EACON 易控

Professional AC Drive Manufacturer

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EC670 AC Drive

User Manual V1.0

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1.Introduction

Thank you for using the EC670 series elevator-specific AC drive. This AC drive is a special AC drive made by our company for elevator industry.

EC670 series elevator-specific AC drive. is a high-performance & low noise general-purpose AC drive, manufactured using high-quality components and incorporating the latest micro-processor technology available. It realizes high torque, high precision speed control drive, and supports speed sensorless torque control and PG torque control, which can meet various requirements of general AC drive. EC670 series AC drive is a product that combines the general needs of customers with the industrial needs. It provides customers with practical functions such as main and auxiliary frequency setting, operation channel frequency binding, PID regulator, simple PLC, textile swing frequency, programmable input and output terminal control, pulse frequency setting and built-in Modbus, CAN bus, Profibus-DP bus, 485 free protocol, etc. For manufacturing and auto-mation engineering customers to provide high integration of integrated solutions.

This manual describes the matters relevant to the installation, parameters setting, abnormality diagnosis and solution, and the daily maintenance of the AC drive that need attention of the users. In order to ensure the correct installation and operation of the motor drive, give full play to its superior performance, please carefully read this manual before the installation, properly keep it and give it to the machine users.

Contact our agents or customer service center if you have problems during the use. We will serve you wholeheartedly.

The instructions are subject to change, without notice, due to the upgrade of our products.

1.1 Safety Precautions

In order to ensure your personal and equipment safety, please read this manual carefully before using the AC drive.

Warning signs and meanings

The following marks are used in this manual to indicate that it is an important part of safety. Failure to observe these precautions may result in personal injury or death, damage to the product and associated systems.

Danger!	Indicates that failure to comply with the notice will result in death, severe personal injury or serious property damage.
Warning!	Indicates that failure to comply with the notice will result in personal injury or damage to the product and associated systems.
Notice!	Tips for special attention when using this product.

Operational qualification

AC drive is a precise electric and electronic product, thus for the safety of the operators and the equipment, please ensure that the installation and parameters adjustment is done by professional motor Engineers.

Safety guidance

Safety rules and warning signs are proposed for the personal safety of operators, and measures are taken to prevent operators from personal injury and damage to the product and associated systems. Please read this manual carefully before use, and operate in strict accordance with the safety rules and warning signs in the manual.

Danger!

1. The power supply must be turned off when laying the wires.
2. When the AC power supply is cut off but the indicator light of the manipulator of AC drive is still on, there is still high voltage in the AC drive which is very dangerous, please do not touch the interior circuit and components.
3. Do not modify the interior components or circuit of AC drive by yourselves.
4. Never connect the main circuit output terminals U, V, and W directly to the AC main circuit power supply as this will damage the drive.
5. The terminal of AC drive must be grounded correctly.6. This series of AC drives can't be used for the occasions related to personal safety, e.g. the life maintaining equipment.

Warning!

1. Please do not test the voltage resistance of the interior components of the drive, as the semiconductor of the drive is easy to be punctured and damaged by high voltage.
2. The circuit board of the drive has CMOS IC which is extremely easy to be damaged by static electricity, thus please do not touch the circuit board with your hand before taking anti-static electricity measures.
3. Even if the motor is inactive, the main loop terminal of the drive may still have dangerous high voltage.
4. Only the qualified motor professionals can install the drive, lay the wire, repair and maintain the drive.

Notice!

1. When certain functions of the drive are set, the motor may immediately start after the power input.
2. Please choose a safe place to install the AC drive to avoid the high temperature, direct sunlight, humidity and splash of water drops.
3. Please prevent the children or irrelevant people against being close to the AC drive.
4. The AC drive can only be used in the places recognized by our company, and the usage in an environment not recognized by our company may lead to fire, gas explosion or electrification.
5. When the wire between the AC drive and the motor is too long, the interlayer insulation of the motor may be damaged, please use the special AC motor for AC drive, or add a reactor between the drive and the motor to prevent the AC motor from being burned due to the damage of insulation.
6. The rated voltage of the power system for the drive can't be higher than ±15% of the rated voltage of product, and the current can't be over 5000A RMS (The current of 40HP (30kW) type or above can't be over 10000A RMS).

1.2. Technical Specifications

Item		Specifications	
Standard functions	Maximum frequency	Vector control:0 - 320.00 Hz V/F control:0 - 3200.00 Hz (When P0-21 needs changed to 1)	
	Carrier frequency	1 - 16 kHz The carrier frequency is automatically adjusted based on the load features.	
	Input frequency resolution	Digital setting: 0.01 Hz Analog setting: maximum frequency x 0.025%	
	Control mode	• Sensorless flux vector control (SFVC) • Closed-loop vector control (CLVC) • Voltage/Frequency (V/F) control	
	Startup torque	• G type: 0.5 Hz/150% (SFVC); 0 Hz/180% (CLVC) • P type: 0.5 Hz/100%	
	Speed range	1:100(SVC)	1:1000(FVC)
	Speed stability accuracy	±0.5%(SVC)	±0.02%(FVC)
	Torque control accuracy	± 5% (FVC)	
	Overload capacity	• G type: 60s for 150% of the rated current, 3s for 180% ofthe rated current • P type: 60s for 120% of the rated current, 3s for 150% ofthe rated current	
	Torque boost	Customized boost 0.1% - 30.0%	
	V/F curve	• Straight-line V/F curve • Multi-point V/F curve • N-power V/F curve (1.2-power, 1.4-power, 1.6-power, 1.8-power, square)	
	V/F separation	Two types: complete separation; half separation	
	Ramp mode	• Straight-line ramp • S-curve ramp Four groups of acceleration/deceleration time with the range of 0.0 - 6500.0s	
	DC braking	DC braking frequency: 0.00 Hz to maximum frequency Braking time: 0.0 - 600.0s Braking action current value: 0.0% - 150.0%	
	JOG control	JOG frequency range: 0.00 - 50.00 Hz JOG acceleration/deceleration time: 0.0 - 6500.0s	
	Onboard multiple preset speeds	It implements up to 16 speeds via the simple PLC function or combination of S terminal states.	
	Onboard PID	It realizes process-controlled closed loop control system easily.	
	Auto voltage regulation (AVR)	It can keep constant output voltage automatically when the mains voltage changes.	
	Overvoltage/ Overcurrent stall control	The current and voltage are limited automatically duringthe running process so as to avoid frequent tripping due to overvoltage/overcurrent.	
	High-speed current limiting function	Minimize over-current fault and protect normal operation of AC drive.	

Item		Specifications
Standard functions	Torque limit and control	It can limit the torque automatically and prevent frequent over current tripping during the running process. Torque control can be implemented in the CLVC mode.
Individualized functions	High performance	Control of asynchronous motor and synchronous motor are implemented through the high-performance current vector control technology.
	Power dip ride through	The load feedback energy compensates the voltage reduction so that the AC drive can continue to run for a short time.
	Rapid current limit	It helps to avoid frequent overcurrent faults of the AC drive.
	Timing control	Time range: 0.0 - 6500.0 minutes
	Multiple communication protocols	It supports communication via Modbus-RTU, PROFIBUSDP, CANlink and CANopen.
	Motor overheat protection	The optional I/O extension card enables AI4 to receive the motor temperature sensor input (PT100, PT1000) so as to realize motor overheat protection.
	Multiple encoder types	It supports various encoders such as differential encoder, open-collector encoder, resolver, UVW encoder, and SIN/COS encoder.
	Advanced background software	It supports the operation of AC drive parameters and virtual oscillograph function, via which the state inside the AC drive is monitored.
RUN	Running command source	• Operation panel • Control terminals • Serial communication port You can perform switchover between these sources in various ways.
	Frequency source	There are a total of 10 frequency sources, such as digital setting, analog voltage setting, analog current setting, pulse setting and serial communication port setting. You can perform switchover between these sources in various ways.
	Auxiliary frequency source	There are ten auxiliary frequency sources. It can implement fine tuning of auxiliary frequency and frequency synthesis.
	Input terminal	Standard: 8 digital input (S) terminals, one of which supports up to 50kHz high-speed pulse input 3 analog input (AI) terminals, two of which only supports 0 - 10 V voltage input and the other supports 0 - 10 V voltage input or 0 - 20 mA current input
	Output terminal	Standard 1 high-speed pulse output terminal (open-collector) that supports 0 - 50 kHz square wave signal output 2 digital output (Y) terminal 2 relay output terminal 2 analog output (AO) terminal that supports 0 - 20 mA current output or 0 - 10 V voltage output
Display and keyboard operation	LED display	It displays the parameters.
	LCD display	Optional, Chinese/English prompt operation content

	Item	Specifications
Display and keyboard operation	Parameters copy	Quick copying of parameters can be realized through LCD operation panel option.
	Key locking and function selection	It can lock the keys partially or completely and define the function range of some keys so as to prevent misfunction.
Protection mode	Protection mode	Motor short-circuit detection at power-on, input/output phase loss protection, overcurrent protection, overvoltage protection, undervoltage protection, overheat protection and overload protection
Optional parts	Optional parts	LCD operation panel, braking unit, I/O extension card 1, I/O extension card 2, user programmable card, RS485 communication card, PROFIBUS-DP communication card, CANlink communication card, CANopen communication card, differential input PG card, UVW differential input PG card, resolver PG card and OC input PG card
Environment	Installation location	Indoor, free from direct sunlight, dust, corrosive gas, combustible gas, oil smoke, vapour, drip or salt.
	Altitude	Lower than 1000m
	Ambient temperature	-10° C to +40° C (de-rated if the ambient temperature is between 40° C and 50° C)
	Humidity	Less than 95%RH, without condensing
	Vibration	Less than 5.9m/s (0.6g)
	Storage temperature	-20℃ ～+60℃
	IP level	IP20
	Pollution degree	PD2

2.Read below information before use

2.1 Delivery Inspection

Every EC670 AC drive has pass by strict quality management before delivery, and been packed to enhance its collision resistance. The customer should immediately inspect the following inspection steps after unpacking the AC drive.

◆ Check whether the AC drive is damaged during the transportation.

◆ Check whether the type and model of the AC drive are consistent with the information on the package.

For any inconsistency between the received product and your order, or any problem of the product, please contact with our agents or distributors that sold you the product.

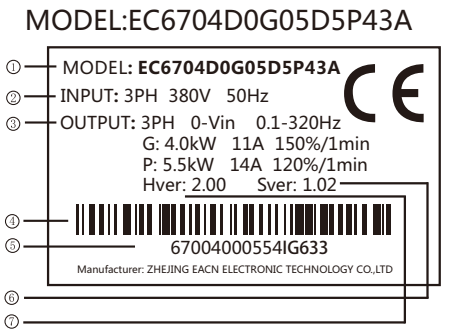
Description of the label of package

① Trademark of product
② Name of product
③ Serial number of production control
④ Barcode
⑤ AC drive Model
⑥ Input power Spec.
⑦ Output power Spec.
⑧ Output frequency Range
⑨ Protection grade version of mainboard
⑩ LED manipulator
⑪ LCD manipulator
⑫ Interior brake unit
⑬ Specification of 220V voltage
⑭ Specification of 380V voltage
⑮ Dimensions of exterior package, total weight

Notice!

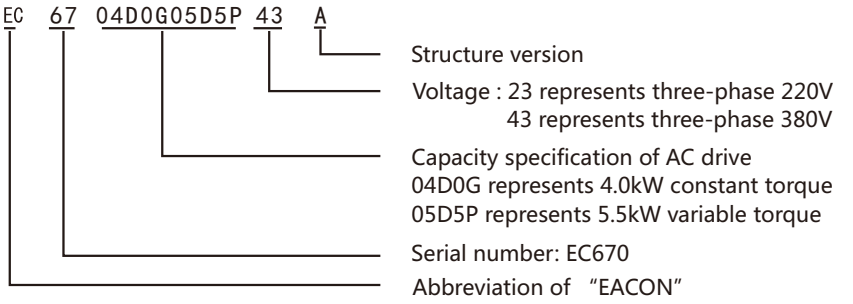
The black squares of 10-14 are the configurations of the AC drive.

Description of the label of AC drive

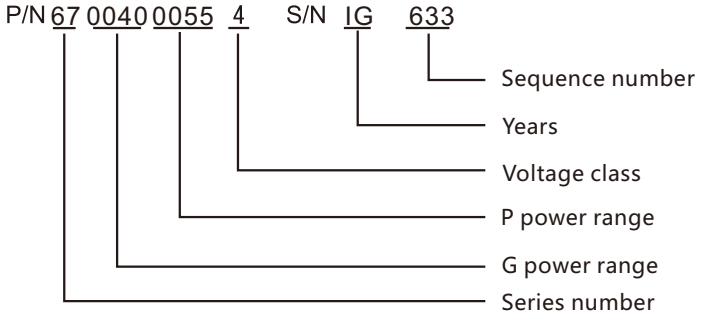


① AC drive Model
② Input power Spec.
③ Output power Spec.
④ Barcode
⑤ Serial number of production control
⑥ Power card versions
⑦ Structure version

Description of Model



Description of Serial number



2.2 Transport

This product is a precise device, please handle it with care during the transport, prevent it from severe collision.

2.3 Storage

This product must be in the packing box before installation. If it won't be used for a period, in order to keep it within the warranty of our company and for the future maintenance, the following matters must be paid attention to for the storage:

√The product must be put in a dust-free and dry place.
√The temperature of the storage place must be -20℃～+60℃.
√The relative humidity of the storage place must be 0%～95% without frost.
√Avoid putting the product in an environment with corrosive gas or liquid.
√It is better to put the product on a shelf or stand with a proper package.

Notice!

1. Even if the humidity meets the requirements of the criterion, if the temperature changes quickly, moisture condensation or icing may also happen, thus the product should not be stored in such place.
2. Do not put the product directly on the ground, but on a proper stand. If the surrounding environment is very bad, desiccant should be put in the packing bag.
3. When the storage period is longer than 3 months, the surrounding temperature should not exceed 30℃ , because the electrolytic condenser is stored with power off, and it will easily degrade if the temperature is high.
4. When the AC drive is installed in the installation or control panel but isn't used, especially in the construction sites or the wet places with lots of dust, the AC drive should be removed and put in a proper environment satisfying the storage requirements mentioned above.
5. The electrolytic condenser is easy to degrade with power off for a long term. Please do not store the electrolytic condenser with power off for more than one year.

2.4 Considerations for choices of AC drives

1.Use large capacity above 600 kva electric current transformer and capacitor into phase, voltage input side surge current is too large, that could undermine the input side of AC drives. At the moment the input side must be installed an AC reactor, in addition to reduce the current, and improve the effect of the input power.

2.To actuate the special AC drive or one AC drive actuate several motors, the total rated current of the motor 1.25 times can't exceed the rated current of the AC drive. It is very careful to choose the AC drive.

3.When the AC drive actuate the motor, the startup, the accelerate and decelerate are limited by the rated current of the AC drive. The starting torque is small(commercial power directly start 6 times when start current, when the AC drive starting, the starting current can't exceed two times), so when the AC drive use for high torque place(For example Elevator, Blender, Machine tool ect), the AC drive must increase one or two grade. The optimal way is increasing one grade of the motor and the AC drive at the same time.

4.To consider that when the AC drive break down and stop the output, the stop mode for the motor and the mechanical equipment, if they need sudden stop that must install the mechanical brake.

2.5 Note for parameter setting

1.Because of the highest speed for the digital operation can reach to 400Hz, so when it use in the highest speed place, it can use the speed limit function limit the output frequency.

2.When the DC braking voltage and the braking time setting too highly, that may cause the motor overheating.

3.The time for the motor accelerate and decelerate is decided by the motor rated torque、 load torque、 load inertia ect.

4.When the antistall (STALL) act in the accelerate and decelerate, please extend the accelerate and decelerate time. If the accelerate and decelerate must be very fast, and also the inertia load is very big, the AC drive can't speed up or stop the motor in requirement time, that must install the braking resistance(only can shorten the deceleration time) or increase the grade of the motor and the AC drive at the same time.

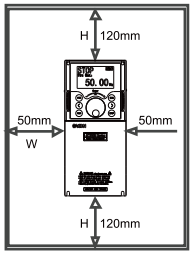
3.Mechanical and Electrical Installation

3.1 Installation Environment

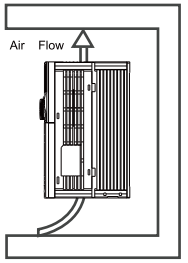
Please install the AC drive in the following environment to guarantee the usage safety of the product:

Operating Environment	Ambient temperature	-10～+50° C (14～122° F) for UL & CUL without anti-dust cover
	Relative humidity	<90%, without frost
	Pressure	86～106 kPa
	Installation height	<1000m
	Vibration	<20Hz: 9.80 m/s(1G) max 20～50H:5.88 m/(0.6G) max.
Storage and Transport Environment	Ambient temperature	-20～+60° C (-4～140° F)
	Relative humidity	<90%, without frost
	Pressure	86～106 kPa
	Vibration	<20Hz: 9.80 m/s(1G) max 20～50H:5.88 m/(0.6G) max.
Degree of Pollution	Class 2: suitable for factory environment	

3.2 Conditions for Installation



(a)



(b)

■ The AC drive shall be installed vertically with screws, and shall not be installed upside down, obliquely or horizontally on a firm structure.
■When the AC drive is running, it will generate heat. To ensure that the cooling air path is as shown in figure (b). There is a certain space in the design, and the heat generated will be emitted upward; therefore, do not install it under the heat-resistant equipment.
■When the AC drive is running, the temperature of the heat sink will rise to nearly 90 ℃. There for, the mounting surface on the back of the AC drive must be made of materials that can withstand higher temperature.

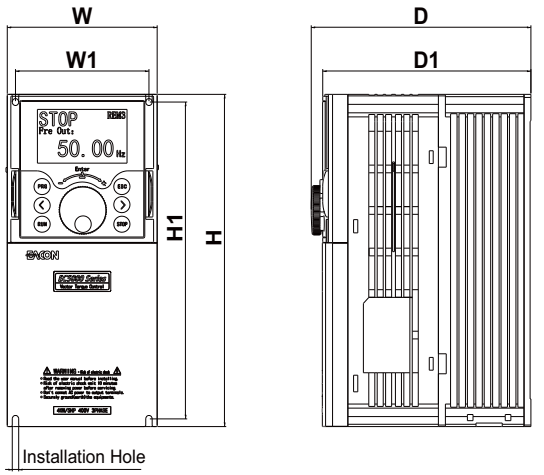
■When the AC drive is installed in the control panel, ventilation and heat dissipation shall be considered to ensure that the ambient temperature of the AC drive does not exceed the specification value. Do not install the AC drive in the airtight box with poor ventilation and heat dissipation.
■When installing multiple AC drives in the same control panel, it is recommended to install them horizontally side by side in order to reduce the thermal impact on each other. If it has to be installed up and down, the partition board must be set to reduce the impact of heat generated at the lower part on the upper part.

Notice!

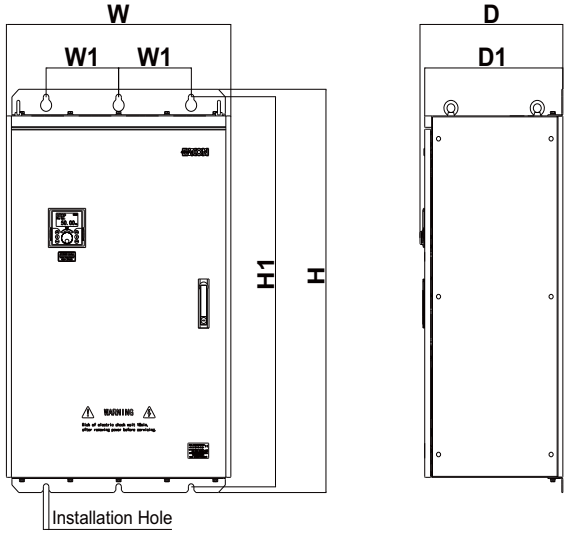
1、Do not let all kinds of fibers, paper, wood chips (chips) or metal fragments and other foreign matters enter the AC drive or adhere to the cooling fan.
2、Installed on structures that will not burn, such as metal, or fire accidents may occur.

3.3 Installation dimension of AC drive

A Structure



B Structure



380V Class

Structure	Power (kW)	W (mm)	W1	H	H1	D	D1	Installation Hole
A Structure	0.75kW	105	94	160	150	137	129	Φ4.5
	1.5kW							
	2.2kW	105	94	216	206	157	149	Φ4.5
	4.0kW							
	5.5kW	126	110	260	246	183	174	Φ6
	7.5kW							
	11kW	153	137	341	327	204	194	Φ7
	15kW							
	18.5kW	181	120	436	418	209	200	Φ9
	22kW							
	30kW	180	120	500	480	258	249	Φ9
	37kW							
B Structure	45kW	300	220	541	516	314	300	Φ11
	55kW							
	75kW	350	270	730	705	354	340	Φ11
	90kW							
	110kW							
	132kW	500	180	780	755	354	340	Φ11
	160kW	650	210	1060	1024	414	400	Φ16
	200kW							
	220kW	750	230	1170	1128	414	400	Φ18
	250kW							
	280kW							
	315kW	850	275	1280	1236	464	450	Φ20
	355kW							
	400kW							
	450kW	1043	250	1426	1382	464	450	Φ20
	500kW							
	560kW							

3.4 Instruction for Wire Layout

After removing the upper cover, the connection terminal strips are exposed, check whether the terminals of main loops and control loops are marked explicitly and pay attention to the following instructions during connection, do not make improper connections.

3.5 Basic Wire Layout

■ The power supply must be connected with the terminals of the main loops of AC drive R/L1, S/L2, T/L3. If the power supply is improperly connected with other terminals, the AC drive will be damaged. Besides, check whether the voltage/current of the power supply is within the allowable range indicated on the nameplate.

■The grounding terminals must be grounded well, on the one hand it can prevent electric shock or fire, and on the other hand it can reduce the noise interference.

■ Connect the terminals with wires, ensure the high reliability of the connection.

■After finishing the wire layout, check the following things:

1. Are all the connections correct?
2. Is there any connection left out?
3. Is there any short circuit or line-to-ground short circuit between the terminals and the connecting wires?

When the power is on, if the connections need to be changed, first the power supply should be turned off, and the filter capacitor of the DC part of the loop will need some time to discharge electricity. The work only can begin after the completion of electricity discharge. Besides, because of the residual voltage, sparks may be generated when there is a short circuit, thus it's better to conduct the work under voltage-free conditions.

Notice!

1. Grounding wire must be connected, or electric shock or fire may happen.
2. The wiring work should be done by the professional technicians.
3. Start the work after confirming that the power is OFF or electric shock may happen.

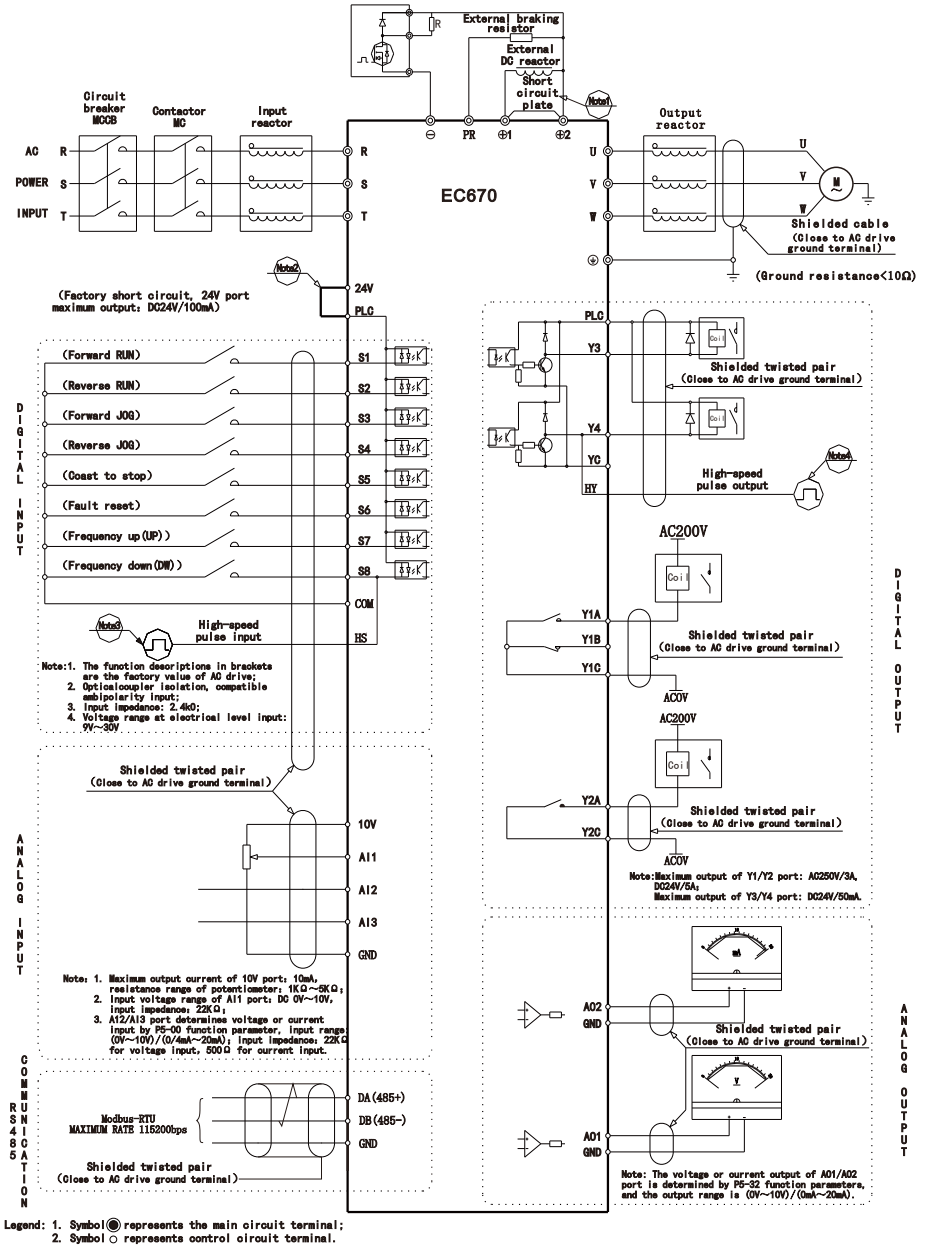
Basic Wire Layout Graph

The wires of AC drive can be divided into main loop and control loop. Users can open the upper cover and see the terminals of main loop and control loop. Users must lay the wires according to the figure below to ensure the accuracy of connections.

