three-phase 380V Range:-15%～20%	5.9	10.5	9.0	175	20
IS300T010		8.9	14.6	13.0		30
IS300T015		11.0	20.5	17.0		40
IS300T020		17.0	26.0	25.0		60
IS300T030		21.0	35.0	32.0		75
IS300T035		24.0	38.5	37.0		85
IS300T040		30.0	46.5	45.0		105
IS300T050		40.0	62.0	60.0		140
IS300T070		57.0	76.0	75.0		180
IS300T080		69.0	92.0	91.0		210
IS300T100		85.0	113.0	112.0		260
IS300T140		114.0	157.0	150.0		360
IS300T170		134.0	180.0	176.0		420
IS300T210		160.0	214.0	210.0		500
IS300T250		192.0	256.0	253.0		600
IS300T300		231.0	307.0	304.0		720

Table 2-1 IS300 Servo Driver Series Model and Technical Data

2.4 Technical Specifications

Table 2-2 IS300 Servo Driver Technical Specifications

Item		Specifications	
Individualized function	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	Close loop vector control (VC) V/F control	
	Startup torque	0Hz/180%（VC）	
	Speed adjustment range	1:1000 (VC)	
	Speed stabilization precision		±0.02%(VC)
	Torque control precision	±5%(VC)	
	Overload capacity	150% rated current 60s; 180% rated current 5s.	
	Auto voltage regulation (AVR)	It can keep constant output voltage automatically in case of change of mains voltage.	
Individualized function	Peripherals self-detection upon power-on	It can conduct safety detections on the peripherals upon power-on, including earth and short circuit detections.	

Item		Specifications
	Shared DC Bus Function	It can realize the function that multiple drivers share the DC bus.
	QUICK key	The user can freely define short-cut menus.
	MF.K Key	Programmable key: Select the command channel switching/forward and reverse rotations/jog operation.
Run	Running command channel	Three types of channels: operation panel setup, control terminal setup,serial communication port setup and CAN communication port setup . These channels can be switched in various modes.
	Frequency source	There are types of frequency sources, such as analog voltage setup, analog current setup, serial portsetup and CAN setup. These frequency sources can be switched in various modes.
	Auxiliary Frequency source	It can implement micro tuning and synthesis of auxiliary frequency.
	Input terminal	There are five digital input terminals, It can be compatible with enabled PNP or NPN input mode. One motor PTC overheating protection input terminal. There are three analog input terminals, two of which can be used only as voltage input, while the other can be used as voltage or current input.
	Output terminal	There are three relay input terminals.One is NO/NC with optional, the other two are NO. Two analog output terminals, with optional 0//4mA to 20mA or 0/2V to 10V.
	Communication terminal	CAN Communication terminal RS485 Communication terminal

Item		Specifications
Display and Keyboard Operation	LED display	It can display the parameters.
	Key locking and function selection	It can lock the keys partially or completely and define the functional range of certain keys so as to prevent error operations.
	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.
	Optional parts	reakers components and PG card, etc.
Environment	Using Place	Indoor, and be free from direct sunlight, dust, corrosive gas, combustible gas, oil smoke, vapor, drip or salt.
	altitude	Lower than 1,000 meters
	Ambient temperature	-10 ℃ Celsius to +40 ℃ Celsius (derated when used in the ambient temperature of 40 ℃ Celsius to 50 ℃ Celsius)
	Humidity	Less than 95%RH, without condensing
	Vibration	Less than 5.9 m/s^2(0.6g)
	Storage temperature	-20 ℃ Celsius ～ +60 ℃ Celsius

2.5 Physical Appearance and Dimensions of Mounting Hole

2.5.1 Physical Appearance

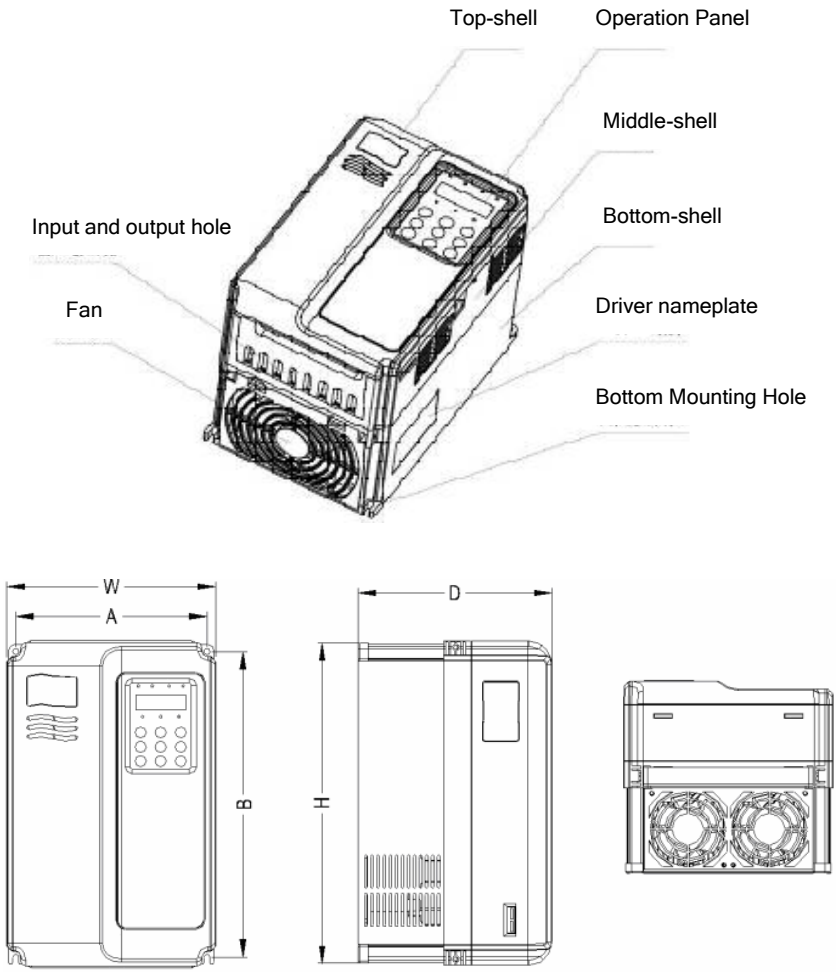


Fig.2-4 Schematic Diagram for Physical Dimensions and Mounting Hole Dimensions

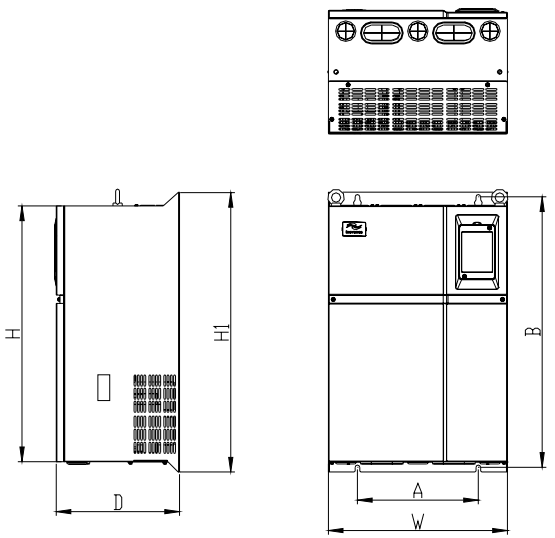


Fig.2-5 Schematic Diagram for Physical Dimensions and Mounting Hole Dimensions

2.5.2 Physical Dimensions and Mounting Hole Dimensions

Table 2-3 Physical Dimensions and Mounting Hole Dimensions (mm)

Model	Mounting Hole		Physical Dimensions				Diameter of Mounting Hole	Weight (kg)
	A	B	H	H1	W	D		
IS300T005	148	236	248	/	160	183	φ5	2.5
IS300T010								
IS300T015	190	305	322	/	208	192	φ6	6.5
IS300T020								
IS300T030								
IS300T035	235	447	432	463	285	228	Φ8	20

Model	Mounting Hole		Physical Dimensions				Diameter of Mounting Hole	Weight (kg)
	A	B	H	H1	W	D		
IS300T040								
IS300T050								
IS300T070	260	580	549	600	385	265	φ10	32
IS300T080								
IS300T100								
IS300T140	343	678	660	700	473	307	φ10	47
IS300T170								
IS300T210	449	905	880	930	579	375	φ10	90
IS300T250								
IS300T300								

1) Physical Dimensions of External Keyboard

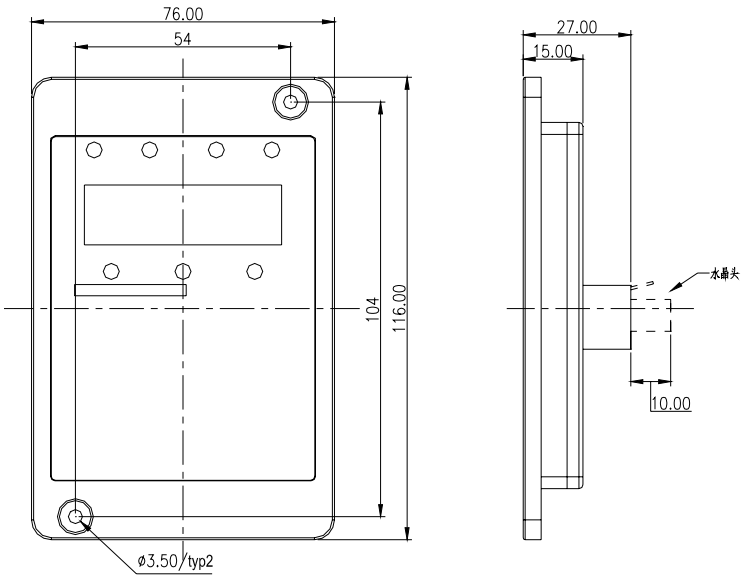


Fig.2-6 Schematic Diagram for Physical Dimensions of External Keyboard

2) Mounting Hole Dimensions of External Keyboard

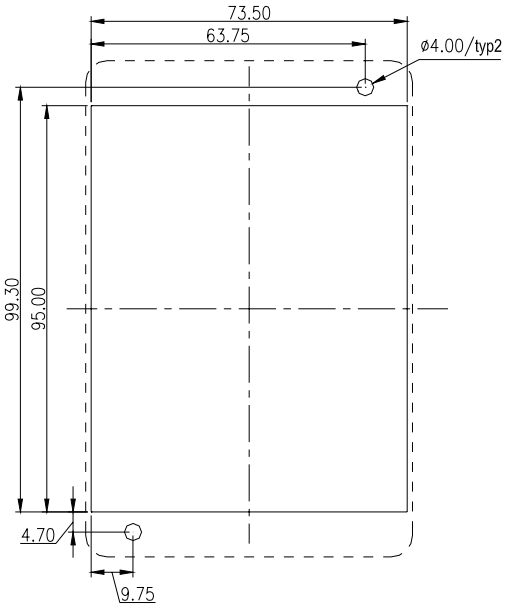


Fig.2-7 Schematic Diagram for Mounting Hole Dimensions of External Keyboard

3) Schematic Diagram for Physical Dimensions of External reactor

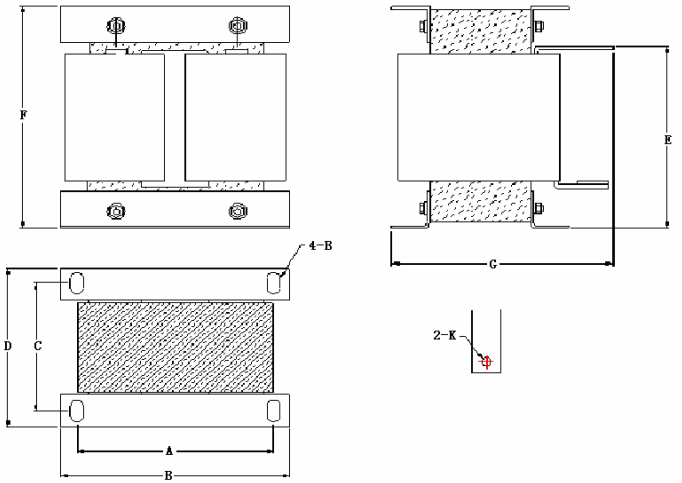


Fig.2-8 Schematic Diagram for Physical Dimensions of External Reactor

Table 2-4 Physical Dimensions table of External Reactor（mm）

Servo Driver Model	A	B	C	D	E	F	G	Fixing Hole	Connecting Diameter of Copper Platoon
IS300T140 IS300T170 IS300T210	160	190	125	161	192	255	195	10*15	φ12
IS300T250 IS300T300	160	190	125	161	192	255	195	10*15	φ12

Note

- For special requirements, the user can customize non-standard products.

*External DC reactor installation mode:

IS300 series Servo Driver of over IS300T140 (included), all employs standard external DC reactor, which is packed in independent wooden box and

delivered together with the Servo Driver. When mounting the Servo Driver, the user needs to remove the short circuit bus between the terminals P and (+) of the main circuit of the Servo Driver and then connect the DC reactor between P and (+). There is no polarity between the reactor terminal and the Servo Driver terminals P and (+) . After the DC reactor is mounted, the short circuit bus between P and (+) will not be used.

2.6 Optional Parts

For detailed functions and usage instructions, see the related options description.
If you require the following options, see description when ordering.

Table 2-5 IS300 Servo Driver Optional Parts

Name	Model	Function	Remarks
Built-in brake unit	The letter "B" attached behind the product model	Built-in brake unit of IS300T035 to IS300T050 (optional)	Built-in brake unit of IS300T005 to IS300T030 is standard configuration.
External brake unit	MDBU	External brake unit of above IS300T070 (included)	If IS300T140 (included) or above is required, it can employ the parallel mode.
Energy feedback unit	MDFB	The servo driver is a energy saving product which can feed the electric energy back to AC power grid.	It can employ the parallel mode.
External LED operation panel	MDKE	External LED display and operation keyboard	IS300 series general-purpose RJ45 interface

Name	Model	Function	Remarks
Extended cable	MDCAB	Standard 8-core network cable and it can be connected with MDKE.	1m, 3m,5m and 10m are available.
Rectifier unit	MFRU	It is used when the driver shares the bus and has energy saving function.	

2.7 Routine Repair and Maintenance of Servo Driver

2.7.1 Routine Repair

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

Danger
It is not allowed to conduct repair and maintenance on the driver right after power shutdown because there is still high voltage on the filter capacitor. 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 servo driver;
4) Whether the servo driver cooling fan works normally;
5) Whether the servo driver has over temperature;

Routine cleaning:

1) The driver shall be kept clean all the time.
2) The dust on the surface of the servo driver shall be effectively removed, so as to prevent the dust entering the servo driver. Especially the metal dust is not allowed.
3) The oil stain on the driver cooling 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:

1) Check and clean the air duct periodically;
2) Check if the screws are loosened;
3) Check if the driver is corroded;
4) Check if the wire connector has arc signs;
5. Main circuit insulation test

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

2.7.3 Replacement of Vulnerable Parts for Driver

The vulnerable parts of the driver 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 ～ 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 is aging.

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 Driver

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

1) Pack the driver 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 Driver

Free warranty only applies to the driver 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:
   a） The equipment is damaged because the user fails to comply with the requirements of the user's manual;
   b） Damage caused by fire, flood and abnormal voltage;
   c） Damage caused when the driver 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

Three control modes are available, namely, V/F and VC.

When selecting driver, 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 driver, 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.

Constant torque load: Most of loads have constant toque characteristics, but the requirements for rotation speed 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.

The controlled object has higher dynamic and static index requirements: It can employ VC control mode in applications where the requirements for speed adjustment precision and dynamic performance index are relatively high and there is high precision synchronous control. Injection molding machine,elevator, paper making and plastic thin film processing product line are the examples.

2.10 Guide to Prototyping of Brake Components

(*): Table 6 Driver Bake Components Prototyping Table provides data for reference, and the user can select different resistance and power according to the actual needs (but the resistance shall not be lower than the recommended value, and the power may be higher than the recommened value). The selection of brake resistor shall be determined in accordance with the power generated by the motor in the actual application sytem and is associated with the system inertia, speed-down time and energy of potential load. Thus, the user needs to select based on the actual needs. The higher the system inertia, the shorter the speed-down time required, and more frequent the brake is, and then it needs to select higher power and lower resistance vlaue for the brake resistor.

2.10.1Selection of resistance vlaue

Renewable electric energy consumption is almost the braking resistor when braking.

Refer to the formula U*U/R=Pb,

In the formula, U refers to stable Braking system of Brake voltage. (Different system has different brake voltage. The system 380VAC is 700V).Pb refers to the Braking power.

2.10.2 Selection of braking resistor Power

Theoretically, braking Power is consistent with braking Power.But in consideration of the 70 percent derating,please refer to the formula 0.7*Pr=Pb*D, Pr refers to the resistor Power, D refers to braking frequency(Which is the regeneration process accounting for the proportion of the whole working process).For example, the braking frequency of elevator is between 20% to 30%, the winding and unwinding is between 20% to 30%.The centrifuge is between 50% to 60%, Occasional braking load is 5%. Injection molding machine braking load is 10%.

Table 2-6Servo driver Bake Components Prototyping Table

Servo Driver model	Recommended Power of Brake Resistor	Recommended Resistance Value of Brake Resistor	Braking Unit	Remarks
IS300T005	300W	≥130Ω	Built-in as standard	No special specification
IS300T010	400W	≥90Ω		
IS300T015	500W	≥65Ω		
IS300T020	800W	≥43Ω		
IS300T030	1000W	≥32Ω		
IS300T035	1300W	≥25Ω		
IS300T040	1500W	≥22Ω		
IS300T050	2500W	≥16Ω		
IS300T070	3.7 kW	≥16Ω	Externally connected	MDBU-35-B
IS300T080	4.5 kW	≥16Ω	Externally connected	MDBU-35-B
IS300T100	5.5 kW	≥8Ω	Externally connected	MDBU-70-B
IS300T140	7.5 kW	≥8Ω	Externally connected	MDBU-70-B
IS300T170	4.5 kW×2	≥8Ω×2	Externally connected	MDBU-70-B×2
IS300T210	5.5 kW×2	≥8Ω×2	Externally connected	MDBU-70-B×2

Servo Driver model	Recommended Power of Brake Resistor	Recommended Resistance Value of Brake Resistor	Braking Unit	Remarks
IS300T250	6.5 kW×2	≥8Ω×2	Externally connected	MDBU-70-B×2
IS300T300	16kW	≥2.5Ω	Externally connected	MDBU-210-B

Note: ×2 refers to two Braking unit paralleled with their respective brake resistor; the meaning of ×3 is the same with ×2.

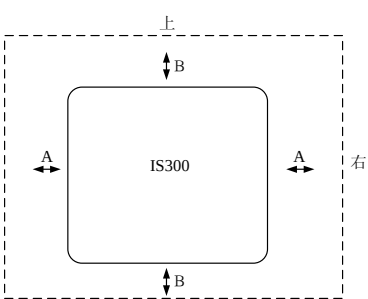
Mechanical and Electric

Chapter 3 Mechanical and Electric Installation

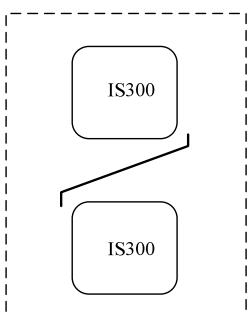
3.1 Mechanical installation

3.1.1 Installation environment:

1) Ambient temperature: The ambient temperature exerts great influences on the service life of the servo driver and is not allowed to exceed the allowable temperature range (-10 ℃ Celsius to 50 ℃ Celsius).
2) The driver shall be mounted on the surface of incombustible articles, with sufficient spaces nearby for cooling. The servo driver is easy to generate large amount of heat during the operation. The servo driver shall be mounted vertically on the base with screws.
3) The servo driver 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 servo driver shall be mounted in locations free from direct sunlight, high humidity and condensate.
5) The servo driver shall be mounted in locations free from corrosive gas, explosive gas or combustible gas.
6) The servo driver shall be mounted in locations free from oil dirt, dust, and metal powder.



Single Unit Installation Diagram



Installation Diagram of Upper and Lower Parts

Note

When the servo driver power is not higher than IS300T040, the A size can be omitted. When the servo driver power is higher than IS300T040, the A size shall be higher than 50mm.

Note

When installing the upper and lower parts of the servo driver, the insulating splitter is required.

Power level	Physical Dimensions	
	B	A
≤IS300T030	≥100mm	No requirements
IS300T035—IS300T050	≥200mm	≥50mm
≥IS300T070	≥300mm	≥50mm

Fig.3-1 Servo Driver Installation Diagram

3.1.2 Cooling problem shall be taken into account during the mechanical installation. Pay attention to the following items:

1) Install the servo driver vertically so that the heat may be expelled from the top. However, the equipment cannot be installed upside down. If there are multiple servo drivers, parallel installation is a better choice. In applications where the upper and lower parts of the driver need to be installed, please refer to “Servo driver Installation Diagram” and install an insulating splitter.
2) The mounting space shall be as indicated as the above figure, so as to ensure the cooling space of the Servo driver. 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 radiator outside the cabinet. In this case, the space in the sealed cabinet shall be large enough.

3.1.3 Removing and mounting the down cover plate:

The IS300T030 (included) employs plastic enclosure. Please refer to Figure 3-2 for removing the lower cover plate of the plastic enclosure. The hooker of

the lower cover plate is easy to pull out with tools by forces inside.

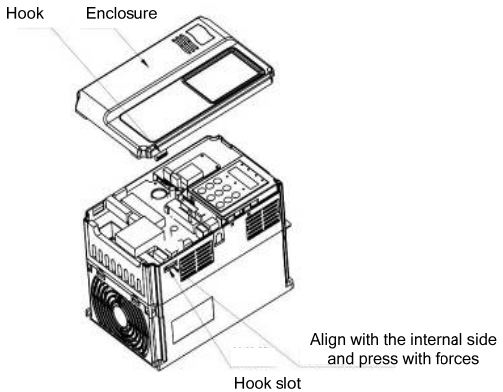


Fig.3-2 Removing theDown Cover Plate of Plastic Enclosure

The servo driver above IS300T035 (included) employs sheet-metal enclosure. Please refer to Figure 3-3 for removing the down cover plate of the sheet-metal enclosure. It is easy to loosen the screws of the upper cover plate with tools.

⚠ Note
● When removing the upper cover plate, be sure to avoid the falling of the upper cover, which may cause human injury or damage to the equipment.

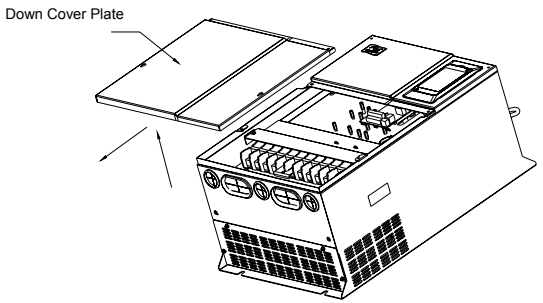


Fig.3-3 Removing the Down Cover Plateof Sheet-Metal Enclosure

3.1.4 The Installation of permanent-magnet synchronous servo motor and pressure transducer

Servo motors work process will appear to start and stop state from repeated high-speed.It easily lead to motor vibration, causing system instability.Please make sure that the electrical installation is fixed and reasonable.

Take the following one installation fixed way (the massive rubber cushion with fixed bolts) as an example for reference.

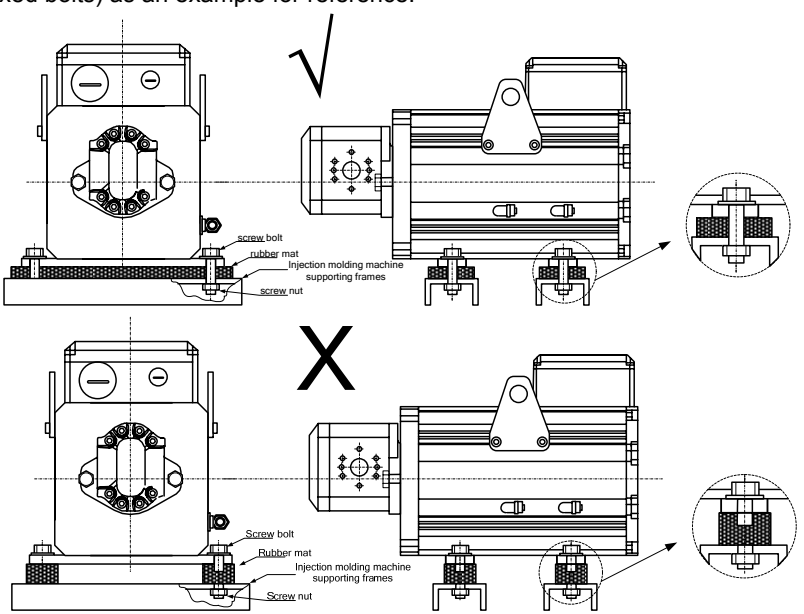


Fig.3-4 Permanent-magnet Synchronous Servo Motor Installation Diagram

The Servo pump work process would lead to vacuum state,in order to prevent air entering the pressure sensor intra-cavity that cause the pressure sensor damaged,please ensure the pressure sensor cavity always retain hydraulic oil, Please follow the oil pressure sensor installed vertically upward, as shown at the fllowing.