Notice!

When wiring, the selection of the wire diameter specification of the wiring should be carried out in accordance with the provisions of the electrical engineering regulations to ensure safety. please tighten the screws of each terminal to prevent loosening due to vibration and the generation of sparks. The following is the standard wiring diagram of the AC motor driver at the time of the 670's factory shipment.

3.6 Standard wiring diagram



Note：1、When installing DC reactor, be sure to remove the short connector between terminals ⊕1 and ⊕2;EC6020 and below structure without ⊕2 terminal.

2、No PR terminal for EC6060 and above.

3、The internal power supply (24V port) or external power supply (PLC port) can be selected for S1～S8 port bias voltage, and the factory value 24V port and PLC port are short circuited;

4、Port S8 is restricted by function parameter P5-00, which can be used as high-speed pulse input channel with maximum input frequency of 50KHz;

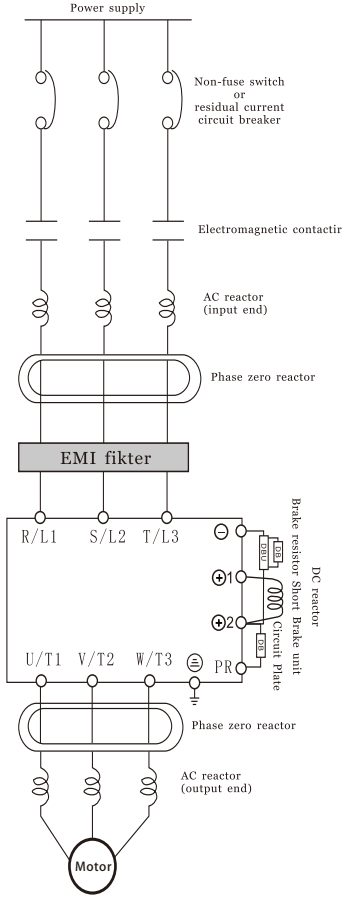
5、Port Y4 is restricted by function parameter P5-32, which can be used as high-speed pulse input channel with maximum input frequency of 50kHz.

6、SP switch pin corresponding legend:

When the Y3 or Y4 terminals use the +24V voltage of PLC and com, the Sw1 dial switch is down.

The resistance of the communication end is down to connect.

3.7 System Wiring Diagram



Power supply	Please use the power supply in accordance with the rated specification in the usage manual
Non-fuse switch or residual current circuit breaker	The input current may be heavy when the power is turned on. Adopt a proper non-fuse switch or residual current circuit breaker.
Electromagnetic contactor	Please do not use the electromagnetic contactor as the power switch of AC drive, since it will shorten the service life of AC drive.
AC reactor (input end)	When the output capacity is over 1000kVA, it is recommended to add an AC reactor to improve the functional factor. The distance of wires should be within 10m.
Phase zeror eactor	Used for reducing the radiation interference, especially in the places with audio devices, and at the same time reducing the interference of input end and output ends as well. The effective range is AM wave band-10MHZ.
DC reactor	Improve power factor and reduce AC pulse of DC bus.
EMI filter	Used for reducing electromagnetic interference. Please refer to the appendix.
Brake resistor	Used for shortening the decelerating time of motor. Please refer to the appendix.
AC reactor (output end)	The length of motor wires will influence the magnitude of the reflection wave on the motor end. When the engine wires are longer than 20m, it is recommended to install the AC reactor. Please refer to the appendix.

3.8 Main Circuit Connection Functions

Terminal	Type	Function Description
R/L1 S/L2 T/L3	Main circuit power supply input	Input end of commercial power supply
U/T1 V/T2 W/T3	AC drive output terminal	AC drive output connected with 3-phase induction motor.
⊕2 PR	External braking resistorconnection	≤37KW with braking unit which is connected to terminal⊕2, PR.To improve the brake moment of force, an external braking resistor is needed.
⊕2/⊕ ⊖	Braking unitor DC Input connection	1: Machinery ≥ 45kW without built-in braking unit component. To improve braking power, external braking unit and braking resistor is necessary (both are optional). 2: DC input terminal.
⊕2 ⊕1	DC reactor connection	Connect DC reactor to improve the power factor, reduce the DC bus AC pulse.
⏚	Grounding terminal	For safety and small noise, AC drive's ground terminal EG should be well grounded.

General precautions for main loop wiring:

■Please do not connect the AC with the output terminal (U/T1, V/T2 and W/T3) of AC drive; otherwise it may cause AC drive damage.

■Ensure that the screws of the main loop terminals are tightened to prevent the sparks caused by the loose screw due to vibration.

■The wires of main loop and those of control loop must be separated to avoid misoperation. If an intersection is needed, make them intersect with a right angle.

■ Please use isolated cable and conduit, and connect with the two ends of the shielding layer or conduit with ground.

■If the installation place of the AC drive is extremely sensitive to interference, please add an RFI filter in a place with a distance from the AC drive as close as possible. The lower the carrier frequency of PWM is, the less the interference there will be.

■ When the AC drive is equipped with a residual current circuit breaker for the protection against electric leakage, please select the ones with action current over 200mA and action time over 0.1s to avoid the misoperation of residual current circuit breaker.

■ The AC drive, motor and wires will cause noise interference. Pay attention to the surrounding sensors, and check whether there is misoperation of the equipment to prevent the accidents.

Description of the power supply input terminals of the main loop (R/L1 S/L2 T /L3)

■Ascertain the voltage of power supply and the maximum current that can supply.

■Main loop terminal R/L1, S/L2, T/L3 is connecting to a three-phase AC power through the circuit (wiring) protection with circuit breakers or earth leakage protection circuit breakers, without considering phase sequence connection.

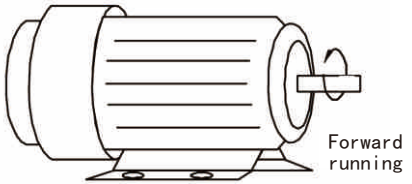
■To cut off power and avoid accident when AC drive protection power is on, electromagnetic contactor to connecting to the circuit is necessary. (The two ends of the electromagnetic contactor should be equipped with R-C surge absorber).

■ Don't use main loop ON/OFF switch to start and stop AC drive. Use loop control terminal FWD, REV or RUN/STOP button on the control panel to start and stop AC drive. If you must use main power supply ON/OFF switch to start and stop, do it no more than 1 time within one hour.

■Do not connect the 3-phase power supply machine with the single-phase power supply.

Output terminals of AC drive(U/T1. V/T2. W/T3)

■ Connect AC drive output terminal to 3 phase motor according to correct phase order. If motor rotates in wrong direction, change any 2 phase of U,V,W.



■The output terminal of AC drive can't be connected to the inlet phase capacitor or surge absorber. If the wires are very long, it should be connected with the AC reactor on the output end.

■There is high frequency current in the extra long wire between motor and AC drive. This may cause AC drive over flow and stop. Besides, long wire increase leaking current, this leads to poor precision of current value. AC drive≤3.7KW choose wire less than 20 meters to motor, less than 50 meters for AC drive over 3.7 KW. If the wire is very long a wave filter connected to the output side AC reactor is necessary.

■Used insulation strengthened motor.

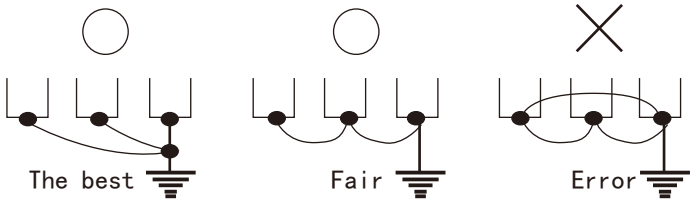
Grounding terminals of AC drive (EG)

■For safety and noise reduction, the grounding terminals of AC drive should be well grounded.

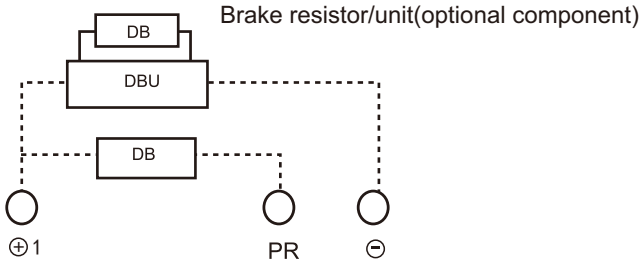
■The grounding wire of AC drive can't be grounded together with the machines with heavy current load e.g. the electric welding machine and high power motor, they should be grounded separately instead.

■In order to prevent electric shock and fire, the external metal grounding wires of electric equipment should be wide and short, and connected to the special grounding terminals of the AC drive system.

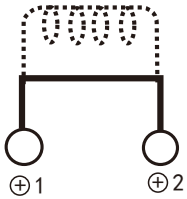
■If there is more than one AC motor speed controller connecting with the ground, Please make sure that is does not form grounding loop, shown as the following figures:



The connection terminals of the external brake resistor [⊕1,PR] and the connection terminals of the brake unit [⊖, ⊕1]



DC reactor connetion terminal ⊕1 ⊕2



DC reactor short circuit plate

3.9 AC drive control terminal connections

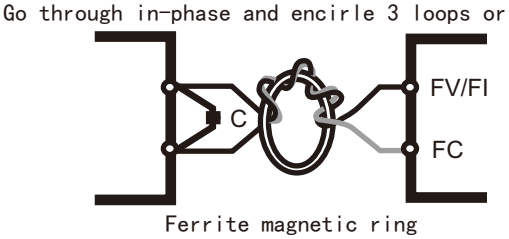
Type	Terminal	Name	Function Description
Power supply	10V-GND	External+10V power supply	Provide +10V power supply for external unit, maximum output current: 10mA Generally, it provides power supply to external potentiometer with resistance range of 1kΩ.～5kΩ.
	24V-COM	External+24V power supply	Provide +24V power supply to external unit, generally, it provides power supply to S/Y terminals and external sensors. Maximum output current: 200mA
	PLC	Input terminal of external power supply	Connect to +24V by default when S1～S8 need to be driven by external signal, PLC needs to be connected to external power supply and be disconnected from +24V power supply terminal.
Analog input	AI1-GND	Analog input termianl 1	1. Input voltage range: DC 0V～10V 2. Impedance: 22kΩ
	AI2-GND	Analog input termianl 2	1. Input range: DC 0V～10V/4mA－20mA, decided by selection of P5-00. 2. Impedance: 22kΩ(voltage input), 500Ω(current input)
	AI3-GND	Analog input termianl 3	
Digital input	S1-COM	Digital input 1	1. Optocoupler coupling isolation, compatible with dual polarity input 2. Impedance: 2.4kΩ 3. Voltage range for level input: 9V-30V 4. S8 can be used for high-speed pulse input. Maximum input frequency: 50kHz
	S2-COM	Digital input 2	
	S3-COM	Digital input 3	
	S4-COM	Digital input 4	
	S5-COM	Digital input 5	
	S6-COM	Digital input 6	
	S7-COM	Digital input 7	
	S8-COM	Digital input 8	
Analog output	AO1-GND	Analog output terminal 1	Voltage or current output is decided by P5-32. Output voltage range: 0V～10V Output current range: 0mA～20mA
	AO2-GND	Analog output terminal 2	
Digital output	Y3-YC	Digital output termianl 1	1.Optocoupler coupling isolation, dual polarity open collector output: 2.Output voltage range: 0～24 V 3.Output current range: 0～50 mA 4.Y4 is limited by F5-32 “HY function enable”. As high-speed pulse output, the maximum frequency is 50 kHz. 5.Select whether YC terminal and COM terminal are electrically connected through SW1.
	Y4-YC	Digitaloutput termianl 2	
	Y1A/Y1B/Y1C	Relay digital output 1	Contact driving capacity: 250Vac, 3A, COSØ=0.4. 30Vdc, 1A
	Y2A/Y2C	Relay digital output 2	
Communication	DA,DB	RS485 interface	1. Standard RS485 communication interface; 2. Select whether to connect 120Ω termination resistor through SW2.

Analog input terminals (FS, FV, FI, FC)

■The connection with analog signal is especially easy to be influenced by the interference of external noise, thus the wire should be as short as possible (less than 20m), and shielding wire should be used. The outer wire mesh of the shielding wire should be basically grounded, but if the inducing noise is very loud, it is better to connect it to the FC terminal.

■For the need of using contact in this circuit, the double-fork contact which can process weak signals should be used. Besides, the terminal FC should not adopt contact control.

■While connecting with the external analog signal follower, sometimes the interference caused by the analog signal follower or the AC drive will lead to misoperation, in such conditions, the capacitor and the magnetic core of ferrite may be conncted to the external analog follower, as shown below:



Input terminals of contact (S1~S8)

■While controlling the input of contacts, in order to prevent bad contact, the contacts that have high reliability for the contact with weak signals should be used.

Output terminals of transistor (Y3,Y4)

■The polarity of the external power supply should be correctly connected.

■While connecting the control relay, the surge absorber should be connected with the two ends of field coil. Please ensure that the polarity is correctly connected.

Others

■It’s best to use the shielding wires as control wires, the isolation network divested segment before the terminals should not be exposed.

■The wires of control terminals should keep away from the wires of the main loop, or misoperation may be caused due to noise interference. If an intersection is needed, make them intersect with a right angle.

■Generally the control wires don’t have good insulation. If the insulation layer is broken due to some reason, high voltage may enter the control circuit (control panel), leading to circuit damage, equipment accidents or personal Danger .

■The control wires in the AC drive should be fixed properly to prevent them from the direct contact with the charge-carrying part of the main circuit (e.g. the terminal strips of the main circuit).

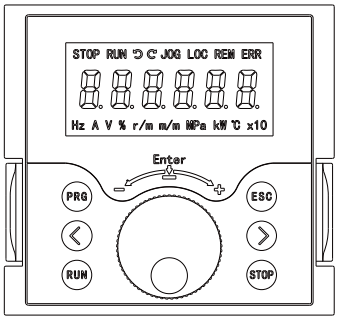
4. Basic operation and commissioning

4.1 LED keyboard panel appearance and operation process

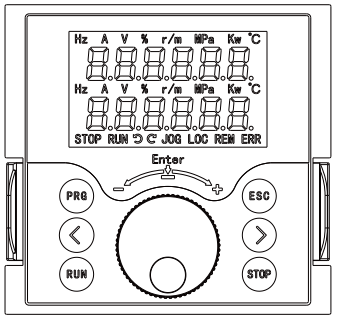
8 segment digital tube LED operation panel by six and seventeen leds, it can display the running condition of AC drives, running direction, alarm, forecasting warning information, panel/remote instruction, monitoring data, I/O status, the parameters of the function of data set, etc.

The panel is detachable and isolated from the input potentiometer. The panel is allowed to be removed during operation, but it is not recommended to do so when running in relation to the panel, such as panel control running/ stopping and setting the frequency.

LED operation panel(Factory standard panel is LED.)



LED single display operation panel



LED dual display operation panel

Description of LED operation panel indicators

Indicator	Description	Indicator	Description
STOP	motor STOP	RUN	motor RUN
↺	motor reverse rotation	↻	motor forward rotation
JOG	JOG state	LOC	control source as panel
REM	control mode set by the source of A03	ERR	AC drive has failure
Hz	monitoring interface is frequency	A	monitoring interface is current
V	monitoring interface is voltage	%	monitoring interface for percentage display
r/m	monitoring interface is motor speed	Kw	monitoring interface is power
MPa	monitoring interface is MPa under monitor mode setting	℃	monitoring interface is temperature

Description of Keys on the LED operation panel

Key	Function
PRG	Programming Set parameters
</>	Move left and right function keys
RUN	RUN key Forward RUN(FRD)
STOP	STOP key
◎	Number INCREASE/DECEREASE and ENTER key
ESC	Exit and fault reset function

Use the panel encoder to set the frequency in the initial interface

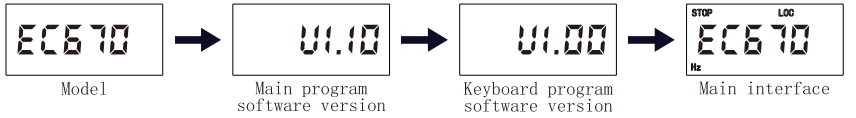
In the initial interface, the encoder can be used to change the setting frequency, left to reduce the set frequency, right to add the set frequency, when you press down the encoder, enter the set frequency, so you can quickly modify the required frequency value.

Monitoring content switching:

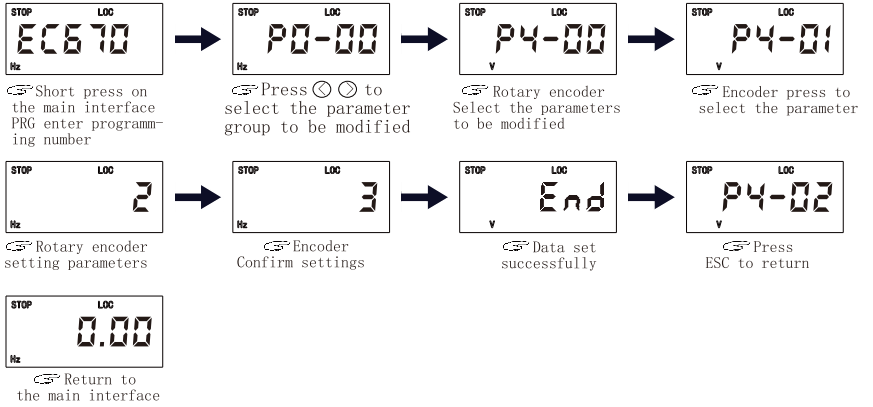
In the monitoring content screen, press the key ◁▷ to switch the monitoring parameters. When typing, the code of the monitoring parameters will be displayed firstly, and then the parameter values will be displayed.

NO.	LED display	Item illustration
0	F-OUT → 50.00	Actual frequency output value
1	F-SET → 50.00	Actual frequency setting value
2	V-OUT → 380.0	Actual voltage output value
3	A-OUT → 11.0	Actual current output value
4	KVA → 7	Actual power output value
5	EDC → 540	DC current voltage inside AC drive
6	PID → 0.000	The current value of the closed-loop feedback
7	TEP → 37	AC drive radiator temperature
8	S1-8 → 111	S1-S8 outside terminal input, 1valid, dark invalid
9	Y1-Y4 → 11	Y1-Y4 outside terminal output, 1 valid, dark invalid
10	HOU → 103	AC drive total running or in power time(select by Pr-C31)
11	VER → 2.00	Control panel edition

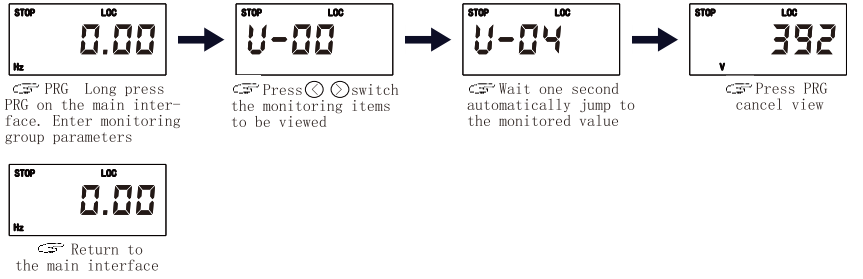
LED single display operation panelPower-on intreface



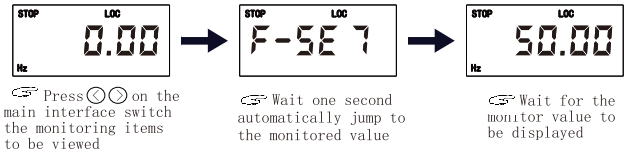
Function parameter setting



Monitoring group parameter setting



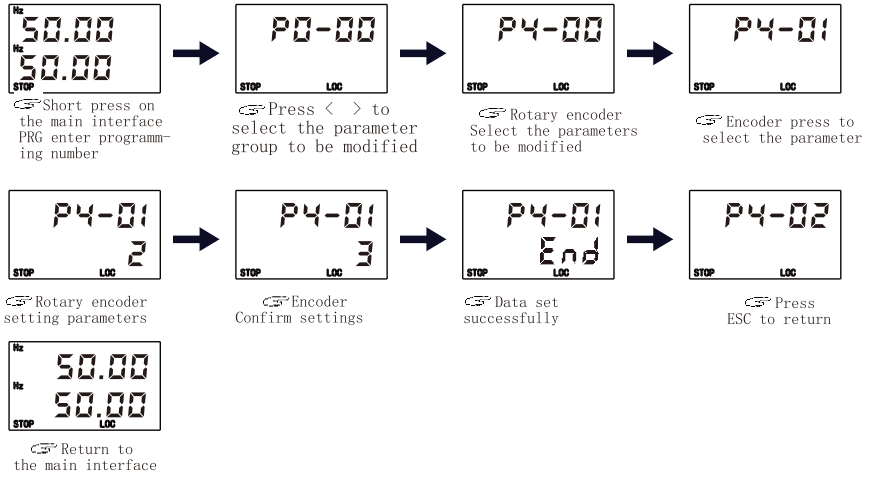
Main interface monitoring item switch



4 monitoring items in the main interface, which can be switched cyclically. Set the name of the item to be monitored through parameters P7-06 and P7-07

LED dual display operation panel Power-on display

Function parameter setting

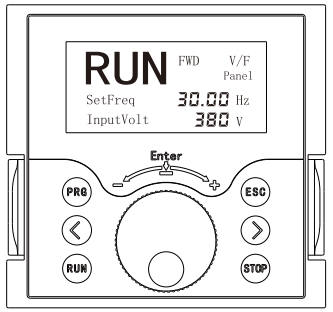


Digital display code comparison table

Text Content	0	1	2	3	4	5	6	7	8	9	A	B	C	D
LED Display	0	1	2	3	4	5	6	7	8	9	A	b	C	d
Text Content	E	F	G	H	I	K	O	P	R	S	T	U	V	Y
LED Display	E	F	G	H	I	K	o	P	r	S	T	U	V	Y

4.2 LCD keyboard panel appearance and operation process

LCD operation panel



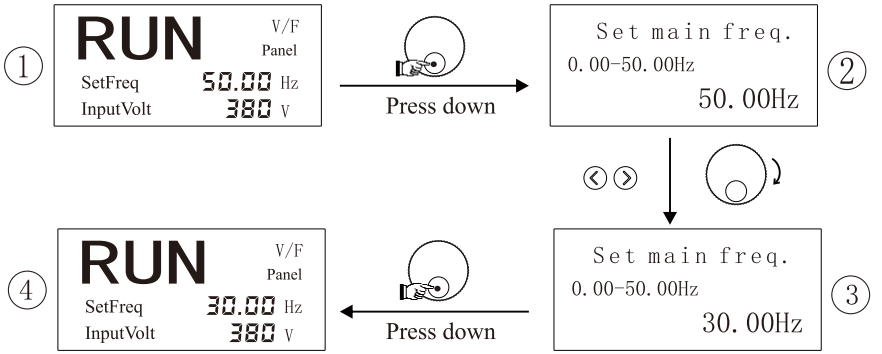
① FWD, REV shoaws the direction of rotation at run time.
② V/F motor control mode.

LCD keyboard operation process

The data on the panel are arranged in the menu and sub-menu, and the general operation can be conducted in the following way.

Setting of main frequency of panel

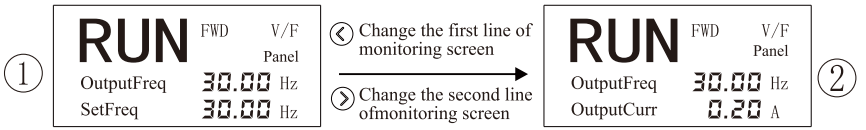
（e.g. the main frequency is altered to: 30. 00Hz）



Press enter under the initial screen ① to enter the frequency setting ②. In the frequency setting Screen ② press ⟨ and ⟩ keys to select the modify bit or ◎ change the frequency from 5 to 3 according to the encoder setting, as shown in figure③. Set the frequency press ◎ to complete the setup, as shown in figure ④.

Switch of the monitored parameters

（e.g. the monitored parameter is altered to: output current）



Press the ⟨ and ⟩ buttons on screen ① to switch monitoring content as shown in figure ②.

Operations like parameter setting/ operation data/ maintenance information/ fault information/ data copy

Under the initial screen press PRG into the frame, the rotary encoder to select feature, press the ◎ key to enter the function menu, press the ESC key to exit to the initial screen, according to the rotary encoder switch pages, and ESC to exit the screen.

Content	LCD display		Function
1.data setting	During installation, set AC motor driver data to be proper value.		
2. monitor running	00 Set Frequency 30. 00Hz 01 Output Frequency 30. 00Hz 02 Output current 0. 21A 03 Output Volt 234V		Press ◎ or ⟨ ⟩ switch monitoring content
3. fault record	First screen	1 : 2 : 3 : Failure S terminal status 0 Failure Y terminal status 0 Failure power on time 0 Failure running time 0	Press ◎ or ⟨ ⟩ switch monitoring content
	Second screen	1 : 2 : 3 : Fault type Err0 Failure operation freq. 0. 00Hz Failure output current 0. 00A Failure DC-bus voltage 0V Failure AC drive status 0	
4. data copy	Only one screen	<DATA COPY> READ	Data copy and checking for batch AC motor driver data setting.

4.3 Check and Test before Operation

The following matters should be paid attention before the operation:

■ Check if wire connection is correct. Confirm AC drive output terminal U, V, W is not connected to POWER and the ground terminal E(G) is grounded well.

■Confirm there is no short circuit within every terminal and electricity naked part.

■Confirm all terminals connection and joints are tight and not loose

■Ensure that the motor isn't connected with loaded machine.

■Before turning the power on, ensure that all the switches are in the disconnected state to guarantee that the AC drive won't start or operate abnormally when the power is on.

■The power supply can only be turned on after the upper cover is installed.

■It is forbidden to operate the switch with wet hand.

■Display of the keypad panel (no indication of faults)

■The cooling fan installed in the AC drive should work normally.

4.4 Running way

There are many running ways showed in “Chapter 4 CONTROL PANEL AND OPE-RATION” and Chapter5 “FUNCTION DATA ILLUSTRATION”.Choose the best operation way according to actual need and running regulations. The common running ways are listed on figure.

Running way	Frequency setting	Running order
Key panel operation	Keyboard keys select or panel adjustment potentiometer	Press FWD or REV to (START) and (STOP)
Remote Control	Potentiometer or simulated voltage current	Input joint terminal S1-COM、terminal S2-COM
Remote communication control method	Communication	Communication

4.5 Test Run

Refer to 4.3 inspection and preparation before operation and confirm that there is no abnormality, and then test operation can be carried out. When the product leaves the factory, it is set to the keyboard operation mode.

1. After the power supply is on, confirm that the LED displays the frequency 0.00Hz.
2. Use the key to set low frequency around 5Hz.
3. Press (START) or (STOP) to start and to low down and stop.
4. Check the following before running:

Check whether the rotation of motor is correct.

Check whether the rotation of motor is steady (without abnormal noise or vibration).

Check whether the acceleration / deceleration are steady.

If there is no abnormality, perform the test run with frequency increased.

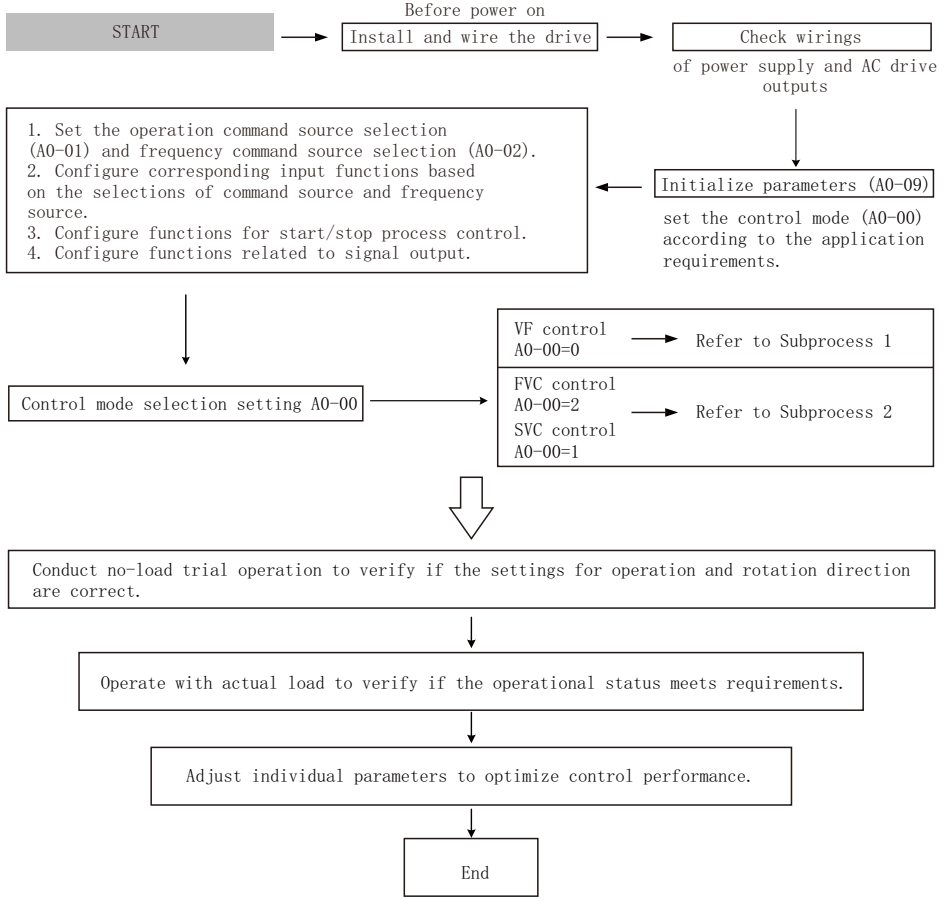
If no abnormality happens in the test run above, the formal operation can be started.

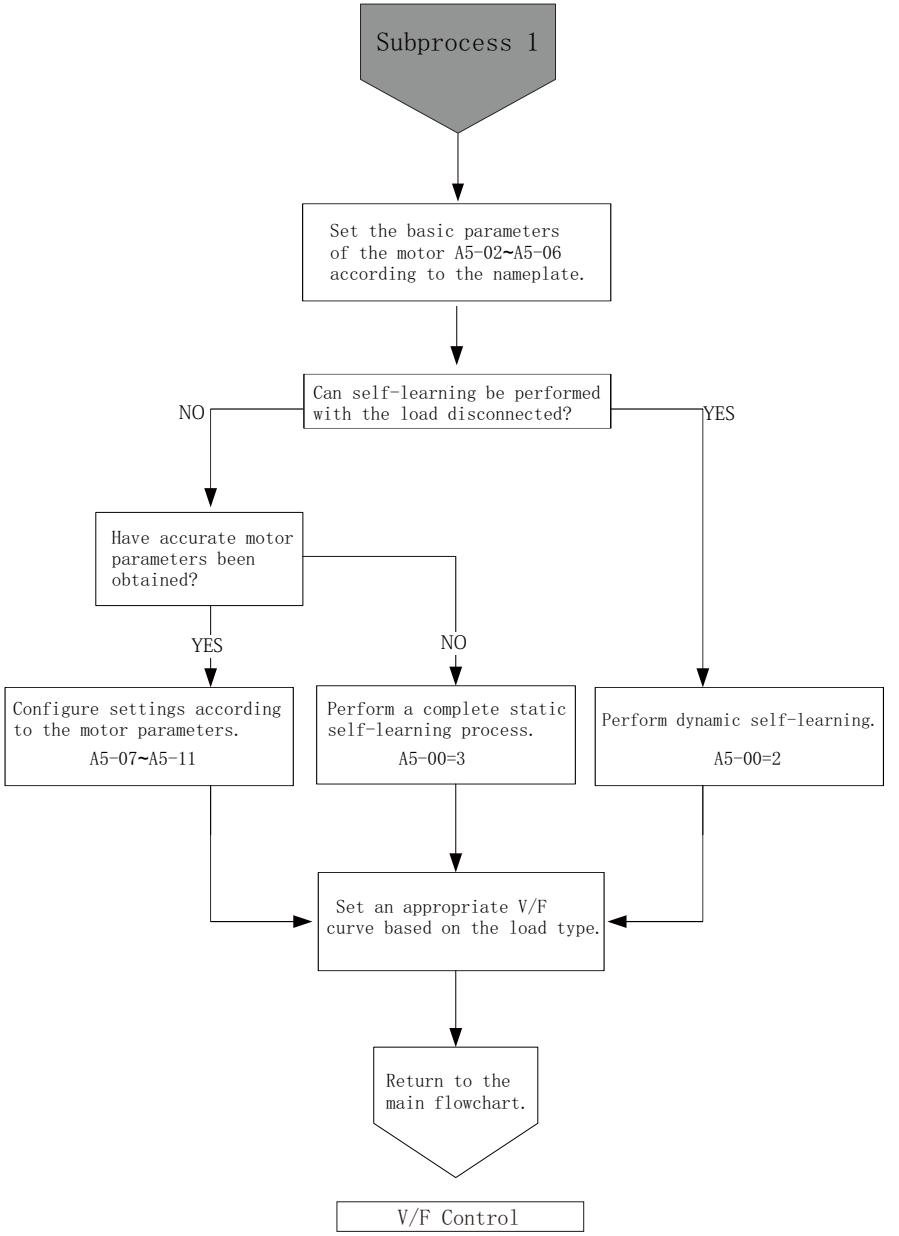
Notice!

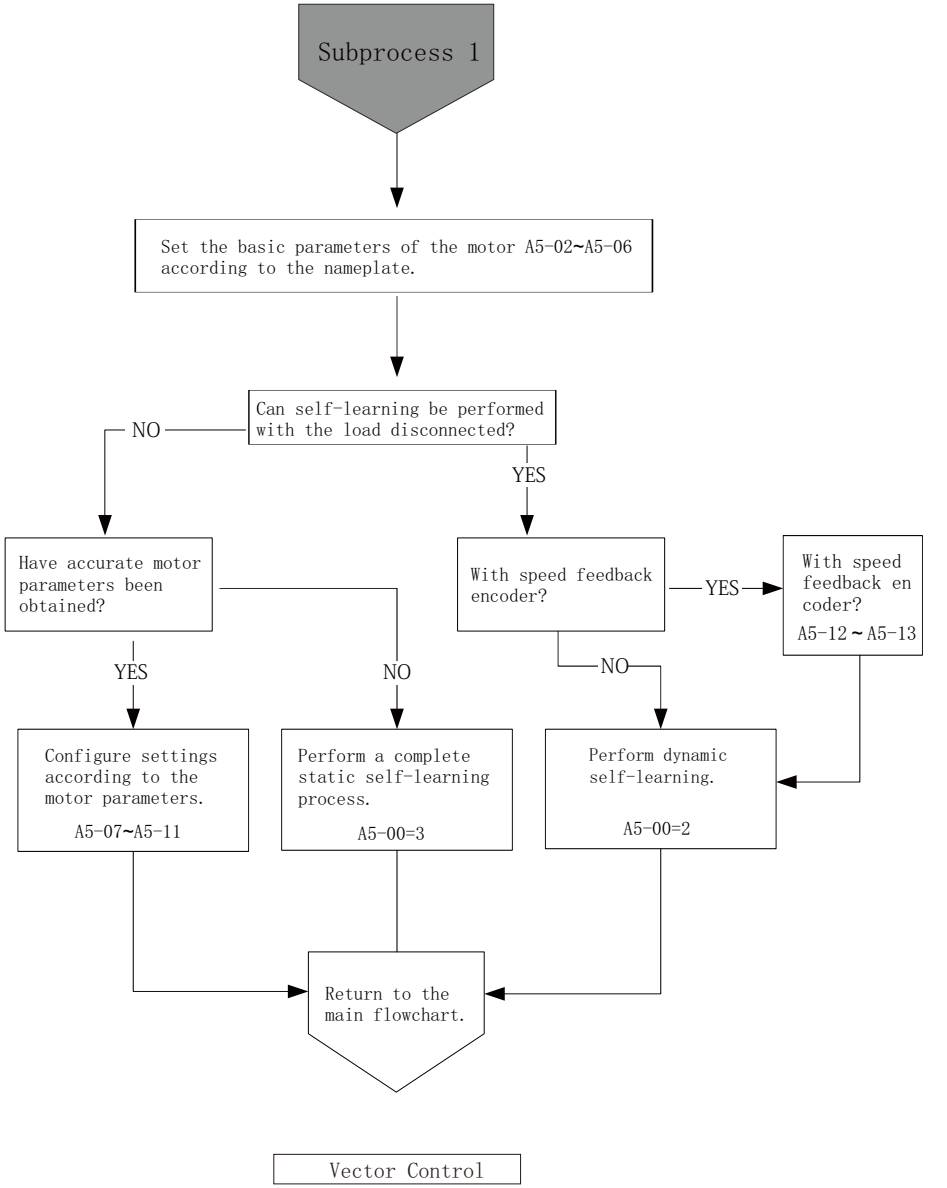
If there is any abnormal phenomena occured , stop AC drive immediately. Consult “fault diagnosis”to find the problem. When AC drive stops, terminal L1/R1, L2/S, L3/T is still with power if main circuit is not switched off.

Any touch onto terminal U, V, W will be shocked. Besides, wave filter capacitor is still full of charging voltage and need certain period of time to discharge, if main circuit power is off. Touch inner AC drive circuit only after power and the DC circuit voltage tested by DC circuit voltage meter is below safety voltage.

4.6 Setup Flowchart




Subprocess 1
Set the basic parameters of the motor A5-02~A5-06 according to the nameplate.
Can self-learning be performed with the load disconnected?
NO
YES
Have accurate motor parameters been obtained?
YES
NO
Configure settings according to the motor parameters.
A5-07~A5-11
Perform a complete static self-learning process.
A5-00=3
Perform dynamic self-learning.
A5-00=2
Set an appropriate V/F curve based on the load type.
Return to the main flowchart.
V/F Control


Subprocess 1
Set the basic parameters of the motor A5-02~A5-06 according to the nameplate.
Can self-learning be performed with the load disconnected?
NO
YES
Have accurate motor parameters been obtained?
YES
NO
With speed feedback encoder?
YES
NO
With speed feedback encoder?
A5-12~A5-13
Configure settings according to the motor parameters.
A5-07~A5-11
Perform a complete static self-learning process.
A5-00=3
Perform dynamic self-learning.
A5-00=2
Return to the main flowchart.
Vector Control

5. Function parameters description

5.1 A0 Standard Parameter group

A0-00	Motor control mode	Setting Range:0～2	Default: 0

0: V/F control

It is applicable to applications with low load requirements or applications where one AC drive operates multiple motors, such as fan and pump.

1: Sensorless flux vector control(SVC)

It indicates open-loop vector control, and is applicable to high-performance control applications such as machine tool, centrifuge, wire drawing machine and injection moulding machine. And one AC drive can operate only one motor.

2: Closed-loop vector control(FVC)

It is applicable to high-accuracy speed control or torque control applications such as high-speed paper making machine, crane and elevator. One AC drive can operate only one motor. An encoder must be installed at the motor side, and a PG card matching the encoder must be installed at the AC drive side.

Note: If vector control is used, motor auto-tuning must be performed because the advantages of vector control can only be utilized after correct motor parameters are obtained. Better performance can be achieved by adjusting speed regulator parameters in group P2.

For the permanent magnetic synchronous motor (PMSM), the EC670 does not support SFVC. CLVC is used generally. In some low-power motor applications, you can also use V/F.

A0-01	Command source selection	Setting Range:0～4	Default: 1

It is used to determine the input channel of the AC drive control commands, such as RUN, STOP, FORWARD RUN, REVERSE FUN and JOG RUNNING.

You can input the commands in the following three channels:

0: Operation panel control (LOC LED on)

Commands are given by pressing keys RUN and STOP on the operation panel.

1: Terminal control (REM LED on)

Commands are given by means of multifunctional input terminals with functions such as FWD, REV, JOGF, and JOGR.

2: Communication control (REM LED blinking)

Commands are given from host computer.

3: Option card(“REMOT” indicator blinking/on)

The operation command is controlled by the input signal of the external option card. For the installation method and parameter setting of the option card, please refer to the instruction manual of the option card.

4:Terminal switchover(REM LOC LED blinking)

The operation command is given by the control terminal switching, see "terminal function description" for details.

A0-02	Main frequency source X selection	Setting Range:0～12	Default: 0

0: Digital setting

The initial value of the set frequency is the value of A0-04 (Preset frequency). You can change the set frequency by pressing ▲ and ▼ on the operation panel (or using the UP/DOWN function of input terminals). When the AC drive is powered on again after power failure, the set frequency is the value memorized at the moment of the last power failure, you can change the set frequency by pressing ▲ and ▼ on the operation panel or the terminal UP/DOWN correction is memorized.

1: AI1

2: AI2

3: AI3

AI1 (0－10 V voltage input)

AI2/AI3(0－10 V voltage input or 4mA－20mA current input, determine by parameter. see "function description of analog terminal parameters" for details.

4: Pulse setting (HS)

The frequency is set by HS (high-speed pulse).

The signal specification of pulse setting is 9－30 V (voltage range) and 0－50 kHz (frequency range). The corresponding value 100% of pulse setting corresponds to the value of S8.For the relationship between the input pulse frequency of HS terminal and the corresponding setting, see "functional description of input terminals" for details.

5: Communication setting

The frequency is set by means of communication.

If the AC drive is in point-point communication and receives data as the frequency source, data transmitted by the master is used as the set frequency. For details, see the description of group PB.

6: UP/DOWN control

The given frequency of the main channel is controlled by the "UP" terminal and the "DW" terminal set by the multi-functional terminal (S1-S8) and the on-off between the (COM) terminal; any end of the multi-functional terminal (X1-X8) can be defined as "UP" terminal and "DW" terminal respectively. See "functional description of input terminal parameters" for details.

7: PID

The output of PID control is used as the running frequency. PID control is generally used in on-site closed-loop control, such as constant pressure closed-loop control and constant tension closed-loop control.

When applying PID as the frequency source, you need to set parameters of “PID Function” in group PA.

8: PLC mode operation setting

When the simple programmable logic controller (PLC) mode is used as the frequency source, the running frequency of the AC drive can be switched over among the 15 frequency references. You can set the holding time and acceleration/deceleration time of the 15 frequency references. For details, refer to the descriptions of Group FD.

9-10: Reserved

11:Option card

The operation command is controlled by the input signal of the external option card. For the installation method and parameter setting of the option card, please refer to the instruction manual of the option card.

12:Terminal switchover

The main channel of frequency setting is selected by "Frequency selection terminal", and "Frequency selection terminal" can be defined by any multi-

A0-03	Maximum output frequency	Setting Range: 0.000～320.00Hz	Default: 50.00Hz

The maximum frequency limit allowed by the AC drive;it is also the acceleration and deceleration time reference.

A0-04	Preset main frequency	Setting Range: 0.00～Maximum output frequency	Default: 50.00Hz

Used to set and modify the set main frequency of keyboard number when frequency set passageway is keyboard number setting.

A0-05	Acceleration time 1	Setting Range: 0.1～6500.0s	Default: By type

Acceleration time indicates the time required by the AC drive to accelerate from 0 Hz to "Acceleration/Deceleration base frequency" (A1-06), that is, t1 in Figure 6-1.

A0-06	Deceleration time 1	Setting Range: 0.1～6500.0s	Default: By type

Deceleration time indicates the time required by the AC drive to decelerate from "Acceleration/Deceleration base frequency" (A1-06) to 0 Hz, that is, t2 in Figure 6-1.

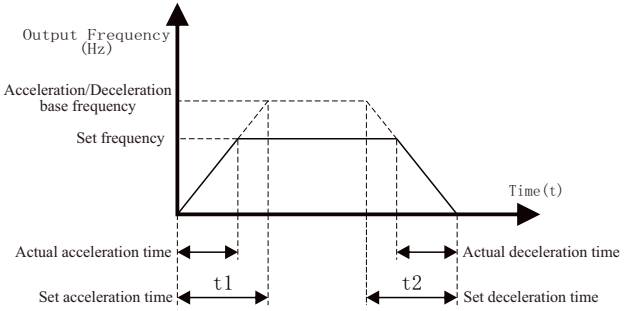


Figure 6-1 Acceleration/Deceleration time

A0-07	Rotation direction selection	Setting Range: 0000～0011	Default: 0

BIT0:

0: Forward direction operation 1: Reverse direction operation

You can change the rotation direction of the motor just by modifying this parameter without changing the motor wiring. Modifying this parameter is equivalent to exchanging any two of the motor's U, V, W wires.

Note:The motor will resume running in the original direction after parameter initialization. Do not use this function in applications where changing the rotating direction of the motor is prohibited after system commissioning is complete.

BIT1:

0: Reverse operation enable 1: Reverse operation disable

It is used to set whether the AC drive allows reverse rotation. In the applications where reverse rotation is prohibited, set the bit 1of A0-07 to 1.

A0-08	Carrier frequency	Setting Range: 1.0～15.0kHz	Default: By type

It is used to set the switching frequency of IGBT of AC drive. Please set this parameter when adjusting motor noise and reducing leakage current. This function is mainly used to improve the noise and vibration that may occur in the operation of the AC drive. When the carrier frequency is high, the current waveform is ideal and the motor noise is low. It is very suitable for places where silence is required. But at this time, the switch loss of the main components is large, the whole machine is hot, the efficiency is reduced, and the output is reduced. At the same time, the radio interference is large, the other problem of high carrier frequency operation is the increase of capacitive leakage current, which may cause its misoperation or over-current when the leakage protector is installed. When the carrier frequency is low, it is opposite to the above phenomenon.

The response of different motors to carrier frequency is also different. The best carrier frequency also needs to be adjusted according to the actual situation. But with the increase of motor capacity, the carrier frequency should be smaller.

Tip: In order to obtain better control characteristics, the ratio of carrier frequency to the highest operating frequency of the AC drive is recommended not to be less than 36. If the AC drive works in the low frequency band for a long time, it is recommended to reduce the carrier frequency to reduce the influence of dead time.

Note: When the carrier frequency is higher than the factory set value, the rated power of the AC drive shall be reduced by 5% for every 1kHz carrier frequency increased. Our company reserves the right to limit the maximum carrier frequency. Adjusting the carrier frequency will affect the following performance:

Carrier frequency	Low → High
Motor noise	Large → Small
Output current waveform	Bad → Good
Motor temperature rise	High → Low
AC drive temperature rise	Low → High
Leakage current	Small → Large
External radiation interference	Small → Large

A0-09	Restore default settings	Setting Range: 0～65535	Default: 0～210

0: No operation 1: Data locked
2: Reset Error message 3～6: Undefined
7: Initialization setting—User data reset
10: Back up current user parameters
210: Restore user backup parameters

If A0-09 is set to (1/7), most function codes are restored to the default settings except fault records, accumulative running time , accumulative power-on time and accumulative power. consumption.

10: Back up current user parameters

If A0-09 is set to 10, the previous backup user parameters are restored.

210: Restore user backup parameters

If A0-09 is set to 210, the current parameter settings are backed up, helping you to restore the setting if incorrect parameter setting is performed.

5.2 A1 Start stop and frequency parameter group

A1-00	Start Mode	Setting Range: 0～2	Default: 0

0: Start from start frequency

The AC drive control the AC drive start at P6-02 set start frequency and P6-02 set start frequency duration; suitable to the situation that bigger static rub torque and smaller loading inertia, or suitable when user matched outer mechanical brake equipment. Means the situation that motor shaft able to keep static after motor stopped and before start again.

1: Firstly DC retaining then start from start frequency

Firstly add a certain DC retaining energy(means electromagnetic brake gate)from the retaining current P6-05 before start and retaining time P6-06 before start, then start from the start frequency; suitable to the small inertia loading which stop machine status had corotation and reversal appearance.

2: Start again after speed tracing and direction judgement

The AC drive firstly check the speed and direction of motor, then running to set frequency start from the checked speed according to accelerate/decelerate time. It's speed trace method divided into interior speed trace and outer exterior speed trace, select through the shift terminal.

A1-01	Minimum output frequency	Setting range: 0.00～60.00Hz	Default: 0.50Hz
A1-02	Braking current before startup	Setting range: 0～150%	Default: 70%
A1-03	Braking time before startup	Setting range: 0.0～300s	Default: 0.8s
A1-04	Initial frequency of stop DC braking	Setting range: 0.00～5.00Hz	Default: 0.00Hz

Minimum output frequency: This function defined as the min output frequency of AC drive, the AC drive output 0.00Hz when lower than this frequency.