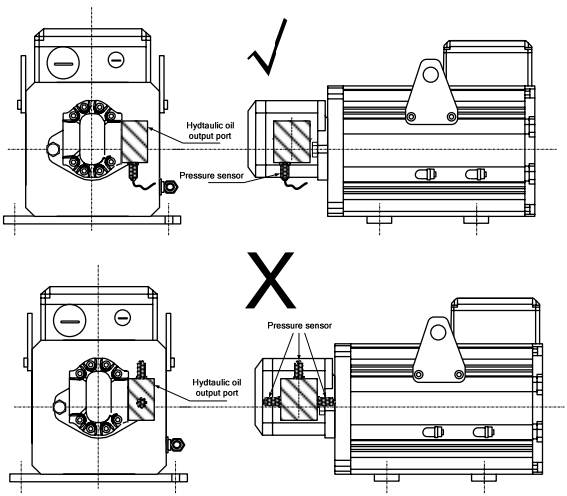


Fig.3-5Pressure Sensor Installtion Mode

3.2 Electrical Installation

3.2.1 Guide to the external electrical parts:

Table 3-1 Guide to Prototyping of External Electrical Parts of IS300 servo driver

Servo Driver Modle	Circuit breaker(MCCB) (A)	Recommended Contactor (A)	Recommend-ed Input filterA	Recommend-ed Conducting Wire of Main Circuit at the Input Side mm^2	Recommended Conducting Wire of Main Circuit at the Output Side mm^2	Recomme-nded Conducting Wire of Control Circuit mm^2
IS300T005	25	16	25	4	4	1.5
IS300T010	32	25	35	4	4	1.5

Servo Driver Modle	Circuit breaker(MCCB) (A)	Recommended Contactor (A)	Recommend-ed Input filterA	Recommend-ed Conducting Wire of Main Circuit at the Input Side mm^2	Recommended Conducting Wire of Main Circuit at the Output Side mm^2	Recomme-nded Conducting Wire of Control Circuit mm^2
IS300T015	40	32	35	4	4	1.5
IS300T020	63	40	50	4	4	1.5
IS300T030	63	40	50	6	6	1.5
IS300T035	100	63	80	6	6	1.5
IS300T040	100	63	80	10	10	1.5
IS300T050	125	100	100	16	10	1.5
IS300T070	160	100	120	16	16	1.5
IS300T080	200	125	150	25	25	1.5
IS300T100	200	125	150	35	25	1.5
IS300T140	250	160	200	50	35	1.5
IS300T170	250	160	200	70	35	1.5
IS300T210	350	350	250	120	120	1.5
IS300T250	400	400	300	150	150	1.5
IS300T300	500	400	400	185	185	1.5

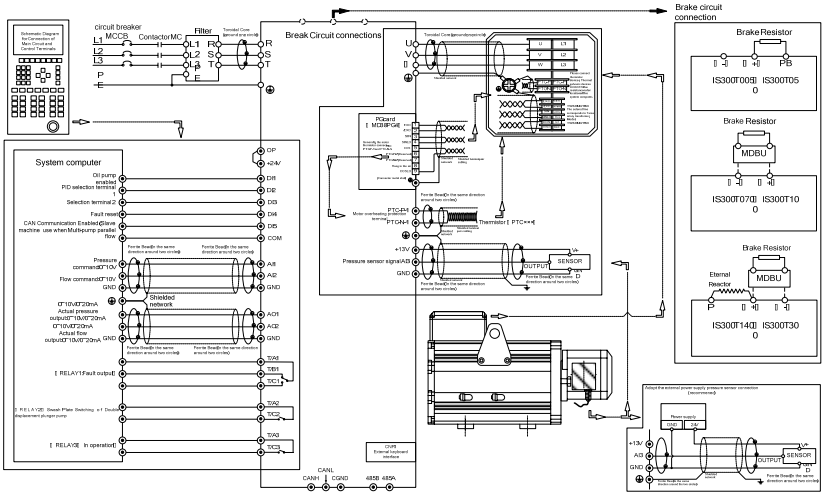
3.2.2 Using instruction of external electrical parts:

Table 3-2 Instruction for the Use of External Electrical Parts of IS300 Servo Driver

Part Name	Mounting Location	Function description
Circuit breaker	Front end of input circuit	Disconnect the power supply when the equipment at the lower part is over current.
Contactor	Between the circuit breaker and the servo driver input side	Connection and disconnection of servo driver. Frequent power-on and power-off operations on the servo driver shall be avoided.
AC input reactor	Input side of the servo driver	1) Improve the power factor of the input side; 2) Eliminate the higher harmonics of the

Part Name	Mounting Location	Function description
		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 servo driver	1) Reduce the external conduction and radiation interference of the servo driver. 2) Decrease the conduction interference flowing from the power end to the servo driver and improve the anti-interference capacity of the servo driver.
DC reactor	IS300 series servo driver adopts DC reactor above IS300T015 (included) as standard.	1) Improve the power factor of the input side; 2) Improve the whole efficiency and thermal stability of the servo driver. 3) Eliminate the impact of higher harmonics of the input side on the servo driver and reduce the external conduction and radiation interference.
AC output reactor	Between the servo driver output side and the motor. Close to the servo driver.	The servo driver output side generally has higher harmonics. When the motor is far from the servo driver, 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 servo driver protection. In general, the distance between the servo driver and the motor exceeds 100 meters. Installation of output AC reactor is recommended.

3.2.3 Connections of servo pump



Schematic Diagram for Servo Pump Connections

3.2.4 Main Circuit Terminals and Connections

Danger
● Make sure that the power switch is in OFF status prior to perform wiring connection. Otherwise there may be danger of electric shock! ● ● Only the qualified and trained personnel can perform wiring connection. Otherwise it may cause equipment and human injuries! ● It shall be earthed reliably. Otherwise there may be danger of electric shock or fire! ● Make sure that the rated value of the input power supply is consistent with that of the driver. Otherwise it may damage the driver! ● Make sure that the motor matches the driver. Otherwise it may damage the motor or generate driver protection! ● Do not connect the power supply to the terminals of U, V and W. Otherwise it may damage the driver! ● Do not directly connect the brake resistor between the DC bus terminals (+) and (-). Otherwise it may cause fire!

1）**Description** of main circuit terminals of single-phase servo driver:

Terminals	Name	Description
R、S、T R、S and T	Input terminal of three-phase power supply	AC single-phase 220V power connection point
(+)、(-)(+) and (-)	Negative and positive terminals of DC bus	Shared DC bus input point (connection point of external braking unit of above IS300T070（included）
(+)、PB(+) and PB	Connecting terminal of brake resistor	Connection point of Brake resistor of below IS300T050(included)
P、(+)P and (+)	Connection terminal of external reactor	Connection point of external reactor above IS300T140(included)
U、V、W U, V and W	Output terminal of servo driver	Connect the three-phase motor
⏚	Earth terminal	Earth terminal

3) Precautions on Wiring:

a） Input power R, S and T:

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

b） DC bus (+) and (-) terminals:

Note that the (+) and (-) terminals of DC bus have residual voltage right after power-on. It needs to wait until the CHARGE indictor is OFF and make sure that the voltage is less than 36V prior to wiring connection. Otherwise there may be danger of electric shock.

When selecting external brake unit for the driver of above IS300T07 (inculded), the poles of (+) and (-) shall not be connected reversely, or it

may damage the driver and even cause fire.
The wiring length of the brake unit shall not exceed 10 meters. Twisted wires or pair wires shall be used and connected in parallel.
Do not connect the brake resistor directly to the DC bus, or it may damage the servo driver and even cause fire.

c） Connecting terminals (+) and PB of brake resistor:
The connecting terminals of the brake resistor are effective only for the servo driver of below IS300T050 (inculded) 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 servo driver.

d） Connecting terminals P and (+) of external reactor:
For the servo driver of above IS300T140 (included)with external reactor, when assembling, remove the connector between terminals P and (+) and connect a reactor instead.

e） Terminals U, V, W at the output side of the servo driver:
The servo driver output side cannot connect to the capacitor or surge absorber. Otherwise, it may cause frequent servo driver protection and even damage the servo driver.
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 servo driver. When the length of motor cable is longer than 100 meters, it needs to install a AC output reactor.

f） Earth terminal ⏚PE:
This terminal shall be earthed reliably, with resistance of earth cable of less than 0.1Ω. Otherwise, it may cause fault or damage the servo driver.
Do not share the earth terminal and zero line of the power supply.

3.2.5 Control terminals and connection:

1）The control circuit terminals are arranged as follows:

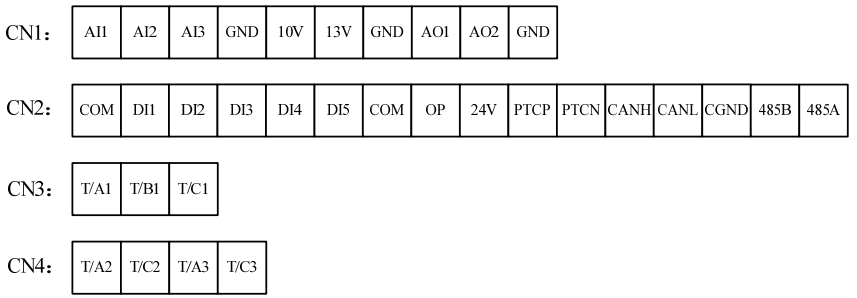


Fig.3-7 Layout of Control Circuit Terminals

2）Function description of control terminal:

Table 3-3 Description of Control Terminal Function of Servo Driver

Type	Terminal	Terminal name	Function description
power supply	+10V-GND	10V power supply	Provide 10V±10% power supply for external- units, and the maximum output current is 10mA. It is generally used as the operating power supply for the external potentiometer. The potentiometer resistance range is 1kΩ～ 5kΩ.
	+13V-GND	Pressure sensor power supply	Provide 13V±10% power supply for external units. The maximum output current is 10mA. It is generally used as the operating power supply for pressure sensor.

Type	Terminal	Terminal name	Function description
	+24V-COM	＋24V power supply	Provide +24V power supply for external units. It is generally used as the operating power supply for digital input/output terminals. 24V±10%, no-load vitual voltage can not exceed 30V. The maximum output current is 200mA. It is internally insulated with GND.
	OP	External power input terminal	COM and 24V is internally insulated .Connect to 24V by default upon delivery. When external signal is used to drive DI1～DI5, OP needs to connect to the external power supply and disconnect from the +24V power terminal.(It is determined by the J4 jumper on the control board.)
Analog Input	AI1-GND	Analog input terminal 1 （The default pressure setting）	Input Voltage range：±10V The resolution is 12 bit, the correction precision is 0.5 pensent. 2、 Input resistance：100kΩ。Input resistance: 100kΩ.
	AI2-GND	Analog input terminal 2 （The default flow settup）	1、 The resolution is 12 bit, the correction precision is 0.5 pensent. 2、 Input resistance：100kΩ。
	AI3-GND	Analog input terminal 3 （default pressure sensor signal input）	1. Input range: ±10V/0 to 20mA, which is determined by J3 jumper on the control board. There is 12-bit resolution, the correction precision is 0.5 pensent. 2. Input impedance: It is 100kΩ at the time of voltage input and 500Ω at the time of current input.

Type	Terminal	Terminal name	Function description
Digital Input	DI1-COM	Digital input 1	1、Insulate drain-to-source input programmable terminals,input frequency is less than 100 Hz; 2、 Input resistance：3.3kΩ； 3、Voltage range for level input：9V～ 30V。
	DI2-COM	Digital input 2	
	DI3-COM	Digital input 3	
	DI4-COM	Digital input 4	
	DI5-COM	Digital input 5	
	PTCP-PTCN	Motor overheating protection input	Motor overheating protection PTC sensor,support PTC130 、PTC150 etc.
Communication Terminal	CANH	CAN Communication terminal	The higest communication speed is 1Mbps.Whether to connect terminal resistance is determined by the J4 jumper on the control board.
	CANL		
	CGND		
	485B	485 Communication terminal	Retain the terminal without the funtion by default, the highest communication speed is 230Kbps with isolation.
	485A		
Analog Output	AO1-GND	Analog output 1	The voltage or current output is determined by the J3 jumper on the control board. Output range: 0V ～10V and 0mA～20mA. There is 12-bit resolution, the correction precision is 1 pensent, the maximum load resistance value is not less than 500Ω.
	AO2-GND	Analog output 2	The voltage or current output is determined by the J24 jumper on the control board. Output range: 0V ～ 10V and 0mA ～ 20mA. There is 12-bit resolution, the correction precision is 1 pensent,the maximum load resistance value is not less than 500Ω.
Realy	T/A1-T/B1	Normally closed terminal	Contact driving capacity:

Type	Terminal	Terminal name	Function description
output	T/A1-T/C1	Normally open terminal	AC250V，3A，COSφ=0.4。 DC 30V，1A。
	T/A2-T/C2	Normally open terminal	
	T/A3-T/C3	Normally open terminal	
Auxiliary interface	CNR1	External keyboard interface	External keyboard and parameter copy unit interface

Function Instructions of PG Card Terminal

Table 3-4 Function Instructions of Servo Driver PG Card Terminal

Item	name	Description
1	EXC	Excitation Signal
2	/EXC	
3	SIN	SIN Feedback Signal
4	SINLO	
5	COS	COS Feedback Signal
9	COSLO	
6	PTC-P	Motor overheating protection PTC sensor,support PTC130 、PTC150 ,etc.
7	PTC-N	
8	--	--

3) Description of Connection of control terminals:

A. Analog input terminal:

Since the weak analog voltage signal is easy to suffer external interferences, it needs to employ shielded cable generally and the length shall be no longer than 20 meters, as shown in Fig. 3-8. In case the analog signal is subject to severe interference, and analog signal source side shall be installed with filter capacitor or ferrite magnetic core, as shown in Fig.3-9.

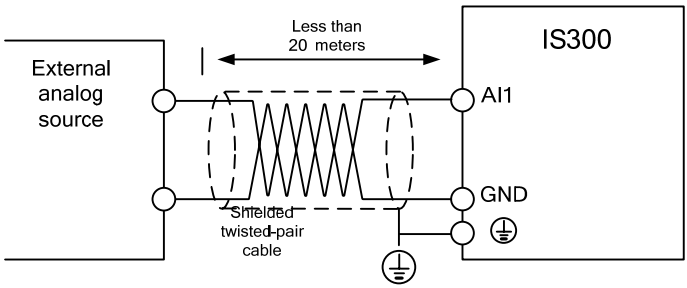


Fig.3-8 Schematic Diagram for Connection of Input Terminal of Analog Signal

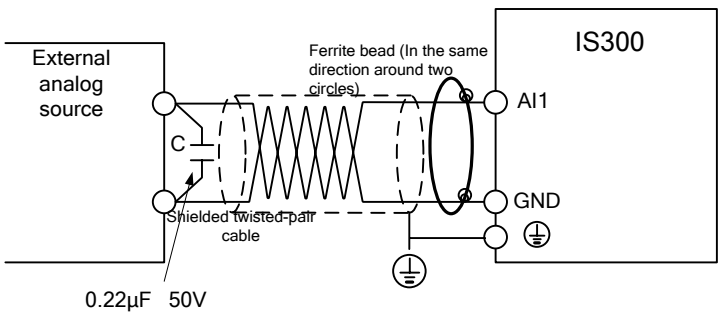


Fig.3-9 Schematic Diagram for Connection of Input Terminal of Analog Signal

B：Digital input terminal:

It needs to employ shielded cable generally, with cable length of no more than 20 meters.

When enabled driving is adopted, necessary filtering measures shall be taken to prevent the interference to the power supply.

It is recommended to use the contact control mode.

C. DI Terminal Connection:

1、 Connection with dry contact sharing the negative pole

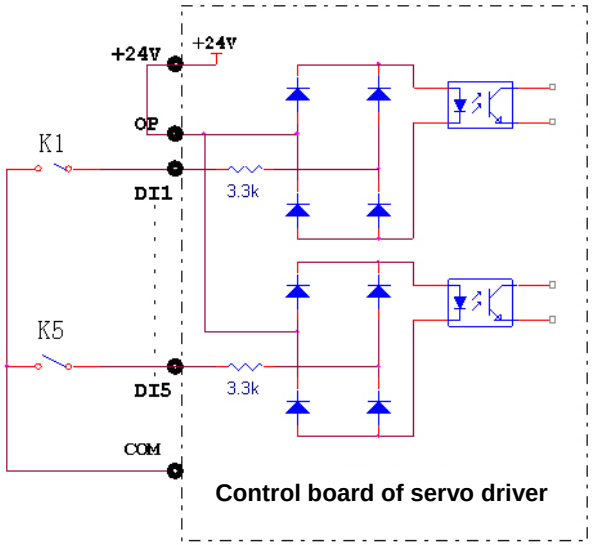


Fig.3-11 Connection with dry contact sharing the negative pole

This is one of the most commonly used connection mode. If external power supply is used, it must remove the short circuit copper bars between +24V and OP respectively,（which is determined by J11 jumper on the control board. ） and connect the positive pole of external power supply to OP and negative pole to CME.

2、 Connection with dry contact sharing the positive pole

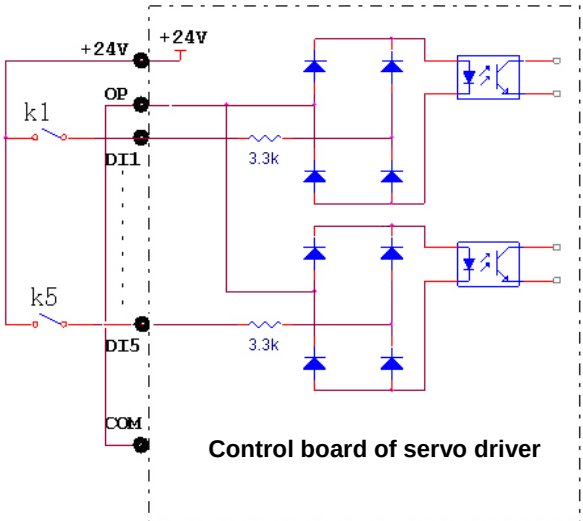


Fig.3-11 Connection with dry contact sharing the positive pole

It must remove the short circuit copper bar between +24V and OP（which is determined by J11 jumper on the control board.）and then connect OP with CME.

4

Operation and Display

Chapter4 Operation and Display

4.1 Introduction to Operation and Display Interface

With the operation panel, it can perform such operations on the driver as function parameter modification, driver working status monitoring and driver running control (startup and stop). Refer to Fig.4-1 for the physical appearance and functional zone of the operation panel.

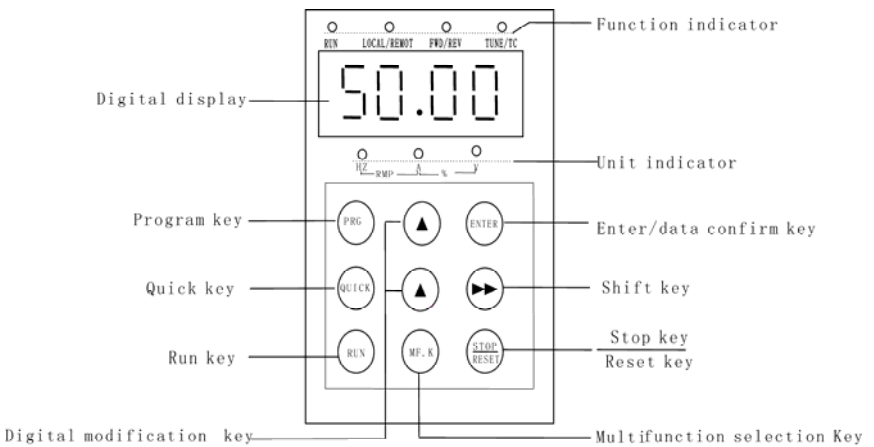


Fig.4-1 Operation Panel Diagram

1) Description of Function LED Indictor:

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

LOCAL/REMOT: It is the LED indictor for keyboard operation, terminal operation and remote operation (communication control). When it is OFF, it indicates the keyboard operation control status; when it is ON, it indicates the terminal operation control status; when it flashes, it indicates the remote operation control status.

FWD/REV: It is the LED indictor for forward/reverse rotation. When it is OFF, it indicates the driver is in forward rotation status; when it is ON, it indicates the driver 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 speed unit.
% refers to percentage
3) Digital display zone:
Five-digit LED display, able to display setup frequency, output frequency, various monitoring datas and alarm codes.

4） Keyboard button description

Button	Name	Function
PRG	Programming key	entry and exit of primary menu, deletion of shortcut parameter
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 running of the driver under keyboard control mode.
STOP/RESET	Stop/reset	Press this button to stop the running in the running status and reset the operation in the fault alarm status. These button characteristics are limited by the function code F7-02.
QUICK	Shortcut key	It can be used to enter or exit level 1 menu of the shortcut menu. Refer to the QUICK operation description for details.
MF.K	Multi-function selection key	In case F7-01=0, it has no function; In case F7-01=1, it serves as the key switching between local operation and remote operation. In case F7-01=2, it serves as forward/reverse rotation switching key; In case F7-01=3, it serves as forward rotation Jog key; Refer to F7-01 for the detailed operation.

Table 4-1 Keyboard Function

4.2 Description of Function Code Viewing and Modification Methods

The operation panel of the IS300 servo driver 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). Refer to Fig.4-2 for the operation procedure.

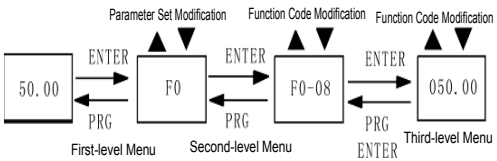


Fig.4-2 Operation Procedure of Three-level Menu

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 and return to the level 2 menu and then 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 F3-02 from 10.00Hz to 15.00Hz. (The bold-type work indicates the flashing bit.)

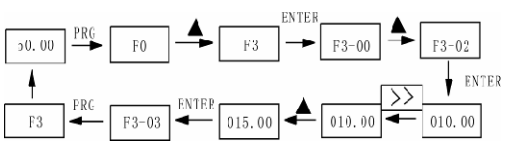


Fig.4-3 Example of parameter editing operation

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 Shortcut Menu Operation Mode

The shortcut menu is set to facilitate the user to quickly view and modify the commonly used function parameters. In the shortcut menu, the parameter is displayed in the form of “UA3-01”, which indicates the function parameter A3-01. Parameter modification in the shortcut menu has the same effect as the operation in the common programming status.

The shortcut menu can contain 16 function parameters at most. If there are 16 parameters and the user wants to add more, it will display “FULL”. If “NULL” is displayed when entering the menu, it indicates that the shortcut menu is NULL. The shortcut menu operation is limited by the function code F7-03. When F7-3 is set to “0”, addition or deletion operation can be performed on the shortcut menu. When F7-03 is set to “1”, the parameter option is locked and addition or deletion operation is inenabled.
The shortcut menu has stored the 16 common parameters by default for the convenience of the user:

uA3-01	Maximum rotation speed	uA3-09	Minimum flow
uA3-02	System oil pressure	uA3-10	Minimum pressure
uA3-03	Maximum oil pressure	A3-20	AI zero drift auto correction
uA3-04	Oil pressure command risetime	uF2-00	Speed loop proportional gain 1
uA3-05	Kp1Oil pressure control Kp1	uF2-01	Speed loop integration time 2
uA3-06	Ti1 Oil pressure control Ti1	uF2-03	Speed loop proportional gain 2
uA3-07	Td1 Oil pressure control Td1	uF2-04	Speed loop integration time 2
uA3-08	Maximum reverse rotation speed		
uF4-32	AI3 Input filter time		

The user can edit the shortcut menu in accordance with the actual needs.
1) Add shortcut parameter item:

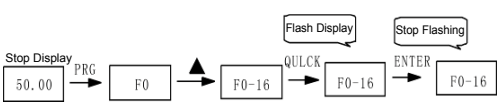


Fig.4-4 Example of Adding Shortcut Parameter Item

Note: When pressing QUICK key during the programming of level 2 menu, the

display flashes and prompts whether to save the parameter into shortcut menu. Press ENTER key for confirmation, the display stops flashing, and the operation is completed. Press PRG key to cancel, the display stops flashing, and the operation is cancelled.

2) Modification of shortcut parameters

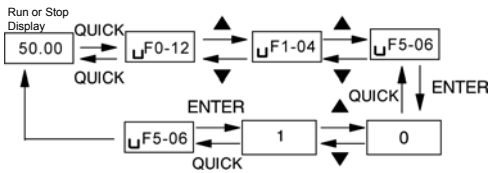


Fig.4-5 Example of Modification of Shortcut Parameters

Run or Stop Desplay：

Note: In Stop or running display interface, press QUICK key to enter shortcut key, and select different shortcut parameters with UP/DOWN key. Then press ENTER key to enter next level of menu. At this time the modification method of shortcut parameter is the same as that of the parameters in common level 3 menu. To return to the upper level display, press QUICK key, and the modified parameters will not be saved.

3) Delete shortcut parameter item:

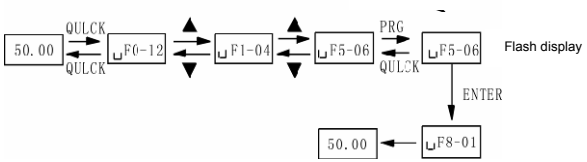


Fig.4-6 Deletion of Shortcut Menu

Note: Press PRG key in shortcut menu, the display flashes and prompts whether to delete the parameter. Press ENTER key for confirmation, the display stops flashing and the deletion operation is completed. Press QUICK key, the display stops flashing, and the deletion operation is canceled. If the last shortcut parameter is deleted, “NULL” will be displayed upon deletion, indicating that the shortcut menu is NULL.

4.4 Method of Viewing Status Parameter

In stop or running status, it can display multiple status parameters. It can select whether to display the parameter through the function codes F7-04 (running parameter) and F7-05 (stop parameter) in accordance with the binary bits. For the meanings of the binary bits, refer to Chapter 6 F7-04 and F7-05 Function Codes for details.

In the running status, five running status parameters are always displayed, namely, setup frequency, bus voltage, output voltage , and output current, and other sixteen parameters, namely, DI input status, DO output status, analog input AI1 voltage, analog input AI2 voltage, analog input AI3 voltage and four reserved parameters ,etc.They are displayed in accordance with the selection of F7-04 (converted into decimal system). The displaying of the selected parameters may be switched by the button sequence.

In the stop status, there are totally sixteen stop status parameters for selection, namely, setup frequency, bus voltage, DI input status, DO output status, analog input AI1 voltage, analog input AI2 voltage, analog input AI3 voltage（or current） and five reserved parameters,They are displayed in accordance with the selection of F7-05 (converted into decimal system).The displaying of the selected parameters may be switched by the button sequence.

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

4.5 Password Setup

The driver 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 the function code editing status. When pressing PRG key again, "------" will be displayed, and common menu cannot be entered until user password is input correctly.

To cancel the password protection function, enter with password and set FP-00 to "0".
The user password protection for the parameter items in the shortcut men depends on the status of F7-03, and is inenabled for the parameter values.

4.6 Automatic Tuning of Motor Parameters

To select the vector control running mode, it must input the nameplate parameter of the motor accurately prior to the running of the driver. The IS300 servo driver will select standard motor parameters matching the nameplate parameter. Since the vector control mode relies highly on the motor parameters, it must acquire the accurate parameters of the controlled motor to ensure the good control performance.

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

First, select the command source (F0-02) as the command channel of the operation panel.

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

F1-01: Rated motor power
F1-02: Rated motor voltage
F1-03: Rated motor current
F1-04: Rated motor frequency
F1-05: Rated rotation speed of motor

If the back EMF of motor is unknown, please make the motor completely disconnect from the load，and set F1-16＝“2”(dynamic tuning),and press RUN key on the keyboard panel, then the servo driver will automatically calculate the following parameters:

F1-11: D axis inductors
F1-12: Q axis inductors
F1-13: Stator resistance
F1-14: Unit
F1-15: Back EMF
A1-02: Encoder installation angle

Finally, complete the dynamic tuning of motor parameters.

If the motor back-EMF is known, please set the parameter to F1-15 according to the motor back-EMF ,the motor can not be completely disconnect from the load，and set F1-16＝“2”(dynamic tuning),and press RUN key on the keyboard panel, then the servo driver will automatically calculate the following parameters:

F1-10: No-load current
F1-11: D axis inductors
F1-12: Q axis inductors
F1-13: stator resistor
F1-14: Unit
F1-15: **Back EMF**
A1-02: Encoder nstallation angle

Finally, complete the static tuning of motor parameters.
You can calculate motor back-EMF according to the motor basic parameters, the motor basic parameters for calculation are rated-EMF coefficient of V1000rpm (V/1000rpm) and the rated speed v (RPM):

Motor back EMFcalculation method as show follows:

Back EMF: Vemf = V1000 * v/1000

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Function Parameter Table

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 entered until correct password is input. To cancel the password, it needs to set FP-00 to “0”.

The parameters in the shortcut menu are free from password protection.

The symbols in the function table are described as follows:

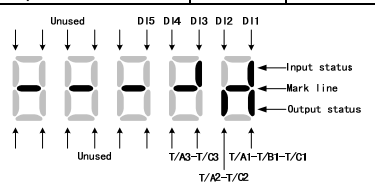
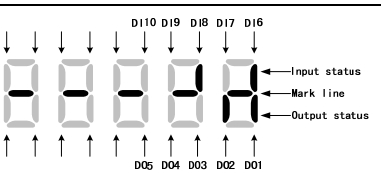
It indicates that the parameter setup value can be modified when the driver is in stop status and running status.

It indicates that the parameter setup value cannot be modified when the driver is in the running status.

It indicates that the numerical value of the parameter is the actually measured value, which cannot be modified.

“*”: It indicates this parameter is “Factory default parameter” and can be set only by the manufacturer.

Function Parameter Table
(Common Parameter reference to appendix table)

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification description
Group U0 Driver Parameter Viewing Group						
U0-00	Running frenquency	Running frenquency	0.00Hz ～maximum frequency（F0-10）	—	—	●
U0-01	Setup frenquency	Setup frenquency	0.00Hz ～ T maximum frequency（F0-10）	—	—	●
U0-02	Bus voltage	Bus voltage	0V～ 830V	—	—	●
U0-03	Output voltage	Output voltage	0V ～ Motor rated voltage（F1-02）	—	—	●
U0-04	Output Current	Output Current	0.01A ～ 655.35A	—	—	●
U0-05	Output power	Output power	0.4kW ～1000.0kW	—	—	●
U0-06	Output torque	Output torque	0.0% ～ Upper limit torque（F2-10）	—	—	●
U0-07	Local DI/DO status	Local DI/DO status				●
U0-08	Expansion DI / DO status	Expansion DI / DO status				●
U0-09	Voltage(after corrected)	Voltage(after corrected)	-10.00V～10.000V	—	—	●
U0-10	AI12 voltage after corrected)	AI12 voltage after corrected)	-10.00V～10.000V	—	—	●

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification description
U0-11	AI3voltage after corrected)	AI3voltage after corrected)	-10.00V～10.000V	—	—	●
U0-12～U0-29	Reserved	—	—	—	—	●
U0-30	AI11voltage （before corrected)	AI11voltage （before corrected)	-10.00V～10.000V	—	—	●
U0-31	AI12voltage before corrected)	AI12voltage before corrected)	-10.00V～10.000V	—	—	●
U0-32	AI13voltage before corrected)	AI13voltage before corrected)	-10.00V ～10.000V	—	—	●
Group A0 Weak Magnetism and SVC Control Group						
A0-00	Weak magnetism control mode	Weak magnetism control mode	0: Direct calculation 1: Automatic adjustment	1	0	★
A0-01	Weak magnetismcurrent coefficient	Weak magnetism current coefficient	80%～200%	1	100%	★
A0-02	Weak magnetism current upper limit	Weak magnetismcurrent upper limit	0～120	1	100%	★
A0-03	Weak magnetism Integral multiples	Weak magnetism Integral multiples	200～1000	1	400	★
A0-04	Weak magnetism adjustment coefficient	Weak magnetism adjustment coefficient	0～100	1	4	★
A0-05	Output phase failure PWM detection time	Output phase failure PWM detection time	0～63000	1	0	★
Group A1 PG Card						

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification description
A1-00～A1-01	Reserved	-	-	-	-	★
A1-02	Encoder installation angle	Encoder installation angle	0.0°～359.9°	0.1°	0.0°	☆
A1-03	Select the reverse feedback speed	Select the reverse feedback speed	0～1	1	0	☆
A1-04	Rotary transformer number of pole-pairs	Rotary transformer number of pole-pairs	1～50	1	1	★
Group A2 CAN Communication Group						
A2-00	Baud rate selection	Baud rate selection	0：20k 1：50k 2：125k 3：250k 4：500k 5：1M	1	4	☆
A2-01	CAN communication address	CAN communication address	1～255	1	1	☆
A2-02	CAN communication continuous time	CAN communication continuous time	0.0s（inenabled） 0.1s～5.0s	0.1s	0.0s	☆
Group F0 Basic Function Group						
F0-00	Model display	Model display	1: G model (heavy load model) 2: P model (light load model)	1	Model dependent	●

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
F0-01	Control mode	Control mode	0: Speed sensorless vector control (SVC) 1: Speed sensor vector control (VC) 2:V/F control	1	1	★
F0-02	Command source selection	Command source selection	0: 0:Operation panel running command channel (LED OFF) 1: Terminal command channel (LED ON) 2: Serial port command channel (LED flashes)	1	0	☆
F0-03	Main frequency source X selection	Frequency source X selection	0: Digital setup UP and DOWN adjustment (non-recorded) 1: Digital setup UP and DOWN adjustment (recorded) 2: AI1 3: AI2 4: AI3 5:Reserved 6: MS speed 7: Resvered 8: Resvered 9: Communication setup	1	1	★

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
F0-04	Auxiliary Frequency source Y selection	Auxiliary Frequency source Y selection	0:Digital setup UP and DOWN adjustment (non-recorded) 1: Digital setup UP and DOWN adjustment (recorded) 2: AI1 3: AI2 4: AI3 5:Reserved 6: MS speed 7: Reserved 8: Reserved 9: Communication setup	1	0	★
F0-05	Auxiliary Frequency source Y range selection	Auxiliary Frequency source Y range selection	0: Relative to maximum frequency 1: Relative to frequency source X	1	0	☆
F0-06	Auxiliary Frequency source Y	Frequency source Y range	0%～100%	1%	100%	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification description
F0-07	Frequency source selection	Frequency source selection	0: Main frequency source X 1: Main frequency source X plus auxiliary frequency source Y 2: Switching between main frequency source X and auxiliary frequency source Y 3: Switching between main frequency source X and (main frequency source X plus auxiliary frequency source Y) 4: Switching between main frequency source Y and (main frequency source X plus auxiliary frequency source Y)	1	0	☆
F0-08	Preset frequency	Preset frequency	0.00Hz ~ the maximum frequency F0-10	0.01Hz	50.00Hz	☆
F0-09	Running direction	Running direction	0: Consistent direction 1:Reverse direction	1	0	☆
F0-10	Maximum frequency	Maximum frequency	50.00Hz～300.00Hz	1	200.00 Hz	★

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
F0-11	Frequency source upper limit	Frequency source upper limit	0: F0-12 setup 1: AI1 2: AI2 3: AI3 4: Reserved 5: Communication setup	1	0	★
F0-12	Frequency upper limit	Frequency upper limit	Frequency lower limit F0-14 ~ maximum frequencyF0-10	0.01Hz	200.00Hz	☆
F0-13	Frequency upper limit offset	Frequency upper limit offset	0.00Hz ~ The maximum frequency F0-10	0.01Hz	0.00Hz	☆
F0-14	Frequency lower limit	Frequency lower limit	0.00Hz ~ frequency upper limit F0-12	0.01Hz	0.00Hz	☆
F0-15	Carrier frequency	Carrier frequency	0.5kHz～16.0kHz	0.1kHz	Model dependent	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification description
F0-16	Carrier frequency adjustment selection	Carrier frequency adjustment selection	0: Fixed PWM, carrier frequency temperature adjustment is inenabled 1: Random PWM, carrier frequency temperature adjustment inenabled 2: Fixed PWM, carrier wave temperature adjustment valid 3: Random PWM, carrier frequency temperature adjustment enabled	1	2	☆
F0-17	Speed-up time 1	Speed-up time 1	0.0s～6500.0s	0.1s	20.0s	☆
F0-18	Speed-down time1	Speed-down time1	0.0s～6500.0s	0.1s	20.0s	☆
Group F1 Motor Parameters						
F1-00	Motor type selection	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor 2: Permanent magnetic synchronous motor	1	2	★
F1-01	Rated power	Rated power	0.4kW～1000.0kW	0.1kW	Model dependent	★

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
F1-02	Rated voltage	Rated voltage	0V～440V	1V	Model dependent	★
F1-03	Rated current	Rated current	0.01A～655.35A	0.01A	Model dependent	★
F1-04	Rated frequency	Rated frequency	0.00～max	0.01Hz	Model dependent	★
F1-05	Rrated rotation speed	Rated rotation speed	0rpm～30000rpm	1rpm	Model dependent	★
F1-06～F1-10	Reserved	—	—	—	—	☆
F1-11	D axis inductors	D axis inductors	0～65535	1	Model dependent	★
F1-12	Q axis inductor	Q axis inductor	0～65535	1	Model dependent	★
F1-13	Stator resistance	Stator resistance	0～65535	1	Model dependent	★
F1-14	Unit	Unit	00～12	01	Model dependent	★
F1-15	Back EMF	Back EMF	0～65535V	1	Model dependent	★

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
F1-16	Tuning selection	Tuning selection	0: No operation 1: Static tuning(low speed) 2: Dynamic tuning (high speed) 3: Tuning mode	1	0	★
Group F2 Vector Control Parameters						
F2-00	Speed loop proportional gain 1	Speed loop P1	0～100	1	60	☆
F2-01	Speed loop integration time 1	Speed loop I1	0.01s～10.00s	0.01s	0.30s	☆
F2-02	Switching frequency 1	Switching frequency 1	0.00～F2-05	0.01Hz	5.00Hz	☆
F2-03	Speed loop proportional gain 2	Speed loop P2	0～100	1	60	☆
F2-04	Speed loop integration time 2	Speed loop I2	0.01s～10.00s	0.01s	0.30s	☆
F2-05	Switching frequency 2	Switching frequency 2	F2-02 ～ the maxnimum	0.01Hz	10.00Hz	☆
F2-06	Slip compensation coefficient	Slip coefficient	50%～200%	1%	100%	☆
F2-07	Time constant of speed loop filter	Speed loop filter	0.000s～0.100s	0.001s	0.000s	☆
F2-08	Torque control	Torque control	0: Inenabled 1: Enabled	1	0	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification description
F2-09	Torque upper limit	Torque upper limit	0: F2-10 1: AI1 2: AI2 3: AI3 4: Reserved 5: Communication setup Analog input scale corresponds to F2-10.	1	0	☆
F2-10	Torque upper limit	Torque upper limit	0.0%～250.0%	0.1%	200.0%	☆
F2-11	Encoder pulse number	Encoder pulse number	1～65535	1	1024	★
F2-12	Reserved	—	—	—	—	★
F2-13	D axis current loop Kp	D axis current loop Kp	0～65535	1	50	★
F2-14	D axis current loop Ki	D axis current loop Ki	0～65535	1	50	★
F2-15	Q axis current loop Kp	Q axis current loop Kp	0～65535	1	50	★
F2-16	Q axis current loop Ki	Q axis current loop Ki	0～65535	1	50	★
F2-17	SoftPwm selection	SoftPwm selection	0: Inenabled 1: Enabled	1	0	☆
Group F3 V/F Control Parameters						
F3-00	V/F curve setup	V/F curve setup	0: Straight V/F curve 1: Multiple-point V/F curve 2: Square V/F curve	1	0	★

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
F3-01	Torque boost	Torque boost	0.0：Automatic 0.1%～30.0%0. 0:(automatic)0.1% to 30.0%	0.1%	1.0%	☆
F3-02	Cutoff frequency of torque boost	Cutoff frequency of torque boost	0.00 ~ maximum frequency	0.01Hz	50.00Hz	★
F3-03	V/F Frequency point 1	V/F Frequency point 1	0.00Hz ~ rated motor frequency	0.01Hz	0.00Hz	★
F3-04	V/F voltage point 1	V/F voltage point 1	0.0%～100.0%	0.1%	0.0%	★
F3-05	V/F frequency point 2	V/F frequency point 2	0.00Hz～motor rated frequency	0.01Hz	0.00Hz	★
F3-06	V/F voltage point 2	V/F voltage point 2	0.0%～100.0%	0.1%	0.0%	★
F3-07	V/F frequency point 3	V/F frequency point 3	0.00Hz～motor rated frequency	0.01Hz	0.00Hz	★
F3-08	V/F voltage point 3	V/F voltage point 3	0.0%～100.0%	0.1%	0.0%	★
F3-09	Slip compensation coefficient	Slip compensation coefficient	0.0%～200.0%	0.1%	0.0%	☆
F3-10	AVR selection	AVR selection	0: Inenabled 1: Enabled 2: Inenabled only at the time of deceleration	1	2	☆
F3-11	Oscillation suppression gain	Oscillation suppression gain	0～100	1	Mmodel dependent	☆
Group F4 Input Terminal						

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification descrip-tion
F4-00	DI1 terminal function selection	DI1 terminal selection	0: No function 1: Forward rotation (FWD) 2: Reverse rotation (REV)（oil pump enabled） 3: Three-line mode running control 4: Forward rotation Jog (FJOG) 5: Reverse rotation Jog (RJOG) 6: Terminal UP 7: Terminal DOWN 8:Free stop 9: Fault reset (RESET) 10: Pause 11: External fault normally open input 12: MS speed terminal 1	1	1	★
F4-01	DI2 terminal function selection	DI2 terminal selection		1	0	★

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
F4-02	D13 terminal function selection	DI3 terminal selection	13: MS speed terminal 2 14: MS speed terminal 3 15: MS speed terminal 4 16:Speed-up time selection terminal 1 17 ： Speed-up /speed-down time selection terminal 18:Main frequency source switching 19: UP and DOWN setup clear (terminal and keyboard) 20: Running command switching terminal 21: Speed-up/speed-down time inenabled 22~23:Reserved 32: DC brake command 33: External fault normally closed input 41~47：Reserved 48：Servo pump PID selection terminal 1	1	9	★
F4-03	D14 terminal function selection	DI4 terminal selection		1	0	★

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
F4-04	DI5 terminal function selection	DI5 terminal selection	49：Servo pump PID selection terminal 2 50 ： CAN communication enabled	1	0	★
F4-05～F4-14	Reserved	Reserved		Reserved	Reserved	★
F4-15	DI terminal filter time	DI terminal filter time	1～10	1	4	☆
F4-16	Terminal command mode	Terminal command mode	0. Two-line mode 1 1. Two-line mode 2 2. Three-line mode 1 3. Three-line mode 2	1	0	★
F4-17	Change rate of terminals UP/DOWN	Change rate of terminals UP/DOWN	0.01 Hz/s ～100.00Hz/s	0.01Hz/s	1.00Hz/s	☆
F4-18	AI1 minimum input	AI1 minimum input	-11.00V～11.00V	0.01V	0.02V	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
F4-19	AI1 minimum input corresponding setup	AI1 minimum setup	-100.0%～100.0%	0.1%	0.0%	☆
F4-20	AI1 maximum input	AI1 maximum input	-11.00V～11.00V	0.01V	10.00V	☆
F4-21	AI1 maximum input correspondi-ng setup	AI1 maximum setup	-100.0%～100.0%	0.1%	100.0%	☆
F4-22	AI1 input filter time	AI1 filter time	0.00s～10.00s	0.01s	0.00s	☆
F4-23	AI2 minimum input	AI2 minimum input	-11.00V～11.00V	0.01V	0.02V	
F4-24	AI2 minimum input correspondi-ng setup	AI2 minimum setup	-100.0%～100.0%	0.1%	0.0%	☆
F4-25	AI2 maximum input	AI2 maximum input	-11.00V～11.00V	0.01V	10.00V	☆
F4-26	AI2 maximum input correspondi-ng setup	AI2 maximum input	-100.0%～100.0%	0.1%	100.0V	☆
F4-27	AI2input filter time	AI2 filter time	0.00s～10.00s	0.01s	0.00s	☆
F4-28	AI3 minimum input	入AI3 minimum input	-11.00V～11.00V	0.01V	0.02V	☆
F4-29	AI3 minimum input correspondi-ng setup	AI3 minimum setup	-100.0%～100.0%	0.1%	0.0%	☆
F4-30	AI3 maximum input	AI3 maximum input	-11.00V～11.00V	0.01V	10.00V	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
F4-31	AI3 maximum input corresponding setup	AI3 maximum setup	-100.0%～100.0%	0.1%	100.0%	☆
F4-32	AI3 input filter time	AI3 filter time	0.00s～10.00s	0.01s	0.00s	☆
F4-33～F4-42	Reserved	Reserved	Reserved	Reserved	Reserved	☆
F4-43	AI1sample voltage	AI1sample voltage	-9.999V～9.999V	0.001V	2.000V	☆
F4-44	AI1 correction voltage 1	AI1 correction voltage 1	-9.999V～9.999V	0.001V	2.000V	☆
F4-45	AI1 sample voltage 2	AI1 sample voltage 2	-9.999V～9.999V	0.001V	8.000V	☆
F4-46	AI1 correction voltage 2	AI1 correction voltage 2	-9.999V～9.999V	0.001V	8.000V	☆
F4-47	AI1 sample voltage 1	AI1 sample voltage 1	-9.999V～9.999V	0.001V	2.000V	☆
F4-48	AI2 correction voltage 1	AI2 correction voltage 1	-9.999V～9.999V	0.001V	2.000V	☆
F4-49	AI2 sample voltage 2	AI2 sample voltage 2	-9.999V～9.999V	0.001V	8.000V	☆
F4-50	AI2 correction voltage2	AI2 correction voltage 2	-9.999V～9.999V	0.001V	8.000V	☆
F4-51	AI3 sample voltage1	AI3 sample voltage 1	-9.999V～9.999V	0.001V	2.000V	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification description
F4-52	AI3 correction voltage1	AI3 correction voltage1	-9.999V～9.999V	0.001V	2.000V	☆
F4-53	AI3 sample voltage2	AI3 sample voltage2	-9.999V～9.999V	0.001V	8.000V	☆
F4-54	AI3 correction voltage2	AI3 correction voltage2	-9.999V～9.999V	0.001V	8.000V	☆
F4-55～F4-58	Reserved	-	-	-	-	☆
Group F5 Output Terminal						
F5-00	Reserved	Reserved	Reserved	reserved	reserved	☆
F5-01	Control board relay (T/A1-T/B1-T/C1）) output selection	Control board RELAY1 output selection	0: No output 1: Servo driver is running 2: Fault output 3: Frequency level detection FDT output 4: Frequency arrival 5: In zero speed operation 6: Motor overload pre-warning 7: Servo driver overload pre-warning 8~11: Reserved 12: Running time arrival	1	2	☆
F5-02	Control board relay（T/A2-T/C2）output selection)	Control board RELAY2 output selection		1	1	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification descrip-tion
F5-03	Control board relay (T/A3-T/C3) output selection	Control board RELAY3 output selection	13: Frequency limiting 14: Torque limiting 15: Ready for running 16: AI1 is larger than AI2 17: Frequency upper limit arrival 18: Frequency lower limit arrival 19: Under voltage status output 20: Communication setup 21~22 Reserved 23: Swash Plate Switching of Double displacement plunger pump （NO） 24: Pressure control status output 25: Alarm output from pump(NC)	1	0	☆
F5-04～F5-09	Reserved	-	-	-	-	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification description
F5-10	AO1 output selection	AO1output selection	0: Running 1: Setup frequency 2: Output current 3: Output torque 4: Output power 5: Output voltage 6:Reserved 7: AI1 8: AI2 9: AI3 10：Feedback frequency 11：Feedback voltage 12～16：Reserved	1	10	☆
F5-11	AO2 output selection	AO2 output selection			11	☆
F5-12～F5-13	Reserved	-	-	-	-	☆
F5-14	AO1 offset coefficient	AO1 offset	-100.0%～100.0%	0.1%	0.0%	☆
F5-15	AO1 gain	AO1 gain	-10.00～10.00	0.01	1.00	☆
F5-16	AO2 offset coefficient	AO2 offset	-100.0%～100.0%	0.1%	0.0%	☆
F5-17	AO2 gain	AO2 gain	-10.00～10.00	0.01	1.00	☆
F5-18～F5-22	Reserved	-	-	-	-	☆
Group F6 Start/Stop Control						

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification descrip-tion
F6-00	Start mode	Start mode	0: Beginning from stop frequency 1: Beginning from zero speed 2: Beginning from maximum frequency	1	0	☆
F6-01	Rotation speed tracking mode	Rotation speed tracking mode	0: Beginning from stop frequency 1: Beginning from zero speed 2: Beginning from maximum frequency	1	0	★
F6-02	Rotation speed tracking speed	Rotation speed tracking speed	1～100	1	20	☆
F6-03	Start frequency	Start frequency	0.00 Hz～10.00Hz	0.01Hz	0.00Hz	☆
F6-04	Start frequency retention time	Start retention time	0.0s～36.0s	0.1s	0.0s	★
F6-05	DC brake current at start	DC brake current at start	0%～100%	1%	0%	★
F6-06	DC brake time at start	DC brake time at start	0.0s～36.0s	0.1s	0.0s	★
F6-07	Speed-up/speed-down mode	Speed-up/ speed-down mode	0: Straight speed-up/speed-down 1:S-cruve speed-up/speed-down	1	0	★
F6-08	Start segment time of S curve	Start segment of S curve	0.0%～40.0%	0.1%	30.0%	★
F6-09	End segment time of S curve	Start segment of S curve	0.0%～40.0%	0.1%	30.0%	★
F6-10	Stop mode	Stop mode	0:Speed-down to stop 1: Free to stop	1	0	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification descrip-tion
F6-11	DC brake beginning frequency at stop	Brake frequency at stop	0.00Hz ~ maximum frequency	0.01Hz	0.00Hz	☆
F6-12	DC brake waiting time at stop	Brake waiting at stop	0.0s～36.0s	0.1s	0.0s	☆
F6-13	DC brake current at stop	DC brake current at stop	0%～100%	1%	0%	☆
F6-14	DC brake time at stop	DC brake time at stop	0.0s～36.0s	0.1s	0.0s	☆
F6-15	Brake use ratio	Brake use ratio	0%～100%	1%	100%	☆
Group F7 Keyboard and Display						
F7-00	LCD Language selection	Language selection	0: Chinese 1: English	1	0	☆
F7-01	MF.K Key function selection	MF.K Key function selection	0:MF.K inenabled 1: Switching between operation panel command channel and remote command channel (terminal command channel or serial port communication command channel) 2: Switching between forward rotation and reverse rotation 3: Forward rotation Jog	1	0	★

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification description
F7-02	STOP/RESET key function	STOP key function	0: Enabled only in the keyboard control mode 1: STOP key enabled in the terminal control mode 2: STOP key fault reset function enabled in the terminal control mode 3: STOP key stop and fault reset function enabled in the terminal control mode	1	0	☆
F7-03	QUICK parameter lockout	Parameter lockout	0: QUICK parameter lockout inenabled 1: QUICK parameter lockout enabled	1	0	☆
F7-04	LED operation display parameter	Operation display	Reference to the last paragraph of chapter explaination	1	624	☆
F7-05	LED stop display parameter	Stop display	Reference to the last paragraph of chapter explaination	1	1139	☆
F7-06	Load speed display coefficient	Load speed coefficient	0.0001～6.5000	0.0001	1.0000	☆
F7-07	Radiator temperature 1	Radiator temperature 1	0.0℃～100℃	1℃	-	●
F7-08	Radiator temperature 2	Radiator temperature 2	0.0℃～100℃	1℃	-	●

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification description
F7-09	Accumulated running time	Accumulated running time	0h～65535h	1	-	●
F7-10	Software version No.1	Software version No.1	-	-	-	●
F7-11	Software version No.2	Software version No.2	-	-	-	●
Group F8 Auxiliary Function						
F8-00	Jog running frequency	Jog running frequency	0.00Hz ~ maximum frequency	0.01Hz	2.00Hz	☆
F8-01	Jog speed-up time	Jog speed-up time	0.0s～6500.0s	0.1s	20.0s	☆
F8-02	Jog speed-down time	Jog speed-down time	0.0s～6500.0s	0.1s	20.0s	☆
F8-03	speed-up time 2	speed-up time 2	0.0s～6500.0s	0.1s	20.0s	☆
F8-04	Speed-down time 2	Speed-down time 2	0.0s～6500.0s	0.1s	20.0s	☆
F8-05	Speed-up time 3	Speed-up time 3	0.0s～6500.0s	0.1s	20.0s	☆
F8-06	Speed-down time 3	Speed-down time 3	0.0s～6500.0s	0.1s	20.0s	☆
F8-07	Speed-up time 4	Speed-up time 4	0.0s～6500.0s	0.1s	20.0s	☆
F8-08	Speed-up time 4	Speed-up time 4	0.0s～6500.0s	0.1s	20.0s	☆
F8-09	Skip frequency 1	Skip frequency 1	0.00Hz ~ maximum frequency	0.01Hz	0.00Hz	☆
F8-10	Skip frequency 2	Skip frequency 2	0.00Hz ~ maximum frequency	0.01Hz	0.00Hz	☆
F8-11	Skip frequency amplitude	Skip frequency amplitude	0.00Hz ~ maximum frequency	0.01Hz	0.01Hz	☆
F8-12	Forward/reverse rotation dead-zone time	Forward/reverse rotation dead-zone time	0.0s～3000.0s	0.1s	0.0s	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification description
F8-13	Reverse control	Reverse control	0: Reverse rotation enabled 1: Reverse rotation inenabled	1	0	☆
F8-14	Set up frequency lower than frequency lower limit action	Frequency lower limit action	0: Run with frequency lower limit 1: Stop 2: Zero speed operation	1	0	☆
F8-15	Droop control	Droop control	0.00Hz～10.00Hz	0.01Hz	0.00Hz	☆
F8-16	Over modulation enabled	Over modulation enabled	0: Over modulation inenabled 1: Over modulation enabled	1	1	☆
F8-17	Setup running time	Setup running time	0h～65535h	1h	65535h	☆
F8-18	Start protection selection	Start protection selection	0: No protection 1: Protection	1	0	☆
F8-19	Frequency detection value (FDTlevel)	FDT level	0.00 ~ maximum frequency	0.01Hz	50.00Hz	☆
F8-20	Frequency detection hysteresis (FDT-hysteresis)	FDT hysteresis	0.0% ~ 100.0%(FDT level)	0.1%	5.0%	☆
F8-21	Frequency arrival detection width	Frequency arrival width	0.0 ~ 100.0% (maximum frequency)	0.1%	0.0%	☆
F8-22	Earth short circuit protection detection upon power-on	Earth short circuit protection detection upon power-on	0: Inenabled 1: Enabled	1	1	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification description
F8-23	Running time to action selection	Running time to action selection	0: Continue running 1: Stop	1	0	★
Group F9 Fault and Protection						
F9-00	Motor overload protection selection	Overload protection selection	0: Inenabled 1: Enabled	1	1	☆
F9-01	Motor overload protection gain	Overload protection coefficient	0.20～10.00	0.01	1.00	☆
F9-02	Motor overload pre-warning coefficient	Overload pre-warning coefficient	50%～100%	1%	80%	☆
F9-03	Stall gain over voltage	Stall gain over voltage	0(No stall over voltage)	1	0	☆
F9-04	Stall protection voltage over voltage	Stall point over voltage	120%～150%	1%	130%	☆
F9-05	Stall gain over curren	Stall gain over curren	0～100	1	20	☆
F9-06	Stall protection current over current	Stall point over current	100%～200%	1%	150%	☆
F9-07	Transient stop/ non-stop function	Transient stop/ non-stop function	0: Inenabled 1: Enabled	1	0	☆
F9-08	Transient stop/ non-stop frequency falling rate	Transient stop/ non-stop frequency falling rate	0.00Hz/s ~ maximum frequency/s	0.01Hz/s	10.00Hz/s	☆
F9-09	Fault auto reset times	Fault auto reset times	0～3	1	0	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
F9-10	（T/A1-T/B1-T/C1）Faulty rely action selection during the fault auto reset（T/A1-T/B1-T/C1）		0:No action 1: Action	1	0	☆
F9-11	Fault auto-reset interval	Fault auto-reset interval	0.1s～100.0s	0.1s	1．0s	☆
F9-12	Input phase loss protection selection	Input phase loss selection	0: Inenabled 1: Enabled	1	1	☆
F9-13	Output phase failure protection selection	Output phase failure selection	0: Inenabled 1: Enabled	1	1	☆
F9-14	Velocity protection deviation	Velocity protection deviation	0.50Hz～50.00Hz	0.01Hz	10.00Hz	☆
F9-15	Velocity deviation protection time	Velocity deviation protection time	0.0s Disable 0.0s Protection inenabled 0.1s ～ 20.0s	0.1	10.0s	☆
F9-16	Motor temperture protection selection	Motor temperture protection selection	0: Inenabled 1: Enabled	1	0	☆
F9-17	Motor temperture protection mode	Motor temperture protection mode	0:D1 Signal input 1:A1 analog input 2-3:Reserved	1	0	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification descrip-tion
F9-18	The first fault type	The second fault type1	0: No fault 1：Reserved 2: Speed-up over current(Err 02) 3:Speed-down over current(Err 03) 4: Constant speed over current (Err 04) 5: Speed-up over voltage (Err 05) 6: Speed-down over voltage (Err 06) 7: Constant speed over voltage (Err 07) 8: Reserved 9: Under voltage failure (Err 09) 10: Servo driver overload (Err 10)	—	—	•
F9-19	The second failure type	The second failure type	11: Motor overload (Err 11) 12: Input phase failure (Err 12) 13: Output phase loss (Err 13) 14: Radiator overheating (Err 14) 15: External fault (Err 15) 16: Communication fault (Err 16) 17: Contactor fault (Err 17) 18: Current detection fault (Err 18) 19: Motor tuning fault (Err 19)	—	—	•

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification descrip-tion
F9-20	The last failure type	The third fault type	20: PG fault (Err 20) 21: Data overflow (21) 22: Reserved 23: Motor earth short circuit fault (23) 24~41: Reserved 42: CAN communication fault 43: Encoder fault (43) 44：Speed deviation protection fault (Err 44) 45: Motor temperature protection 46: Oil pressure sensor fault (Err46) 47~48:Relevant fault of multi-pump in parallel flow（Err47、Err48）	—	—	•
F9-21	Frequency upon fault	Frequency upon fault	—	—	—	•
F9-22	Current upon fault	Current upon fault	—	—	—	•

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modification description
F9-23	Bus voltage upon fault	Bus voltage upon fault	—	—	—	●
F9-24	Input terminal upon fault	Input terminal upon fault	—	—	—	●
F9-25	Output terminal upon fault	Output terminal upon fault	—	—	—	●
Group FD Communication Parameters						
Group FP User Password						
FP-00	User password 1	Authorization for all functions code except FP-05	0～65535	1	0	☆
FP-01	Parameter initialization	Parameter initialization	0: No operation 1: Restore factory default setup value 2: Clear the fault record 3: Restore function code setup value saved by FP-05	1	0	★
FP-02	Motor specifications solidification	Motor specifications	0～65535	1	0	★
FP-03	Injection molding machine fixed specifications	Injection molding machine specifications	0～65535	1	0	★
FP-04	User password 2	Authorization to the FP-05 function code	0～65535	1	0	★

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
FP-05	Function code setting values in real time saved	Save all the present function setup value code	0:No operation 1: Save all the present function setup value code	1	0	★

Parameter Description and Solution

Chapter 6 Parameter Description

Group U0 Driver parameters viewing group

Group A0 Weak magnetism and SVC control group (SAV control reserved)

A0-00	**Weak magnetism control mode**		Factory default value	0
	Setup range	0	Direct calculation	
		1	Automatic adjustment	

A0-01	**Weak magnetism current Coefficient**	Factory default value	100%
	Setup range	80%～200%	

A0-02	**Weak magnetism current upper limit**	Factory default value	100%
	Setup range	0～120	

A0-03	**Weak magnetism Integral multiples**	Factory default value	400
	Setup range	200～1000	

A0-04	**Weak magnetism adjustment coefficient**	Factory default value	4
	Setup range	0～1000	

When A0-00 =“0”, calculate the weak magnetism directly, the actual output of weak magnetism current is to multiply the theoretical value by weak magnetic current coefficient（A0-01）, the greater setup value is,the greater the weak magnetic current will be, the better the dynamic effect will be. But it may cause speed and current oscillation if it is too large.