Braking current before startup: Means the size of retaining current which transferred into motor by AC drive when DC retaining. This value based on the output rated current of AC drive. Only has DC retaining function at starting when A0-00 select "1".

Braking time before startup: Retaining time before start: means the duration of DC retaining current when starting; only has DC retaining function when A0-00 select "1"; no DC retaining process when retaining time is 0.0s.

Initial frequency of stop DC braking: means the AC drive will stop output when moderate to this frequency, start DC remaining function; when stop machine, start DC retaining function when output frequency less than the stop machine DC retaining start frequency. During the moderate stop machine process, start DC retaining when set frequency less than the stop machine DC retaining start frequency, the output frequency of AC drive jump change to be 0. If the running working situation no strict requirements of stop machine retaining, DC retaining start frequency when stop machine should set at smaller as possible.

A1-05	Stop DC braking current	Setting range: 0～150%	Default: 70%
A1-06	Stop DC braking holding time	Setting range: 0.0～600.0s	Default: 1.0s

Stop DC braking current: means the size of retaining current which transferred into motor by AC drive when DC retaining. This value based on the output rated current of AC drive. DC retaining function can provide zero torque moment. Generally, it used to improve the stop machine precision and realize quickly stop machine, but can't be used at moderate retaining when normally running; once start DC retaining, the AC drive will stop output. If too big DC retaining current set, the AC drive easy to generate over current failure when stop machine.

Stop DC braking holding time: Stop machine DC retaining duration: means the time of DC retaining current when stop, no DC retaining process when the duration is 0.0s, means the DC retaining function invalid.

A1-07	Acceleration /deceleration mode selection	Setting range: 0～1	Default: 10
A1-08	S-curve start of acceleration segment	Setting range: 0.0～100.0%	Default: 30%
A1-09	S-curve end of acceleration segment		Default: 30%
A1-10	S-curve start of deceleration segment		Default: 30%
A1-11	S-curve end of deceleration segment		Default: 30%

Accelerate/decelerate select

BIT 0: accelerate/decelerate time base

This parameter used as the accordance of select accelerate/decelerate time.

0: The max frequency The base of accelerate/decelerate time is the max frequency P0-09.

1: Fix frequency The base of accelerate/decelerate time is the 50.00Hz fix frequency.

BIT 1: accelerate/decelerate method

EC670 provides two types accelerate/decelerate method; the two accelerate/decelerate method all are valid during normally start, stop machine, corotation and reversal, accelerate and decelerate process.

0: Linear Generally, it's suitable to commonly used loading.

1: S curve S type accelerate and decelerate curve mainly provide for the loading like that need retard noise and vibration when at accelerate and decelerate, reduce the start-stop impact or low frequency need gradually reduce torque, high frequency need short time accelerate. If happen over current or overload failure when starting then please reduce the set value of P6-12.

BIT 2: Reserved

BIT 3: Reserved

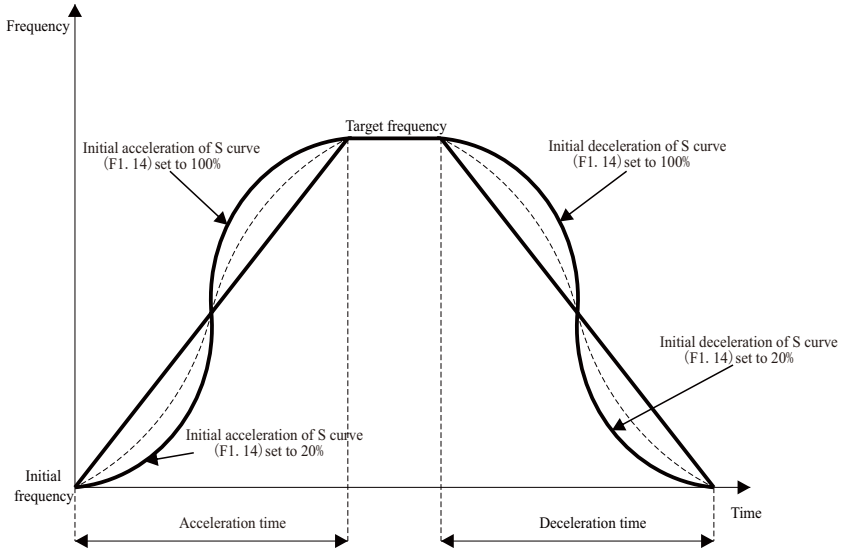
Accelerate start S word time: the frequency gradually rise speed ratio when accelerate process start.

Accelerate finish S word time: the frequency gradually rise speed ratio when accelerate process finish.

Decelerate start S word time: the frequency gradually reduce speed ratio when decelerate process start.

Decelerate finish S word time: the frequency gradually reduce speed ratio when decelerate process finish.

More bigger S word time set then more bending of S curve during the accelerate process, oppositely, S curve more close to the straight line. Can increase the S word time to make accelerate and decelerate curve more soft.



S-curve acceleration/deceleration

A1-12	Reference 1	Setting Range: 0～100%	Default: 0%
A1-13	Reference 2		Default: 0%
A1-14	Reference 3		Default: 0%
A1-15	Reference 4		Default: 0%
A1-16	Reference 5		Default: 0%
A1-17	Reference 6		Default: 0%
A1-18	Reference 7		Default: 0%
A1-19	Reference 8		Default: 0%
A1-20	Reference 9		Default: 0%
A1-21	Reference 10		Default: 0%
A1-22	Reference 11		Default: 0%
A1-23	Reference 12		Default: 0%
A1-24	Reference 13		Default: 0%
A1-25	Reference 14		Default: 0%
A1-26	Reference 15		Default: 0%

The EC670 multi-reference has many functions. Besides multi-speed, it can be used as the setting source of the V/F separated voltage source and setting source of process PID. In addition, the multi-reference is relative value.

Multi-reference can be the setting source of frequency, V/F separated voltage and process PID. The multi-reference is relative value and ranges from -100.0% to 100.0%.

As frequency source, it is a percentage relative to the maximum frequency. As V/F separated voltage source, it is a percentage relative to the rated motor voltage. As process PID setting source, it does not require conversion. Multi-reference can be switched over based on different states of S terminals.

Explanation of terminal combination for multi speed function

K1	K2	K3	K4	Muiti stage speed setting	Corresponding parameters
1	0	0	0	Reference 1	A1-12
0	1	0	0	Reference 2	A1-13
1	1	0	0	Reference 3	A1-14
0	0	1	0	Reference 4	A1-15
1	0	1	0	Reference 5	A1-16
0	1	1	0	Reference 6	A1-17
1	1	1	0	Reference 7	A1-18
0	0	0	1	Reference 8	A1-19
1	0	0	1	Reference 9	A1-20
0	1	0	1	Reference 10	A1-21
1	1	0	1	Reference 11	A1-22
0	0	1	1	Reference 12	A1-23

K1	K2	K3	K4	Muiti stage speed setting	Corresponding parameters
1	0	1	1	Reference 13	A1-24
0	1	1	1	Reference 14	A1-25
1	1	1	1	Reference 15	A1-26

5.3 A2 Terminal IO parameter group

The EC670 provides eight S-terminals (S8 can be used for high-speed pulse input), 4 pieces multiple function digit output terminals(among, need be used to as high speed pulse output terminals).

A2-00	S1 Function	Setting Range: 0～56	Default: 1
A2-01	S2 Function		Default: 3
A2-02	S3 Function		Default: 2
A2-03	S4 Function		Default: 16
A2-04	S5 Function		Default: 17
A2-05	S6 Function		Default: 18
A2-06	S7 Function		Default: 19
A2-07	S8 Function		Default: 53

These parameters are used to set the functions of the digital multi-functional input terminals. The selectable functions are shown in the following table:

Value	Function	Description
0	No function	Terminals that are not in use can be set to "no function" to prevent misoperation.
1	Forward operation	The forward and reverse operations of the frequency converter can be controlled through external terminals.
2	Reverse operation	
3	Three-wire operation control	This terminal is used to determine whether the operation mode of the frequency converter is the three-wire control mode. For detailed information, please refer to the description of function code A2-12 ("Terminal command mode").
4	Forward jogging	FJOG is for forward jogging operation, and RJOG is for reverse jogging operation. For the jogging operation frequency and jogging acceleration and deceleration time, please refer to the description of function codes P8-00 to P8-03.
5	Reverse jogging	

Value	Function	Description
6	Free stop	The output of the frequency converter is blocked, and at this time, the stopping process of the motor is not controlled by the frequency converter. This mode has the same meaning as the free stop described in P0-18.
7	Emergency stop	If an emergency stop command is input during the operation of the frequency converter, the frequency converter will decelerate and stop according to the deceleration time set in P8-10. During the emergency stop time, the re-operation command is invalid.
8	Fault reset	It has the function of fault reset through the terminal, which is the same as the function of the RESET key on the keyboard. This function can be used to achieve remote fault reset.
9	External fault input	When this signal is sent to the frequency converter, the frequency converter will report a fault ERR15 and perform fault handling according to the fault protection action mode (for detailed content, refer to function code A8-35).
10	Frequency increase (UP)	These are the commands for increasing and decreasing the frequency when the frequency is set by external terminals. When the frequency source is set to 6, the set frequency can be adjusted up and down through the UP or DW terminals. The UP/DW reset terminal can clear the frequency value changed by the UP/DW terminals, restoring the set frequency to the value set in A0-04.
11	Frequency decrease (DW)	
12	UP/DW reset	
13	Torque/Speed Control Switching	It enables the frequency converter to switch between the torque control mode and the speed control mode. When this terminal is ineffective, the frequency converter operates in the mode defined by A0-00 (Speed/Torque Control Mode). When this terminal is effective, it will switch to the other mode.
14	Speed Search and Startup	When this terminal is effective, the starting mode of the frequency converter is speed search starting, which has the same effect as setting A1-00 to 2.
15	Reserved	-
16	Multi-speed Terminal 1	Through the 16 states of these four terminals, the setting of 16-segment speeds or 16 other commands can be achieved. For detailed information, please refer to Schedule 1.
17	Multi-speed Terminal 2	
18	Multi-speed Terminal 3	
19	Multi-speed Terminal 4	
20	Acceleration and Deceleration Time Selection Terminal 1	Through the 4 states of these two terminals, the selection of 4 kinds of acceleration and deceleration times can be achieved. For detailed information, please refer to Schedule 2.
21	Acceleration and Deceleration Time Selection Terminal 2	

Value	Function	Description
22	Acceleration and Deceleration Prohibition	It ensures that the frequency converter is not affected by external signals (except the stop command) and maintains the current output frequency.
23	PID Control Cancellation	If this terminal is effective, the PID function can be disabled, and the given frequency of the main frequency-given channel will become the value set in A0-04. When this terminal becomes ineffective, the PID will start recalculating the given frequency of the main frequency-given channel.
24	PID Control Pause	The PID function is temporarily invalid. The frequency converter maintains the current output frequency and stops the PID regulation of the frequency source.
25	PID Integration Pause	When this terminal is effective, the integral regulation function of the PID is suspended, but the proportional regulation and derivative regulation functions of the PID are still effective.
26	PID Action Direction Inversion	When this terminal is effective, the acting direction of the PID is opposite to the direction set in the units digit of PA-06.
27	PID Parameter Group Switching	When the PID parameter switching condition is the S terminal (the tens digit of PA-06 = 1), when this terminal is ineffective, the PID parameters used are P-08-PA-10; when this terminal is effective, the PID parameters used are PA-18~PA-20.
28	PID Given Value Switching 1	
29	PID Given Value Switching 2	
30	Torque/Speed Control Switching 3	
31	PID Feedback Switching 1	When the given signal source of the PID controller is set to "8" (terminal selection) in PA-00, the channels of the given signal source of the PID controller can be switched through this group of terminals. For detailed information, please refer to the parameter setting of PA-00.
32	PID Feedback Switching 2	
33	PID Feedback Switching 3	
34	Program Operation (PLC) Pause	During the program operation process, if this signal is effective, it can pause the program operation. After the signal disappears, the operation will continue according to the state before the pause. For the detailed parameters of the program control (PLC), please refer to the "PD" group of parameters for the multi-segment speed and PLC functions.
35	Program Operation (PLC) Restart	During the program operation process, if this signal is effective, it can restart the program operation and start running from the first stage. For the detailed parameters of the program control (PLC), please refer to the "PD" group of parameters for the multi-segment speed and PLC functions.
36	Swing Frequency Activation	In the swing frequency control, if it is set to manual activation, when this terminal is effective, the swing frequency function will be enabled, and the frequency

36	Swing Frequency Activation	converter will start the swing frequency operation. For detailed information, please refer to parameters PD-46~52.
37	Swing Frequency Pause	In the swing frequency control, when this terminal is effective, the frequency converter will keep the current output frequency unchanged. After the command of this terminal is revoked, the swing frequency operation will be resumed. For detailed information, please refer to parameters PD-46~52.
38	Swing Frequency Reset	In the swing frequency control, when this terminal is effective, the frequency converter will return to running at the center frequency. After the command of this terminal is revoked, the swing frequency operation will be resumed. For detailed information, please refer to parameters PD-46~52.
39	Frequency Channel Switching Terminal 1	This is only valid when parameter A0-02 is set to "12" (terminal switching control). The main frequency input channel is selected by the terminals. The four terminals can be combined to form values from 0 to 11, which respectively correspond to the frequency input channels of "0 to 11" in A0-02. For detailed information, please refer to the detailed description of parameter A0-02.
40	Frequency Channel Switching Terminal 2	
41	Frequency Channel Switching Terminal 3	
42	Frequency Channel Switching Terminal 4	
43	Operation Command Switching Terminal 1	This is only valid when parameter A0-01 is set to "4" (terminal switching control). The main frequency input channel is selected by the terminals. The two terminals can be combined to form values from 0 to 3, which respectively correspond to the frequency input channels of "0 to 3" in A0-02. For detailed information, please refer to the detailed description of parameter A0-01.
44	Operation Command Switching Terminal 2	
45	Timer Trigger Terminal	This is the port for starting the timer timing action, and it is valid when closed. For detailed information, please refer to parameters P8-28 to 31.
46	Timer Reset Terminal	This clears the timing record of the timer, and it is valid when closed instantaneously. For detailed information, please refer to parameters P8-28 to 31.
47	Counter Clock Input Terminal	This is the clock input terminal for the counter function. For detailed information, please refer to parameters P8-32 to 33.
48	Counter Reset	This clears the counting record of the counter, and it is valid when closed instantaneously. For detailed information, please refer to parameters P8-32 to 33.
49	DC Braking Command	When the frequency converter is in the stop state, the DC braking function of the frequency converter can be started. The current during DC braking refers to the set value of the shutdown DC braking current in parameter A1-04. If an operation or jogging command is input, the DC braking will be released.

Value	Function	Description
50	Terminal Pre-excitation	When the frequency converter is in the stop state, the pre-excitation function of the frequency converter can be started. If an operation or jogging command is input, the pre-excitation will be released.
51	User-defined Fault 1	When user-defined faults 1 and 2 are valid, the frequency converter will give alarms ERR27 and ERR28 respectively. The frequency converter will process according to the action mode selected by the units and tens digits of A8-37 for the fault protection action.
52	User-defined Fault 2	
53	Pump 1 Enable	When the multi-pump control function is enable, it serves as the control signal for pump switching and selection. For detailed information, please refer to the instruction for the multi-pump control function.
54	Pump 2 Enable	
55	Pump 3 Enable	
56	Pump 4 Enable	

A2-08	Characteristic selection of terminals S1-4	Setting Range: 0000～1111	Default: 0000

Characteristic selection of terminals S1-S4: Set the characteristics of S terminals S1, S2, S3 and S4 respectively.

BIT 0: S1 terminal

0: effective closing
1: effective opening

BIT 1: S2 terminal

0: effective closing
1: effective opening

BIT 2: S3 terminal

0: effective closing
1: effective opening

BIT 3: S4 terminal

0: effective closing
1: effective opening

A2-09	S1-S4 terminal filtering time	Setting Range: 0.0～60.0s	Default: 0.10s

This function used to set the filtering time of multiple function input terminal. When the input terminal status change, if still keep the status after changed through the set filtering time then can regard the terminal status change is valid, otherwise, still keep the last time status, thus valid to reduce the error action which caused by the disturb.

A2-10	Characteristic selection of terminals S5-8	Setting Range: 0000～1111	Default: 0000

Same as A2-08

A2-11	S5-S8 terminal filtering time	Setting Range: 0.00～60.00s	Default: 0.1s

Same as A2-09

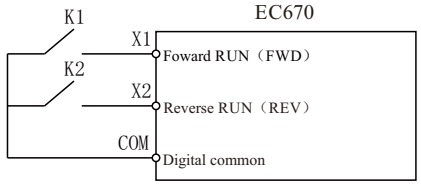
A2-12	Terminal command mode	Setting Range: 0～3	Default: 0

This parameter is used to set the mode in which the AC drive is controlled by external terminals.

0: Two-line mode 1

Integration of operation and direction. It is the most commonly used two-line mode, in which the forward/reverse rotation of the motor is decided by S1 and S2.
The parameters are set as below:

K1	K2	RUN command
0	0	STOP
1	0	Foward RUN
0	1	Reverse RUN
1	1	STOP

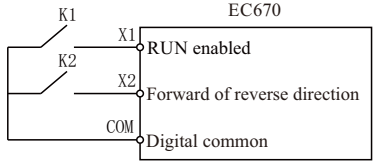


0: Setting of two-liner mode 1

1: Two-line mode 2

Separation of operation and direction. In this mode, S1 is RUN valid terminal, and S2 determines the running direction. The parameters are set as below:

K1	K2	RUN command
0	0	STOP
1	0	Forward RUN
1	1	Reverse RUN
0	1	STOP

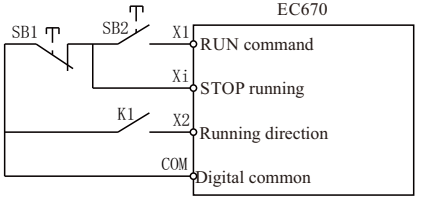


1: Setting of two-liner mode 2

2: Three-line mode 1

In this mode, S1 is RUN valid terminal. The RUN command is given by S1 and the direction is decided by S2. The (S1) is valid input.

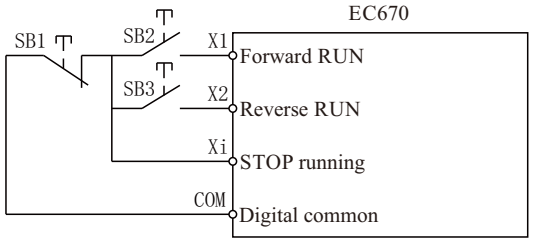
K1	RUN command
0	Forward RUN
1	Reverse RUN



2:Setting of three-liner mode 1

3: Three-line mode 2

In this mode, S1 is RUN valid terminal, and the direction is decided by S1 and S2. And both control the running direction at the same time.



3：Setting of three-liner mode 2

Tips: As shown in the preceding figure, if SB1 is ON, the AC drive instructs forward rotation when SB2 is pressed to be ON and instructs reverse rotation when SB3 is pressed to be ON.

A2-13	Y1 terminal function	Setting Range: 0～39	Default: 1
A2-14	Y2 terminal function		Default: 2
A2-15	Y3 terminal function		Default: 3
A2-16	Y4 terminal function		Default: 6

Value	Function	Description
0	No Output	The output terminal has no function.
1	Forward RUN(FWD)	It indicates that the AC drive is in the state of FWD OR REV, and has output frequency(can be 0), at this time, it output “ON” signal.
2	Reverse RUN(REV)	
3	Fault output 1 (No action during self recovery	When the AC drive fails and stops, it will not action during self recovery, and will output “ON” signal after exceeding the self recovery times.
4	Fault alarm 2 (Action during self recovery	When the AC drive breaks down and stops, it will output terminal “ON” immediately.
5	Ready fo RUN	When the power supply of the main circuit and control circuit of the AC drive has been stable, and the AC drive has not detected any fault information, and the AC drive is in the operational state, it will output “ON” signal.
6	Frequency reached	Refer to P8-19 for instructions.
7	Frequency-level detection FDT1 output	Refer to P8-15, P8-16 for instructions.
8	Frequency-level detection FDT2 output	Refer to P8-17, P8-18 for instructions.
9	Frequency upper limit reached	When the AC drive operates at the upper limit frequency, it will output effective signal.
10	Frequency upper lower reached	When the AC drive operates at the lower limit frequency, it will output effective signal.
11	Current 1 reached	Refer to P8-20, P8-21 for instructions.
12	Current 2 reached	Refer to P8-22, P8-23 for instructions.

13	Zero current output	Refer to P8-24, P8-25 for instructions.
14	Output current out of limit	Refer to P8-26, P8-27 for instructions.
15	Torque limited	In the speed control mode, when the output torque reaches the limit value, the AC drive is in stall protection state and output “ON” signal at the same time.
16	OL1 motor overload pre-warning	Before the motor overload protection acts, it is judged according to the threshold value of overload pre-warning, and outputs “ON” signal after exceeding the pre-warning threshold. Motor overload parameter setting parameter code A8-32.
17	OL2 AC drive overload pre-warning	10s before the overload protection of AC drive, the “ON” signal is output.
18	Zero-speed running (no output at stop)	Output frequency is 0.
19	Acceleration running	Frequency output increasing.
20	Deceleration running	Frequency output decreasing.
21	DC breaking	Output DC breaking
22	PLC step completed	When the end of a stage of program running, 500ms effective signal is output.
23	PLC cycle completed	When the end of a cycle of program running, 500ms effective signal is output.
24	Reserved	
25	Running time reached	When the starting operation time of AC drive exceeds the time set by P8-29,the “ON”signal is output.
26	Set count value reached	When the AC drive reaches the timing time, the port outputs an effective pulse signal with the width of 1 second. Refer to P8-30, P8-31 for instructions.
27	Maximum count value reached	When the count reaches the maximum value of P8-32, the terminal outputs a valid signal whose width is equal to external clock cycle, and the counter is cleared.
28	Set count value reached	When the count reaches the set value of P8-32, the terminal outputs a valid signal, the output valid signal is cancelled when the count is reset due to the counter is exceeding the maximum value of the counter.
29	AI1 input out of limit	When the value of AI1 is greater than P8-34 or less than P8-35, it output “ON” signal.
30	Model temperature reached	When the radiator temperature of AC drive module reaches the set value P8-36, it output “ON” signal.
31	Fan running	The AC drive outputs “ON” signal when the cooling fan is running.
32	Data output 1 from transfer(Y function)	BIT12 of communication output command 0X2000.
33	Data output 2 from transfer(Y function)	BIT13 of communication output command 0X2000.
34	Data output 1 from transfer(Y function)	BIT14 of communication output command 0X2000.

35	Data output 2 from transfer(Y function)	BIT15 of communication output command 0X2000.
36	Pump 1 start-up	When the multi pump control is effective, it is used as control signal of pump switching. See the multi pump control function description for details.
37	Pump 2 start-up	
38	Pump 3 start-up	
39	Pump 4 start-up	

5.4 A3 Communication parameter

A3-00	Local address	Setting Range: 1～247	Default: 1

This parameter define the communication address when this machine as sub machine. If this machine as main machine, this parameter nonsense. 0 is the broadcast address.

A3-01	Baud rate selection	Setting Range: 0～7	Default: 3

Set the baud rate for communication. If the baud rate settings are different, communication will not be possible.
0：1200bps 1：2400bps 2：4800bps 3：9600bps
4：19200bps 5：38400bps 6：57600bps 7：115200bps

A3-02	Date format	Setting Range: 0～5	Default: 3

0: (N, 8, 1)No check, data format:8, stop bit:1
1: (E, 8, 1)Even parity check, data format:8, stop bit:1
2: (O, 8, 1)Odd Parity check, data format:8, stop bit:1
3: (N, 8, 2)No check, data format:8, stop bit:2
4: (E, 8, 2)Even parity check, data format:8, stop bit:2
5: (O, 8, 2)Odd Parity check, data format:8, stop bit:2

A3-03	Communication proportion setting	Setting Range: 0.000～5.000	Default: 1.000

The communication instructions sent by the upper computer are multiplied by this parameter as the communication given value or feedback value of the machine. The communication instructions of the upper computer can be modified in proportion.

A3-04	Communication response delay	Setting Range: 0.000～0.500	Default: 0.000s

It refers to the intermediate interval between the end of data acceptance of the AC drive and the sending of data to the upper computer. If the response delay is less than the system processing time, the response delay shall be subject to the system processing time. If the response delay is longer than the system processing time, the system shall delay waiting after data processing, and send data to the upper computer until the response delay time is up.

A3-05	Communication timeout failure	Setting Range: 0.0～100.0	Default: 1.0s

If the interval between the first communication and the next communication exceeds the communication timeout, the communication is considered to be broken, and BIT 0 in A8-36 determines the action mode of fault disconnection.

A3-06	Transmit response handle	Setting Range: 0～1	Default: 0

This parameter select whether AC drive responding when host computer send write operation order to AC drive. If host computer need AC drive reply information, the AC drive will time sharing occupy communication bus line, when do communication control, the host computer need keep enough time to reply information to AC drive. If needn't AC drive reply information, only send order to AC drive, can select write operation without responding to improve the utilize efficiency of communication bus line. This parameter only valid to write operation, no affection to read operation.
0: Write operation has responding
1: Write operation no responding

5.5 A5 Motor parameter

A5-00	Auto-tuning parameters	Setting Range: 0～3	Default: 0

0: No auto-tuning
1: Asynchronous motor partial static auto-tuning
2: Asynchronous motor dynamic auto-tuning
3: Asynchronous motor complete static auto-tuning

A5-01	Motor type	Setting Range: 0～2	Default: 0
A5-02	Motor rated power	Setting Range: 0.1Kw～1000.0kW	Default: By type
A5-03	Motor rated voltage	Setting Range: 1V～2000V	Default: By type
A5-04	Rated motor current	Setting Range: Model dependent	Default: By type
A5-05	Rated motor frequency	Setting Range: 0.01Hz～Maximum frequency	Default: By type
A5-06	Rated motor rotational speed	Setting Range: 1rpm～65535rpm	Default: By type

Set the parameters according to the motor nameplate no matter whether V/F control or vector control is adopted. The motor auto-tuning accuracy depends on the correct setting of motor nameplate parameters.

A5-07	Stator resistance (asynchronous motor)	Setting Range: Model dependent	Default: By type
A5-08	Rotor resistance (asynchronous motor)		Default: By type
A5-09	Leakage inductive reactance (asynchronous motor)	Setting Range: Model dependent	Default: By type
A5-10	Mutual inductive reactance (asynchronous motor)		Default: By type
A5-11	No-load current (asynchronous motor)	Setting Range: Model dependent	Default: By type

The parameters in F1-07 to F-11 are asynchronous motor parameters. These parameters are not found on the on the motor nameplate and are obtained by means of motor auto-tuning. Only F1-07 to F1-09 can be obtained through static motor auto-tuning. Through complete motor auto-tuning, encoder phase sequence and current loop PI can be obtained besides the parameters in F1-06 to F1-10. If it is impossible to perform motor auto-tuning on site, manually input the values of these parameters according to data provided by the motor manufacturer.

A5-12	Encoder type	Setting Range:0000～0214	Default: 0000

BIT0:Encoder type

The EC670 supports multiple types of encoder. Different PG cards are required for different types of encoder. Select the appropriate PG card for the encoder used. Any of the five encoder types is applicable to synchronous motor. Only ABZ incremental encoder and resolver are applicable to asynchronous motor.

After installation of the PG card is complete, set this parameter properly based on the actual condition. Otherwise, the AC drive cannot run properly.

BIT1:A/B phase sequence of ABZ incremental encoder

This parameter is valid only for ABZ incremental encoder and is used to set the A/B phase sequence of the ABZ incremental encoder.

BIT2:U, V, W phase sequence of UVW encoder

These two parameters can be obtained by synchronous motor no-load auto-tuning or with-load auto-tuning. They are valid only when the UVW encoder is applied to a synchronous motor.

BIT3:PG coder connect in source

0: Local PG, 1: expanding PG, 2: PULSE input(s8)

A5-13	Encoder pulses per revolution	Setting Range:0～60000	Default: 1024

This parameter is used to set the pulses per revolution (PPR) of ABZ or UVW incremental encoder. In CLVC mode, the motor cannot run properly if this parameter is set incorrectly.

A5-14	PG break detection time	Setting Range: 0.00～60.00s	Default: 2.00s

This parameter is used to set the time that a wire-break fault lasts. If it is set to 0.0s, the AC drive does not detect the encoder wire-break fault. If the duration of the encoder wire-break fault detected by the AC drive exceeds the time set in this parameter, the AC drive reports Err20.

A5-15	Vector Control Mode	Setting Range: 0000～0001	Default: 0001

Optimization mode 1:used when there is a higher torque control linearity requirement

A5-16	Speed loop proportional gain 1	Setting Range: 1～100	Default: 30
A5-17	Speed loop integral time 1	Setting Range: 0.01s～10.00s	Default: 0.50s
A5-18	Switchover frequency 1	Setting Range: 0.00～A5-20	Default: 5.00Hz
A5-19	Speed loop proportional gain 2	Setting Range:1～100	Default: 20
A5-20	Speed loop integral time 2	Setting Range: 0.01s～10.00s	Default: 1.00s
A5-21	Switchover frequency 2	Setting Range: A5-18～Maximum frequency	Default: 10.00Hz

Speed loop PI parameters vary with running frequencies of the AC drive.

- If the running frequency is less than equal to "Switchover frequency 1" (A5-17), the speed loop PI parameters are A5-15 and A5-16.
- If the running frequency is equal to or greater than "Switchover frequency 2", the speed loop PI parameters are A5-18 and A5-19.
- If the running frequency is between land 2, the speed loop PI parameters are obtained from the linear switchover between the two groups of PI parameters, as shown in Figure 6-2.

Figure 6-2 Relationship between running frequencies and PI parameters

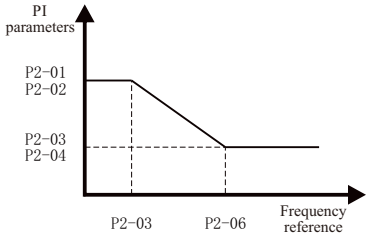


Figure 6-2 Relationship between running frequencies and PI parameters

The speed dynamic response characteristics in vector control can be adjusted by setting the proportional gain and integral time of the speed regulator. To achieve a faster system response, increase the proportional gain and reduce the integral time. Be aware that this may lead to system oscillation.

The recommended adjustment method is as follows: If the factory setting cannot meet the requirements, make proper adjustment. Increase the proportional gain first to ensure that the system does not oscillate, and then reduce the integral time to ensure that the system has quick response and small overshoot.

Note: Improper PI parameter setting may cause too large speed overshoot, and over-voltage fault may even occur when the overshoot drops.

A5-22	Vector control slip gain	Setting Range: 50%～200%	Default: 100%

For SFVC, it is used to adjust speed stability accuracy of the motor. When the motor with load runs at a very low speed, increase the value of this parameter; when the motor with load runs at a very large speed, decrease the value of this parameter. For CLVC, it is used to adjust the output current of the AC drive with same load.

A5-23	Time constant of speed loop filter	Setting Range: 0.001s～1.000s	Default: 0.100s

In the vector control mode, the output of the speed loop regulator is torque current reference. This parameter is used to filter the torque references. It need not be adjusted generally and can be increased in the case of large speed fluctuation. In the case of motor oscillation, decrease the value of this parameter properly.

If the value of this parameter is small, the output torque of the AC drive may fluctuate greatly, but the response is quick.

A5-24	Vector control over-excitation gain	Setting Range: 0～200	Default: 64

During deceleration of the AC drive, over-excitation control can restrain rise of the bus voltage to avoid the over-voltage fault. The larger the over-excitation gain is, the better the restraining effect is.

Increase the over-excitation gain if the AC drive is liable to over-voltage error during deceleration. Too large over-excitation gain, however, may lead to an increase in output current. Therefore, set this parameter to a proper value in actual applications.

Set the over-excitation gain to 0 in applications of small inertia (the bus voltage will not rise during deceleration) or where there is a braking resistor.

A5-25	Torque upper limit source in speed control mode	Setting Range: 0～7	Default: 0
A5-26	Digital setting of torque upper limit in speed control mode	Setting Range: 0.0%～200.0%	Default: 150.0%

In the speed control mode, the maximum output torque of the AC drive is restricted by A5-24.

If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of A5-24, and 100% of the value of A5-25 corresponds to the AC drive rated torque.

For details on the AI1, AI2 and AI3 setting, see the description of the AI curves in group P4.

For details on the pulse setting, see the description.

When the AC drive is in communication with the master, if it is currently a point-to-point communication slave and receives data as torque timing, the torque digital setting is sent directly by the host. For details, refer to the introduction of A8 group point-to-point communication.

In other conditions, the host computer writes data -100.00% to 100.00% by the communication address 0x2009, where 100.0% corresponds to the value of A5-25.

A5-27	Excitation adjustment proportional gain	Setting Range: 0～6000	Default: 2000
A5-28	Excitation adjustment integral gain		Default: 1300
A5-29	Torque adjustment proportional gain		Default: 2000
A5-30	Torque adjustment integral gain		Default: 1300

These are current loop PI parameters for vector control. These parameters are automatically obtained through "Asynchronous motor complete auto-tuning" or "Synchronous motor no-load auto-tuning", and need not be modified.

The dimension of the current loop integral regulator is integral gain rather than integral time. Note that too large current loop PI gain may lead to oscillation of the entire control loop. Therefore, when current oscillation or torque fluctuation is great, manually decrease the proportional gain or integral gain here.

A5-31	Speed loop integral property	Setting Range: 0～1	Default: 0

Integral separation 0: invalid 1: valid

5.6 A6 Optimization parameters

A6-00	Carriage frequency characteristic select	Setting Range: 0000～0A11	Default: 0000

BIT 0:
0:Fix carriage frequency
1:the carriage frequency adjust along with the temperature
The carriage frequency adjust along with the temperature, means the AC drive measure the heat radiation self temperature more higher then automatically reduce the carriage wave frequency, convenient for reduce the rise temperature of AC drive. When radiator temperature a little lower, carriage frequency gradually recover to set value. This function able to reduce the overheat alarm of AC drive.
BIT 1:
0: Asynchronous modulation
1: Synchronous modulation
This parameter is valid only for V/F control.
Synchronous modulation indicates that the carrier frequency varies linearly with the change of the output frequency, ensuring that the ratio of carrier frequency to output frequency remains unchanged. Synchronous modulation is generally used at high output frequency, which helps improve the output voltage quality.
At low output frequency (100 Hz or lower), synchronous modulation is not required. This is because asynchronous modulation is preferred when the ratio of carrier frequency to output frequency is high.
Synchronous modulation takes effect only when the running frequency is higher than 85 Hz. If the frequency is lower than 85 Hz, asynchronous modulation is always used.
BIT 2:reserved
BIT 3:reserved

A6-01	DPWM switchover frequency upper limit	Setting Range: 0.00～15.00Hz	Default: 12.00Hz

It is used to determine the wave modulation mode in V/F control of asynchronous motor. If the frequency is lower than the value of this parameter, the waveform is 7-segment continuous modulation. If the frequency is higher than the value of this parameter, the waveform is 5-segment intermittent modulation.
The 7-segment continuous modulation causes more loss to switches of the AC drive but smaller current ripple. The 5-segment intermittent modulation causes less loss to switches of the AC drive but larger current ripple. This may lead to motor running instability at high frequency. Do not modify this parameter generally.

A6-02	Cooling fan control	Setting Range: 0～1	Default: 1

It is used to set the working mode of the cooling fan. If this parameter is set to 0, the fan works when the AC drive is in running state. When the AC drive stops, the cooling fan works if the heat-sink temperature is higher than 40° C, and stops working if the heat-sink temperature is lower than 40° C. If this parameter is set to 1, the cooling fan keeps working after power-on.

A6-03	Utilization rate of energy consumption braking	Setting Range: 0~100%	Default: 100%
A6-04	Bus overvoltage protection value	Setting Range: 0～2500.0V	Default: By tpye

It is used to set the overvoltage threshold of the AC drive. The default values of different voltage classes are listed in the following table:

Voltage Class	Factory Value of Overvoltage point
Single-phase 220 V	400V
Three-phase 220 V	400V
Three-phase 380 V	810V
Three-phase 480 V	890V

A6-05	Bus undervoltage protection value	Setting Range: 200.0～2000.0V	Default: By type

It is used to set the undervoltage threshold of Err09. The undervoltage threshold 100% of the AC drive of different voltage classes corresponds to different nominal values, as listed in the following table.

Voltage Class	Factory Value of Overvoltage point
Single-phase 220 V	200V
Three-phase 220 V	200V
Three-phase 380 V	350V
Three-phase 480 V	450V

5.7 A7 Display and maintenance parameter group

A7-00	Parameter and key lock selection	Setting Range: 0000～0023	Default: 0

0: Unlock
Parameter and key lock function invalid
1: Function parameter lock
Lock all set value of function parameter, forbid to modify the parameters. Need input password when unlock, the password set by A7-01.
2: Function parameter and key lock(except FWD/STOP/JOG/PRG)
Lock all set value of all function parameter, forbid to modify the parameters; at the same time, lock all keys on the keyboard except FWD/STOP/JOG/PRG. Means only can process start/stop operation on AC drive through keyboard. Need input password when unlock, the password set by P7-01.
3: Function parameter and key all locked
Lock all set value of function parameters, at the same time, lock all keys on the keyboard except PRG. Can't process any operation on AC drive through keyboard. Need input password when unlock, the password set by P7-01.
Note: when P7-01 set as "2" or "3" function, press down "PRG" key on keyboard then automatically enter into password input interface, input the correct password then can enter into function parameter interface.

A7-01	Function parameter copy	Setting Range: 0～2	Default: 0

Set function parameter copy, the parameter automatically change to be "0" after finish copy.

0: No operation

1: AC drive parameter value transmit to keyboard and save

Cop the F0 to Fd parameters group in the AC drive to the keyboard and storage.

2: Transmit the keyboard saved parameter value to AC drive

Download the copied data which in the keyboard to AC drive.

Note: will remind error when software version not compatible, unable to transmit the saved parameter value in the keyboard to AC drive.

A7-02	Display speed factor	Setting Range: 0.001～50.000	Default: 1.000

If the load speed indicate coefficient A7-02 as 2.000, the load speed is: 40.00*2.000=80.00 when the running frequency of AC drive is 40.00Hz.

A7-03	LED run display	Setting range: 0000～BBBB	Default: 3210
A7-04	LED stop display		Default: 3210

The indicate content under the first row running status of keyboard: the circling monitor content of first row when set the running status of keyboard, can modify the monitor content through keyboard "< >"key when at running status, circulating between the unit of LED and LED thousand digit, jump one item each one time press the key. No power off memory function after circulating monitor parameter modified, default indicate the unit of LED setting value after power on.

The indicate content under the first row stop status of keyboard: the circling monitor content of first row when set the stop status of keyboard, can modify the monitor content through keyboard "< >"key when at stop status, circulating between the unit of LED and LED thousand digit, jump one item each one time press the key. No power off memory function after circulating monitor parameter modified, default indicate the unit of LED setting value after power on.

The set content from the BIT 0 of LED to BIT 3 of LED as below:

BIT0: The first group displays

BIT1: The second group displays

BIT2: The third group displays

BIT3: The fourth group displays

0: Given frequency	1: Output frequency	2: Output current
3: Output voltage	4: Input voltage	5: Machanical speed
6: Bus voltage	7: Output power	8: Given torque
9: Output torque	A: PID setting	B: PID feedback
C: AI1 input value	D: AI2 input value	E: HS input value
F: Counter value		

A7-05	Multiple function expanding card selection	Setting Range: 0～7	Default: 0

EC670 can support multiple expanding card application to meet the application of field special requirements.

A7-06	Operation panel display item selection	Setting Range: 0000～1111	Default: 0

BIT0:LCD keyboard indicate language

Set liquid crystal keyboard language, only valid when use the liquid crystal keyboard.

0: Chinese

1: English

BIT1: Output frequency indicate select

0: Target frequency

Indicate the target frequency of currently controlled motor.

1: Synchronous frequency

Indicate the output frequency after AC drive calculated.

BIT2: Machinery speed indicate select

0: Target speed

Indicate the target speed of currently controlled motor.

1: Actual speed

Indicate the AC drive actually measured motor speed.

BIT3: Reserved

A7-07	Accumulative power-on days	Setting range: 0～65535	Default: Ready-only
A7-08	Accumulative power-on hours	Setting range: 0.0～24.0	Default: Ready-only

It is used to display the accumulative power-on time of the AC drive since the delivery.

A7-09	Accumulative running days	Setting range: 0～65535	Default: Ready-only
A7-10	Accumulative running hours	Setting range: 0.0～24.0	Default: Ready-only

It is used to display the accumulative running time of the AC drive since the delivery.

A7-11	Accumulative power consumption(10000 kWh)	Setting range: 0～65535*10000kWh	Default: Ready-only
A7-12	Cumulative power consumption measurement	Setting range: 0～9999kWh	Default: Ready-only

It is used to display the accumulative power consumption of the AC drive until now.

A7-13	AC drive status before power off	Setting range: 0000～0011	Default: Ready-only

BIT0: 0:STOP 1:RUN

BIT1: 0:FOWARD RUN 1:REVERSE RUN

BIT2: Reserved

BIT3: Reserved

A7-14	Module temperature threshold	Setting Range: 0.1～100℃	Default: Ready-only

When the radiator temperature of the AC drive reaches the value of this parameter, the corresponding Y becomes ON, indicating that the module temperature reaches the threshold.

5.8 A8 Protection function parameter

A8-00	Protection action selection 1	Setting range: 0000～1111	Default: 1011

BIT 0: Motor overload protection selection

0:The motor overload protective function is valid. The motor is exposed to potential damage due to overheating. A thermal relay is suggested to be installed between the AC drive and the motor.

1:The AC drive judges whether the motor is overloaded according to the inverse time lag curve of the motor overload protection. Set P9-32 properly based on the actual overload capacity. If the value of F9-01 is set too large, damage to the motor may result because the motor overheats but the AC drive does not report the alarm.

BIT 1: Short-circuit to ground upon power-on

It is used to determine whether to check the motor is short-circuited to ground at power-on of the AC drive. If this function is valid, the AC drive's UVW will have voltage output a while after power-on.

BIT 2: Input phase loss protection/contactor energizing protection selection

0: invalid 1: valid

It is used to determine whether to perform input phase loss or contactor energizing protection.

BIT 3: Output phase loss protection selection

0: invalid 1: valid

It is used to determine whether to perform output phase loss protection.

A8-01	Protection function selection 2	Setting range: 000～411	Default: 0000

BIT 0: Output load loss protection selection

0: Invalid 1:Ramp to stop

BIT 1: Instantaneous power failure action selection

0: Invalid 1: Valid

Upon instantaneous power failure or sudden voltage dip, the DC bus voltage of the AC drive reduces. This function invalids the AC drive to compensate the DC bus voltage reduction with the load feedback energy by reducing the output frequency so as to keep the AC drive running continuously.

BIT 2: Continue operation frequency selection in case of failure.

0: Current running frequency
1: Set frequency
2: Frequency upper limit
3: Frequency lower limit
4: Backup frequency upon abnormality

A8-02	Fault auto reset times	Setting range: 0～20	Default: 0

It is used to set the times of fault auto resets if this function is used. After the value is exceeded, the AC drive will remain in the fault state.

A8-03	Time interval of fault auto reset	Setting range: 0.1～100.0s	Default: 1.0s

It is used to set the waiting time from the alarm of the AC drive to fault auto reset.

A8-04	1st fault type	Setting Range: 1～99	Default: ready-only
A8-05	2nd fault type		Default: ready-only
A8-06	3rd fault type		Default: ready-only

It is used to record the types of the most recent three faults of the AC drive. 0 indicates no fault. For possible causes and solution of each fault, refer to the troubleshooting section for instructions.

A8-07	Frequency upon 1st fault	Setting Range: 0.0～maximum frequency	Default: ready-only

It displays the frequency when the latest fault occurs.

A8-08	Current upon 1st fault	Setting Range: 0.1～2000.0A	Default: ready-only

It displays the current when the latest fault occurs.

A8-09	Bus voltage upon 1st fault	Setting Range: 0~3000V	Default: ready-only

It displays the bus voltage when the latest fault occurs.

A8-10	S terminal status upon 1st fault	See input terminal status diagram	Default: ready-only

It displays the status of all S terminals when the latest fault occurs.
The sequence is as follows:

BIT9	BIT8	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
S10	S9	S8	S7	S6	S5	S4	S3	S2	S1

If a S is ON, the setting is 1. If the S is OFF, the setting is 0. The value is the equivalent decimal number converted from the S status.

A8-11	Y terminal status upon 1st fault	See input terminal status diagram	Default: ready-only

It displays the status of all output terminals when the latest fault occurs.
The sequence is as follows:

BIT4	BIT3	BIT2	BIT1	BIT0
Y2	Y1	REL2	REL1	FMP

If an output terminal is ON, the setting is 1.If the output terminal is OFF, the setting is 0.The value is the equivalent decimal number converted from the S statuses.

A8-12	AC drive status upon 1st fault	Setting Range: ready-only	Default: ready-only

BIT0：Direction of operation
0：FWD 1：REV
BIT1：Running state
0：STOP 1：CONST 2：ACC 3：DEC
BIT2：RESERVED
BIT3：RESERVED

A8-13	Power on time upon 1st fault	Setting Range: ready-only	Default: ready-only

It displays the power-on time upon time when the latest fault occurs.

A8-14	Running time upon 1st fault	Setting Range: ready-only	Default: ready-only

It displays the present running time when the latest fault occurs.

A8-15	Frequency upon 2nd fault	Setting Range: ready-only	Default: Ready-only
A8-16	Current upon 2nd fault	Setting Range: ready-only	Default: Ready-only
A8-17	Bus voltage upon 2nd fault	Setting Range: ready-only	Default: Ready-only

A8-18	S terminal status upon 2nd fault	Setting Range: ready-only	Default: Ready-only
A8-19	Y terminal status upon 2nd fault	Setting Range: ready-only	Default: Ready-only
A8-20	AC drive status upon 2nd fault	Setting Range: ready-only	Default: Ready-only
A8-21	Power-on time upon 2nd fault	Setting Range: ready-only	Default: Ready-only
A8-22	Running time upon 2nd fault	Setting Range: ready-only	Default: Ready-only
A8-23	Frequency upon 3rd fault	Setting Range: ready-only	Default: Ready-only
A8-24	Current upon 3rd fault	Setting Range: ready-only	Default: Ready-only
A8-25	Bus voltage upon 3rd fault	Setting Range: ready-only	Default: Ready-only
A8-26	S terminal status upon 3rd fault	Setting Range: ready-only	Default: Ready-only
A8-27	Y terminal status upon 3rd fault	Setting Range: ready-only	Default: Ready-only
A8-28	AC drive status upon 3rd fault	Setting Range: ready-only	Default: Ready-only
A8-29	Power-on time upon 3rd fault	Setting Range: ready-only	Default: Ready-only
A8-30	Running time upon 3rd fault	Setting Range: ready-only	Default: Ready-only

A8-32	Motor overload protection gain	Setting Range: 0.20～10.00	Default: 1.00

P9-32=Overload ratio*Overload time/2.2 (Overload time: Minute)
For example, when the motor operates at 1.5 times of rated current, the AC drive is required to report the motor overload fault within 1 minute, then P9-32=1.5×1/2.2=0.68.

A8-33	Motor overload warning coefficient	Setting Range: 50%～100%	Default: 80%

This function is used to give a warning signal to the control system via Y before motor overload protection. This parameter is used to determine the percentage, at which pre-warning is performed before motor overload. The larger the value is, the less advanced the pre-warning will be.
When the accumulative output current of the AC drive is greater than the value of the overload inverse time-lag curve multiplied by A8-32, the Y terminal on the AC drive allocated with function " Motor overload pre-warning " becomes ON.

A8-34	Drop-off detection level	Setting Range: 0.0～100.0%	Default: 10.0%
A8-35	Drop-off detection time	Setting Range: 0.0～60.0s	Default: 1.0s

If protection upon load becoming 0 is valid, when the output current of the AC drive is lower than the detection level (A8-33) and the lasting time exceeds the detection time (A8-34), the output frequency of the AC drive automatically declines to 7% of the rated frequency. During the protection, the AC drive automatically accelerates to the set frequency if the load resumes to normal.

A8-36	Input phase loss protection level	Setting Range: 1～100%	Default: 20%
A8-37	Input phase loss protection delay	Setting Range: 2.0～60.0s	Default: 8.0s

Through software measure the DC bus line wave situation to judge whether it is the status that input lack phase, judge these two function code of the machine invalid through the hardware. When bus line verification wave value reach up to A8-36 and time exceed A8-37, judge it as input lack phase. Under the motor unloading or stop status, because too small loading, the input lack phase judgement will not be triggered.