When A0-00=1, adjust weak magnetism current automaticlly, get the required minimum weakening current. Adjustment speed is determined by weak magnetism adjustment coefficient (A0-04), the bigger setup value is, the faster the adjustment will be.But it may be caused by speed and current oscillation if it is too large.

A0-05	**Output phase failure PWM detection time**	Factory default value	0
	Setup range	0～63000	

Determine the phase failure detection time, the value is equal to zero that does not do output phase failure detection, it can automaticlly set up after motor parameter tuning.

Group A1 PG Card Group

A1-00～ A1-01	**Reserved**	Factory default value	—
	Setup range	—	

A1-02	**Encoder Installation angle**	Factory default value	0°
	Setup range	0.0°～359.9°	

The unit is 0.1 °, it is automatically set after the motor parameter tuning.

A1-03	**Select the reverse of feedback speed**		Factory default value	0
	Setup range	0	Select the forward direction of speed direction	
		1	Select the reverse direction of speed direction	

A1-04	**Rotary transformer number of pole-pairs**	Factory default value	1
	Setup range	1～50	

Group A2 CAN Communication Group

A2-00	**Baud rate selection**		Factory default value	4
	Setup range	0	20k	
		1	50k	
		2	125k	
		3	250k	
		4	500k	
		5	1M	

A2-01	**CAN communication address**		Factory default value	1
	Setup range	1～255		

A2-02	**CAN communication continuous time**	Factory default value	0.0

	Setup range	0.0： 0.1s～5.0s 0.0：inenabled 0.1s～5.0s

Set up detection CAN break time, if the driver did not receive data within the setup time, then it will alarm 42.

Group A3 Servo oil pump control group

A3-00	**oil pressure control mode**		Factory default value	0
	Setup range	0	Non-oil pressure control mode	
		1	Driver oil pressure control mode 1	
		2	Driver **oil pressure control mode 2**	
		3	CAN **oil pressure mode(For special use)**	
		4	Reserved	

A3-00＝“0”：**Non-oil pressure control mode**

A3-00＝“1”：Driver oil pressure control mode 1.

CAN setup flow, oil pressure command and A13 analog channel provides oil pressure feedback command，driver conduct oil pressure control.

A3-00＝“2”： Driver **oil pressure control mode 2.**

A13 analog channel provides oil pressure command, A12 analog channel provides flow command, and A13 analog channel provides oil pressure feedback command, driver conducts oil pressure control.

A3-00＝“3”：CAN oil pressure contol mode (For special use), group A3 control group parameters of the servo oil pump disabled.

A3-00＝“4”：保留。Reserved.

A3-01	**Maximum rotation speed**	Factory default value	2000rpm
	setup range	The maximum frequency of frequency lower limit corresponding to rotation speed～30000rpm	

The corresponding system output flow sets motor running maximum speed, the recommendations of the setup value is less than 1.4% of the motor rated speed (F1-05).

A3-02	**System oil pressure**	Factory default value	175.0kg/cm^2
	Setup range	0.0kg/cm^2 to maximum oil pressure(A3-03)	

Set the system maximum oil pressure value.

A3-03	Maximum oil pressure	Factory default value	250.0kg/cm^2
	Setup range	System oil pressure（**A3-02**） to 500.0kg/cm^2	

Set the pressure scale of the oil pressure sensor. (Corresponding voltage DC0～10V output pressure sensor)

A3-04	Oil pressure command risetime	Factory default value	20ms
	Setup range	0ms～2000ms	

Corresponding filter time of oil pressure command

A3-05	Oil pressure control **Kp1**	Factory default value	210.0
	Setup range	0.0～800.0	

The Oil pressure controls PID proportional gain of the first group. The greater setup value is, the faster responses will be.Responding too fast that can easily lead to overshoot and cause system instability and running oscillation. The smaller setting value is, the slower response will be, responding too slow can easily lead to inefficient and product instability.

A3-06	Oil pressure control **Ti1**	Factory default value	0.100s
	Setup range	0.001s～10.000s	

The oil pressure controls PID integration time of the first group. The smaller setup value is, the faster response will be.Responding too fast that can easily lead to overshoot, cause system instability and running oscillation. The greater setup value is, the slower response will be, responding too slow can easily lead to inefficient and product instability.

A3-07	Oil pressure control **Td1**	Factory default value	0.000s
	Setup range	0.000s～1.000s	

The oil pressure controls PID derivative time of the first group. The smaller setup value is, the faster response will be. Responding too fast that can easily lead to overshoot, cause system instability and running oscillation. The greater setup value is, the slower response will be, responding too slow that can easily lead to inefficient and product instability.

A3-05、A3-06、A3-07：PID of the first group oil pressure

The switching methods of PID groups refer to the servo pump commissioning steps of chapter seven.

PID of the first group oil pressure corresponding to terminals combination: DI2（OFF）、DI3（OFF）

A3-08	Maximum reverse rotation speed	Factory default value	20.0%
	设定范围 Setup range	0.0%～100.0%	

It is the maximum reverse rotation when pressure relief, which corresponds to the percentage setup of the manimum rotation speed. It is used to set the maximum reverse rotation speed. The greater setup value is, the faster pressure relief will be.But excessive noise cause pump reversal.The smaller setting value is, the slower pressure relief will be.

A3-09	**Minimum flow**	Factory default value	0.5%
	设定范围 Setup range	0.0%～50.0%	

The system running mixiumum flow,corresponding to the percentage setup of the manimum rotation speed（A3-01）.

A3-10	**Minimum pressure**	Factory default value	0.5kg/cm^2

	Setup range	0.0 kg/cm^2～50.0 kg/cm^2

The minimum pressure of the system running.

A3-11	**Oil pressure Kp2**	Factory default value	210.0
	Setup range	0.0～800.0	

Corresponding oil pressure control Kp1（A3.05）

A3-12	**Oil pressure Ti2**	Factory default value	0.100s
	Setup range	0.001s～10.000s	

Corresponding oil pressure control Ti1（A3.06）

A3-13	**Oil pressure Td2**	Factory default value	0.000s
	Setup range	0.000s～1.000s	

Corresponding oil pressure control Td1（A3.07）

PID of the second group oil pressure

The switching methods of PID groups refer to the servo pump commissioning steps of chapter seven.

PID of the second group oil pressure corresponding to terminals combination: DI2（ON）、DI3（OFF）.

A3-14	**Oil pressure Kp3**	Factory default value	210.0
	Setup range	0.0～800.0	

Corresponding oil pressure control Kp1（A3.05）

A3-15	**Oil pressure Ti3**	Factory default value	0.100s
	Setup range	0.001s～10.000s	

Corresponding oil pressure control Ti1（A3.06）

A3-16	Oil pressure Td3	Factory default value	0.000s
	Setup range	0.000s～1.000s	

Corresponding oil pressure control Td1（A3.07）

A3-14、A3-15、A3-16：PID of the third group oil pressure

The switching methods of PID groups refer to the servo pump commissioning steps of chapter seven.

PID of the third group oil pressure corresponding to terminals combination:

A3-17	Oil pressure Kp4	Factory default value	210.0
	Setup range	0.0～800.0	

Corresponding oil pressure control Kp1（A3.05）.

A3-18	Oil pressure Ti4	Factory default value	0.100s
	Setup range	0.001s～10.000s	

Corresponding oil pressure control Ti1（A3.06）

A3-19	Oil pressure Td4	Factory default value	0.000s
	Setup range	0.000s～1.000s	

Corresponding oil pressure control Td1（A3.07）

A3-17、A3-18、A3-19： PID of the fourth group oil pressure

The switching methods of PID groups refer to the servo pump commissioning steps of Chapter seven.

PID of the fourth group oil pressure corresponding to terminals combination：DI2（ON）、DI3（ON）。

A3-20	AI zero drift detection	Factory default value	0
	Setup range	0:Inenabled 1: Enabled	

Set A3-20 to 1.The driver auto detection the zero drift of AI1、AI2 and AI3, give the detection various analog zero drift value to F4-18、F4-23 and F4-28,the function code will restore to zero after detection.

A3-21	**Fault detection time of oil pressure sensor**		Factory default value	A3-21
	Setup range	0.000s：Detection disabled 1s～60.000s		

Set the sensor fault detection time

Group F0 Basic Function Group

F0-00	**Model display**		Factory default value	Model dependent
	Set up range	0	G model (heavy load model)	
		1	P model (light load model)	

This parameter is provided only for the user to view the factory default model and cannot be modified.
1: It is applicable to the heavy load of the designated rated parameters.
2: It is applicable to the light load of the designated rated parameters.

F0-01	**Control mode**		Factory default value	0
	Setup Range	0	Speed sensorless vector control	
		1	Speed sensor vector control (VC)	
		2	V/F control	

0: Speed sensorless vector control refers to open loop vector. It is applicable to the general high-performance control applications where one driver can only drive one motor. Such as servo pump, high-speed paper machine, crane, elevator, etc.
1: Speed sensor vector control refers to close loop vector. It must be added with encoder and PG card and is applicable to the applications where high-precision speed control or torque control is required. One driver can only drive one motor loads, such as paper-making machine, lifting machine and elevator.
2: V/F control

It is applicable to the applications where the load requirements are rather low or one driver drives multiple motors, such as fan and pump loads. It can be used in the applications where one driver drives multiple motors.
Prompt: Motor parameter identification must be conducted when selecting the vector control mode. Only when correct motor parameters are provided can the vector control mode be fully made use of. Better performance can be achieved by adjusting the speed regulator parameters (group F2).

F0-02	**Command Source Selection**		Factory default value	0
	Setup Range	0	Operation panel command	
		1	Terminal command channel	
		2	Serial port communication command channel	

Select the channel for driver control command.
The driver control command includes start, stop, forward rotation, reverse rotation and Jog.
0: Operation panel command channel (“LOCAL/REMOT” LED OFF);
Perform running command control with keys on the operation panel, such as RUN, STOP/RES keys.
1: terminal command channel (“LOCAL/REMOT” LED ON)
Perform running command control by the multifunctional input terminals such as FWD, REV, JOGF, JOGR, etc.
2: serial port command channel (“LOCAL/REMOT” LED flashes)
The running command is sent by the host computer via the communication mode.

F0-03	**Main frequency source X selection**		Factory default value	0
	Setup Range	0	Digital setup UP and DOWN (non-recorded)	
		1	Digital setup UP and DOWN (non-recorded)	
		2	AI1	
		3	AI2	
		4	AI3	
		5	PULSE setup (DI5)	
		6	MS speed	
		7	PLC	

		8	PID
		9	communication setup

Select the input channel for main reference frequency of the driver. There are nine types of main reference frequency channels:

0: Digital setup (non-recorded)

The initial value is the value of F0-08 “Digital Setup Preset Frequency”.

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

Non-recorded means that the setup frequency value is recovered to the value of F0-08 “Digital Setup Preset Frequency” in case of driver power failure.

1: Digital setup (recorded)

The initial value is the value of F0-08 “Digital Setup Preset Frequency”.

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

“Recorded” means that the setup frequency upon restart of driver due to power failure remains the same.

2: AI1 3: AI2 4: AI3

It means that the frequency is determined by the analog input terminal. Standard unit provides two analog input terminals, and optional I/O expansion card can provide one analog input terminal (AI3). AI1 and AI3 refer to voltage input of 0 to 10V. AI2 can be used as either voltage input of 0V to10V or current input of 4mA to 20mA, which can be selected by the J3 jumper on the control board.

5: Pulse setup (DI5)

The frequency setup is set up by the terminal pulse.

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

Note: Pulse setup can only be input from the multifunctional input terminal DI5.

6. MS speed

Select MS speed running mode. It needs to set Group F4 “Input Terminal” and Group FC “MS Speed and PLC” parameters to determine the relative relationship between the setup signal and the reference frequency.

7. Simple PLC

Select simple PLC mode. When the frequency source is simple PLC, it needs to set Group FC “MS Speed and PLC” parameters to determine the setup frequency.

8. PID

Select process PID control. In this case, it needs to set Group FA “PID Function”. The running frequency of the driver is that after PID functions. For the meanings of PID setup source, setup quantity and feedback source, please refer to Group A “PID Function”.

9: Communication setup

It means that the main frequency source is set up by the host computer via the communication mode.

F0-04	**Auxiliary Frequency source Y selection**		Factory default value	0
	Setup Range	0	Digital setup UP and DOWN (non-recorded)	
		1	Digital setup UP and DOWN (recorded)	
		2	AI1	
		3	AI2	
		4	AI3	
		5	PULSE setup (DI5)	
		6	MS speed	
		7	PLC	
		8	PID	
		9	Communication setup	

When the auxiliary frequency source is used as independent frequency setup channel (i.e. frequency source switching from X to Y”), it is used in the same way as the main frequency source X.

When the auxiliary frequency source is used as overlap setup(i.e. frequency source selection switching from X plus Y or X to X plus Y), it has special points as follows:

1. When the auxiliary frequency source is digital setup, the preset frequency (F0-08) has no action, and it needs to adjust the main reference frequency through the keys “▲”and “▼” of the keyboard (or UP and DOWN of multifunctional input terminals).

2. When the auxiliary frequency source is analog input setup(AI1, AI2 and AI3) or pulse input reference, 100% of input setup is relative to the auxiliary frequency source range (refer to F0-05 and F-06). To adjust the main reference frequency, it needs to set the corresponding setup range of analog input to “-n% to n% (refer to F4-13 and F4-26).

3. When the frequency source is pulse input setup, it is similar to the analog

value.

Prompt: There is difference between the auxiliary frequency source Y selection and the main frequency source X setup value. That is to say, the main and auxiliary frequency sources cannot use the same frequency setup channel.

F0-05	**Auxiliary Frequency source Y relative value selection**		Factory default value	0
	Setup Range	0	Relative to maximum frequency	
		1	Relative to frequency source X	
F0-06	**Auxiliary Frequency source Y**		Factory default value	0
	Setup Range		0% to 100%	

When the frequency source selection is frequency superimpositon setup (F0-07 is set to 1 or 3), it is used to determine the adjustment range of auxiliary frequency source. F0-05 is used to determine the relative object of that range. If it is relative to maximum frequency X, that range will vary with the main frequency X.

F0-07	**Frequency source selection**		Factory default value: 0
	Setup Range	0	Main frequency source X
		1	Main frequency source X plus auxiliary frequency source Y
		2	Switching between main frequency source X and auxiliary frequency source Y
		3	Switching between main frequency source X and (main frequency source X plus auxiliary frequency source Y)
		4	Switching between main frequency source Y and (main frequency source X plus auxiliary frequency source Y)

This parameter is used to select the frequency setup channel. Frequency setup is realized through combination of main frequency source X and auxiliary frequency source Y.

When 1 is selected, the frequency source “main frequency source X plus auxiliary frequency source Y” can realize frequency superimpositon function.
When 2 is selected, it can switch between the main frequency source X and auxiliary frequency source Y via the multifunctional input terminal “Frequency Source Switching”.
When 3 is selected, it can switch between the main frequency source X and (main frequency source X plus auxiliary frequency source Y) via the multifunctional input terminal “Frequency Source Switching”.
When 4 is selected, it can switch between the auxiliary frequency source Y and (main frequency source X plus auxiliary frequency source Y) via the multifunctional input terminal
“Frequency Source Switching”.
In this way, it can realize mutually switching between the frequency setup modes, such as switching between PID running and common running, switching between simple PLC and common running, switching between pulse setup and analog setup, and switching between analog setup and common running.

F0-08	**Preset frequency**		Factory default value	50.00 Hz
	Setup Range	0.00 to maximum frequency (enabled when the frequency source selection mode is digital setup)		

When the main frequency source is selected as “Digital setup” or “Terminals UP/DN”, this function code is the initial value of frequency digital setup of the driver.

F0-09	**Running direction**		Factory default value	0
	Setup Range	0	consistent direction	
		1	reverse direction	

Through modifying this function code, it can change the rotary direction of the motor without changing any other parameters. The role of this function code is to adjust any two lines of the motor (U, V and W) and further change the rotary direction of the motor.
Prompt: After parameter initialization, the motor running direction will restore to the original status. This action shall be carefully performed in the applications where the rotary direction of the motor is not allowed to change upon system commissioning.

F0-12	**Frequency upper limit**		Factory default value	50.00Hz
	Setup Range	Frequency lower limit F0-11 to maximum frequency F0-10		
F0-13	**Frequency upper limit offset**		Factory default value	0.00Hz
	Setup Range	0	F0-12 setup	
		1	AI1	
		2	AI2	
		3	AI3	
		4	PULSE setup	
		5	Communication setup	

F0-10	**Maximum frequency**		Factory default value	50.00 Hz
	Setup Range	50.00Hz to 300.00Hz		
F0-11	**Frequency source upper limit**		Factory default value	0

It is used to define the source of frequency upper limit.The frequency upper limit can be sourced from either digital setup (F0-12) or analog input channel. When the analog input is used to set the frequency upper limit, 100% of analog input setup is relative to F0-12.

For example, in case of torque control, the speed control is inenabled. To avoid occurrence of broken materials, it can use the analog value to set the frequency upper limit. When the driver runs at the frequency upper limit, the torque control is inenabled, and the driver continues running with frequency upper limit.

When the frequency upper limit is analog value reference, this parameter is used as analog value offset.

Its benchmark value is F0-12. The addition of offset frequency and analog setup value of frequency upper limit is used as the final setup value of frequency upper limit.

F0-14	**Frequency lower limit**	Factory default value	0. 00Hz
	Setup range	0.00Hz to frequency upper limit F0-12	

The driver starts from the start frequency. If the setup frequency is lower than frequency lower limit during the running process, the driver will keep running under frequency lower limit until it stops or the setup frequency is higher than the frequency lower limit.

F0-15	Carrier frequency	Factory default value	Model dependent
	Setup range	0.5kHz~16.0kHz	

This function is used to adjust the carrier frequency of the driver. 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 driver 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 driver 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
Driver temperature rise	Low to high
Leakage current	low to high
External radiation interference	low to high

F0-16	Carrier frequency adjustment selection		Factory default value	0
	Setup range	0	Fixed PWM and carrier frequency temperature adjustment inenabled.	

		1	Random PWM and carrier frequency temperature adjustment inenabled.
		2	Fixed PWM, and carrier frequency temperature adjustment enabled.
		3	Random PWM, and carrier frequency temperature adjustment enabled.

Two PWM carrier frequency adjustment modes, fixed and random, are provided. The random PWM motor noise has wide frequency range, while the fixed PWM motor noise has fixed frequency.

When the carrier wave temperature adjustment is enabled, the driver can automatically adjust the carrier frequency according to its temperature. This function can reduce the possibility of over heat alarm of the driver.

F0-17	**Speed-up time 1**	Factory default value	20.0s
	Setup range	0.0s～6500.0s	
F0-18	**Speed-down time 1**	Factory default value	20.0s
	Setup range	0.0s～6500.0s	

Speed-up time 1 refers to the time “t1” required for the driver to accelerate from 0Hz to the maximum output frequency (F0-10).

Speed-down time 1 refers to the time “t2” required for the driver to decelerate from the maximum output frequency (F0-10) to 0Hz,

as shown in the following figure:

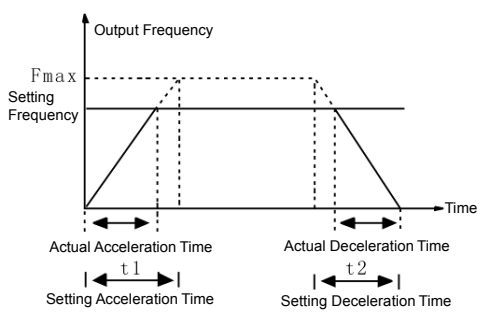


Fig.6-1 Schematic diagram for speed-up/speed-down time

Plesase pay attention to the difference between the actual

speed-up/speed-down time and the setup speed-up/speed-down time.
There are totally four groups o speed-up/speed-down time for selection.
Group 1: F0-17 and F0-18;
Group 2: F8-03 and F8-04;
Group 3: F8-05 and F8-06;
Group 4: F8-07 and F8-08;
It can select speed-up/speed-down time via the multifunctional digital input terminals (F4-00 to F4-08).

Group F1 Motor Parameters

F1-00	**Motor type selection**		Factory default value	2
	Setup range	0	Common asynchronous motor	
		1	Variable frequency asynchronous motor	
		2	Permanent 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	Model dependent
	Setup range	0V～440V		
F1-03	**Rated current**		Factory default value	Model dependent
	Setup range	0.00A～655.35A		
F1-04	**Rated Frequentcy**		Factory default value	Model dependent
	Setup range	0.00Hz~ maximum frequency		
F1-05	**Rated rotation speed**		Factory default value	Model dependent
	Setup range	0rpm～30000rpm		

⚠ Note

1. Please set the parameters according to the nameplate parameters of the motor.
2. It needs accurate motor parameters to ensure the excellent control performance of the vector control. Accurate parameter identification comes from the correct setting of the rated motor parameters.
3. To ensure the control performance, please carry out motor configurations in accordance with the standard adaptable motor of the driver. If there is huge difference between the motor power and the power of standard adaptable motor, the control performance of the driver will decrease obviously.

F1-06～ F1-09	**Resvered**	Factory default value	—
	Setup range	—	

F1-11	**D-axis inductance**	Factory default value	Model dependent
	Setup range	0～65535	
F1-12	**Q-axis inductance**	Factory default value	Model dependent
	Setup range	0～65535	
F1-13	**Stator resistance**	Factory default value	Model dependent
	Setup range	0～65535	
F1-14	**unit**	Factory default value	Model dependent
	Setup range	00～12	
F1-15	**Back EMF**	Factory default value	Model dependent
	Setup range	0～65535V	

When the automatic tuning of the motor is normally completed, the setup values of F1-10－F1-15 will be automatically set up.

unit（F1-14）

a) Units digit determines inductors unit

0: the unit is μH;

1: the unit is10μH

2: the unit is 100μH

b) Tens digit determine resistance（F1-13） unit:

0: the unit is μH

1: the unit is10μH

2: the unit is 10mΩ

Back EMF（F1-15）:

It is used to set the motor back EMF of rated frequency.

Each time when the rated power of the motor F1-01 is changed, the motor will automatically recover the parameter values of F1-10 to F1-15 of the default standard motor parameters. If it is impossible to conduct the motor tuning on the site, the user can manually input the parameters refer to the known parameters of the same type motors.

F1-16	Tuning selection		Factory default value	0
	Setup range	0	no operation	
		1	static tuning（low speed）	
		2	dynamic tuning（high speed）	
		3	Tuning mode 3	

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

0: No operation, it is tuning inenabled.

1: Static tuning.

It is applicable to the motor back-EMF known occasion, please set the parameter F1-15 according to the motor back-EMF.

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

2: Dynamic tuning

To ensure the dynamic control performance of the driver, 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 driver will conduct static tuning at first. Upon completion of static tuning, the motor will accelerate to 40% of the rated

motor frequency and maintain for certain period of time. Then the motor will decelerate to zero speed, and by this time the rotary tuning is completed.
Action description: Set the F1-16 to 2 and press RUN key for confirmation, and then the driver 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. After the tuning is completed, the display will return to the stop status interface. 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.
Note: Tuning is enabled only in the keyboard control mode. （Set F0-02 to zero）

Group F2 Vector Control Parameters

Group F2 function code is enabled only for the vector control. That is to say, when F0-01=0 or 1, it is enabled, and when F0-01=2, it is inenabled.

F2-00	**Speed loop proportional gain 1**	Factory default value	30
	Setup range	0~100	
F2-01	**Speed loop integration time 1**	Factory default value	0.50s
	Setup range	0.01s ~ 10.00.s	
F2-02	**Switching frequency 1**	Factory default value	5.00 Hz
	Setup range	0.00~ F2-05	
F2-03	**Speed loop proportional gain 2**	Factory default value	15
	Setup range	0~100	
F2-04	**Speed loop integration time 2**	Factory default value	1.00s
	Setup range	0.01s ~ 10.00s	

F2-05	Switching frequency 2	Factory default value	10.00Hz
	Setup range	F2-02 ~ maximum frequency	

F2-00 and F2-01 are PI adjustment parameters when the running frequency is lower than switching frequency 1 (F2-02) F2-00 and F3-01 are PI adjustment parameters when the running frequency is higher than switching frequency 2. PI parameter of frequency channel between the switching frequency 1 and switching frequency 2 is linear switching between two groups of PI parameters, as shown in the figure below:

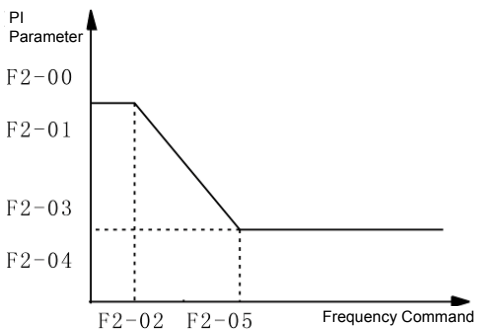


Fig.6-2 Schematic diagram of PI parameter

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	Slip compensation coefficient	Factory default value	100%
	Setup range	50%~200%	

For the speed sensorless vector control, this parameter is used to adjust the speed stabilizing precision of the motor. When the speed is too low due to heavy load of motor, this parameter needs to be enlarged or this parameters needs to be reduced.
For the speed sensor vector control, this parameter can adjust the output current of the driver carrying the same load.