A8-38	Protection action selection 1	Setting Range: 0000～2222	Default: 0

BIT 0：(Motor overload, Err11)
0：Coast to stop
1：Stop according to the stop mode
2：Continue to run
BIT 1：(Power input phase loss, Err12)
Same as BIT 0
BIT 2：(Power output phase loss, Err13)
Same as BIT 0
BIT 3: (External equipment fault, Err15)
Same as BIT 0

A8-39	Protection action selection 2	Setting Range: 00000～3123	Default: 0

BIT 0：(Communication fault, Err16)
Same as BIT 0 in A8-38
BIT 1: (Encoder fault, Err20)
0: Coast to stop
1: Switch over to V/F control, stop according to the stop mode
2: Switch over to V/F control, continue to run
BIT 2: (EEPROM read-write fault, Err21)
0: Coast to stop
1: Stop according to the stop mode
BIT 3: (Motor overheat, Err45)
Same as BIT 0

A8-40	Protection action selection 3	Setting Range: 0000～2222	Default: 0

BIT 0：(Communication fault, Err27)
Same as BIT 0 in A8-38
BIT 1: (Encoder fault, Err28)
0: Coast to stop
1: Switch over to V/F control, stop according to the stop mode
2: Switch over to V/F control, continue to run
BIT 2: (EEPROM read-write fault, Err29)
0: Coast to stop
1: Stop according to the stop mode
BIT 3: (Motor overheat, Err30)
Same as BIT 0

A8-41	Protection action selection 4	Setting Range: 0000～2222	Default: 0

BIT 0：(PID feedback lost during running, Err31)
Same as BIT 0 in A8-38
BIT 1: (Too large speed deviation, Err42)
Same as BIT 0
BIT 2: (Motor over-speed, Err43)
Same as BIT 0
BIT 3: (Initial position fault, Err51)
Same as BIT 0

A8-42	Protection action selection 5	Setting Range: 0000～0002	Default: 0

BIT 0：(Speed feedback fault, Err52)
Same as BIT 0 in A8-38
BIT 1: Reserved
BIT 2: Reserved
BIT 3: Reserved

6: Regular inspection and maintenance

6.1 Daily inspection

During power-up and operation, without taking away the cover, check the operation of AC drive with eye survey from outside and confirm that there's nothing abnormal. Usually, check the followings:

■whether the operation performance accord with the regulation
■whether the environment accord with the regulation
■whether keyboard panel display is normal
■whether without abnormal noises, vibrations and abnormal odor
■whether without abnormality such as overheat or change in color

6.2 Periodic Inspection

Before doing the periodic inspection, first stop operation, shut off power supply and take away the cover.

Even when the power supply of the AC drive is shut off, there's still charged voltage on the filter capacitors and it takes some time to discharge. In order to avoid the danger, be sure to wait until the charge indicator goes out and test with a voltmeter to ensure the voltage is lower than safe value (≤25Vdc) before the operation of inspection.

Notice!

1.For AC drives ≤22kW, wait 5 minutes after shutting down the power, and wait 10 minutes for those ≥ 30kW. Not until the DC voltage between terminals N- and P+ is lower than DC25V could examination operation with cover removed begin.

2.No one other than the appointed operators could perform maintenance and part replacement and other operations.(Metal objects such as watches and rings should be taken off before operation, and use tools with insulation in operation.)

3.Rebuilding the AC drive is absolutely forbidden.

4.Avoid electric shock and facility accident.

List of Periodic Inspection

Inspection cycle	Inspection parts	Inspection item	Inspection method
Daily	Environment	Confirm environment temperature, humidity, vibration and whether there's dust, gas, oil mist and water drops and so on.	With eye survey and apparatus measuring
Daily		Are there any foreign bodies like tools or dangerous goods nearby?	With eye survey
Daily	Voltage	Are voltages of main circuit and control circuit both normal?	Measure with a multi-meter
Daily	Keyboard Display Panel	Is the display clear?	With eye survey
Daily		Is any character missing?	
Half a year	Mechanism Parts	Is there any abnormal sound or vibration?	With eye survey and hearing
Half a year		Are the bolts (fasteners) loose?	Fasten
Half a year		Is there any distortion and damage?	With eye survey
Half a year		Is there color change due to over-heat?	With eye survey
Half a year		Is any character missing?	With eye survey
Daily	Main Circuit	Have any bolts been loose and dropped off?	Fasten
Half a year		Is there distortion, crack, to over-heat and aging in the machine and insulation? damage or color change due	With eye survey
Half a year		Is it stained with dust or defacement?	With eye survey
Half a year	Main Circuit: Terminals and Wiring	Is there color change and distortion due to overheat in the conductor?	With eye survey and hearing
Half a year		Is there any damage and color change in the wire protection?	With eye survey
Daily		Is there any damage?	With eye survey
Half a year		Is there any looseness between the bolts and the connector?	Fasten
Half a year		Is there any odors and color change?	Smell and hearing
Half a year		Is there color change. damaged and distortion due to corrosion?	With eye survey
Half a year		Is there leakage and distortion of the capacitor?	With eye survey
Daily	Main Circuit: Terminal Block	Is there leakage,color change,crack and shell inflation?	With eye survey
Daily		Has the safety valve loose? Is there significant inflation in the valve?	With eye survey
Daily		Measure static capacity according to the need	Measure with a multi-meter
Daily	Main Circuit: Filter Capacitor	Is there abnormal odor or crackle in the insulator due to overheat?	With eye survey
Daily		Is there any broken wire?	With eye survey, or open the connection at one end and measure with a multimeter

Daily	Main Circuit: Resistor	Is there abnormal noise of vibration or odor?	With hearing, eye survey and smelling
Daily	Main Circuit: Transformer and Reactor	Is there noise of vibration while operating?	With eye survey
Daily		Are the junctions well connected?	With eye survey
Half a year	Main Circuit: Control PCB Connector	Is there abnormal noise or vibration?	With hearing, eye survey and turn with hand (must cut off the power)
Half a year		Are the bolts loose?	Fasten
Half a year		Is there color change due to over-heat?	With eye survey
Half a year	Cooling System: Cooling Fans	Is there any blockings or foreign bodies on the radiator and the air inlet and outlet?	With hearing

Note!

Please wipe the polluted areas with chemically neutral cleaning cloth. Sweep the dust with electric cleaner.

7. Faults and Solutions

7.1 List of actions to protect

The AC drive itself has the functions of over-voltage, low voltage and over-current alarms and protection. Once a failure occurs, the protective actions will work, the AC drive will stop the output, the abnormal contact will act, and the free operation of motor will stop. Please refer to the abnormality causes and solutions according to the shown abnormality information of AC drive. The abnormality records will be kept in the interior storage unit of AC drive (which can record the latest 4 faults message), and can be read on the digital operation panel or by communication via parameter reading.

Display	Fault name	Possible causes	Solutions
Err01	Inverter unit protection	1: The output circuit is grounded or short circuited. 2: The power cable between the motor and the AC drive is too long. 3: The power module is overheated. 4: The internal connections become loose. 5:The main control board is faulty. 6: The drive board is faulty. 7: The inverter module is faulty.	1: Eliminate external faults. 2: Install a reactor or an output filter. 3: Check the air filter and the cooling fan. 4: Connect all cables properly. 5: Seek technical support. 6: Seek technical support. 7: Seek technical support.
Err02	Overcurrent during acceleration	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The acceleration time is too short. 4: Manual torque boost or V/F curve is not appropriate. 5: The input voltage is too low. 6: The startup operation is performed on the rotating motor. 7: A sudden load is added during acceleration. 8: The AC drive model is of too small power class.	1: Eliminate external faults. 2: Perform the motor auto-tuning. 3: Increase the acceleration time. 4: Adjust the manual torque boost or V/F curve. 5: Adjust the voltage to the normal range. 6: Select rotational speed tracking restart or start the motor after it stops. 7: Remove the added load. 8: Select an AC drive of higher power class.
Err03	Overcurrent during deceleration	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The deceleration time is too short. 4: The input voltage is too low. 5: A sudden load is added during deceleration. 6: The braking unit and braking resistor are not installed.	1: Eliminate external faults. 2: Perform the motor autotuning. 3: Increase the deceleration time. 4: Adjust the voltage to the normal range. 5: Remove the added load. 6: Install the braking unit and braking resistor.

Err04	Overcurrent at constant speed	1: The output circuit is grounded or short circuited. 2: Motor auto-tuning is not performed. 3: The input voltage is too low. 4: A sudden load is added during operation. 5: The AC drive model is of too small power class.	1: Eliminate external faults. 2: Perform the motor autotuning. 3: Adjust the voltage to the normal range. 4: Remove the added load. 5: Select an AC drive of higher power class.
Err05	Overvoltage during acceleration	1: The input voltage is too high. 2: An external force drives the motor during acceleration. 3: The acceleration time is too short. 4: The braking unit and braking resistor are not installed.	1: Adjust the voltage to normal range. 2: Remove the external force or install a braking resistor. 3: Increase the acceleration time. 4: Install the braking unit and braking resistor.
Err06	Overvoltage during deceleration	1: The input voltage is too high. 2: An external force drives the motor during deceleration. 3: The deceleration time is too short. 4: The braking unit and braking resistor are not installed.	1: Adjust the voltage to normal range. 2: Remove the external force or install a braking resistor. 3: Increase the deceleration time. 4: Install the braking unit and braking resistor.
Err07	Overvoltage at constant speed	1: The input voltage is too high. 2: An external force drives the motor during running.	1: Adjust the voltage to the normal range. 2: Remove the external force or install the braking resistor.
Err08	Control power supply fault	1: The input voltage is not within the allowable range.	1: Adjust the input voltage to the allowable range.
Err09	Undervoltage	1: Instantaneous power failure occurs on the input power supply. 2: The AC drive's input voltage is not within the allowable range. 3: The DC-Bus voltage is abnormal. 4: The rectifier bridge and buffer resistor are faulty. 5: The drive board is faulty. 6: The main control board is faulty.	1: Reset the fault. 2: Adjust the voltage to the normal range. 3: Contact technical support. 4: Contact technical support. 5: Contact technical support. 6: Contact technical support.
Err10	AC drive overload	1: The load is too heavy or locked rotor occurs on the motor. 2: The AC drive model is of too small power class.	1: Reduce the load and check the motor and mechanical condition. 2: Select an AC drive of higher power class.
Err11	Motor overload	1: P9-23 is set improperly. 2: The load is too heavy or locked rotor occurs on the motor. 3: The AC drive model is of too small power class.	1: Set it correctly. 2: Reduce the load and check the motor and the mechanical condition. 3: Select an AC drive of higher power class.
Err12	Power input phase loss	1: The three-phase power input is abnormal. 2: The drive board is faulty. 3: The lightening board is faulty. 4: The main control board is faulty.	1: Eliminate external faults. 2: Seek technical support. 3: Seek technical support. 4: Seek technical support.

Err13	Power output phase loss	1: The cable connecting the AC drive and the motor is faulty. 2: The AC drive's three-phase outputs are unbalanced when the motor is running. 3: The drive board is faulty. 4: The module is faulty.	1: Eliminate external faults. 2: Check whether the motor three-phase winding is normal. 3: Seek technical support. 4: Seek technical support.
Err14	Module overheat	1: The ambient temperature is too high. 2: The air filter is blocked. 3: The fan is damaged. 4: The thermally sensitive resistor of the module is damaged. 5: The inverter module is damaged.	1: Lower the ambient temperature. 2: Clean the air filter. 3: Replace the damaged fan. 4: Replace the damaged thermally sensitive resistor. 5: Replace the inverter module.
Err15	External equipment fault	1: External fault signal is input via S.	1:Reset the operation.
Err16	Communication fault	1: The host computer is in abnormal state. 2: The communication cable is faulty. 3: The communication parameters in group PB are set improperly.	1: Check the cabling of host computer. 2: Check the communication cabling. 3: Set the communication parameters properly.
Err17	Contactor faul	1: The drive board and power supply are faulty. 2: The contactor is faulty.	1: Replace the faulty drive board or power supply board. 2: Replace the faulty contactor.
Err18	Current detection fault	1: The HALL device is faulty. 2: The drive board is faulty.	1: Replace the faulty HALL device. 2: Replace the faulty drive board.
Err19	Motor auto-tuning fault	1: The motor parameters are not set according to the nameplate. 2: The motor auto-tuning times out.	1: Set the motor parameters according to the nameplate properly. 2: Check the cable connecting the AC drive and the motor.
Err20	Encoder fault	1: The encoder type is incorrect. 2: The cable connection of the encoder is incorrect. 3: The encoder is damaged. 4: The PG card is faulty.	1: Set the encoder type correctly based on the actual situation. 2: Eliminate external faults. 3: Replace the damaged encoder. 4: Replace the faulty PG card.
Err21	EEPROM readwrite fault	1: The EEPROM chip is damaged.	1: Replace the main control panel.
Err22	AC drive hardware fault	1: Overvoltage exists. 2: Overcurrent exists.	1: Handle based on over-voltage. 2: Handle based on over-current.
Err23	Short circuit to ground	1: The motor is short circuited to the ground.	1: Replace the cable or motor.
Err24	Running time reached	1: Accumulative running time reaches setting.	1: Clear the record through the parameter initialization function.
Err25	User-defined fault 1	1: The user-defined fault 1 signal is input via DI.	1: Reset the operation.
Err26	User-defined fault 2		

Err27	power-on time reached	1: Accumulative power-ontime reaches the setting.	1: Clear the record through the parameter initialization function.
Err28	Load becoming 0	1: The AC drive running current is lower than P9-38.	1: Check that the load is disconnected or the setting of P9-38 and P9-39 is correct.
Err29	PID feedback lost during running	1: The PID feedback is lower than the setting of PA-27.	1: Check the PID feedback signal or set PA-27 to a proper value.
Err30	Pulse-by-pulse current limit fault	1: The load is too heavy or lockedrotor occurs on the motor. 2: The AC drive model is of too small power class.	1: Reduce the load and check the motor and mechanical condition. 2: Select the AC drive of higher power class.
Err31	Too large speed deviation	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed. 3: P9-42 and P9-43 are set incorrectly.	1: Set the encoder parameters properly. 2: Perform the motor autotuning. 3: Set F9-69 and F9-70 correctly based on the actual situation.
Err32	Motor over-speed	1: The encoder parameters are set incorrectly. 2: The motor auto-tuning is not performed. 3: P9-40 and P9-41 are set incorrectly	1: Set the encoder parameters properly. 2: Perform the motor autotuning. 3: Set P9-40 and P9-41 correctly based on the actual situation.
Err33	Motor overheat	1: The cabling of the temperature sensor becomes loose. 2: The motor temperature is too high.	1: Check the temperature sensor cabling and eliminate the cabling fault. 2: Lower the carrier frequency or adopt other heat radiation measures.
Err34	Initial position fault	1: The motor parameters are not set based on the actual situation.	1: Check the motor para-meters are set correctly and whether the setting of rated current is too small.

7.2 Reset Alarm

■When a failure is detected from EC670, the failure will be shown on the digital manipulator, and the abnormal contact will have output and the motor will slide to stop. Check the failure causes in the list below and take corrective measures.

■If the mentioned inspection and corrective measures can't solve the problem, please directly contact with our company.

■For restart, connect with the resetting input signal or press (ESC), or disconnect the power supply of the main loop for one time, to reset the failure status.

■If you want to change the parameters in the failure indication, please press (PRG).

Note!

When inputting the right/opposite operation order, the AC drive fails to receive the failure resetting signal. You must cut off the right/opposite operation order first, and then reset.

7.3 The Causes and Solutions for AC drive's faults

Malfunction or fault can be caused by reasons such as ways of operation, setting conditions, environment or the AC drive itself. If these causes are not eliminated or no measures are taken, the drive will end up and unable to operate normally.

(1)Measures against electromagnet noises and induction noises

If there's noise source near the AC drive, the noise may invade the AC drive through radiation or power line and cause faulty actions of control circuit, and even destroy AC drive. Naturally, one solution is to improve noise capability of AC drive, but that's not economic, let alone the limited range of improvement. So it's best to take measures outside it to avoid the interference.

1. Install surge killer on relay or contactor in order to restrain switching surge noises at on and off switching.

2. Try to shorten the wiring of control circuit or program control circuit, and separate it from main circuit wiring.

3. For circuits regulated to use shielded wire for wiring, wiring must comply with the wiring regulations. And if the wiring is too long, an isolation amplifier should be added.

4. The grounding terminal of AC drive should be grounded according to regulations, and the grounding should be separate and not shared with electric welding machine or power devices.

5. Add a noise filter on the input terminal of the AC drive to avoid noise invasion from the power line.

(2)Environment setup measures

AC drive is a device made up of electronic parts, and its admissible environment is described in the specifications in detail. If the regulations cannot be followed, corresponding measures or solutions must be taken.

1. Avoid vibrations, and use vibration-proof pads when necessary.

Make sure that the vibration is under regulation. Because of the effect of vibration on electronic parts equals to mechanical stress, it should not be taken for long or repeatedly, which may cause faults in the AC drive.

2. Avoid corrosive gases and dusty environment, both of which will cause electronic parts rust and bad contact, and what's more, insulation will be decreased due to moisture absorption and cause short circuit accidents. Regular measure is treating with paint and dust-proof, and in strict conditions, inner-pressure suited for clean air or self-protective whole sealing structures are adopted.

3. The temperature of the around environment should be appropriate, the life-span and reliability of electronic parts is affected by both too high and too low temperature. Take semiconductor module for example, once the regulated limit is exceeded, damage will be instant. Therefore, except equipping with cooler and sun-shade to keep the temperature in the regulated range, cleaning and spot check on air filter in the AC drive rack and the angles of cooling fan are also necessary. Besides, the internal microprocessor may stop working under extremely low temperature, space heaters must be equipped in low temperature areas.

4. No damp, and never should dewing occur. When AC drive needs to be left unused for a long time, be careful that dewing may occur as soon as air-conditioning is stopped. It would be best that the cooling device of the electric room has dehumidification function.

(3)Prevent AC drive from interfering other machines

It is common that an AC drive interferes other machines at the same site, and this should be avoided through taking measures or solutions beforehand.

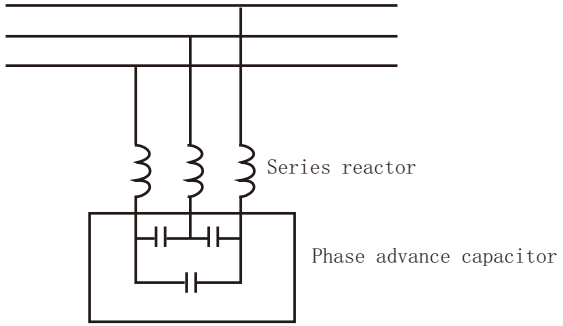
High-order harmonics on the power supply side

When the AC drive is running, there will be high-order harmonics flowing to the power supply and adversely affecting the system. The countermeasures are as follows:

1. Separate the power supply system and set up a dedicated transformer to connect the power to the AC drive.

2. Insert a reactor or filter on the input side of the AC drive to reduce high-order harmonic components as shown in the figure:

3. If there is a phase-in capacitor, a reactor should be connected in series to prevent too much high-harmonic current from flowing in and causing overheating to burn the capacitor.



4. Add a reactor or magnetic ring to the output side of the AC drive.

The temperature of the motor rises

When the motor is used for variable speed operation, if the motor is a synchronous ventilation type induction motor, it will have a cooling effect at low speeds. Poor, so overheating may occur. In addition, the waveform output by the AC drive contains high-order harmonics, so copper loss and iron loss are increased.

Check the data for the load status and operating range for reference, and add the following countermeasures when necessary:

1. The motor is changed to an independent power supply ventilation type or the first-level capacity specification is improved.

2. The motor matching is changed to a special motor for AC drive.

3. Limit the operating range and avoid low-speed belt operation.

8. 1 Appendix 1: Functional code table

A0 Basic parameter group				
Function Code	Parameter Name	Setting Range	Default	Address
A0-00	Motor control mode	0～2 0: Voltage/Frequency (V/F)control (direction LED on) 1: Sensorless flux vector control(SFVC) (direction LED blinking) 2: Closed-loop vector control(CLVC) (direction LED fast blinking)	0	1000H
A0-01	Command source selection	0～4 0: Operation panel control (LOC LED on) 1: Terminal control (REM LED on) 2: RS485 Communication control (REM LED blinking) 3.PV Auto-control (LOC REM on) 4: Terminal switchover (REM LOC LED blinking)	1	1001H
A0-02	Main frequency source X selection	0～12 0: Digital setting A0-04 1: AI1 2: AI2 3: AI3 4: Pulse setting(HS) 5: Communication setting 6: UP/DW setting 7: PID 8: Simple PLC 9: Reserved 10: Reserved 11: Option card 12: Terminal switchover	0	1002H
A0-03	Maximum frequency	0.00～320.00Hz The maximum frequency limit allowed by the frequency converter is also the acceleration and deceleration time reference.	50.00Hz	1003H
A0-04	Preset main frequency	0～Maximum output frequency	50.00Hz	1004H
A0-05	Acceleration time1	0.1～6500.0s	By type	1005H
A0-06	Deceleration time1	0.1～6500.0s	By type	1006H
A0-07	Rotation direction	0000～0011 BIT 0: 0: Same direction 1: Reverse direction BIT 1: 0: Reverse enable 1: Reverse disable	0	1007H
A0-08	Carrier frequency	1.0～15.0kHz If the carrier frequency is set higher than the factory value, it will cause the temperature rise of the converter radiator to increase. At this time, the user needs to use the converter derating, otherwise the converter will have the danger of overheating alarm.	By type	1008H
A0-09	Restore default settings	0: No operation 1: Data locked 2: Reset Error message 3～6: Undefined 7: Initialization setting—User data reset 10: Back up current user parameters 210: Restore user backup parameters	0～210	1009H

A1 Start stop and frequency parameter group				
Function Code	Parameter Name	Setting Range	Default	Address
A1-00	Start mode	0～2 0: Direct start 1: Start DC break restart 2: Rotational speed tracking	0	1100H
A1-01	Minimum output frequency	0.00～60.00Hz Define the minimum output frequency of the AC driver. When it is less than this frequency, the AC driver outputs 0.00hz.	0.50Hz	1101H
A1-02	Braking current before startup	0～150% When DC braking, the braking current sent by converter to motor. This value is based on the rated output current of the frequency converter. Only when [A1-00] is selected as "1", it will have DC braking function when starting.	70%	1102H
A1-03	Braking time before startup	0.0～300.0s The duration of DC braking current at start-up, and no DC braking process at braking time of 0.0s.	0.8s	1103H
A1-04	Initial frequency of stop DC braking	0.00～5.00Hz When the frequency converter decelerates to this frequency, it will stop the output and start the DC braking function; when it stops, it will start the DC braking function when the output frequency is less than the start frequency of DC braking.	0.00Hz	1104H
A1-05	Stop DC braking current	0 ～ 150% It refers to the braking current sent by the converter to the motor during DC braking. This value is based on the rated output current of the frequency converter.	70%	1105H
A1-06	Stop DC braking time	0.0 ～ 600.0s The duration of DC braking current when stopping. When the braking time is 0.0s, there is no DC braking process, that is, DC braking function is invalid.	1.0s	1106H
A1-07	Acceleration/ Deceleration mode	0～1 LED BIT 0: Acceleration/Deceleration time base frequency 0: 50.00Hz 1: Maximum frequency LED BIT 1: S-curve selection 0: Linear acceleration/deceleration 1: S-curve acceleration/deceleration	10	1107H
A1-08	S-curve start of Acceleration segment	0.0～100.0% Set the s-word characteristic time at 4 places to reduce the vibration when the machine starts / stops.	30.0%	1108H
A1-09	S-curve end of Acceleration segment		30.0%	1109H

A1-10	S-curve start of Deceleration segment	After setting the s-word characteristic time, the acceleration and deceleration time will only extend 1/2 of the s-word characteristic time at the beginning and the end.	30.0%	110AH
A1-11	S-curve end of Deceleration segment		30.0%	110BH
A1-12	Reference 1	0～100.0% Multi segment instructions can be used in three situations: As frequency source, voltage source separated from VF and setting source of process PID. As a frequency source, it is the percentage of relative maximum frequency. As a VF separated voltage source, it is the percentage of rated voltage relative to the motor. As a PID given, it is originally a relative value, and as a PID set source, it does not need dimensional conversion. Multi segment instructions need to be selected according to different states of multi-functional digital S. please refer to A2 group for details.	0.0%	110CH
A1-13	Reference 2		0.0%	110DH
A1-14	Reference 3		0.0%	110EH
A1-15	Reference 4		0.0%	110FH
A1-16	Reference 5		0.0%	1110H
A1-17	Reference 6		0.0%	1111H
A1-18	Reference 7		0.0%	1112H
A1-19	Reference 8		0.0%	1113H
A1-20	Reference 9		0.0%	1114H
A1-21	Reference 10		0.0%	1115H
A1-22	Reference 11		0.0%	1116H
A1-23	Reference 12		0.0%	1117H
A1-24	Reference 13		0.0%	1118H
A1-25	Reference 14		0.0%	1119H
A1-26	Reference 15		0.0%	111AH

A2 Terminal IO parameter group

Function Code	Parameter Name	Setting Range	Default	Address
A2-00	S1 terminal function	0～56 0: No function 1: Forward RUN (FWD) 2: Reverse RUN (REV) 3: Three-line control 4: Forward JOG (FJOG) 5: Reverse JOG (RJOG) 6: Coast to stop 7: Emergency stop 8: Fault reset (RESET) 9: Normally open (NO) input of external fault 10: Terminal UP 11: Terminal DOWN 12: UP and DOWN setting clear (terminal, operation panel) 13: Speed control/Torque control switchover 14: Torque control prohibited 15: Speed search start enable 16: Multi-reference terminal 1 17: Multi-reference terminal 2 18: Multi-reference terminal 3 19: Multi-reference terminal 4	1	1200H
A2-01	S2 terminal function		3	1201H
A2-02	S3 terminal function		2	1202H
A2-03	S4 terminal function		16	1203H

A2-04	S5 terminal function	20: Terminal 1 for acceleration/deceleration time selection 21: Terminal 2 for acceleration/deceleration time selection 22: Acceleration/Deceleration prohibited 23: PID ctrl diaable 24: PID pause 25: PID integral pause 26: Reverse PID action direction 27: PID parameter switchover 28: PID target value switchover terminal 1 29: PID target value switchover terminal 2 30: PID target value switchover terminal 3 31: PID feedback value switchover terminal 1 32: PID feedback value switchover terminal 2 33: PID feedback value switchover terminal 3 34: PLC pause 35: PLC status reset 36: Swing enable 37: Swing pause 38: Swing reset 39: Frequency source switchover terminal 1 40: Frequency source switchover terminal 2 41: Frequency source switchover terminal 3 42: Frequency source switchover terminal 4 43: Command source switchover terminal 1 44: Command source switchover terminal 2 45: Counter input 47: Length count input 48: Length reset 49: Immediate DC braking 50: Terminal pre flux 51: User-defined fault 1 52: User-defined fault 2 53: UPS mode active	17	1204H
A2-05	S6 terminal function		18	1205H
A2-06	S7 terminal function		19	1206H
A2-07	S8 terminal function		53	1207H
A2-08	Characteristic selection of terminals S1-4	0000～1111 LED BIT 0: S1 terminal 0: Effective closing 1: Effective opening LED BIT 1: S2 terminal 0: Effective closing 1: Effective opening LED BIT 2: S3 terminal 0: Effective closing 1: Effective opening LED BIT 3: S4 terminal 0: Effective closing 1: Effective opening	0000	1208H
A2-09	S1-S4 terminal filtering time	0.00～60.00s This parameter is defined as the size of filtering the input signal to eliminate the interference signal. The longer the filtering time is, the stronger the anti-interference ability is, but the slower the response speed is; the shorter the filtering time is, the weaker the anti-interference ability is, but the faster the response speed.	0.10s	1209H
A2-10	Characteristic selection of terminals S5-8	0000～1111 LED BIT 0: S5 terminal 0: Effective closing 1: Effective opening	0000	120AH

A2-10	Characteristic selection of terminals S5-8	LED BIT 1: S6 terminal 0: Effective closing 1: Effective opening LED BIT 2: S7 terminal 0: Effective closing 1: Effective opening LED BIT 3: S8 terminal 0: Effective closing 1: Effective opening	0000	120AH
A2-11	S5-S8 terminal filtering time	0.00～60.00s Same as A2-08	0.01s	120BH
A2-12	Terminal control operation mode	0～3 0: Two-wire system 1 When the terminal set as 1 is in operation, it runs in the forward direction, and when the terminal set as 2 is in operation, it runs in the reverse direction. 1: Two-wire system 2 The terminal set as 1 starts the operation, and the terminal set as 2 controls the forward and reverse running. 2: Three-wire system 1 The terminal set as 1 runs in the forward direction, the terminal set as 2 runs in the reverse direction, and the terminal set as 3 stops the operation. it runs in the forward direction, and when the terminal set as 2 is in operation, it runs in the reverse direction. 3: Three-wire system 2 The terminal set as 1 starts the operation, the terminal set as 2 switches between forward and reverse running, and the terminal set as 3 stops the operation.	0	120CH
A2-13	Y1 terminal function	0～39 0: No output 1: AC drive Forward running 2: AC drive Reverse running 3: Fault output1 (no output at auto reset period) 4: Fault output2 (output at auto reset period) 5: Ready for RUN 6: Frequency reached 7: Frequency-level detection FDT1 output 8: Frequency-level detection FDT2 output 9: Frequency upper limit reached 10: Frequency lower limit reached 11: Current 1 reached 12: Current 2 reached 13: Zero current state 14: Software current limit exceeded 15: Torque limited 16: Motor overload pre-warning 17: AC drive overload pre-warning 18: Zero-speed running (no output at stop) 19: Acceleration running 20: Deceleration running 21: DC breaking 22: PLC step complete 23: PLC cycle complete 24: Reserved 25: Accumulative running time reached 26: Timing reached	1	120DH
A2-14	Y2 terminal function		2	120EH
A2-15	Y3 terminal function		3	120FH

A2-16	Y4 terminal function	27: Designated count value reached 28: Set count value reached 29: AI1 input limit exceeded 30: Module temperature reached 31: Fan runing 32: From com Y1 33、From com Y2 34: From com Y3 35: From com Y4 36: Output uvw contactor enable 37: Mechanical brake contactor enable 38: Pre open door enable	6	1210H

A3 Communication parameter group

Function Code	Parameter Name	Setting Range	Default	Address
A3-00	Address	1～247	1	1300H
A3-01	Baud rate sel	0～7	3	1301H
A3-02	Data format	0～5	3	1302H
A3-03	Communication response set	0.000～5.000	1.000	1303H
A3-04	Communication response delay	0.000～0.500s	0.000s	1304H
A3-05	Communication response delay	0.1～100.0s	1.0s	1305H
A3-06	Transmission response processing	0～1	0	1306H

A4 Holding brake and UPS parameter group

Function Code	Parameter Name	Setting Range	Default	Address
A4-00	Lift control mode	0010～0144 LED BIT 0: 0: Lift control disable 1: Lift control enable LED BIT 1: 0: UPS active change direction mb disable 1: UPS active change direction mb enable LED BIT 2: reserved LED BIT 3: reserved	0110	1400H
A4-01	Pre open door freq	0.0 ～ 50.0Hz When the frequency is lower than this parameter at constant speed or deceleration, the multifunction node outputs the enable signal.	7.00Hz	1401H
A4-02	Start mb delay	0.00 ～ 5.00s Delay time of closing mechanical holding brake after deceleration to stop (holding brake coil is de energized)	0.5s	1402H
A4-03	Stop mb delay	0.00 ～ 5.00s Delay time of closing mechanical holding brake after deceleration to stop (holding brake coil is de energized)	0.5s	1403H

A4-04	Ups run freq lmt	0～100%-hz Operating frequency in UPS mode	10%	1404H
A4-05	Ups acc time	1.0～10.0s Acceleration time in UPS mode	3.0s	1405H
A4-06	Ups dec time	1.0～10.0s Deceleration time in UPS mode	2.0s	1406H
A4-07	Ups dir check freq	1.00～20.00%-Hz Refer to the maximum frequency	10.0%	1407H
A4-08	Ups direction check frequency delay	0～10.0s The maintenance time of detecting torque direction frequency during UPS mode startup acceleration	0.1	1408H
A4-09	Ups dir check torque lmt	1.0～10.0% During the acceleration process of UPS mode startup, the maximum value of forward torque is detected. If the value is exceeded, the direction of operation will be switched	5.0%	1409H
A4-10	Ups dir check refe torque filter time	0.01～1.00s Current output torque is collected in normal operation mode for reference of direction identification when switching into UPS mode. This value is the filtering time when collecting torque.	0.05s	140AH
A4-11	Ups mode torque lmt	50～150% The maximum value of forward torque during UPS mode operation. When the value is exceeded, the output frequency will be reduced	150%	140BH
A4-12	Ups mode Uu val	50～100%-Voltage 100%=undervoltage value in 350vdc UPS mode	72%	140CH
A4-13	Ups Torque record value	(-150)～150% only read Output torque value collected in normal operation mode	-	140DH
A4-14	Ups direction record value	Only reay Operation direction of acquisition in normal operation mode	-	140EH
A4-15	Ups dir change dc break time	0～10.0 DC braking time when torque exceeds the maximum value of A4-09 forward torque during startup acceleration in UPS mode	2.0s	140FH
A4-16	Ups dir change dc break current	0～150% DC braking current in reverse direction when torque exceeds A4-09 maximum forward torque during UPS mode startup acceleration	50%	1410H

A5 Motor parameters and vector control parameters group

Function Code	Parameter Name	Setting Range	Default	Address
A5-00	Auto-tuning selection	0: No auto-tuning 1: Asynchronous motor partial static auto-tuning 2: Asynchronous motor dynamic auto-tuning 3: Asynchronous motor complete static auto-tuning	0	1500H

A5-01	Motor type selection	0～2 0: Common asynchronous motor 1: Variable frequency asynchronous motor 2: Permanent magnetic synchronous motor	0	1501H
A5-02	Rated motor power	0.1kW～1000.0kW Set motor rating	By type	1502H
A5-03	Rated motor voltage	1V～2000V Set motor rated voltage	By type	1503H
A5-04	Rated motor current	0.01A～655.35A (Ac Drive<=55kW) 0.1A～6553.5A (Ac Drive>55kW)	By type	1504H
A5-05	Rated motor frequency	0.01Hz～Maximum frequency Set motor rated frequency	By type	1505H
A5-06	Rated motor rotational speed	1rpm～65535rpm Set motor rated speed	By type	1506H
A5-07	Stator resistance (asynchronous motor)	By type 0.001Ω～65.535Ω(Ac Drive < = 55kW) 0.0001Ω～6.5535Ω(Ac Drive > 55kW)	By type	1507H
A5-08	Rotor resistance (asynchronous motor)		By type	1508H
A5-09	Leakage inductive reactance (asynchronous motor)	By type 0.01mh～655.35mh(Ac Drive< = 55kW) 0.001mh～65.535mh(Ac Drive> 55kW)	By type	1509H
A5-10	Mutual inductive reactance (asynchronous motor)		By type	150AH
A5-11	No-load current (asynchronous motor)	By type 0.01A～A5-04 (Ac Drive< = 55kW) 0.1A～A5-04 (Ac Drive> 55kW)	By type	150BH
A5-12	Encoder type	0000～0214 LED BIT 0: Encoder type 0: ABZ incremental encoder 1: UVW incremental encoder 2: Resolver 3: SIN/COS encoder 4: Wire-saving UVW encoder LED BIT 1: ABZ incremental encoder phase sequence 0: Forward 1: Reverse LED BIT 2: UVW encoder phase sequence 0: Forward 1: Reverse	0000	150CH

A5-12	Encoder type	LED BIT 3:Encoder input source 0: Local PG 1: Extended PG 2: HS pulse input		0000	150CH
A5-13	Encoder pulses per revolution	0～60000		1024	150DH
A5-14	PG break detection time	0.00～60.00 0.0: No action 0.1s ～ 10.0s		2.00s	150EH
A5-15	Vector control mode	0000～0001 LED BIT 0: 07 SFVC optimization mode selection 0: No optimization 1: Optimization mode 1 2: Optimization mode 2 LED BIT 1: Reserved LED BIT 2: Reserved LED BIT 3: Reserved		0001	150FH
A5-16	Speed loop proportional gain 1	1～100	It is only valid for vector control and invalid for VF control. Running at different frequencies, different PI parameters of speed loop can be selected. When the operating frequency is less than the switching frequency 1, the PI adjustment parameters of the speed loop are A5-16 and A5-17. When the operating frequency is greater than the switching frequency 2, the PI adjustment A5-19 and A5-20. The PI parameters of speed loop between switching frequency 1 and switching frequency 2 are linear switching of two groups of PI parameters. By setting the proportional coefficient and integral time of the speed regulator, the dynamic response characteristics of the vector control can be adjusted. The dynamic response of the speed loop can be accelerated by increasing the proportional gain and reducing the integration time. However, if the proportional gain is too large or the integration time is too small, the system may oscillate.	30	1510H
A5-17	Speed loop integral time 1	0.01s ～ 10.00s		0.50s	1511H
A5-18	Switchover frequency 1	0.00 ～ A5-20		5.00Hz	1512H
A5-19	Speed loop proportional gain 2	1～100		20	1513H
A5-20	Speed loop integral time 2	0.01s ～ 10.00s		1.00s	1514H
A5-21	Switchover frequency 2	A5-18 ～ Maximum output frequency		10.00Hz	1515H
A5-22	Vector control slip gain	50%～200% For the speed sensorless vector control, this parameter is used to adjust the speed stability accuracy of the motor. When the speed of the motor is low when it is loaded, this parameter will be increased, and vice versa. For vector control with speed sensor, this parameter can adjust the output current of inverter under the same load.		100%	1516H

A5-23	Time constant of speed loop filter	0.001s～0.100s This parameter is used to filter the torque command. Generally, there is no need to adjust. When the speed fluctuates or the vibration of the motor is large, the filtering time can be increased properly. If the motor vibrates, the parameter should be reduced properly.	0.100s	1516H
A5-24	Vector control overexcitation gain	0～200 During the deceleration process of frequency converter, the over-excitation control can restrain the rise of bus voltage and avoid over-voltage fault. The larger the over-excitation gain, the stronger the suppression effect.	64	1517H
A5-25	Torque upper limit source in speed control mod	0～7 0: A5-25 1: AI1 2: AI2 3: AI3 4: Pulse setting (HS) 5: Communication setting 6: MIN(AI1,AI2) 7: MAX(AI1,AI2) 1-7 Full scale correspondence of options A5-25	0	1518H
A5-26	Digital setting of torque upper limit in speed control mod	0.0%～200.0% Digital setting of torque upper limit in speed control mode	150.0%	1519H
A5-27	Excitation adjustment proportional gain	0～60000 The current loop PI parameter of vector control can be obtained automatically after the asynchronous machine is fully tuned or the synchronous machine is no-load tuned, which generally does not need to be modified. If the current loop PI gain setting is too large, the whole control loop may oscillate. Therefore, when the current oscillation or torque fluctuation is large, the PI proportional gain or integral gain can be reduced manually.	2000	151AH
A5-28	Excitation adjustment integral gain		1300	151BH
A5-29	Torque adjustment proportional gain		2000	151CH
A5-30	Torque adjustment integral gain		1300	151DH
A5-31	Speed loop integral property	0～1 0: Invalid 1: Valid	0	151FH
A5-32	Speed loop-KP	5～300	-	1520H
A5-33	Speed loop-KI	0～65535	-	1521H

A6 Optimization function parameter group

Function Code	Parameter Name	Setting Range	Default	Address
A6-00	Carrier frequency characteristic selection	0000～0A11 LED BIT 0: 0: Temperature independent 1: Temperature related LED BIT 1: 0: Asynchronous modulation 1: Synchronous modulation	0000	1600H

A6-00	Carrier frequency characteristic selection	LED BIT 2: 0:Random PWM invalid 1 - A:Random PWM valid LED BIT 3: Reserved	0000	1600H
A6-01	DPWM switchover frequency upper limit	0～15.00Hz	12.00Hz	1601H
A6-02	Cooling fan control	0～1 0: Shutdown fan stops, operation related to temperature 1: Shutdown is related to temperature, and operation means operation	1	1602H
A6-03	Utilization rate of energy consumption braking	0～100%	100%	1603H
A6-04	Bus overvoltage protection value	0.0～2500.0V	By type	1604H
A6-05	Bus undervoltage protection value	200.0～2000.0V	By type	1605H

A7 Display and maintenance parameter group

Function Code	Parameter Name	Setting Range	Default	Address
A7-00	Parameter and key lock selection	0000～0023 LED BIT 0: 0: Not locked 1: Function parameter locking 2: Function parameters and key locking (except run / stop) 3: The function parameters and keys are fully locked LED BIT 1: Close the display of P parameter group 1: Display of P parameter group LED BIT 2: Reserved LED BIT 3: Reserved	0	1700H
A7-01	Copy of function parameters	0～2 0: Read in data to keyboard 1: Proofread data 2: Write keyboard data to frequency converter	0	1701H
A7-02	Display speed factor	0.000～50.000	1.000	1702H
A7-03	LED run display	0000～BBBB LED BIT 0: The first group displays LED BIT 1: The second group displays LED BIT 2: The third group displays LED BIT 3: The fourth group displays 0: Given frequency 1: Output frequency 2: Output current 3: Input voltage 4: Output voltage 5: Mechanical speed 6: Set torque 7: Output torque 8: PID dosing 9: PID feedback value A: Output power B: Bus voltage	3210	1703H
A7-04	LED stop display		3210	1704H

A7-05	Multi function expansion card selection	0～7	0	1705H
A7-06	Keyboard display item selection	0000～0111 Led BIT 0: LCD keyboard display language Set LCD keyboard display language, only valid when using LCD keyboard. 0: Chinese 1: English Led BIT 1: Output frequency display selection 0: Target frequency displays the target frequency of the current control motor. 1: The synchronous frequency shows the output frequency after converter operation. Led BIT 2: Mechanical speed display selection 0: Target speed displays the target speed of The current control motor 1: The actual speed shows the motor speed actually detected by the AC drive. Led BIT 3: Reserved	0	1706H
A7-07	Accumulated power on days	0～65535	/	1707H
A7-08	Accumulated power on hours	0.0～24.0	/	1708H
A7-09	Accumulated running days	0～65535	/	1709H
A7-10	Accumulated running hours	0.0～24.0	/	170AH
A7-11	Accumulated power consumption 10000 kWh	0～655355*10000kWh	/	170BH
A7-12	Cumulative power consumption measurement	0～9999kWh	/	170CH
A7-13	Inverter status before power off	0000～0011 BIT 0: 0: Stop 1: Run BIT 1: 0: Forward 1: Reverse BIT 2: Reserved BIT 3: Reserved	/	170DH
A7-14	Module temperature reached	0～100℃ When the inverter radiator temperature reaches this temperature, the inverter multi-function y outputs the "module temperature reaches" on signal.	/	170EH

A8 Protection function parameter group

Function Code	Parameter Name	Setting Range	Default	Address
A8-00	Protection function selection 1	0000～1111 LED BIT 0: Motor overload protection selection 0: Disabled 1: Enabled LED BIT 1: Short-circuit to ground upon power-on	1011	1800H

A8-00	Protection function selection 1	0: Disabled 1: Enabled LED BIT 2: Input phase loss protection selection 0: Disabled 1: Enabled LED BIT 3: Output phase loss protection selection 0: Disabled 1: Enabled	1011	1800H
A8-01	Protection function selection 2	0000～0411 LED BIT 0: Output load loss protection selection 0: Invalid 1: Deceleration 2: Deceleration shutdown LED BIT 1: Instantaneous power failure action selection 0: Invalid 1: Valid LED BIT 2: Continue operation frequency in case of failure select 0 to operate at current operation frequency 1 to operate at set frequency 2 operate at the upper limit frequency and 3 operate at the lower limit frequency 4 operation at abnormal standby frequency LED BIT 3: Reserved	0000	1801H
A8-02	Fault auto reset times	0～20 0: No automatic reset function is turned off, only manual reset is allowed. 1-20: Enable this function, 1-20 is the number of times of self recovery after failure (defined as the maximum number of times of self recovery after each failure)	0	1802H
A8-03	Time interval of fault auto reset	0.1～100.0s The waiting time from the fault of frequency converter to each reset.	1.0s	1803H
A8-04	1st fault type	0～99 0 -- ERROR_NONE 1 -- ERROR_INVERTER_UNIT 2 -- ERROR_OC_ACC_SPEED 3 -- ERROR_OC_DEC_SPEED 4 -- ERROR_OC_CONST_SPEED 5 -- ERROR_OV_ACC_SPEED 6 -- ERROR_OV_DEC_SPEED 7 -- ERROR_OV_CONST_SPEED 8 -- ERROR_BUFFER_RES 9 -- ERROR_UV 10 -- ERROR_OL_INVERTER 11 -- ERROR_OL_MOTOR 12 -- ERROR_LOSE_PHASE_INPUT 13 -- ERROR_LOSE_PHASE_OUTPUT 14 -- ERROR_OT_IGBT 15 -- ERROR_EXTERNAL 16 -- ERROR_COM_TIMEOUT 17 -- ERROR_CONTACTOR 18 -- ERROR_CURRENT_SAMPLE 19 -- ERROR_TUNE 20 -- ERROR_ENCODER1	Only read	1804H
A8-05	2nd fault type		Only read	1805H

A8-06	3rd (latest) fault type	21 -- ERROR_EEPROM 22 -- ERROR_22 23 -- ERROR_MOTOR_SHORT_TO_GND 24 -- ERROR_24 25 -- ERROR_25 26 -- ERROR_RUN_TIME_OVER 27 -- ERROR_USER_1 28 -- ERROR_USER_2 29 -- ERROR_POWER_UP_TIME_OVER 30 -- ERROR_LOSE_LOAD 31 -- ERROR_FDB_LOSE 32 -- ERROR_COM_1 40 -- ERROR_CBC 41 -- ERROR_SWITCH_MOTOR_WHEN_RUN 42 -- ERROR_DEV 43 -- ERROR_OS 45 -- ERROR_MOTOR_OT 51 -- ERROR_INIT_POSITION 52 -- ERROR_SPEED_DETECT 53 -- ERROR_UVW_FDB	Only read	1806H
A8-07	Frequency upon 1st fault	Only read 0.00～maximum frequency	Only read	1807H
A8-08	Current upon 1st fault	0.1～2000.0A	Only read	1808H
A8-09	Bus voltage upon 1st fault	0～3000V	Only read	1809H
A8-10	S terminal status upon 1st fault	Only read See input terminal status diagram	Only read	180AH
A8-11	Y terminal status upon 1st fault	Only read See input terminal status diagram	Only read	180BH
A8-12	AC drive status upon 1st fault	LED BIT0: Direction of running 0: FWD 1: REV LED BIT1: running state 0: STOP 1: CONST 2: ACC 3: DEC LED BIT2: Reserved LED BIT3: Reserved	Only read	180CH
A8-13	Power-on time upon 1st fault	Only read	Only read	180DH
A8-14	Running time upon 1st fault	Only read	Only read	180EH
A8-15	Frequency upon 2nd fault	Only read	Only read	180FH
A8-16	Current upon 2nd fault	Only read	Only read	1810H
A8-17	Bus voltage upon 2nd fault	Only read	Only read	1811H
A8-18	S terminal status upon 2nt fault	Only read See input terminal status diagram	Only read	1812H
A8-19	Y terminal status upon 2nt fault	Only read See input terminal status diagram	Only read	1813H
A8-20	AC drive status upon 2nd fault	Only read	Only read	1814H
A8-21	Power-on time upon 2nd fault	Only read	Only read	1815H

A8-22	Running time upon 2nd fault	Only read	Only read	1816H
A8-23	Frequency upon 3rd fault	Only read	Only read	1817H
A8-24	Current upon 3rd fault	Only read	Only read	1818H
A8-25	Bus voltage upon 3rd fault	Only read	Only read	1819H
A8-26	S terminal status upon 3rd fault	Only read See input terminal status diagram	Only read	181AH
A8-27	Y terminal status upon 3rd fault	Only read See input terminal status diagram	Only read	181BH
A8-28	AC drive status upon 3rd fault	Only read	Only read	181CH
A8-29	Power-on time upon 3rd fault	Only read	Only read	181DH
A8-30	Running time upon 3rd fault	Only read	Only read	181EH
A8-32	Motor overload protection gain	0.20～10.00 The frequency converter judges whether the motor is overloaded according to the inverse time limit curve of motor overload protection. A8-33 = overload multiple × overload time / 2.2 (overload time: minute)	1.00	1820H
A8-33	Motor overload warning coefficient	50%～100% This function is used to send a warning signal to the control system through Y before the motor overload fault protection is triggered. This warning coefficient is used to determine the degree of warning before the motor overload is activated. The large this value is, the smaller the advance warning margin will be.	80%	1821H
A8-34	Drop-off detection level	0.0%～100.0%	10.0%	1822H
A8-35	Drop-off detection time	0.0s～60.0s	1.0s	1823H
A8-36	Input phase loss protection level	0.0%～100.0%	20.0%	1824H
A8-37	Input phase loss protection delay	2.0s～60.0s	8.0s	1825H

If the load shedding protection function is effective, when the output current of the frequency converter is less than the load shedding detection level A8-33 and the duration is greater than the load shedding detection time A8-34, the output frequency of the frequency converter will automatically reduce to 7% of the rated frequency.