F2-07	Time constant of speed loop filter	Factory default value	0.000s
	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.
The time constant of speed loop filter is low, and the output torque of the driver may vary greatly, but the response is quick.

F2-08	Torque control		Factory default value	0
	Setup range	0	Inenabled	
		1	Enabled	

0: Torque control is inenabled, and the driver performs command speed control. In case of speed control, the driver output frequency in accordance with the setup frequency command, and the output torque automatically matches the load torque, but the output torque is limited by the torque upper limit (refer to F2-09 and F2-10). When the load torque is higher than the setup torque upper limit, the output torque of the driver is limited, and the output frequency will be different from the setup frequency.
1: Torque control is enabled, and the driver performs torque control. In case of torque control, the driver outputs torque in accordance with the setup torque command, and the output frequency automatically matches the load speed, but the output frequency is limited by the frequency upper limit (refer to F0-12). When the load speed is higher than the setup frequency upper limit, the output frequency of the driver is limited, and the output torque will be

different from the setup torque.
In case of torque control, the torque command is the torque upper limit, and set by the torque upper limit source (F2-09).
It can perform switching between torque control and speed control via the multifunctional input terminals.
In case of torque control, the output frequency of the driver automatically tracks the change of the load speed, but the change of the output frequency is affected by the setup acceleration/deceleration time. If it needs to quicken the tracking speed, the acceleration/deceleration time shall be shortened.
When the setup torque of the driver is higher than the load torque, the output frequency of the driver will rise; when the output frequency of the driver reaches the frequency upper limit, the driver will keep running with the frequency upper limit.
When the setup torque of the driver is lower than the load torque, the output frequency of the driver will fall; when the output frequency of the driver reaches the frequency lower limit, the driver will keep running with the frequency lower limit.

F2-09	**Torque upper limit source**		Factory default value	0
	Setup range	0	F2-10	
		1	AI1	
		2	AI2	
		3	AI3	
		4	PULSE setup	
		5	Communication setup	

F2-10	**Torque upper limit**	Factory default value	150%
	Setup range	0%~ 200%	

In the speed control mode, F2-09 is used to select the setup source of torque upper limit. When setting via the analog value, 100% of the analog input setup corresponds to F2-10, and the setup 100% corresponds to the rated torque of the motor matching the driver.
In the torque control mode, torque upper limit source is the torque setup source. Torque upper limit is the torque setup command.

F2-11	**Encoder pulse number**	Factory default value	1024

	Setup range	0 ~ 65535

Note: When the driver controls the speed sensor vector control, it must set the pulse number of the encoder correctly, or the motor will run abnormally. If normal operation cannot be realized after correct pulse number of the encoder is set, exchange the connection positions of Phase A and Phase B of the encoder.

F2-12	**Reserved**	Factory default value	—
	Setup range	—	

F2-13	**D axis current loop**	Factory default value	50
	Setup range	0～65535	
F2-14	**D-axis current loop Ki**	Factory default value	50
	Setup range	0～65535	
F2-15	**D -axis current loop Kp**	Factory default value	50
	Setup range	0～65535	
F2-16	**D-axis current loop Ki**	Factory default value	50
	Setup range	0～65535	

When the automatic tuning of the motor is normally completed, the setup values of F2-13 to F2-16 will be automatically set up.

Each time when the rated power of the motor F1-01 is changed, the driver will automatically recover the parameter values of F2-13～F2-16 to the default standard motor parameters.

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.

F2-17	**SoftPwm selection**	Factory default value	0

	Setup range	0	Inenabled
		1	Enabled

Group F3 V/F Control Parameters

This group of function code is enabled only for the V/F control (F0-01=2) and is inenabled for the vector control.
V/F control is applicable to the general loads such as fan and pump or the applications where one driver drives multiple motors or the driver power is one level lower or higher than the motor power.

F3-00	**V/F curve setup**		Factory default value	0
	Setup range	0	Straight V/F curve	
		1	Multiple-point V/F curve	
		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.
1: Multiple-point V/F curve. It is suitable for the special loads such as dehydrator and centrifugal machine.
2: Square V/F curve. It is suitable for the centrifugal loads such as fan and pump.

F3-01	**Torque boost**	Factory default value	1.0%
	Setup range	0.0% ~ 30%	
F3-02	**Cutoff frequency of torque boost**	Factory default value	50.00Hz
	Setup range	0.00Hz~ maximum output frequency	

To compensate the low frequency torque characteristics of V/F control, it can boost the output voltage of the driver at the time of low frequency.
If the torque boost is set to be too large, the motor may be over heat, and the driver may be over current. In general, the torque boost shall not exceed 8.0%.
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 0.0, the driver will adopt auto torque boost.

Cutoff frequency of torque boost: Under this frequency, the torque boost is enabled. If it exceeds this setup frequency, the torque boost is inenabled. Refer to Fig.6-3 for details.

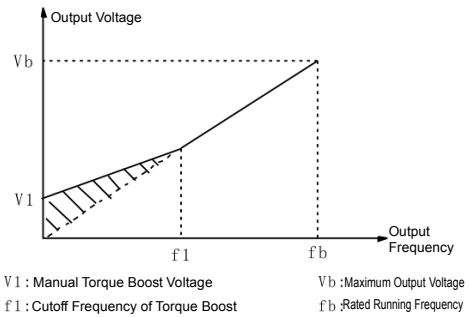


Fig.6-3 Schematic Diagram for Manual Torque

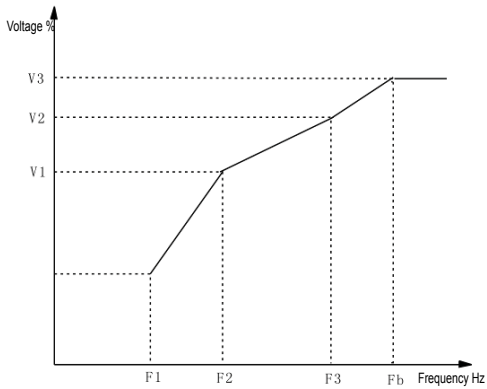
F3-03	**V/F frequency F1**	Factory default value	0.00Hz
	Setup range	0.00Hz ~ rated motor frequency	
F3-04	**V/F voltage V1**	Factory default value	0.0%
	Setup range	0.0%~ 100.0%	
F3-05	**V/F frequency F2**	Factory default value	0.00Hz
	Setup range	V1 ~ rated motor frequency	
F3-06	**V/F voltage V2**	Factory default value	0.0%
	Setup range	F1 ~ 100.0%	
F3-07	**V/F frequency F3**	Factory default value	0.00Hz
	Setup range	V2 ~ rated motor frequency	
F3-08	**V/F voltage V3**	Factory default value	0.0%
	Setup range	F2 ~ 100.0%	

Six parameters of F3-03 to F3-08 define MS V/F curve.

The setup value of V/F curve is generally set in accordance with the load characteristics of the motor.

Note: V1<V2<V3 and F1<F2<F3. In case of low frequency, higher setup

voltage may cause over heat and even burning of the motor and stall over current or current protection of the driver.



V1～V3：Segments 1 to 3 Voltage Proportion of MS V/F
F1～F3：Segments 1 to 3 Frequency Point of MS V/F
Fb：Rated Motor Frequency F1=04

Fig.6-4 Schematic Diagram for V/F Curve Setup

F3-09	**Slip compensation coefficient**	Factory default value	0.0%
	Setup range	0% ~ 200.0%	

It is enabled only for V/F control. 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 driver is close to the reference speed.

F3-10	**AVR(Automatic Voltage Regulation)**		Factory default value	2
	Setup range	0	Inenabled	
		1	Enabled	
		2	Inenabled only at the time of deceleration	

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

F3-11	**Oscillation suppression gain**	Factory default value	Model dependent
	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 F4 Input Terminal

The standard unit of IS300 series driver has five multifunctional digital input terminals (DI5 of which can be used as high-speed pulse input terminal) and two analog input terminals. If the system needs more input/output terminals, optional multifunctional input/output expansion card can be used.
The multifunctional input/output expansion card has 5 multifunctional digital input terminals (DI6 to DI10) and 1 analog input terminal (AI4).

F4-00	**DI1 terminal function selection**	Factory default value	1
F4-01	**DI2 terminal function selection**	Factory default value	0
F4-02	**DI3 terminal function selection**	Factory default value	0
F4-03	**DI4 terminal function selection**	Factory default value	9
F4-04	**D15 terminal function selection**	Factory default value	0

This parameter is used to set the functions of the multifunctional digital input terminals. If the setup is oil pressure control mode (A3-00 setting values is non-zero), the DI2 default is “48: PID select terminals 1”, the DI3 default is “49: PID select Terminal 2”, DI5 the default is “50: CAN communication enabled”.

Setup value	Function	Description
0	No function	Even when there is signal input, the driver 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 driver via the external terminals.
2	Reverse rotation (REV)	
3	Three-line mode running control	This terminal is used to confirm that the driver running mode is three-line control modeFor detailed description, please refer to F4-11 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 F8-00, F8-01 and F8-02 function codes.
5	Reverse rotation Jog (RJOG)	
6	Terminal UP	When the frequency is given by the external terminals, it is used as increment 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 driver locks the output, and the motor stop process is beyond the driver 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.
10	Running	The driver decelerates to stop, but all the running

Setup value	Function	Description
	pause	parameters are all in the recorded status, such as PLC parameter, swing frequency parameter and PID parameter. After this signal disappears, the driver restores to the status before stopping.
11	External fault normally open input	After the external fault signal is sent to the driver, the driver reports fault and stops.
12	MS speed terminal 1	It can realize 16S speed through the combination of digital status of these four terminals. Refer attached table 6-1 for the MS speed function description.
13	MS terminal 2	
14	MS peed terminal 3	
15	MS terminal 4	
16	Speed-up/speed-down time selection terminal 1	It can select four types of Speed-up/speed-down time through the combination of digital status of these two terminals.
17	Speed-up/speed-down time selection terminal 2	
18	Frequency source switching	When the frequency source selection (F0-07) is set to 2, it performs switching between main frequency source X and auxiliary frequency source Y via this terminal. When the frequency source selection (F0-07) is set to 3, it performs switching between main frequency source X and (main frequency X plus auxiliary frequency source Y) via this terminal. When the frequency source selection (F0-07) is set to 4, it performs switching between auxiliary frequency source X and (main frequency X plus auxiliary frequency source Y) via this terminal.
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 F0-08.
20	Running	When the command source (F0-02) is set to 1, it performs

Setup value	Function	Description
	command switching terminal	switching between terminal control and keyboard control via this terminal. When the command source (F0-02) is set to 2, it performs switching between communication control and keyboard control via this terminal.
21	Speed-up/speed-down inenabled	Protect the driver from affecting by the external signals (except stop command), and maintain the current frequency.
22	Reserved	–
23	Reserved	–
24	Reserved	–
25	Reserved	–
26	Reserved	–
27	Reserved	–
28	Reserved	–
29	Torque control inenabled	The torque control of driver is inenabled.
30	Reserved	–
31	Reserved	–
32	DC brake command	This terminal is enabled, and the driver directly switches to the DC brake status.
33	External fault normally closed input	After the external fault signal is sent to the driver, the driver reports fault and stops.

Attached Table 1 MS Speed Function Description

K_4	K_3	K_2	K_1	Frequency Setup	Corresponding Parameter
OFF	OFF	OFF	OFF	MS speed 0	FC-0
OFF	OFF	OFF	ON	MS speed 1	FC-01
OFF	OFF	ON	OFF	MS speed 2	FC-02
OFF	OFF	ON	ON	MS speed 3	FC-03
OFF	ON	OFF	OFF	MS speed 4	FC-04
OFF	ON	OFF	ON	MS speed 5	FC-05
OFF	ON	ON	OFF	MS speed 6	FC-06
OFF	ON	ON	ON	MS speed 7	FC-07

ON	OFF	OFF	OFF	MS speed 8	FC-08
ON	OFF	OFF	ON	MS speed 9	FC-09
ON	OFF	ON	OFF	MS speed 10	FC-10
ON	OFF	ON	ON	MS speed 11	FC-11
ON	ON	OFF	OFF	MS speed 12	FC-12
ON	ON	OFF	ON	MS speed 13	FC-13
ON	ON	ON	OFF	MS speed 14	FC-14
ON	ON	ON	ON	MS speed 15	FC-15

NOTE: FC00 ~ FC15 the parameter corresponding unit is "Hz",
the negative number indicates reversal.

Attached Table 2 MS Speed Function Description

Terminal 2	Terminal 1	Speed-up/speed-down time selection	Corresponding Parameter
OFF	OFF	Speed-up time 1	F0-17 and F0-18
OFF	ON	Speed-up time 2	F8-03, F8-04
ON	OFF	Speed-up time 3	F8-05 and F8-06
ON	ON	Speed-up time 4	F8-07 and F8-08

F4-05～F4-14	**Reserved**	Factory default value	—
	Setup range	—	

F4-15	**DI filter time**	Factory default value	4
	Setup range	0～10	

It is used to set the sensitivity of DI terminal. If the digital input terminal is vulnerable to interferences and may cause error action, it can increase this parameter value to enhance the anti-interference capability. However, this operation will reduce the sensitivity of DI terminal.

F4-16	**Terminal command mode**		Factory default value	0
	Setup range	0	Two-line mode 1	
		1	Two-line mode 2	
		2	Three-line mode 1	

		3	Three-line mode 2

This parameter defines four different modes of controlling the operation of the driver via the external terminals.

0: Two-line running mode 1: This mode is the most commonly used two-line mode. The forward/reverse rotation of the motor is decided by the commands of FWD and REV terminals.

K1	K2	Running command
0	0	Stop
0	1	Reverse Rotation
1	0	Forward Rotation
1	1	Stop

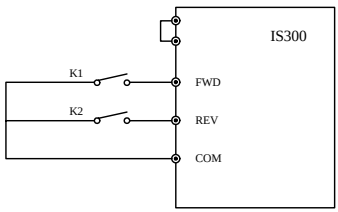


Fig.6-5 Two-line Running

1: Two-line running mode 2: When this mode is adopted, REV is enabled terminal. The direction is determined by the status of FWD.

K1	K2	Running Command
0	0	Stop
0	1	Stop
1	0	Forward Rotation
1	1	Reverse Rotation

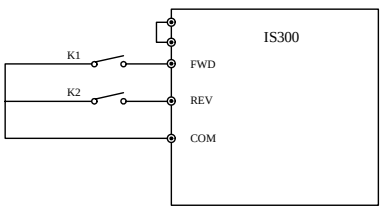


Fig.6-6Three-line running

2: Three-line running mode 1: 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 driver stops.

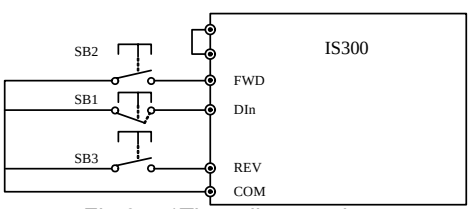


Fig.6-7-1Three-line running

Where,

SB1: Stop button

SB2: Forward rotation button

SB3:Reverse rotation button

DIn is multifunctional input terminals of DI1 to DI5 (DI1 to DI10 if multifunctional input and output expansion card is selected). In this way, it shall define the corresponding terminal functions as No.3 function “Three-line Mode Running Control".

3: Three-line running mode 2: In this mode, DIn is enabled terminal, and the running command is given by FWD, while the direction is determined by the status of REV.

Stop command is performed through disconnecting the DIn signal.

K	Running Direction Selection
0	Forward Rotation
1	Reverse Rotation

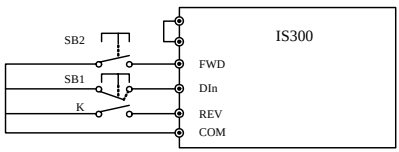


Fig.6-7 Three-line Running Mode

Where,

SB1: Stop button

SB2: Running button

DIn is multifunctional input terminals of DI1 to DI5 (DI1 to DI10 if multifunctional input and output expansion card is selected). In this way, it shall define the corresponding terminal functions as No.3 function “Three-line Mode running Control".

F4-17	**Terminal UP/DOWN Speed**	Factory default value	1.00Hz/s
	Setup range	0.01Hz/s～100.00Hz/s	

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

F4-18	**AI1 minimum input**	Factory default value	0.02V
	Setup range	-11.00V～11.00V	
F4-19	**AI1 minimum input corresponding setup**	Factory default value	0.0%
	Setup range	-100.00%～100.0%	

F4-20	**AI1 maximum input**	Factory default value	10.00V
	Setup range	-11.00V～11.00V	
F4-21	**AI1 maximum input corresponding setup**	Factory default value	100.0%
	Setup range	-100.00%～100.0%	
F4-22	**AI1 input filter time**	Factory default value	0.010s
	Setup range	0.000s～10.000s	

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:

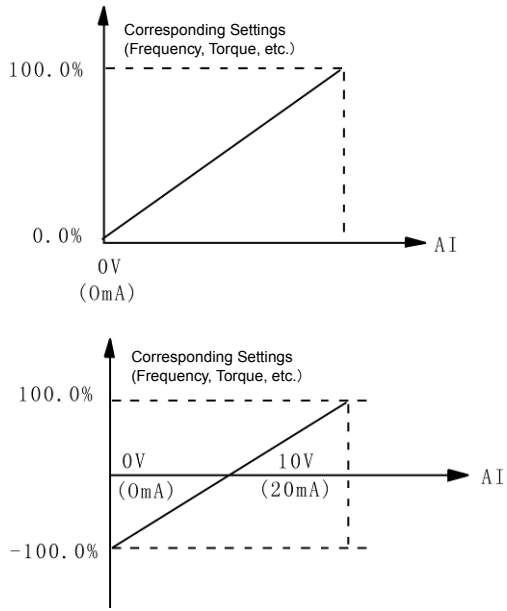


Fig.6-9 Corresponding Relationship between Analog Reference and Setting Value

F4-23	**AI2 minimum input**	Factory default value	0.02V
	Setup range	-11.00V～11.00V	
F4-24	**AI2 minimum input corresponding setup**	Factory default value	0.0%
	Setup range	-100.00%～100.0%	
F4-25	**AI2 maximum input**	Factory default value	10.00V
	Setup range	-11.00V～11.00V	

F4-26	**AI2 maximum input corresponding setup**	Factory default value	100.0%
	Setup range	-100.00%～100.0%	
F4-27	**AI2 input filter time**	Factory default value	0.00s
	Setup range	0.000s～10.000s	
F4-28	**AI3 minimum input**	Factory default value	0.02V
	Setup range	-11.00V～11.00V	
F4-29	**AI3 minimum input corresponding setup**	Factory default value	0.0%
	Setup range	-100.00%～100.0%	
F4-30	**AI3 maximum input**	Factory default value	10.00V
	Setup range	-11.00V～11.00V	
F4-31	**AI3 maximum input corresponding setup**	Factory default value	100.0%
	Setup range	-100.00%～100.0%	
F4-32	**AI3 input filter time**	Factory default value	0.00s
	Setup range	0.000s～10.000s	

The applications AI2、AI3 of function are similar to those of AI1 function.

F4-33～F4-42	**Reserved**	Factory default value	—
	Setup range	—	

F4-43	**AI1 sample voltage 1**	Factory default value	2.000V
	Setup range	-9.999V～9.999V	
F4-44	**AI1 correction voltage 1**	Factory default value	2.000V
	Setup range	-9.999V～9.999V	
F4-45	**AI1 sample voltage 2**	Factory default value	8.000V
	Setup range	-9.999V～9.999V	
F4-46	**AI1 correction voltage 2**	Factory default value	8.000V
	Setup range	-9.999V～9.999V	
F4-47	**AI2 sample voltage 1**	Factory default value	2.000V
	Setup range	-9.999V～9.999V	
F4-48	**AI2 correction voltage 1**	Factory default value	2.000V
	Setup range	-9.999V～9.999V	
F4-49	**AI2 sample voltage 2**	Factory default value	8.000V
	Setup range	-9.999V～9.999V	
F4-50	**AI2 correction voltage 2**	Factory default value	8.000V
	Setup range	-9.999V～9.999V	

F4-51	**AI3 sample voltage 1**	Factory default value	2.000V
	Setup range	-9.999V～9.999V	
F4-52	**AI3 correction voltage 1**	Factory default value	2.000V
	Setup range	-9.999V～9.999V	
F4-53	**AI3 sample voltage 2**	Factory default value	8.000V
	Setup range	-9.999V～9.999V	
F4-54	**AI3 correction voltage 2**	Factory default value	8.000V
	Setup range	-9.999V～9.999V	

Aiming at the degree of linearity of AI1～AI3 command voltage signal to corrected.

F4-55～ F4-58	**Reserved**	Factory default value	—
	Setup range	—	

Group F5 Output Terminal

IS300 series driver standard unit consists of three multifunction relay output terminals, 2 multiple analog output terminals.

F5-00	**Reserved**	Factory default value	—
	Setup range	—	

F5-01	**Control board relay output selection (T/A1-T/B1-T/C1)**	Factory default value	2（Fault output）
F5-02	**Control board relay output selection (T/A2-T/C2)**	Factory default value	1(Servo driver is running)

F5-03	Control board relay output selection (T/A3-T/C3)	Factory default value	1(Servo driver is running)

This parameter is used to set the functions of the multifunctional digital input terminals.If the setup is oil pressure control mode (A3-00 setting values is non-zero), the T/A2-T/C2 default is swashplate switching、the T/A3-T/C3 default is pressure control status output.

Multifunctional output terminal function selection is as follows:

Setup value	Function	Description
0	No output	The output terminal does not have any function.
1	Driver is running	It indicates the driver is running, and there is output frequency (can be zero), and ON signal will output at this time.
2	Fault output	When the driver is faulty, it outputs ON signal.
3	Frequenc-y level detection FDT arrival	Please refer to F8-19 and F8-20 for details.
4	Frequenc-y arrival	Please refer to F8-21 for details.
5	In zero speed operation	When the driver output frequency is less than the start frequency, it outputs ON signal.
6	Motor overload pre-warning	Judgment will be made according to the pre-warning parameter value before the motor electronic thermal protection is enabled. If it exceeds the pre-warning value, it will output ON signal. Motor overload parameters are set in F9-00 to F9-02.
7	Driver overload pre-warni-ng	After it is found that the driver is overloaded, pre-warning will be invoked 10 seconds before the occurrence of protection. And ON signal will be output.
8	Reserved	–
9	Reserved	–
10	Reserved	–
11	Reserved	–
12	Run time arrival	When the accumulated running time of the driver exceeds the setup time F8-17, it outputs ON signal.
13	Frequenc-y limiting	When the setup frequency exceeds the frequency upper limit and frequency lower limit, and the output

Setup value	Function	Description
		frequency of the driver reaches the frequency upper limit and frequency lower limit, it outputs ON signal.
14	Torque limiting	When the torque limiting function is enabled, the stall protection function is automatically enabled and the output frequency is automatically changed. Meanwhile, it outputs ON signal, indicating that it is outputting torque limit. This output signal can be used to reduce load or display overload status signal on the monitoring device.
15	Ready for running	When the main circuit and control circuit power supply are connected, the driver protection function is inenabled, and the driver is in running status, it output ON signal.
16	AI1>AI2	When the analog input AI1 value is higher than AI2 value, it outputs ON signal.
17	Frequenc-y upper limit arrival	When the running frequency reaches frequency upper limit, it outputs ON signal.
18	Frequenc-y lower limit arrival	When the running frequency reaches frequency lower limit, it outputs ON signal.
19	Under voltage status output	When the driver is in under voltage status, it outputs ON signal.
20	Communication setup	Refer to the communication protocol for relevant descriptions.
21～22	Reserved	—
23	Double displacement Plunger Pump swashplate swicth（NO）	Double displacement Plunger Pump displacement swicth
24	Pressure control status output (NC)	
25	Alarm output from pump(NC)	

F5-04～F5-09	Resvered	Factory default value	—
	Setup range	—	

F5-10	A01 output selection	Factory default value	9
F5-11	A02output selection	Factory default value	10

The standard output of analog output (zero offset is 0 and gain is 1) is 0mA to 20mA (or 0v TO 10V), and the output range of FMP is between 0Hz and setup value of F5-09.

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

Set up value	Function	Range
0	Running frequency	0 to maximum output frequency
1	Setup frequency	0 to maximum output frequency
2	Output current	0 to 200% of the rated current of the motor
3	Output torque	0 to 200% of the rated torque of the motor
4	Output power	0 to 200% rated power
5	Output voltage	0 to 120% of the rated voltage of the driver
6	PULSE input PULSE input	0.1kHz to 50.0kHz
7	AI1	0V to 10V
8	AI2	0V to 10V/0 to 20mA
9	AI3	0V to 10V
10	Feedback frequency	0 to maximum frequency
11	Feedback voltage	0 to maximum oil pressure
12~16	Reserved	

F5-12～F5-13	Reserved	Factory default value	—
	Setup range	—	

F5-14	**AO1 offset coefficient**	Factory default value	0.0%
	Setup range	-100.0%～100.0%	
F5-15	**AO1 gain**	Factory default value	1.00
	Setup range	-10.00～10.00	
F5-16	**AO2 offset coefficient**	Factory default value	0.00%
	Setup range	-100.0%～100.0%	
F5-17	**AO2 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;

AO1 and AO2 zero offset coefficients 100% corresponds to 10V(20mA).

Standard output refers to 0 to maximum analog output corresponding to the output of 0 to 10V(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%”.

F5-18～ F5-22	**Resreved**	Factory default value	—
	Setup range	—	

Group F6 Start/Stop Control

F6-00	**Startup mode**		Factory default value	0
	Setup range	0	Direct start (When the DC brake time is non-zero value, perform DC braking prior to start.	
		1	Rotation speed tracking restart	

0: Direct start

If the DC brake time is set to 0, start at the start frequency.

When the DC brake time is non-zero value, perform DC braking prior to start. It is applicable to the applications where reverse rotation is likely to occur when small loads are started.

1: Rotation speed tracking restart

The driver judges the rotation speed and director 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.

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)

F6-01	**Rotation speed tracking mode**		Factory default value	0
	Setup range	0	Beginning from stop frequency	
		1	Beginning from zero speed	
		2	Beginning from maximum frequency	

To complete the rotation speed tracking process within the shortest time, select the mode of driver tracking motor rotation speed:

0: To track from the frequency upon power failure, it generally selects this mode.

1: This mode is used to track from zero frequency and restart upon long period of time of power failure.

2: This mode is used o track from the maximum frequency and applicable to the general power generating loads.

F6-02	**Rotation speed tracking fastness and slowness**	Factory default value	20
	Setup range	1~ 100	

When it is in the mode of rotation speed tracking restart, select the fastness and slowness of the rotation speed tracking. The higher this parameter value is, the faster the tracking speed is. But too high value may result in unreliable tracking.

F6-03	**Startup frequency**	Factory default value	0.00Hz
	Setup range	0.00Hz~ 10.00Hz	
F6-04	**Startup frequency retention time**	Factory default value	0.0s
	Setup range	0.0s~ 36.0s	

To ensure the torque at the start of driver, it needs to set a proper start frequency. In addition, to set up flux at the time of motor start, it needs to start speed-up after the start frequency is kept for a certain period of time. The start frequency value F6-03 is not limited by the frequency lower limit.

When the frequency setup value (frequency source) is lower than the start frequency, the driver cannot be started and is in the standby status. When the forward rotation and reverse rotation is being switched each other, the start frequency retention time is inenabled. The retention time is not included in the speed-up time but in the running time of simple PLC.

Example 1:

F0-03=0 Frequency source is digital setup

F0-08=2.00Hz Digital setup frequency is 2.00Hz.

F6-03=5.00Hz Start frequency is 5.00Hz.

F6-04=2.0s Start frequency retention time is 2.0s.

At this time, the driver is in the standby status, and the output frequency of the driver is 0Hz.

Example 2:

F0-03=0 Frequency source is digital setup.

F0-08=10.00Hz Digital setup freqeuncy is 10.00Hz.

F6-03=5.00Hz Start frequency is 5.00Hz.

F6-04=2.0s Start frequency retention time is 2.0s.

At this time, the driver accelerates to 5Hz and further to setup freuqency of 10Hz in 2s.

F6-05	**DC brake current at start**	Factory default value	0%
	Setup range	0% ~ 100%	
F6-06	**DC brake time at start**	Factory default value	0.0s
	Setup range	0.0s~ 36.0s	

DC brake at start s generally used when the motor is restarted after it stops completely.

If the start mode is direct start, the driver firstly performs DC brake in accordance with the DC brake current at start, and then start running after the setup DC brake time at start. If the DC brake time is set to 0, the driver directly starts without passing through the DC brake.

The higher the DC brake current is, the higher the brake force is.

DC brake current at start refers to the percentage of rated current of the driver.

F6-07	**Speed-up/speed-down/ mode**		Factory default value	0
	Setup range	0	Straight speed-up/speed-down	
		1	S-curve speed-up/speed-down	

It is used to select the frequency change mode during the driver start and stop process.

0: Straight speed-up/speed-down

The output frequency increases or decreases along the straight line. The speed-up/speed-down time varies with the setup speed-up/speed-down time. IS300 series driver provides four types of speed-up/speed-down time. It can select speed-up/speed-down time via the multifunctional digital input terminals (F4-00 to F4-08).

1: S-curve speed-up/speed-down

The output frequency increases or decreases along the S curve. S curve is generally used in the applications where start and stop processes are relatively flat, such as elevator and conveyor belt. Refer to F6-08 and F6-09 for the meanings of the parameters.

F6-08	**Start segment proportion of S curve**	Factory default value	30.0%
	Setup range	0.0% ~ 40.0%	

F6-09	**End segment proportion of S curve**	Factory default value	30.0%
	Setup range	0.0%~ 40.0%	

t1 in the following figure is the parameter set in F6-08, within which the output frequency change slope increases gradually. t2 is the time defined in F6-03, with which the slope of the output frequency change gradually decreases to 0. Within the time between t1 and t2, the slope of the output frequency change remains fixed.

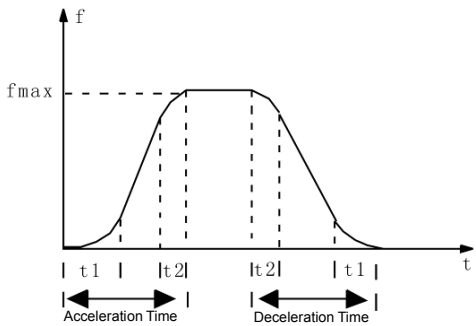


Fig.6-9 Schematic Diagram for S curve Speed-up/Speed-down

F6-10	**Stop mode**		Factory default value	0
	Setup range	0	Deceleration to stop	
		1	Coast to stop	

0: Speed-down to stop

After the stop command is enabled, the driver 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: Free stop

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

F6-11	**DC brake beginning frequency at stop**	Factory default value	0.00Hz
	Setup range	0.00Hz ~maximum frequency	
F6-12	**DC brake waiting time at stop**	Factory default value	0.0s
	Setup range	0.0s~ 36.0s	

F6-13	**DC brake current at stop**	Factory default value	0%
	Setup range	0%~ 100%	
F6-14	**DC brake time at stop**	Factory default value	0.8s
	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.

DC brake waiting time at stop: Prior to the beginning of DC brake at stop, the driver 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 speed 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 driver will stop according to the setup decoration to stop process.

F6-15	**Brake using ratio**	Factory default value	100%
	Setup range	0% ~ 100%	

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

Group F7 Keyboard and Display

F7-00	**LCD language selection**	Factory default value	0
	Setup range	0	Chinese
		1	English

It is enabled for the LCD keyboard. It is used to select the character mode of LCD display.

F7-01	MF.K Key function selection		Factory default value	0
	Setup range	0	MF.K Key function inenabled	
		1	Switching between operation panel command channel and remote command channel (terminal command channel or serial port communication 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 inenabled.

2: Switching between forward rotation and reverse rotation

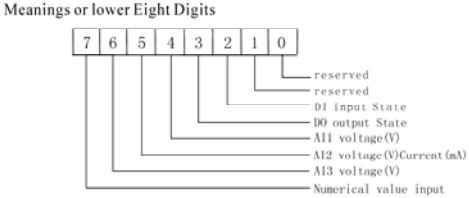
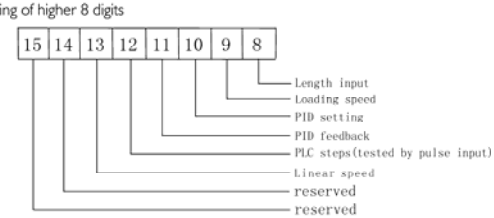
It can switch the direction of the frequency command via the MF.K key on the keyboard. It is enabled only in the operation panel command channel.

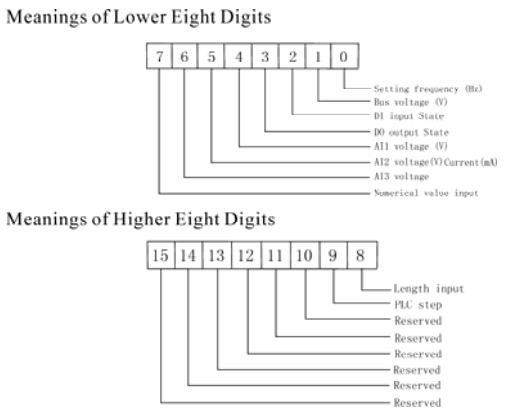
3: Forward rotation Jog

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

F7-02	STOP/RESET key function		Factory default value	0
	Setup range	0	Enabled only in the keyboard control mode	
		1	STOP key enabled in the terminal control mode	
		2	STOP reset function enabled in the terminal control mode	

		3	STOP key stop and fault reset function enabled in the terminal control mode
F7-03	**QUICK parameter lockout**	Factory default value	0
	Setup range	QUICK parameter lockout inenabled. The parameter items in the shortcut menu can be added, reduced or modified at this time.	
		1: QUICK parameter lockout inenabled. The parameter items in the shortcut menu cannot be modified at this time, but the related parameter contents can be modified.	

F7-04	**LED operation display parameter**	Factory default value	624
	Setup range: 1~ 65535	Meanings or lower Eight Digits  Meaning of higher 8 digits  If the above parameters need to be displayed during the operation, set the corresponding positions to 1, and change the binary numbers into decimal numbers and set them in F7-01.	

F7-05	**LED stop display parameter**	Factory default value	1139
	Setup range: 1 ~ 65535	Meanings of lower eight digits:  If the above parameters need to be displayed during the stop, set the corresponding positions to 1, and change the binary numbers into decimal numbers and set them in F7-05.	

F7-06	**Load speed display coefficient**		Factory default value	1.0000
	Setup range	0.0001~ 6.5000	The output frequency of the driver and the load speed are relative through this parameter. It is set when the load speed needs to be displayed.	

F7-07	**Radiator temperature of driver module**		Factory default value	
	Setup range	0.0℃~ 100.0℃	Display the temperature of driver module IGBT, and the over temperature protection value of the driver module IGBT varies with the model.	

F7-08	**Radiator temperature of rectifier module**		Factory default value	
	Setup range	0.0℃~ 100.0℃	Display the temperature of driver module IGBT, and the over temperature protection value of the driver module IGBT varies with the model.	

F7-09	**Accumulated running time**		Factory default value	0h
	Setup range	0h ~ 65535h	Display the accumulated running time of the driver till now. When this time reaches the setup running time (F8-17), the multifunctional digital output of the driver (DO and F5-04) performs action.	
F7-10	**Software version No.1**		Factory default value	
	Setup range		Management software version No. of the control board	
F7-11	**Software version No.2**		Factory default value	
	Setup range		Software version No. of the motor control board	

Group F8 Auxiliary Function

F8-00	**Jog running frequency**	Factory default value	2.00Hz
	Setup range	0.00Hz ~ maximum frequency	
F8-01	**Jog speed-up time**	Factory default value	20.00s
	Setup range	0.00s~ 6500.0s	
F8-02	**Jog speed-down time**	Factory default value	20.00s
	Setup range	0.00s~ 6500.0s	

It is used to define the reference frequency and acceleration/deceleration time of the driver when jogging. The Jog process is started and stopped according to the start mode 0 (F6-00, direct start) and the stop mode 0 (F6-10, deceleration time to stop).

The Jog acceleration time means the time required for the driver to accelerate from 0Hz to the maximum output frequency (F0-10).

The Jog deceleration time means the time required for the driver to decelerate from the maximum output frequency (F0-10)to 0Hz.

F8-03	**Speed-up time 2**	Factory default value	20.00s
	Setup range	0. 0s~ 6500.0s	
F8-04	**Speed-down time 2**	Factory default value	20.00s
	Setup range	0.0s~ 6500.0s	
F8-05	**Speed-up time 3**	Factory default value	20.00s
	Setup range	0.0s~ 6500.0s	
F8-06	**Speed-down time 3**	Factory default value	20.00s
	Setup range	0.0s~ 6500.0s	
F8-07	**Speed-up time 4**	Factory default value	20.00s
	Setup range	0.0s~ 6500.0s	
F8-08	**Speed-down time 4**	Factory default value	20.00s

	Setup range	0.0s ~ 6500.0s

Speed-up/speed-down time can select F0-17 and F0-18 and above three types of Speed-up/speed-down time. Their meanings are the same, and refer to F0-17 and F0-18 for the relevant descriptions.

It can select Speed-up/speed-down time 1 to 4 during the driver running process via the different combination of multifunctional digital input terminal DI. Please refer to F4-01 to F4-05.

F8-09	**Skip frequency 1**	Factory default value	0.00Hz
	Setup range	0.00Hz~ maximum frequency	
F8-10	**Skip frequency 2**	Factory default value	0.00Hz
	Setup range	0.00Hz~ maximum frequency	
F8-11	**Skip frequency amplitude 1**	Factory default value	0.00Hz
	Setup range	0.00~ maximum frequency	

When the setup frequency is within the skip frequency range, the actual running frequency will be in the skip frequency boundary close to the setup frequency.

It can make the driver run away from the mechanical resonance point of the load through setting the skip frequency. This driver can set two skip frequency points. If the two skip frequencies are set to zero, this function will be inenabled.

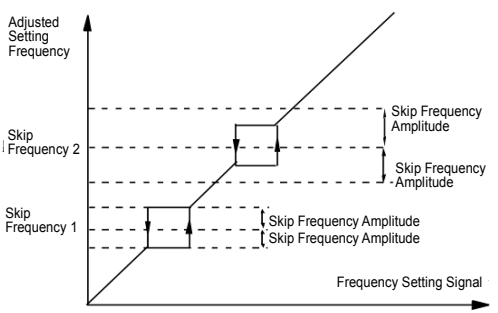


Fig.6-10 Schematic Diagram of Skip Frequency

F8-12	Forward/reverse rotation dead-zone time	Factory default value	0.00s
	Setup range	0.00s~ 3000.0s	

During the setting of forward/reverse rotation of the driver, the transition time at the output zero frequency position is shown in the following figure:

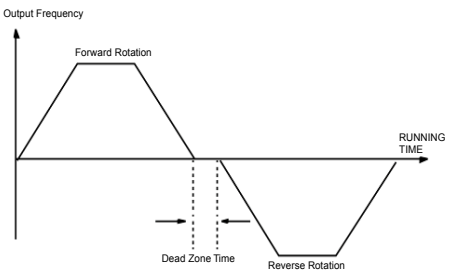


Fig.6-11 Schematic diagram for Forward/ Reverse Rotation Dead-zone Time

F8-13	Reverse control		Factory default value	0
	Setup range	0	Reverse rotation enabled	
		1	Reverse rotation inenabled	

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

When this parameter is set to 1, the reverse rotation control function is enabled and has nothing to with the command source selection. That is to say, the reverse control function is inenabled at the time of keyboard, terminal and communication controls.

F8-14	Setup frequency lower than frequency lower limit action		Factory default value	0
	Setup range	0	Run with frequency lower limit	
		1	stop	
		2	Running with zero speed	

It is used to select the running status of the driver when the setup frequency is lower than the frequency lower limit.

In order to avoid that the motor always runs with low speed, it can use this function to stop.

F8-15	Droop control	Factory default value	0.00Hz
	Setup range	0.00Hz~ 10.00Hz	

When multiple drivers drive the same load, the unbalanced load distribution due to difference speed causes the driver with faster speed to carry heavier load. The droop control characteristics cause the speed droop change along with the addition of load, which can lead to balanced load distribution.

This parameter is used to adjust the frequency change value of the driver with droop speed.

F8-16	Over modulation enabled		Factory default value	1
	Setup range	0	Over modulation inenabled	
		1	Over modulation enabled	

Over modulation function means that the driver can improve the output voltage by adjusting the use ratio of the bus voltage when the input voltage is relatively low or the driver always works under heavy load. When the over modulation is enabled, the output current harmonics will slightly increase.

This function can select whether the over modulation function is enabled.

F8-17	Setup running time	Factory default value	0h
	Setup range	0h to 65535h	

It is sued to preset the running time of the driver.

When the accumulated running time (F7-09) reaches this setup running time, the multifunctional digital DO of the driver outputs the signal of running time arrival.

F8-18	Start protection selection		Factory default value	0
	Setup range	0	no protection	
		1	protection	

This function code is used to improve the safety protection coefficient. If it is set to 1, it has two roles: first, if the running command exists upon driver power-on, it must cancel the running command to remove the running protection status.

Second, if the running command exists upon driver 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.

F8-19	**Frequency detection value (FDT level)**	Factory default value	50.00Hz
	Setup range	0.00Hz~ maximum frequency	
F8-20	**Frequency detection hysteresis (FDT hysteresis)**	Factory default value	5.0%
	Setup range	0.0%~ 100.0%(FDT level)	

It is used to set the detection value of output frequency and hysteresis value upon removing of the output action.

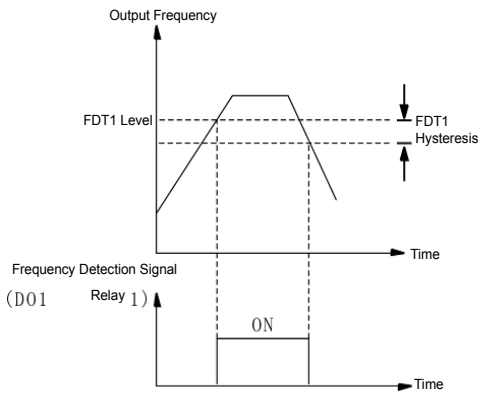


Fig.6-12 Schematic Diagram for FDT Level

F8-21	**Frequency arrival detection amplitude**	Factory default value	0.0%
	Setup range	0.00~ 100% maximum frequency	

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

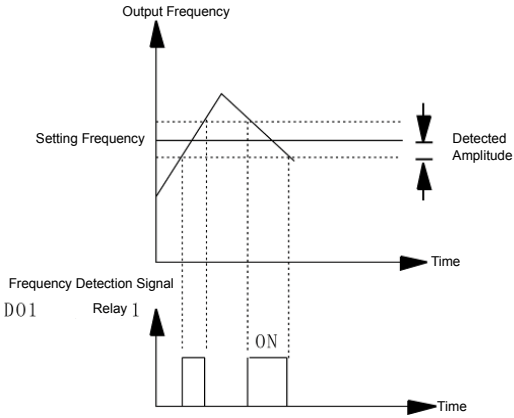


Fig.6-14 Schematic Diagram for Detection Amplitude

F8-22	**Earth short circuit protection detection upon power-on**	Factory default value	1
	Setup range	Inenabled 1: Enabled	

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

F8-23	**Running time to action selection**	Factory default value	0
	Setup range	0: Continue running 1: Stop	

Group F9 Fault and Protection

F9-00	**Motor overload protection selection**	Factory default value	1
	Setup range： 0: Inenabled 1:Enabled	0: The driver has no overload protection for the motor, and thermal relay is installed before the motor. 1: The driver has overload protection function for the motor. Refer to F9-01 for the protection value.	

F9-01	**Motor overload protection gain**	Factory default value	1.00
	Setup range： 0.20 ~ 10.00	The motor overload protection is driver time-lag curve; 220%×(F9-01)× rated motor current: one minute; 150%×(F9-01)× rated motor current: 60 minutes.	

F9-02	**Motor overload pre-warning coefficient**	Factory default value	80%
	Setup range： 50%~ 100%	The reference for this value is the motor overload current. When the driver detects that the output current reaches (F9-02)× motor overload current and lasts time as specified by the reverse time-lag curve, it outputs pre-warning signal from DO or relay.	
F9-03	**Stall gain over voltage**	Factory default value	0

	Setup range： 0(no stall over voltage) to 100	It adjusts the driver'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.

F9-04	**Stall protection voltage over voltage**	Factory default value	130%
	Setup range： 120% to 150%	Select the protection point for function of stall over voltage. When the value is exceeded, the driver starts executing the protection function for stall over voltage.	

F9-05	**Stall gain over current**	Factory default value	20
	Setup range： 0~ 100	It adjusts the driver'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 voltage fault may occur.	

F9-06	**Stall protection current over current**	Factory default value	150%
	Setup range: 100% ~ 200%	Select the protection point for function of stall over current. When the value is exceeded, the driver starts executing the protection function for stall over current.	

F9-07	**Transient stop non-stop function**	Factory default value	0
	Setup range: 0: Inenabled 1: Enabled	This function means that the driver will not stop upon transient power failure. In case of transient power failure or sudden reduction in voltage, the driver will reduce the output speed and compensate the reduced voltage with the load feedback energy, so as to ensure the driver continues running within short period of time.	

F9-08	**Transient stop non-stop frequency falling rate**	Factory default value	10.00Hz/s
	Setup range: 0.00Hz/s ~ maximum frequency	It is used to set the falling rate of the output frequency of the driver when the transient stop non-stop function is enabled. If the value is too small, the load feedback energy is not enough to provide effective compensation for the low voltage. If the value is too large, the load feedback energy will be too high and cause over voltage protection. Please adjust the parameter according to the load inertia.	

F9-09	**Fault auto reset times**	Factory default value	0
	Setup range： 0 to 3	When the driver selects fault auto reset, it is used to set the times of auto reset. If this value is exceeded, the driver will stop because of failure and wait for maintenance.	
F9-10	**Fault rely action selection during the fault auto reset**	Factory default value	1
	Setup range： 0: No action 1: Action	After the failure auto reset function is selected, this parameter can be set to determine if it needs the action of the faulty relay so as to shield the fault alarm caused and ensure the continuous operation of the equipment during the failure reset.	

F9-11	**Fault auto reset interval**	Factory default value	1.0s
	Setup range： 0.1s ~ 100.0s	The waiting time of the driver from the fault alarm to auto reset.	

F9-12	**Input phase loss protection selection**		Factory default value	1
	Setup range：	0: Inenabled 1: Enabled	Select whether to provide protection for input phase loss. Only the MD series driver of G model with over 18.5kW can have input phase loss protection function, and the P model with 18.5kW has not such function no matter whether F9-10 is set to 0 or 1.	
F9-13	**Output phase loss protection selection**		Factory default value	1
	Setup range	0: Inenabled 1: Enabled	Select whether to provide protection for output phase failure.	

F9-14	**Speed protection deviation**		Factory default value	10.00Hz
	Setup range	0.50Hz ～ 50.00Hz	It is used to set the frequency deviation value of the motor speed deviation. (The deviation value between motor actual operating frequency and command frequency.	
F9-15	**Speed deviation protection time**		Factory default value	10.0s
	Setup range	0.0s disable 0.1s ～ 20.0s 0.0s（protection inenabled） 0.1s～20.0s	It is used to set speed deviation protection time.	
F9-16	**Motor temperature protection selection**		Factory default value	0
	Setup range	0:Inenabled 1:Enabled	Select whether or not to protect the motor temperature overheating.	
F9-17	**Motor temperature protection mode**		Factory default value	0
	Setup range	0:DI signal input 1: AI 1:analog input 2-3: Reserved	Select the motor temperature overheating protection mode	

F9-18	**The First fault type**	0～45
F9-19	**The Second fault type**	
F9-20	**The the most recent fault type**	

It is used to record the fault types of driver for the resent three times: 0 indicates no fault, while 1 to 24 indicates ERR01 to ERR24. Refer to Chapter 7 for details.

<table>
<tr><td>F9-21</td><td>Frequency upon fault</td><td>Display the most recent failure of the frequency</td></tr>
<tr><td>F9-22</td><td>Current upon fault</td><td>Display the current upon fault for the most recent one time.</td></tr>
<tr><td>F9-23</td><td>Bus voltage upon fault</td><td>Display the bus voltage upon fault for the most recent one time.</td></tr>
<tr><td>F9-24</td><td>Input terminal status upon fault</td><td>This value is a decimal number.Display the status of all the digital input terminal upon fault for the most recent one time,with sequence of:
<table><tr><td>BIT 4</td><td>BIT 3</td><td>BIT 2</td><td>BIT 1</td><td>BIT 0</td></tr></table>DI5……DI1
It will be displayed in decimal number converted from each digit status.
When the input terminal is ON, the corresponding value is 1. When the input terminal is OFF, the value is 0.
It can know the details regarding digital output signal via this value.</td></tr>
<tr><td>F9-25</td><td>Output terminal upon fault</td><td>This value is a decimal number.Display the status of all the digital input terminal upon fault for the most recent one time,with sequence of:
<table><tr><td>BIT 2</td><td>BIT 1</td><td>BIT 0</td></tr></table>REL3 REL2 REL1
It will be displayed in decimal number converted from each digit status.
When the input terminal is ON, the corresponding value is 1. When the input terminal is OFF, the value is 0.
It can know the details regarding digital output signal via this value.</td></tr>
</table>

Group FD Communication Parameters(Reserved)

Group FP User Password

FP-00	**user password （Authorization for all functions code except FP-05）**	Factory default value	0
	Setup range	0 to 65535	

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

000: Clear the previous setup user password and disable the password protection function.

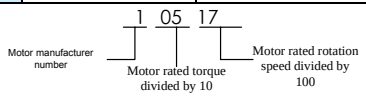
Upon setup and validation of the user password, when the user enters the parameter setting status again, the user can view the parameters only and cannot modify the parameter if the password is incorrect. Please remember the setup user password correctly. If the password is set wrongly or forgotten, 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 driver restores all the parameters except the parameters in Group F1 to the factory default ones.

2: The driver clears the recent fault records.

3：Restore the setup function code value of the FP-04 saved.

FP-02	Motor specifications solidification	Factory default value	0
	setup instroution		

When the motor specifications solidification parameter is non-zero, the following parameters will not be able to change:

F1-00： Motor type selection

F1-01：Rated power

F1-02：Rated voltage

F1-03：Rated current

F1-04： Rated Frequency

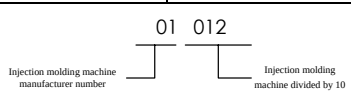
F1-05：Rated rotation speed

F1-15：Back EMF

FP-03： Injection molding machine specifications solidification

Commissioning introduction:

It can not only realize motor specifications solidification,but also set the “ motor static tuning ” (F1-16 = ” “ 1) and “ AI zero drift auto correction” (A3-20 = “ 0 ”), after that,injection molding machine is able to realize running.Then adjust PID, and the injection molding machine parameter adjustment is ended.

FP-03	Injection molding machine specifications solidification	Factory default value	0
	setup instroution		

When the parameter of injection molding machine specifications solidification is non-zero, the following parameters can not be changed.

F1-00： Motor type selection

F1-01： Rated power

F1-02： Rated voltage

F1-03： Rated current

F1-04： Rated Frequentcy

F1-05： Rated rotation speed

F1-15： Back EMF

F2-00： Speed loop proportional gain 1

F2-01： Speed loop integration time 1
F2-03： Speed loop proportional gain 2
F2-04： Speed loop integration time 2
F2-10： Torque upper limit
FP-02：Motor specifications solidification
Commissioning introduction:
It can not only realize injection molding machine specifications solidification,but also set the “ motor static tuning ”（F1-16＝“1”）and “ AI zero drift auto correction ”（A3-20＝“0”）, then the injection molding machine parameter adjustment is ended.

FP-04	**User Password 2（Authorization for FP-05function code）**	Factory default value	0
	Ssetup range	0～65535	

Set any one of the non-zero number, password protection function is taken into effect.
0000：Clear a previously setup user passwords 2 value, and make password protection function inenabled.
After setup the user password 2, and re-entry into parameter setup State, if the user password 2 is incorrect, you can only view the parameter, you cannot modify the parameters.Please keep the user's password 2in mind .If you accidentally by mistake or forgot,please contact the manufacturer.

FP-05	**Function code setup values in real time saved**	Factory default value	0
	Setup range	0	No operation
		1	Save the currently set values for all the function code

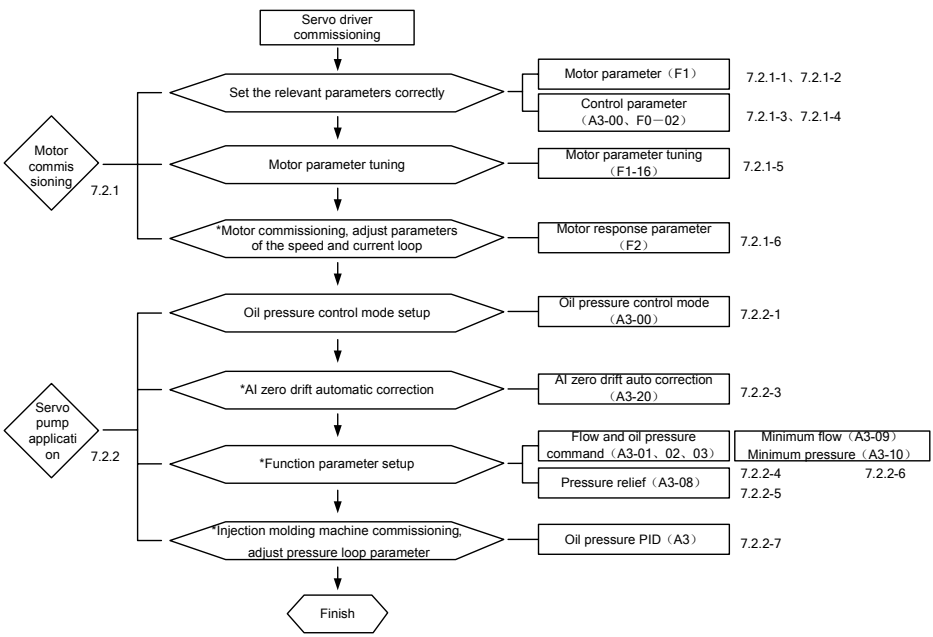
1：Save the currently set values for all the function code,It can be restored By FP-01＝“3”.

7

Servo Pump Commissioning Steps and Prototyping of servo pump optional parts

Chapter 7 Servo Pump Commissioning Steps and Prototyping of servo pump optional parts

7.1 Servo Pump Commissioning Process



Note：（1）Detailed instructions please refer to the following corresponding contents.
（2）Do not conduct the commissioning steps with *, it can also start the injection molding machine action.

7.2 Servo Pump Commissioning Steps

7.2.1 Motor commissioning

1) Set group F1 motor parateters（F1-00～F1-05，F1-15）
2) Set rotary encoder number of pole-pairs
3) Set the drvier to non-oil pressure control mode：A3-00 ＝“0”
4) Set the driver to operation panel control mode, at this time the light of LOCAL/REMOT is off.
5) Motor parameter tuning(automatic identification) （F1-16）
   a) F1-16＝“0”：No operation.It doesn’t conduct the motor parameters tuning.
   b) F1-16＝“1”：Staic tuning.Adopt when the motor back EMF is known.Run the motor at the low speed without opening the overflow valve during tuning.
   c) F1-16＝“2”：Dynamic tuning. Adopt it when the motor back EMF is unknown. Run the motor at the low speed with opening the overflow valve during tuning. Carrier tuning will affect the precision of the motor parameters tuned, affecting the system control effectiveness.
      1） If correctly set F1 group motor parameters （F1-00～F1-05、F1-15）、rotary encoder number of pole-pairs（A1-04）, just only conduct F1-16＝“1”(staic tuning).
      2） If it is only able to correctly set F1 group motor parameters (F1-00 ~ F1-05), rotary encoder number of pole-pairs (A1-04) was unable to determine the F1-15 (back EMF), you must conduct F1-16 =” “1” (dynamic tuning).

The numerical value of parameter F1-16 will restore to zero automaticly after tuning.

If the driver alarm Err43 in the tuning process, it indicates that the encoder feedback signal is wrong, please check the encoder signal wiring and installation precision.

6) When commissioning, and set running frequency (F0-08), run by using the operation panel, while detecting whether the output current is normal, whether the motor is running quietly, and the way of using the operator .Please refer to the operation and display of Chapter 4.
   a) Look into whether the running direction of the driver is correct, if it is correct, please swap motor wiring arbitrary two-phase UVW and recheck motor parameters tuning.Then commissioning.
   b) If abnomal running, please check the motor parameters (F1 groups) and rotary encoder number of pole-pairs (A1-04) setup, and then

restart the motor parameters tuning, then commissioning.

c) Motor has oscillation when running or sends a low voice, please weaken the speed loop（F2-00、F2-01、F2-03、F2-04） and current loop(F2-13、F2-14、F2-15、F2-16) appropriately（Reduce the value of F2-00、F2-03、F2-13、F2-14、F2-15、F2-16，increase the value of F2-01、F2-04）.

d) Motor running speed is not steady, please enhance speed loop （F2-00、F2-01、F2-03、F2-04） and current loop(F2-13、F2-14、F2-15、F2-16) appropriately.(Increase the value of F2-00、F2-03、F2-13、F2-14、F2-15、F2-16.Reduce the value of F2-01、F2-04)

NOTE: The slow response of the speed and current loop will affect the pressure stability directly, if the condition allows, please set the stronger speed loop and current loop response.

7.2.2 Servo Pump Application Commissioning

1） Oil pressure control mode selection

A3-00＝“0”：Non- Oil pressure control mode

A3-00＝“1”：Driver oil pressure control mode 1.CAN provides oil pressure command and flow command, AI3 analog Channel provides oil pressure feedback command, the driver conducts oil pressure control.

1. A3-00＝“2”：Driver oil pressure control mode2. AI1 provide oil pressure command, AI2 analog Channel provide flow command, AI3 analog Channel provides oil pressure feedback command, and the driver conducts oil pressure control.
2. A3-00＝“3”： Oil pressure control mode (For special use), the control parameters of group A3 servo pump control group are inenabled.e）A3-00＝“4”：Reserved.

2） The parameters automatic setup in the Oil pressure control mode.When the non-oil pressure mode switches to oil pressure mode（A3-00≠“0”）, the relevant parameters will be automatically set, as described in the following table.

Table 7-1 Automatic setup parameters deails

Function Code	Function Code Description	Setup
F0-01	Control mode	1(Vetor control mode)
F0-02	Command source	1(Terminal command source)
F0-03	Frequency source	If A3-00＝“2”, F0-03＝“3 ”(A I2 is frequency source).If A3-00＝“1” or “3”,

Function Code	Function Code Description	Setup
		F0-03 = “9”(Communication setup is frequency source)
F0-07	Frequency source selection	0 (Non-auxiliary frequency source)
F0-17	Speed-up time	0.0s
F0-18	Speed-down time	0.0s
F1-00	Motor type selection	2 (Synchronous motor)
F4-00	DI1 terminal function selection	11（Running enabled）
F4-01	DI2 terminal function selection	48 (Oil pressure control PID select terminal 1)
F4-02	DI3 input function selection	49(Oil pressure control PID select terminal 2)
F4-03	DI4 input function selection	9 (Fault reset)
F4-04	DI5 input function selection	50(CAN communication enabled)
F5-01	DO1 output function selection	2 (Fault output)
F5-02	DO2 output function selection	23(Swashplate switch)
F5-03	DO3 output function selection	24 (Pressure control status output)

Modify the above-mentioned parameters in the oil pressure control mode, it may be power-failure recorded (which the driver to repower is to restore setup value automatically), When the oil pressure mode switches to non-oil pressure mode, the above parameters will be restored to switch to the numerical value which is before oil pressure control mode.

3） AI zero drift auto-correction（A3-20）:

Set AI zero drift auto correction parameter A3-20 to 1, the driver will conduct an AI zero drift auto correct operation:

Write the detection value zero drift of three analog channel into the parameters, they are F4-18 (AI1 is the minimum input), F4-23 (AI2 is the minimum input), F4-28 (AI3 is the minimum input). The detection value of zero drift can be

found at U1-07, U1-08, and U1-09.

Command setup of flow and oil pressure（A3-01、A3-02、A3-03）:

ii. A3-01： Manimum rotation speed.Set the motor running manimum rotation speed which is the motor rotation speed corresponds to flow command one hundred percent.

iii. A3-02：System oil pressure.Set system manimum pressure.

iv. A3-03: Manimum oil pressure.Set the pressure scale of pressure sensor.

Pressure relief setup（A3-08）:

A3-08：It is the maximum reverse rotation speed when pressure relief, which corresponds to the percentage setup of manimum rotation speed. It is used to set the maximum reverse rotation speed. The greater setup value is, the faster pressure relief will be, but excessive noise cause pump reversal.The smaller setting value is, the slower pressure relief will be.

4） Minimum Flow and Minimum Pressure（A3-09、A3－10）:

Due to oil pump exists internal leakage, the system is not given flow and pressure command, the hydraulic oil in oil circuit oil tanks wil reflow to the oil tank, then it will cause the air enters the oil circuit, resulting in a system running noise and unstable.So you need to set a certain minimum Flow (A3-09, corresponding the percentage of manimum rotation speed setup) and minimum Pressure (A3-10).

5） System Response（Oil pressure PID control）

The driver provides four groups PID, according to the input terminals of the DI2 and DI3 combination selection, the corresponding selection is as follows.

Table 7-2 PID Combination Selection

DI3	DI2	Group PID
0	0	The first group PID: A3-05、A3-06、A3-07
0	1	The second group PID: A3-11、A3-12、A3-13
1	0	The third group PID: A3-14、A3-15、A3-16
1	1	The fourth group PID: A3-17、A3-18、A3-19

The greater proportional gain KP is, the smaller integration time Ki will be, and the larger derivative time KD is, the faster response will be. Response too quickly can easily lead to overshoot, cause system instability and running oscillation.

In contrast, the smaller proportional gain KP is, the greater integration time Ki will be, and the smaller derivative time KD is, the lower response will be. Response too slowly can easily lead to inefficient and products unstable.

7.3 Servo oil pump optional parts prototyping

Flow is Q（L/min）,system pressure is P1（kgf/cm2）,motor or oil pump manimum rotation speed is Vmax（rpm）.

7.3.1 Oil pump prototyping
Oil pumps pressure selection:
Oil pumps rated pressure should be greater than system pressure P1（kgf/cm^2）.
Oil pump displacement selection:
Oil pump displacement per revolution l（ml/rev）＝Q（L/min）×1000（ml/L）/ Vmax（rpm）
Oil pump type selection:
Please follow the instructions below corresponding to pump type selection

Table 7-3 Oil Pump Features Contrast

Oil pump type	Price	Volumetric efficiency	Fluctuation（stability）	Noise	Reliability	Pressure（single stage）	Rotation speed
Gear pump	Low	Low	Medium	Medium	High	Low	Medium
Plunger pump	Middle	High	High	High	Low	Medium	Low
Screw pump	High	Medium	Low	Low	Medium	High	High

7.3.2 Servo Motor Prototyping
Rated rotation speed selection of servo motor
Characteristic curve of servo motor (permanent magnet synchronous servo motor) shown in Figure 7-1.

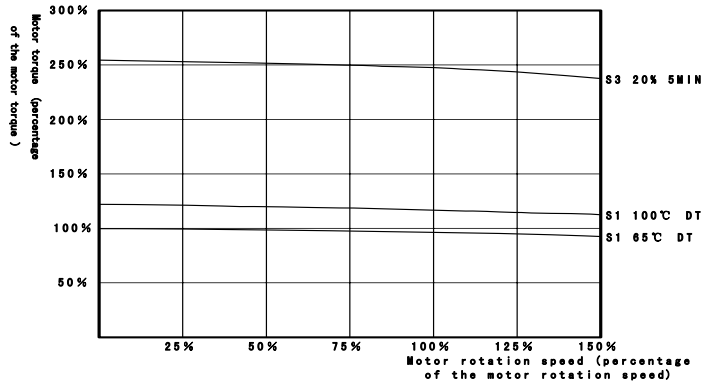


Fig. 7-1 Characteristic curve of servo motor (permanent magnet synchronous servo motor)

From the figure above, after the motor speed is higher than the rated speed, and with the motor speed, the motor torque will gradually decrease. But when the motor speed exceeds 150% of the rated speed, the motor torque will decline rapidly, so the speed segment cannot be used as the work of the servo motor speed fragment uses.

Therefore, select 140% of the rated speed to be the motor maximum speed.

Motor rated rotation speed: V（rpm）＝Vmax（rpm）/140％

Note: For better control results, please select 130% of he motor rated speed to be the maximum speed.

Servo motor rated toque selection:

According to energy conservation law, plastic maximum output power is P2max（kW）＝P1（kgf/cm^2）×0.9807（kgf/cm^2/bar）×Q（L/min）

Motor maximum output power is (Follow 80 percent of the energy conversion efficiency, Including motor efficiency, hydraulic transmission efficiency, mechanical transmission efficiency, etc.) P3max（kW）＝P2max（kW）/ 80％

Servo motor maximum output torque is: Tmax（Nm）＝P3max（kW）×9550/ Vmax（rpm）

Due to injection molding machine requires continuous output high torque when packing pressure,according to the servo motor (servo motor) characteristic curve, servo motor overall job status is in the DT-100 ° c (s1) and (S3 20 percent between 5MIN).

Therefore, select 180% of the motor rated torque to be the maximum torque.

Servo motor rated torque is:　Tn（Nm）＝Tmax（Nm）/180%

Note: If selecting the double displacement plunger pump or dual-gear pump,

while packing pressure by decreasing the pump displacement that can greatly reduce motor torque output, servo motors general working state is in the working state. (The S3 state is 20 percent of the working status of 5MIN), select 230% of the rated torque to be the motor maximum torque.

7.3.3 Servo Driver Prototyping

Capacity Selection of Servo Driver:

After the prototyping of servo drivers, please ask the servo motor supplier for corresponding motor torque constant values Kt（Nm/A）.

Note: The torque constant value Kt（Nm/A）is relevant to the servo motor technology, materials and motor rated speed Vn（rpm）.

The packing pressure current of servo driver (Follow 93% of the energy conversion efficiency):

Imax（A）＝Tmax（Nm）/ Kt（Nm/A）/93%

According to the principle that the numerical value which is less than 150 percent of servo driver rated output current， it can get the desired servo driver model and the driver accessories model.

EMC(Electromagnetic Compatibility)

Chapter 8 EMC (Electromagnetic Compatibility)

8.1 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.

8.2 EMC Standard Description

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

The existing products of our company apply 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 driver in terms of electromagnetic interference and anti-electronic interference. Electromagnetic interference mainly tests the radiation interference, conduction interference and harmonics interference on the driver (required for the driver 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 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 Section8.3 and have good electromagnetic compatibility in general industry environment.

8.3 EMC Guide

8.3.1 Harmonic Effect

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

8.3.2 Electromagnetic Interference and Installation Precautions

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

Installation precautions:

The earth wires of the Driver and other electric products shall be well grounded;

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

It is recommended that the output power cables of the driver 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.

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

8.3.3 Handling method for the interferences of the surrounding equipment on the servo driver:

The electromagnetic interference on the servo driver is generated because plenty of relays, contactors and electromagnetic brakes are installed near the driver. When the servo driver 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 driver. Refer to Section 7.3.6 for the specific operations.
3） The lead cables of the control signal cable of the driver and the detection line employ shielded cable and the shielding layer shall be earthed reliably.

8.3.4 Handling method for the interferences of servo driver on the surrounding equipment:

These interferences include two types: one is radiation interference of the servo driver, and the other is conduction interference of the servo driver. 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 driver or together with the driver 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 with the power cables in parallel 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 driver and wind it 2 to 3 cycles; install EMC output filter in more severe conditions.

2) When the equipment suffering interferences and the driver 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 driver 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 servo driver's earth wire when common earth mode is adopted.

8.3.5 Leakage current and handling

There are two forms of leakage current when using the driver. 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 driver 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 driver. 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 driver, and that electronic over current protection function of the driver be used instead.

8.3.6 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） ⚠ Note When using the filter, please follow its rated values strictly. Since the filter belongs to Classification I electric appliances, the metal enclosure of the filter shall be large and the metal ground

of the installing cabinet shall be well earthed 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 driver 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 terminal of the power supply as much as possible.

9

Failure Diagnosis and Solution

Chapter 9 Failure Diagnosis and Solution

9.1 Failure Diagnosis and Solution

IS300 Servo Driver has 23 pieces of warning information and protection function. In case of abnormal fault, the protection function will be invoked, the driver will stop output, and the faulty relay contact of the driver will start, and the fault code will be displayed on the display panel of the driver. 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 driver or our company directly.

Err01（Reserved）

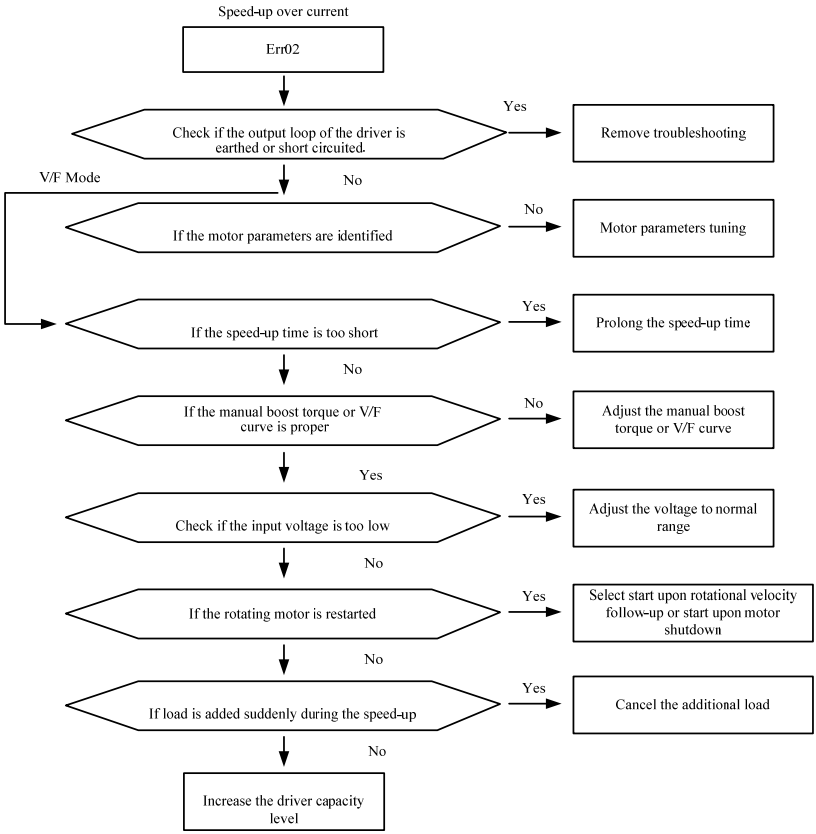


Fig.9-1 Speed-up over current (ERR02)

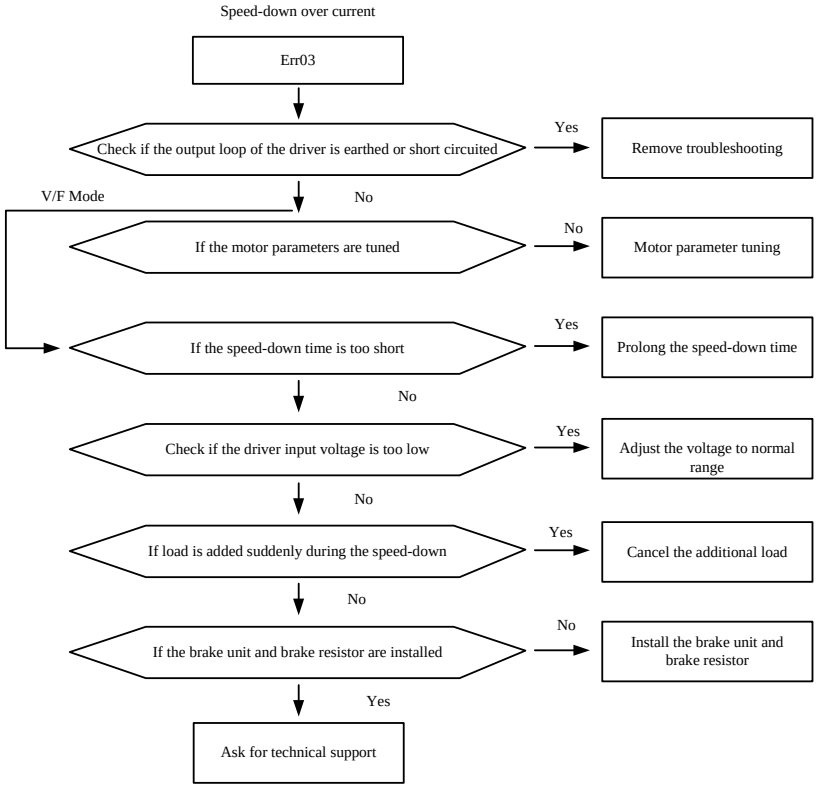


Fig.9-2 Speed-down over current (ERR03)

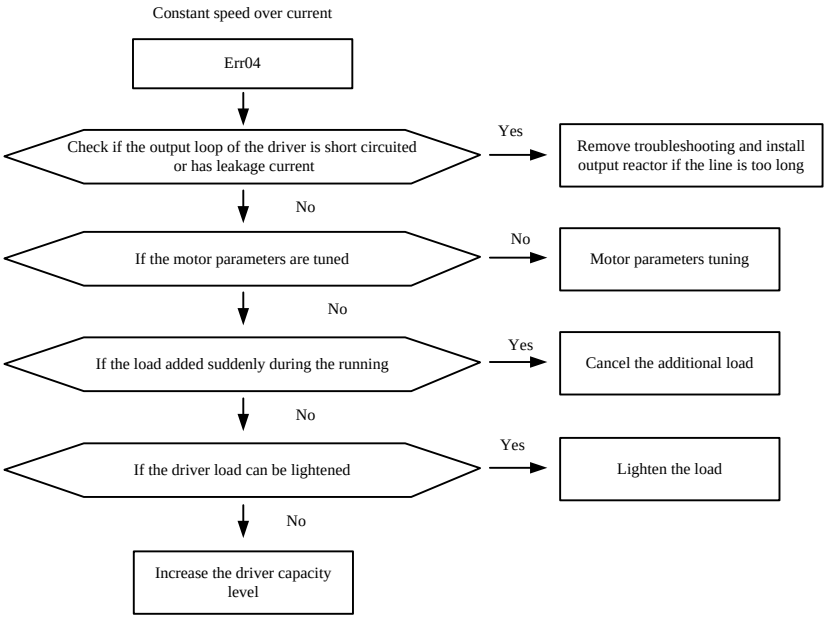


Fig.9-3 Constant speed over current (ERR04)

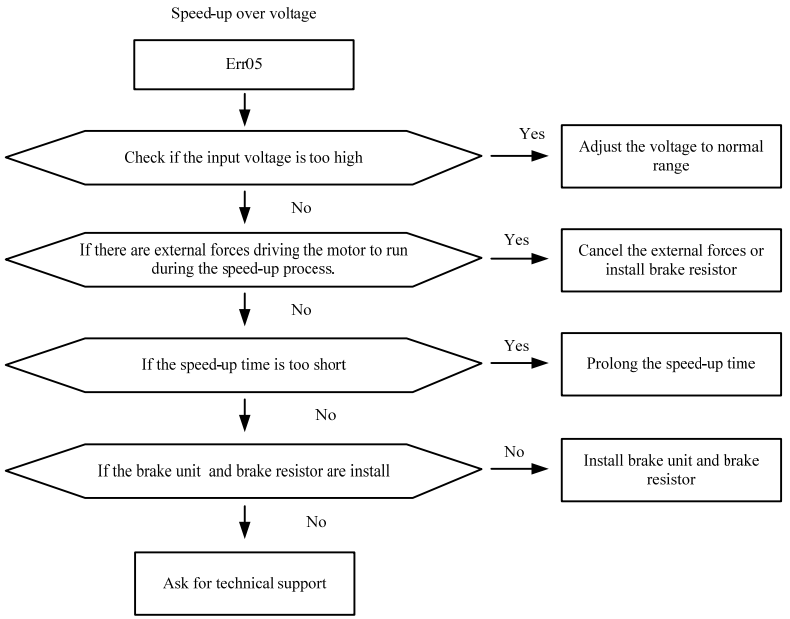


Fig.9-4 Speed-up over voltage (ERR05)

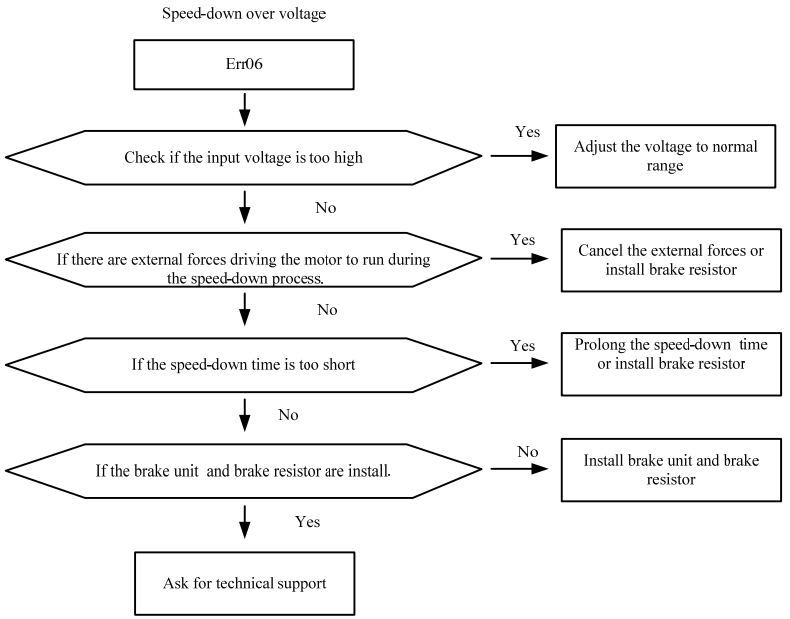


Fig.9-5 Speed-down over voltage (ERR06)

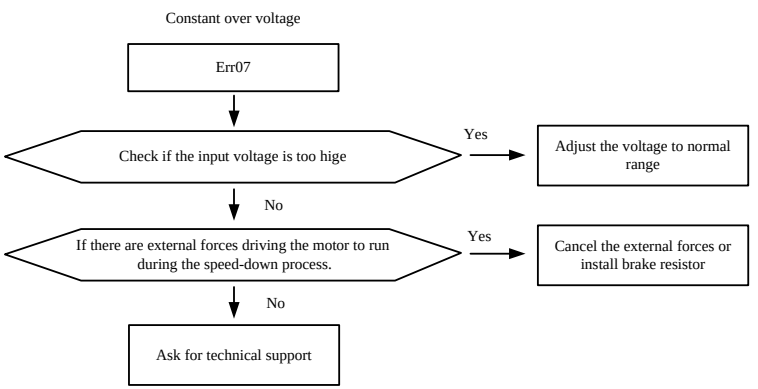


Fig.9-6 Constant Speed over voltage (ERR07)

Err08（Reserved）

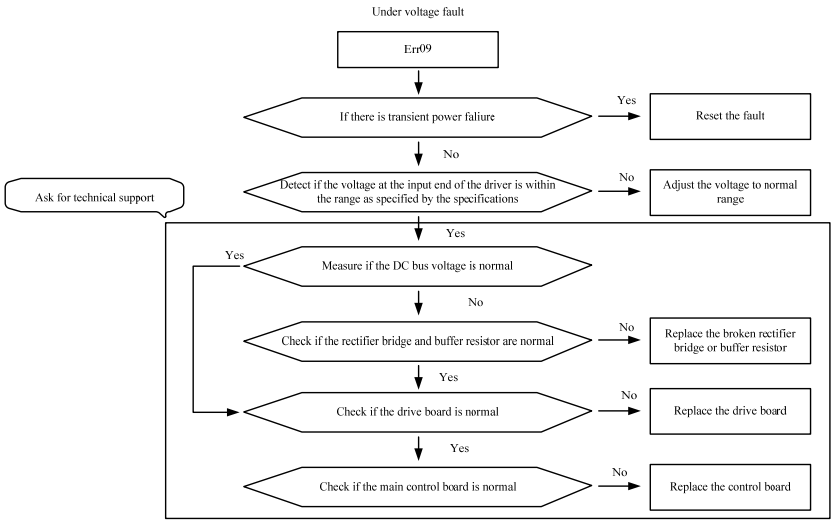


Fig.9-7 Under Voltage Fault (ERR09)

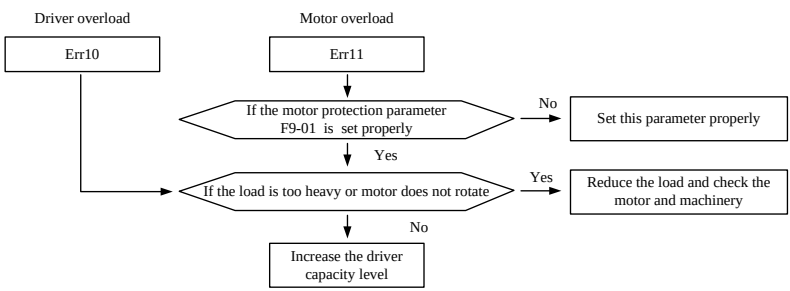


Fig.9-8 Servo Driver/Motor Overload (ERR10/ERR11)

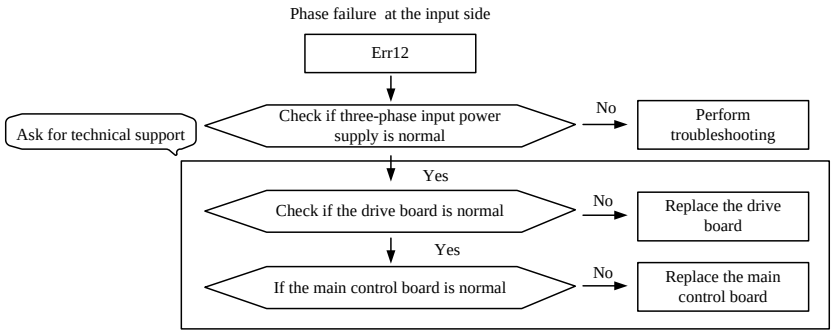


Fig.9-9 Phase Failure at Input Side(ERR12)

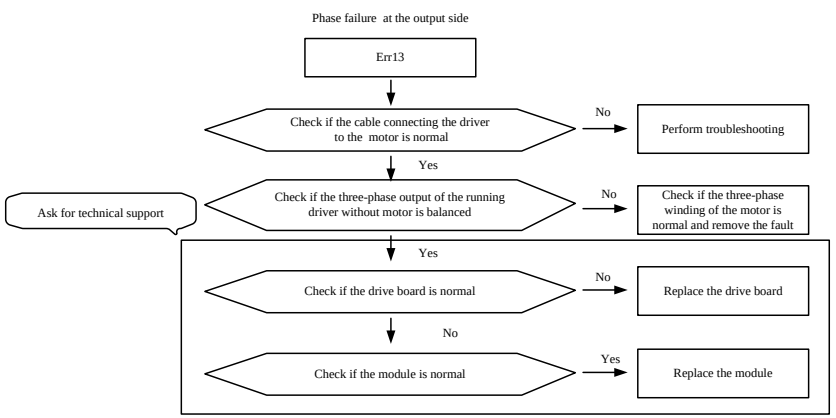


Fig.9-10 Phase Failure at Output Side (ERR13)

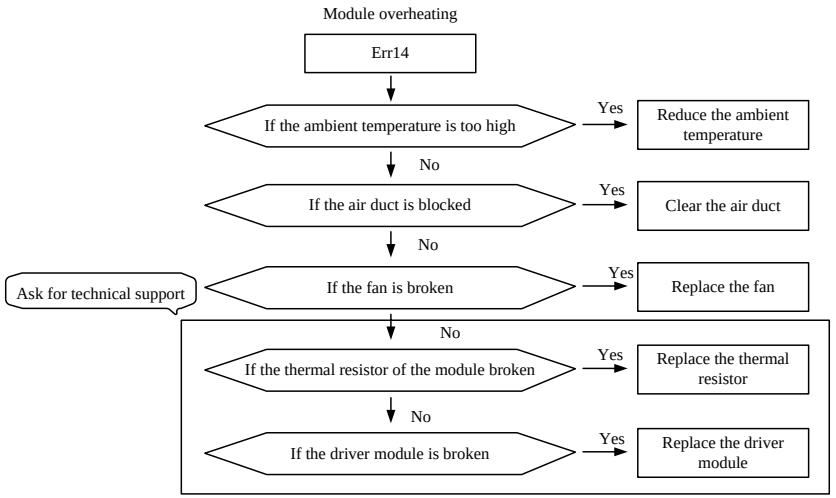


Fig.9-11 Module overheating (ERR14)

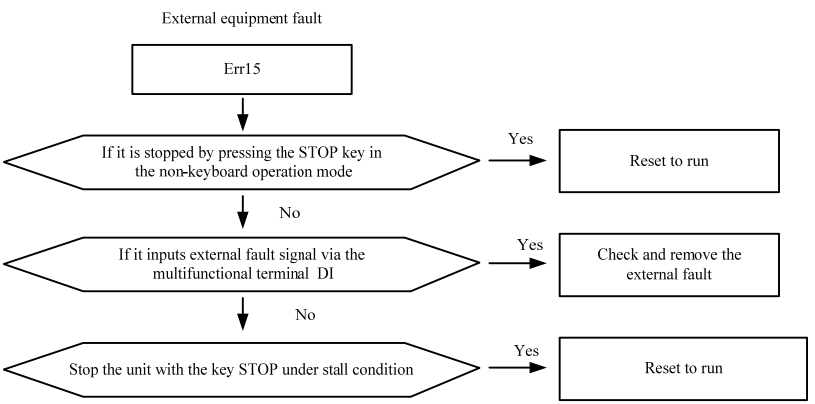


Fig.9-12External Equipment Fault (ERR15)

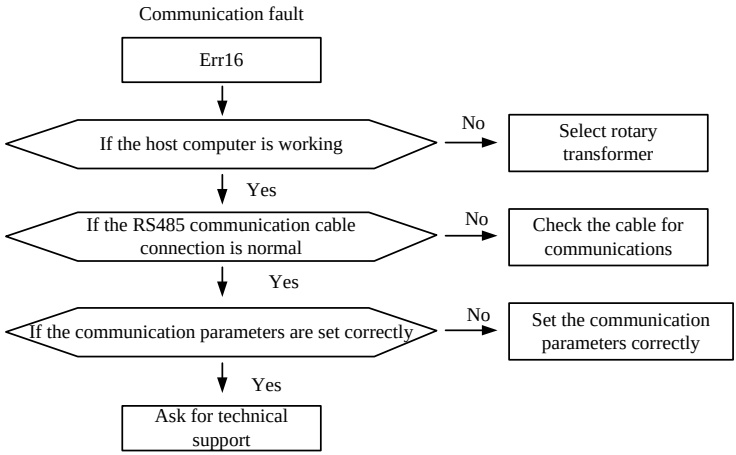


Fig.9-13 Communication Fault (ERR16)

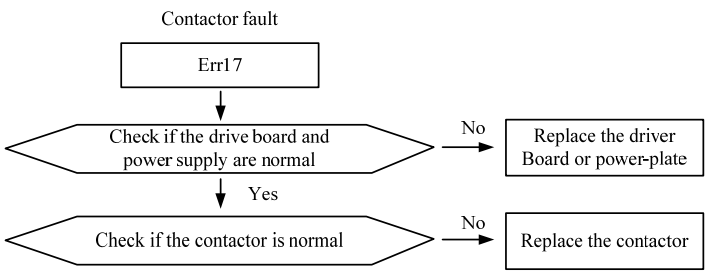


Fig.9-14 Contactor Fault (ERR17)

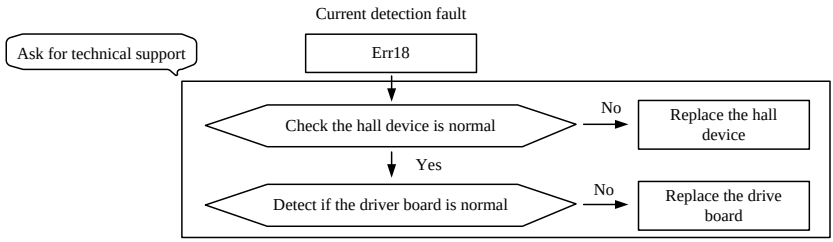


Fig.9-15 Current Detection Fault (ERR18)

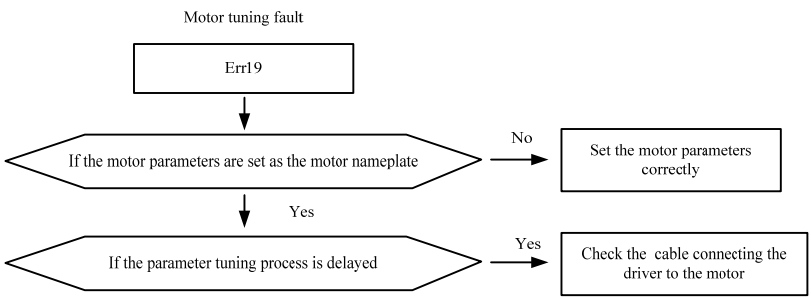


Fig.9-16Motor Tuning Fault (ERR19)

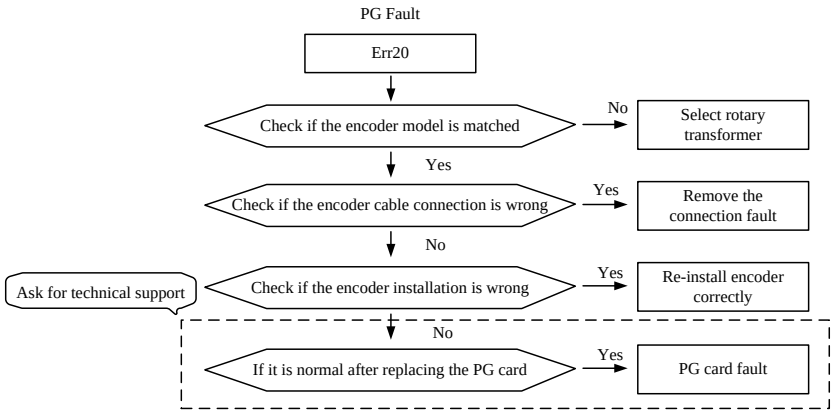


Fig.9-17 PG Fault (ERR20)

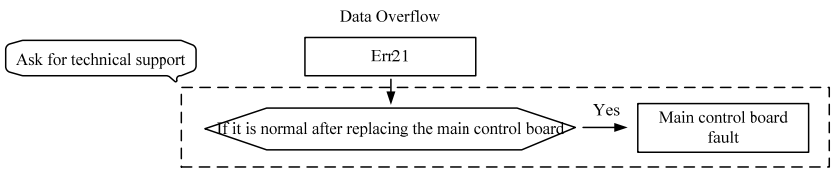


Fig. 9-18 Data Overflow (ERR21)

Err22（Reserved）

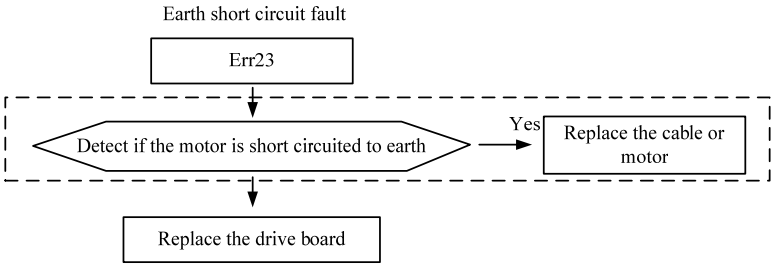


Fig.9-19 Earth Short Circuit Fault (ERR23)

Err24~Err41（Reserved）

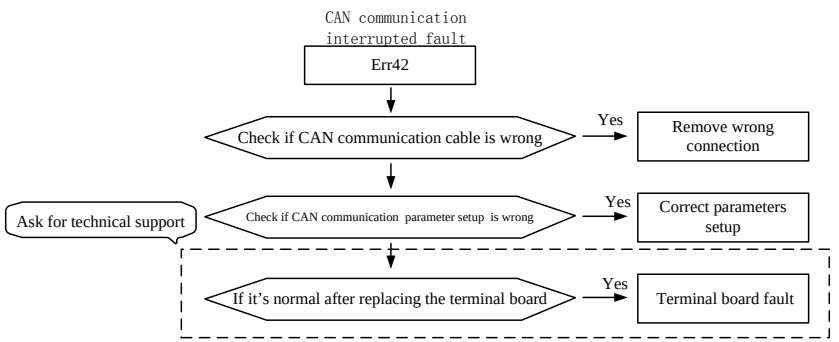


Fig.9-20 CAN Communication Interrupted Fault（Err42）

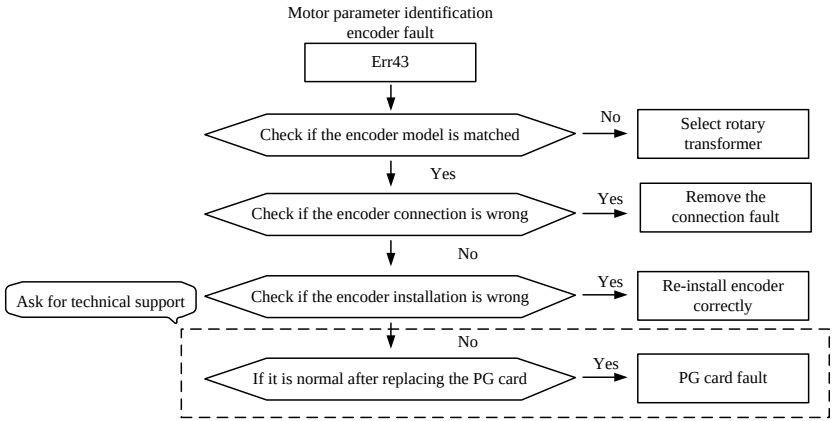


Fig.9-21 Motor Parameter Identification Encoder Fault

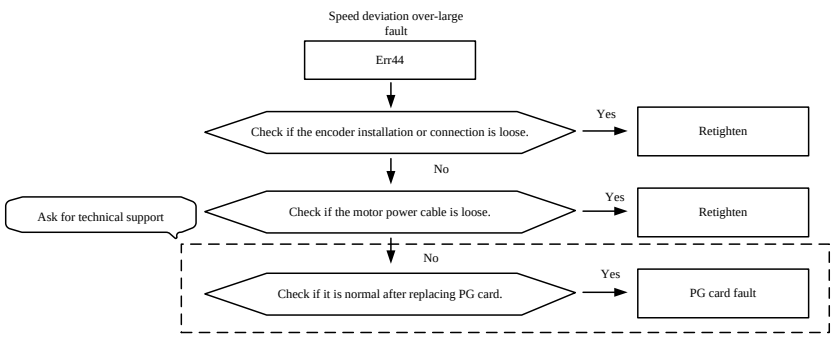


Fig.9-22 Speed Deviation Over Large Fault（Err44）

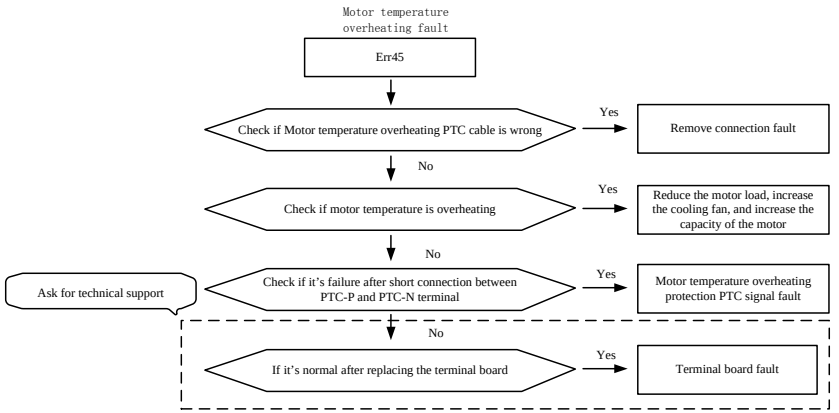


Fig.9-22 Motor Temperature Overheating Fault（Err45）

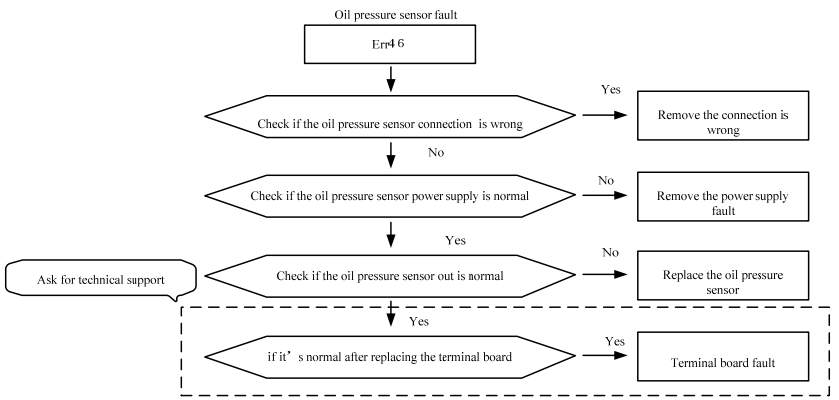


Fig.9-23 Oil Pressure Sensor Fault (（Err46）

Note: Err47 and Err48 are the relevant failure contents of pumps in parallel flow.

If adopt the control single pump, please cut off DI5 input terminals.And if adopt pumps in parallel flow control, please refer to the mulitple pump control solution.

9.2 Common Fault and Resolution

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

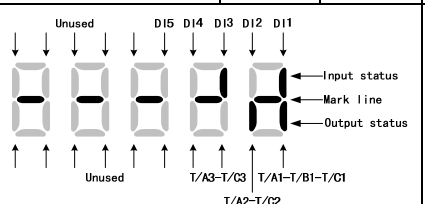
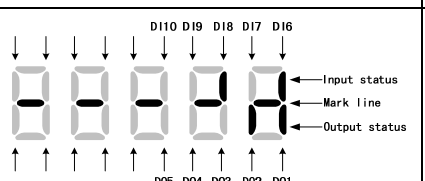
No.	Fault Phenomenon	Possible Cause	Solution
1	No display upon power-on	1. The driver has no input power supply. 2. 8-core bus connecting with the drive board and control bard is in poor contact. 3. The internal parts of the driver are damaged.	1. Check the input power supply. 2. Plug/unplug the 8-core bus once again. 3. Consult the manufacturer.
2	HC is displayed upon power-on	1. 4-core bus connecting with the drive board and control bard is in poor contact. 2. Other parts of the driver are damaged.	1. Plug/unplug the 4-core bus once again. 2. Consult the manufacturer.
3	“ERR23” alarm is displayed upon power-on.	1. The motor or the output line is short	1. Measure the insulation of the motor and output line with magneto-ohmmeter.

No.	Fault Phenomenon	Possible Cause	Solution
		circuited to the earth. 2. The driver is damaged.	2. Consult the manufacturer.
4	The driver displays normally upon power-on, but “HC” is displayed upon running and stops immediately.	The fan is either damaged or blocked.	Replace the fan.
5	ERR14 (module overheating) fault is frequently reported.	1. The carrier frequency is set too high. 2. The fan is damaged or the air duct is blocked. 3. The internal parts (thermal coupler or others) of the driver are damaged.	1. Reduce the carrier frequency (F0-15). 2. Replace the fan and clear the air duct. 3. Consult the manufacturer.
6	The motor does not rotate upon driver running.	1. The motor is either damaged or blocked. 2. The parameters are set	1. Replace the motor or remove the mechanical fault. 2. Check and reset Group F1 parameters.

No.	Fault Phenomenon	Possible Cause	Solution
		improperly (mainly Group F1 motor parameters).	
7	DI terminal inenabled	1. The parameter is set wrongly. 2. The short circuit copper bar between OP and +24V is loosen. 3. Control board fault.	1. Check and reset Group F4 related parameters. 2. Reconnect the cables. 3. Consult the manufacturer.
8	In the close loop vector control mode, the motor speed is always low.	1. The PG is damaged or cable connection is wrong. 2. The internal parts of the driver are damaged.	1. Replace the PG and reconfirm the cable connection. 2. Consult the manufacturer.
9	The driver frequently reports over current fault and over voltage fault.	1. The motor parameters are set wrongly. 2. Speed-up and speed-down time is improper.	1. Reset Group F1 parameters or perform motor tuning. 2. Set proper speed-up/speed-down. 3. Consult the manufacturer.

No.	Fault Phenomenon	Possible Cause	Solution
		3. Load fluctuates.	
10	ERR17 alarm is reported upon power-on.	1. The soft start contactor is not switched on.	1. Check if the contactor cables are loosened; 2. Check if the contactor has fault; 3. Check if the 24V power supply of the contactor has fault; 4. Consult the manufacturer.

Appendix 1: Common Parameters Table

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
Group U0 Driver Parameter Viewing group						
U0-00	Running frequency	Running frequency	0.00Hz～maximum frequency（F0-10）	—	—	●
U0-01	Setup frequency	Setup frequency	0.00Hz～maximum frequency（F0-10）	—	—	●
U0-02	Bus voltage	Bus voltage	0V～830V	—	—	●
U0-03	Output voltage	Output voltage	0V ～ Motor rated voltage（F1-02）	—	—	●
U0-04	Output current	Output current	0.01A～655.35A	—	—	●
U0-05	Output power	Output power	0.4kW～1000.0kW	—	—	●
U0-06	Output Torque	Output Torque	0.0% ～ Torque upper limit（F2-10）	—	—	●
U0-07	Local DI/DO status	Local DI/DO status				●
U0-08	Expansion DI / DO status	Expansion DI / DO status				●

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
U0-09	AI1 voltage(after corrected)	AI1 voltage(after corrected)	-10.00V～10.000V	—	—	●
U0-10	AI2 voltage(after corrected)	AI2 voltage(after corrected)	-10.00V～10.000V	—	—	●
U0-11	AI3voltage(after corrected)	AI3voltage(after corrected)	-10.00V～10.000V	—	—	●
U0-12～U0-29	Reserved	—	—	—	—	●
U0-30	AI1 voltage(before corrected)	AI1 voltage(before corrected)	-10.00V～10.000V	—	—	●
U0-31	AI2voltage(before corrected)	AI2 voltage(before corrected)	-10.00V～10.000V	—	—	●
U0-32	AI3 voltage(before corrected)	AI3 voltage(before corrected)	-10.00V～10.000V	—	—	●
Group A0 Weak magnetism and SVC control group						
A0-00	Weak magnetism control mode	Weak magnetism control mode	0:Direct calculation 1:Automatic adjustment	1	0	★
A0-01	Weak magnetismcurrent coefficient	Weak magnetism current coefficient	80%～200%	1	100%	★

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
A0-02	Weak magnetism current upper limit	Weak magnetism current upper limit	0～120	1	100	★
A0-03	Weak magnetism_ Integral multiples	Weak magnetism_ Integral multiples	200～1000	1	400	★
A0-04	Weak magnetism_ coefficient	Weak magnetism_ coefficient	0～100	1	4	★
A0-05	Output phase failure PWM detection time	Output phase failure PWM detection time	0～63000	1	0	★
Group A1 Group PG Card						
A1-00～ A1-01	Reserved	-	-	-	-	★
A1-02	Encoder installation angle	Encoder installation angle	0.0°～359.9°	0.1°	0.0°	☆
A1-03	Select the reverse feedback speed	Select the reverse feedback speed	0～1	1	0	☆
A1-04	Rotary transformer number of pole-pairs	Rotary transformer number of pole-pairs	1～50	1	1	★
Group A2 CAN Communication Group						

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
A2-00	Baud rate selection	Baud rate selection	0：20k 1：50k 2：125k 3：250k 4：500k 5：1M	1	5	☆
A2-01	CAN communication address	CAN communication address	1～255	1	1	☆
A2-02	CAN communication continuous time	CAN communication continuous time	0.0s（inenabled） 0.1s～5.0s	0.1s	0.3s	☆
Group F0 Basic Function Group						
F0-02	Command source selection	Command source selection	0: Operation panel running command channel (LED OFF) 1: terminal command channel (LED ON) 2: serial port command channel (LED flashes)	1	0	☆
Group F1 Motor Parameters						
F1-00	Motor type selection	Motor type selection	Permanent magnetic synchronous motor	1	2	★
F1-01	Rated power	Rated power	0.4kW ～ 1000.0kW	0.1kW	Model dependent	★

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
F1-02	Rated voltage	Rated voltage	0V～440V	1V	Model dependent	★
F1-03	Rated current	Rated current	0.01A～655.35A	0.01A	Model dependent	★
F1-04	Rated frequency	Rated frequency	0.00~maximum frequency	0.01Hz	Model dependent	★
F1-05	Rated rotation speed	Rated rotation speed	0rpm～30000rpm	1rpm	Model dependent	★
F1-15	Back EMF	Back EMF	0～65535V	1	Model dependent	★
F1-16	Tuning selection	Tuning selection	0: no operation 1: static tuning(low speed) 2: dynamic tuning (high speed)	1	0	★
GroupF2 Control Parameters						
F2-00	speed loop proportional gain 1	Speed loop P1	0～100	1	60	☆
F2-01	Speed loop integration time 1	Speed loop I1	0.01s～10.00s	0.01s	0.30s	☆
F2-03	Speed loop proportional gain 2	Speed loop P2	0～100	1	60	☆
F2-04	Speed loop integration time 2	Speed loop I2	0.01s～10.00s	0.01s	0.30s	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
F2-10	Torque upper limit	Torque upper limit	0.0%～250.0%	0.1%	200.0%	☆
F2-13	D axis current loop Kp	D axis current loop Kp	0～65535	1	50	☆
F2-14	D axis current loop Ki	D axis current loop Ki	0～65535	1	50	☆
F2-15	Q axis current loop Kp	Q axis current loop Kp	0～65535	1	50	☆
F2-16	Q axis current loop Ki	Q axis current loop Ki	0～65535	1	50	☆
Group F4 Input terminal						
F4-32	AI3 input filter time	AI3 filter time	0.00s～10.00s	0.01s	0.00s	☆
Group F7 Keyboard and Display						
F7-10	Software version No.1	Software version No.1	-	-	-	●
F7-11	Software version No.2	Software version No.2	-	-	-	●
Group FP User Password						
FP-00	user password1	Authorization for all functions code except FP-05	0～65535	1	0	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
FP-01	Parameter initialization	Parameter initialization	0:No operation 1::Restore the factory default setup value 2: Clear the fault record 3:Restore the setup function code value of FP-05 saved.	1	0	★
FP-02	Motor specification solidification	Motor specification	0～65535	1	0	★
FP-03	Injection molding machine specification solidification	Injection molding machine specifications	0～65535	1	0	★
FP-04	user password2	Authorization for FP-05 function code	0～65535	1	0	★
FP-05	Function code setup values in real time saved	Save the currently set values for all the function code	0：No operation 1 ： Save the currently set values for all the function code	1	0	★

Appendix 2 Shortcut menu parameters table

It can be quickly called function code from the shortcut menu by quick keys. The shortcut menu is set to facilitate the user to quickly view and modify the commonly used function parameters. In the shortcut menu, the parameter is displayed in the form of “Uf3-02”, which indicates the function parameter F-02. Parameter modification in the shortcut menu has the same effect as the operation in the common programming status.

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
uA3-01	Maximum rotation speed	Maximum rotation speed	Maximum frequency lower limit corresponding to rotation speed~30000rpm	1rpm	2000rpm	★
uA3-02	System oil pressure	System oil pressure	0.0kg/cm^2 ～ the maximum oil pressure(A3-03)	0.0kg/cm^2	175.0kg/cm^2	☆
uA3-03	Maximum oil pressure	Maximum oil pressure	system oil pressure(A3-02) ～500.0kg/cm^2	0.0kg/cm^2	250.0kg/cm^2	☆
uA3-04	Oil pressure command risetime	Oil pressure setup risetime	0ms～2000ms	1ms	20ms	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
uA3-05	Oil pressure control Kp1	Oil pressure control Kp1	0.0～800.0	0.1	210.0	☆
uA3-06	Oil pressure control Ti1	Oil pressure control Ti1	0.001s～10.000s	0.001s	0.100s	☆
uA3-07	oil pressure control Td1	oil pressure control Td1	0.000s～1.000s	0.001s	0.000s	☆
uA3-08	Maximum reverse rotation speed	Maximum reverse rotation speed	0.0%～100.0%	0.1%	20.0%	☆
uA3-09	Minimum flow	Minimum flow	0.0%～50.0%	0.1%	0.5%	☆
uA3-10	minimum pressure	minimum pressure	0.0 kg/cm^2～50.0 kg/cm^2	0.1kg/cm^2	0.5kg/cm^2	☆
uA3-20	AI zero drift auto correction	AI zero drift auto correction	0:Inenabled 1:Enabled	0	0	☆
uF2-00	Speed loop proportional gain 1	Speed loopP1	0～100	1	60	☆
uF2-01	Speed loop integration time 1	Speed loop I1	0.01s～10.00s	0.01s	0.30s	☆
uF2-03	Speed loop proportional gain 2	Speed loopP2	0～100	1	60	☆
uF2-04	Speed loop integration time 2	Speed loopP I2	0.01s～10.00s	0.01s	0.30s	☆

Function code	Name	LED display	Setup range	Minimum unit	Factory default value	Modific-ation descrip-tion
uF4-32	AI3 input filter time	AI3 filter time	0.00s～10.00s	0.01s	0.00s	☆

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: 400-777-1260 P.C.: 518101

Website: www.inovance.cn

Product Warranty Car

<table>
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<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>
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