A8-38	Protection action selection 1	0000～2222 LED BIT 0: Motor overload (err11) action selection 0: Free stop, fault alarm 1: Emergency stop, fault alarm 2: Only warning, converter continues to operate LED BIT 1: Input phase loss (err12) action selection Same as LED BIT 0 LED BIT 2: Output phase loss (err13) action selection Same as LED BIT 0 LED BIT 3 : External fault (err15) action select Same as LED BIT 0	0	1826H
A8-39	Protection action selection 2	0000～3123 LED BIT 0: Abnormal communication (err16) action selection 0: Free stop, fault alarm 1: Emergency stop, fault alarm 2: Only warning, converter continues to operate LED BIT 1: Encoder failure (err20) action selection 0: Free stop, fault alarm 1: Emergency stop, fault alarm 2: Switch to VF, continue operation LED BIT 2: Function code reading and writing abnormal (err21) action selection 0: Free stop, fault alarm 1: Emergency stop, fault report LED BIT 3: Motor overheating (err25) action select Same as LED BIT 0	0	1827H
A8-40	Protection action selection 3	0000～2222 LED BIT 0: User defined fault 1 (err27) action selection 0: Free stop, fault alarm 1: Emergency stop, fault alarm 2: Only warning, converter continues to operate LED BIT 1: User defined fault 2 (err28) action selection Same as LED BIT 0 Led BIT 2: Power on time arrival (err29) action selection Same as LED BIT 0 LED BIT 3: Load loss (err30) action selection 0: Emergency stop, fault alarm 1: Emergency stop, fault alarm 2: Directly jump to 7% of the rated frequency of the motor to continue operation, and automatically return to the set frequency operation if no load is dropped	0	1828H
A8-41	Protection action selection 4	0000～2222 LED BIT 0: loss of PID feedback during operation (err31) action selection 0: Free stop, fault alarm 1: Emergency stop, fault alarm	0	1829H

A8-41	Protection action selection 4	2: Only warning, converter continues to operate LED BIT 1: Excessive speed deviation (err42) action selection Same as LED BIT 0 LED BIT 2: Motor over speed (err43) action selection Same as LED BIT 0 LED BIT 3: Initial position error (err51) action selection Same as LED BIT 0	0	1826H
A8-42	Protection action selection 5	0000～0002 LED BIT 0: speed feedback error (err52) action selection Same as A8-38 BIT 0 Led BIT 1: Reserved Led BIT 2: Reserved Led BIT 3: Reserved	0	1827H

U Monitoring parameter group

Function Code	Parameter Name	Setting Range	Default	Address
PU-00	AC drive status	Only read BIT0=Runing BIT1=0:Fwd 1:Rev BIT2=Ready BIT3=Fault BIT4=Jog BIT5=Pre alarm BIT6=Atuo tuning BIT7-15=NC	Only read	2100H
PU-01	AC drive fault type	Only read Err00--ERROR_NONE Err01--ERROR_INVERTER_UNIT Err02--ERROR_OC_ACC_SPEED Err03--ERROR_OC_DEC_SPEED Err04--ERROR_OC_CONST_SPEED Err05--ERROR_OV_ACC_SPEED Err06--ERROR_OV_DEC_SPEED Err07--ERROR_OV_CONST_SPEED Err08--ERROR_BUFFER_RES Err09--ERROR_UV Err10--ERROR_OL_INVERTER Err11--ERROR_OL_MOTOR Err12--ERROR_LOSE_PHASE_INPUT Err13--ERROR_LOSE_PHASE_OUTPUT Err14--ERROR_OT_IGBT Err15--ERROR_EXTERNAL Err16--ERROR_COMM Err17--ERROR_CONTACTOR Err18--ERROR_CURRENT_SAMPLE Err19--ERROR_TUNE Err20--ERROR_ENCODER1 Err21--ERROR_EEPROM Err22--ERROR_22 Err23--ERROR_MOTOR_SHORT_TO_GND Err24--ERROR_24 Err25--ERROR_25 Err26--ERROR_RUN_TIME_OVER Err27--ERROR_USER_1 Err28--ERROR_USER_2	U00.3=1	2101H

PU-01	AC drive pre warning type	Err29--ERROR_POWER_UP_TIME_OVER Err30--ERROR_LOSE_LOAD Err31--ERROR_FDB_LOSE Err32--ERROR_COM_ Err40--ERROR_CBC Err41--ERROR_SWITCH_MOTOR_WHEN_RUN Err42--ERROR_DEV Err43--ERROR_OS Err45--ERROR_MOTOR_OT Err51--ERROR_INIT_POSITION Err52--ERROR_SPEED_DETECT Err53--ERROR_UVW_FDB	U00.5=1	2102H
PU-03 ～ PU-15	Reserved	Only read		2103H ～ 210FH
PU-16	Set frequency	Only read		2110H
PU-17	Output frequency	Only read		2111H
PU-18	Output current	Only read		2112H
PU-19	Output voltage	Only read		2113H
PU-20	Input voltage	Only read		2114H
PU-21	Line speed	Only read		2115H
PU-22	Edc voltage	Only read		2116H
PU-23	Output power	Only read		2117H
PU-24	Target torque	Only read		2118H
PU-25	Output torque	Only read		2119H
PU-26	PID setting	Only read		211AH
PU-27	PID feedback	Only read		211BH
PU-28	AI1 input value	Only read		211CH
PU-29	AI2 input value	Only read		211DH
PU-30	HS input value	Only read		211EH
PU-31	Counter count value	Only read		211FH
PU-32	AI3 input value	Only read		2120H
PU-33	Input terminal X status	Only read		2121H
PU-34	Output terminal Y status input value	Only read		2122H
PU-35	AO1 output value	Only read		2123H
PU-36	AO2 output value	Only read		2124H
PU-37	HY output value	Only read		2125H
PU-38	Reserved	Only read		2126H

PU-39	IGBT temperature	Only read		2127H
PU-40	Output excitation	Only read		2128H
PU-41	Power factor angle	Only read		2129H
PU-42	Power on time	Only read		212AH
PU-43	Power on running time	Only read		212BH
PU-44	Accumulated time	Only read		212CH
PU-45	AC drive running status	Only read		212DH
PU-46	Maximum current	Only read		212EH
PU-47	Maximum EDC	Only read		212FH
PU-48	Maximum temperature	Only read		2130H
PU-49	Minimum EDC	Only read		2131H
PU-50	Rated power of AC drive	Only read		2132H
PU-51	Rated voltage of AC drive	Only read		2133H
PU-52	Rated current of AC drive	Only read		2134H
PU-53	Application Control Software version	Only read		2135H
PU-54	Motor Control Software version	Only read		2136H
PU-55	Communication frequency setting	Only read		2137H
PU-56	Main frequency X display	Only read		2138H
PU-57	Auxiliary frequency Y display	Only read		2139H
PU-58	Remaining running time	Only read		213AH
PU-59	Target voltage upon V/F separation	Only read		213BH
PU-60	Output voltage upon V/F separation	Only read		213CH
PU-61	PG feedback speed	Only read		213DH
PU-62	Linear speed	Only read		213EH
PU-63	PM rotor position	Only read		213FH
PU-64	Resolver position	Only read		2140H

PU-65	ABZ position	Only read		2141H
PU-66	Phase Z counter	Only read		2142H
PU-67	P2P Communication Sent Value	Only read		2143H
PU-68	P2P Communication Receive Value	Only read		2144H
PU-69	Motor temperature	Only read		2145H
PU-70	Reserved	Only read		2146H

Communication operation control command

Parameter Name	Setting Range	Default	Address
Communication operation control command	0000～FFFF	-	2000H
Communication Set value of frequency	0～320.00Hz	-	2001H
Communication upper limit frequency	-	-	2002H
Communication PID setting value	-	-	2003H
Communication PID feedback value	-	-	2004H
Communication AO1 output value setting	-	-	2005H
Communication AO2 output value setting	-	-	2006H
Communication HDO output value setting	-	-	2007H
Setting of communication output voltage value	-	-	2008H
Communication torque setting	-	-	2009H
Maximum frequency of communication torque forward rotation	-	-	200AH
Maximum frequency of communication torque reversal	-	-	200BH

8.2 Appendix 2: S485 communication protocol

• Introduction to communication protocol

EC670 series AC drive is equipped with RS485 communication interface as standard, and adopts master-slave communication of international standard ModBus communication protocol. Users can realize centralized control (set converter control command、 operation frequency、 modification of relevant function code parameters, monitoring of converter working status and fault information, etc.) through PC / PLC, master computer, main station AC drive, etc., to adapt to specific application requirements.

• Application mode

1. EC670 series AC drive has a "single master and multi slave" control network connected to RS485 bus. When the master uses the broadcast command (slave address is 0), the slave does not answer.

2. EC670 only provides RS485 interface, asynchronous half duplex. If the communication port of external equipment is RS232, an additional RS232 / RS485 converter is required.

3. Modbus protocol defines the information content and use format of asynchronous transmission in serial communication, which can be divided into rut mode and ASCII mode. EC670 is RTU (remote terminal unit) mode.

• Frames in Communication structure

The format of communication data is as follows:

Byte composition: including start bit, 8 data bits, parity bit and stop bit.

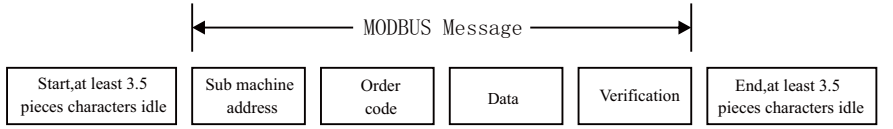
Start Bit	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7	Bit8	Parity Bit	Stop Bit

The information of a frame must be transmitted in a continuous data stream. If the interval of more than 1.5 bytes before the end of the whole frame transmission, the receiving device will clear these incomplete information and mistakenly think that the next byte is the address domain part of the new frame. Similarly, if the interval time between the start of a new frame and the previous frame is less than 3.5 bytes, the receiving device will consider it as the continuation of the previous frame. Due to the frame confusion, the final CRC check value is not correct, resulting in communication errors.

Frame header	3.5 bytes transmission time
slave address	mail address: 0-247 (decimal) (0 is broadcast address)
Command code	03h: read slave parameters 06h: write slave parameters 08h: loop self test
Data area	Parameter address, number of parameters, parameter value, etc
CRC CHK low	Test value: 16 bit CRC test value
CRC CHK high	
Frame tail	3.5 bytes transmission time

In the RTU mode, the new one frame use at least 3.5 pieces bytes transmit time stop interval as start. The follow transmit data region are in proper sequence: sub machine address, operation order code, data and CRC verify byte, each region transmit byte all are hexadecimal 0....9, A....F. The internet equipment continue sense the internet bus line, include within the stop interval time. When received the first region(address information), each internet equipment all decoding this byte to judge whether it is send to own. At the final one byte transmit finished, and make one at least 3.5 pieces bytes transmit time interval to present this frame finished, after this, a new message can start.

RUT Date Frame Format



• Order code and communication data description

Order code: o3H, read N pieces byte(word), the max can continue read five words.

Example: from the AC drive which sub machine address is 01h, the start address of memory is 2100H([C-00]), reading continue 3 pieces words, then the structure description of this frame as below:

START	3.5 pieces bytes transmit time
Sub machine address	01H
Order code	03H
Start address high position	21H
Start address low position	00H
Data quantity high position	00H
Data quantity low position	03H
CRC CHK low position	0FH
CRC CHK high position	F7H
END	3.5 pieces bytes transmit time

RTU sub machine responding information(when normal)

START	3.5 pieces bytes transmit time
Sub machine address	01H
Order code	03H
Bytes quantity low position	06H
Data address 2100H high position	13H
Data address 2100H low position	88H
Data address 2101H high position	00H
Data address 2101H low position	00H

Data address 2102H high position	00H
Data address 2102H low position	00H
CRC CHK low position	90H
CRC CHK high position	A6H
END	3.5 pieces bytes transmit time

RTU sub machine responding information (when abnormal)

START	3.5 bytes transmit time
Sub machine address	01H
Order code	83H
Error code	04H
CRC CHK low position	40H
CRC CHK high position	F3H
END	3.5 bytes transmit time

Order code:06H, write one word

Function: write one word data into appointed data address, can use into modify the frequency transformer parameter value.

Example: write the 5000(1388H) in the 3000H address of sub machine address 1 frequency transformer. Then the structure description of this frame as below:

RTU main machine order information

START	3.5 pieces bytes transmit time
Sub machine address	01H
Order code	06H
Check the code high position	30H
Check the code low position	00H
Data high position	13H
Data low position	88H
CRC CHK low position	8BH
CRC CHK high position	9CH
END	3.5 pieces bytes transmit time

RTU sub machine responding information(when normal)

START	3.5 pieces bytes transmit time
Sub machine address	01H
Order code	06H
Check the code high position	30H
Check the code low position	00H
Data high position	13H
Data low position	88H
CRC CHK low position	8BH
CRC CHK high position	9CH
END	3.5 pieces bytes transmit time

RTU sub machine responding information(when abnormal)

START	3.5 pieces bytes transmit time
Sub machine address	01H
Order code	86H
Error code	01H
CRC CHK low position	83H
CRC CHK high position	A0H
END	3.5 pieces bytes transmit time

Order code: 08H, return circuit self check

Function: send back the sub machine responding information which same to the main machine order information, used to check whether the signal transmit between main machine and sub machine are normal.

RTU main machine order information

START	3.5 pieces bytes transmit time
Sub machine address	01H
Order code	08H
Check the code high position	00H
Check the code low position	00H
Data high position	13H
Data low position	88H
CRC CHK low position	EDH
CRC CHK high position	5DH
END	3.5 pieces bytes transmit time

RTU sub machine responding information (when normal)

START	3.5 pieces bytes transmit time
Sub machine address	01H
Order code	08H
Check the code high position	00H
Check the code low position	00H
Data high position	13H
Data low position	88H
CRC CHK low position	EDH
CRC CHK high position	5DH
END	3.5 pieces bytes transmit time

RTU sub machine responding information (when abnormal)

START	3.5 pieces bytes transmit time
Sub machine address	01H
Order code	88H
Error code	03H
CRC CHK low position	06H
CRC CHK high position	01H
END	3.5 pieces bytes transmit time

● Communication frame error verify method

The standard Modbus series internet adopt two type error test method. Odd-even verification used to verify each character, CRC test used to verify one frame data.

1: Odd-even verification

The user can configure the controller at odd or even verification, or no verification. This will decide the odd-even verification position of each character how to set.

If appointed odd or even verification, the digit bit of "1" will count the digit bit of each character(ASCII mode 7 data capacity, 8 data bit in RTU). Example, RTU character frame include the below 8 pieces data bit: the number of whole "1" in 1 1 0 0 0 1 0 1 is 4 pieces, if use even verification, the odd-even verification bit of frame will be 0, then obtain the quantity of whole "1" still be 4, also not process verification test. Replace one attached stop bit fill to the need transmit character frame.

2: CRC-16(circulating redundancy verification)

Use RTU frame format, the frame include the counting frame error test area which based on CRC method. CRC region test the content of the whole frame. CRC region is two bits, include the 16 bits binary system value. This calculating method of CRC adopt international standard CRC verification rules, the user can reference the relate standard CRC algorithm when edit the CRC algorithm, write out the CRC calculating procedure which really in accordance with requirements.

● The definition of communication data address

This part is the address definition of communication data, used to control the running of AC drive, obtain the status information of AC drive and the relate function parameter setting of AC drive, etc.

(1) EC670 series function parameter address description rules

Use the function parameter serial number of AC drive as the register address, divided into two parts at high bits and low bits. High bits represent the function parameter located group serial number, low bits represent the serial number in group of function parameter, need translate into hexadecimal. The address of detail parameter please check the communication address column in the parameter overview table in chapter?

Note: because the communication exist the possibility that frequently rewrite parameter value, if EEPROM frequently been storage then will reduce the working life. For the users, some function code parameter needn't storage under the communication mode, only need to change the value of RAM in the sheet then can meet use requirements. AC80B communication agreement stipulated that when use the write order, only write in AC drive RAM, not storage when power off, if use write order (41H), write in EEPROM, means storage when power off.

Control order function instruction	Address definition	Data meanings instruction		R/W characteristics
Communication running control order	2000H	BIT0	0-stop order 1-Running order	W
		BIT1	0-Corotation order 1-Reversal order	
		BIT2	STOP command	
		BIT3	0-No order 1-Reset order	
		BIT4	Jog command	
		BIT12-15	Y1-Y4	
Communication frequency setting	2001H	Setting range:0-Maximum frequency		W
Communication set upper limit frequency	2002H	Setting range:0-Maximum frequency		W
Communication PID give value	2003H	Setting range: 0-100.0%		W
Communication PID feedback value	2004H	Setting range: 0-100.0%		W
Communication AO1 output value	2005H	Setting range: 0-100.0%		W
Communication AO2 output value	2006H	Setting range: 0-100.0%		W
Communication HY output value	2007H	Setting range: 0-50000HZ		W
Communication VF separate voltage setting	2008H	Setting range: 0-100.0%		W
Communication torque setting value	2009H	Setting range: 0-100.0%		W

Monitor command function instruction	Address definition	Data meanings instruction		R/W characteristics
AC drive operation status	2100H	BIT0	RUN	R
		BIT1	REV	
		BIT2	Ready	
		BIT3	Fault	
		BIT4	Jogging	
		BIT5	Pre-alarm	
		BIT6	Auto-turning	
		BIT7-10	Operation control mode 0:Operation panel control 1:Terminal control 2:RS485 control 3:Option card 4:Terminal switchover	

AC drive operation status	2100H	BIT11-12	Motor control mode 0: V/F mode 1: SVC control 2: FVC control	R
		BIT13	Hibernation sign	
AC drive fault type	2101	1 -- ERROR_INVERTER UNIT 2 -- ERROR_OC_DURING_ACC 3 -- ERROR_OC_DURING_DEC 4 -- ERROR_OC_AT_CONST_SPEED 5 -- ERROR_OV_DURING_ACC 6 -- ERROR_OV_DURING_DEC 7 -- ERROR_OV_AT_CONST_SPEED 8 -- ERROR_CONTROL POWER SUPPLY 9 -- ERROR_UV 10 -- ERROR_OL_AC DRIVE 11 -- ERROR_OL_MOTOR 12 -- ERROR_LOSE_PHASE_INPUT 13 -- ERROR_LOSE_PHASE_OUTPUT 14 -- ERROR_OH_MODULE 15 -- ERROR_EXTERNAL EQUIPMENT 16 -- ERROR_COMMUNICATE 17 -- ERROR_CONTACTOR 18 -- ERROR_CURRENT_DETECTION 19 -- ERROR_AUTO-TUNING 20 -- ERROR_ENCODER 21 -- ERROR_EEPROM_READWRITE 22 -- ERROR_HARDWARE_AC DRIVE 23 -- ERROR_MOTOR_SHORT_TO_GND 24 -- ERROR_ERRPROM_INITIALIZETE 26 -- ERROR_RUNNING TIME_REACHED 27 -- ERROR_USER-DEFINED_1 28 -- ERROR_USER-DEFINED_2 29 -- ERROR_POWER-ON_TIME_REACHED 30 -- ERROR_LOAD_0 31 -- ERROR_PID_FDB_LOSE 40 -- ERROR_PBP_CURRENT_LIMIT 41 -- ERROR_SWITCH_MOTOR_WHEN_RUN 42 -- ERROR_TOO_LARGE_SPEED_DEVIATION 43 -- ERROR_MOTOR_OS 45 -- ERROR_MOTOR_OH 51 -- ERROR_POLE_POSITION_DETECTION 52 -- ERROR_ZERO_POSITION_INDENTIFI-CATION 53 -- ERROR_FEEDBACK_UVW_SIGNAL		R

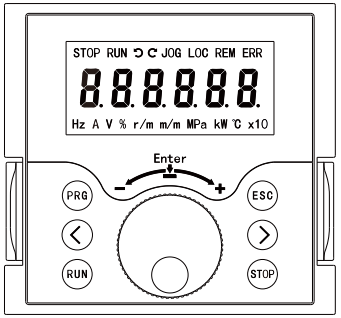
8.3 Appendix 3: Product specification

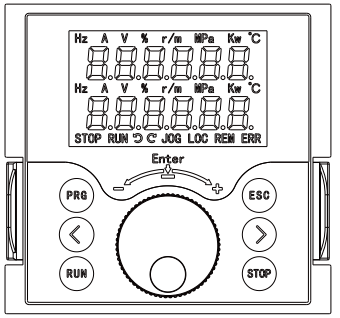
Product standard specification

Voltage	380V
Power (kW)	Rated output current(A)
0.75	3.4
1.5	4.8
2.2	6.2
4.0	11.0
5.5	14.0
7.5	18.0
11	27.0
15	34.0
18.5	41.0
22	52.0
30	65.0
37	80.0
45	96.0
55	128.0
75	165.0
90	185.0
110	210.0
132	250.0
160	307.0
200	380.0
220	450.0
250	480.0
280	520.0
315	605.0
355	670.0
400	750.0
450	810.0
500	860.0
560	990.0

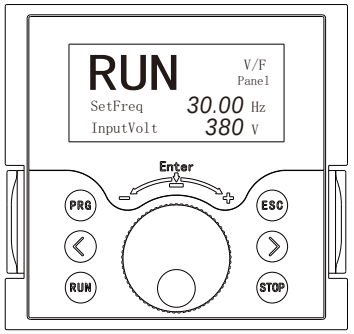
8. 4 Appendix 4: Optional digital manipulator and external components

■ LED manipulator PU-01

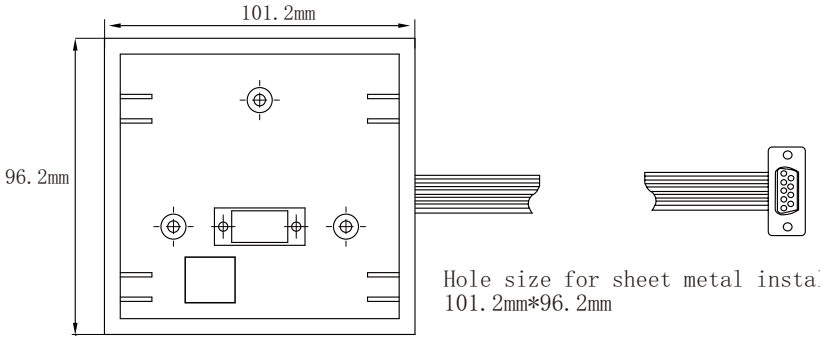




■ LCD manipulator PU-02



■ External components PUZ-01



Hole size for sheet metal installation:
101.2mm*96.2mm

8.5 Appendix 5: Braking resistor

Braking resistor selection list

AC drive model	Resistance specifications		Braking torque%	Applicable motor/KW type G	Applicable motor/KW type P
	Power W	Resistor Ω			
EC6700D4G23	80	200	125	0.4	-
EC670D75G23	100	200	125	0.75	-
EC6701D5G23	300	100	125	1.5	-
EC6702D2G23	300	70	125	2.2	-
EC6703D7G23	400	40	125	3.7	-
EC6705D5G23	500	27.2	125	5.5	-
EC6707D5G23	1000	20	125	7.5	-
EC670011G23	1000	14	125	11	-
EC670015G23	4800	10	125	15	-
EC6718D5G23	4800	10	125	18.5	-
EC670022G23	4800	10	125	22	-
EC670030G23	6000	7	125	30	-
EC670037G23	9600	7	125	37	-
EC670045G23	9600	3.5	125	45	-
EC670055G23	12000	3.5	125	55	-
EC670075G23	18000	3	125	75	-
EC670090G23	18000	3	125	90	-
EC670110G23	18000	3	125	110	-
EC670132G23	36000	3	125	132	-
EC670D75G43	80	750	125	0.75	-
EC6701D5G02D2P43	300	400	125	1.5	2.2
EC6702D2G03D0P43	300	250	125	2.2	3.0
EC6703D0G04D0P43	400	150	125	3.0	4.0
EC6704D0G05D5P43	500	125	125	4.0	5.5
EC6705D5G07D5P43	500	100	125	5.5	7.5
EC6707D5G0011P43	1000	75	125	7.5	11
EC670011G0015P43	1000	50	125	11	15

EC670015G18D5P43	1500	40	125	15	18.5
EC6718D5G0022P43	4800	32	125	18.5	22
EC670022G0030P43	4800	27.2	125	22	30
EC670030G0037P43	6000	20	125	30	37
EC670037G0045P43	9600	16	125	37	45
EC670045G0055P43	9600	14	125	45	55
EC670055G0075P43	12000	10	125	55	75
EC670075G0090P43	18000	7	125	75	90
EC670090G0110P43	18000	7	125	90	110
EC670110G0132P43	18000	7	125	110	132
EC670132G0160P43	36000	3.5	125	132	160
EC670160G0200P43	36000	3.5	125	160	185
EC670200G0220P43	36000	3.5	125	185	220
EC670220G0250P43	48000	3	125	220	250
EC670250G0280P43	48000	3	125	250	280
EC670280G0315P43	48000	3	125	280	315
EC670315G0355P43	48000	3	125	315	350
EC670355G0400P43	48000	3	125	350	400
EC670400G0450P43	48000	3	125	400	450
EC670450G0500P43	48000	3	125	450	500
EC670500G0560P43	48000	3	125	500	560
EC670560G0630P43	48000	3	125	560	630

Note!

1. If the AC drive of 400V class, ≥45kW or above, to achieve rapid braking, a brake unit must be installed.
2. Select the resistance value and frequency of use established by our company.
3. The company does not bear any responsibility for the damage to the AC drive or other equipment caused by the use of braking resistors and braking modules not provided by our company.
4. The installation of the braking resistor must consider the safety and flammability of the environment.
5. To change the resistance and power number, please contact your local dealer.
6. The braking resistor and braking module need to be ordered separately. For details, please contact your local dealer.

8.6 Appendix 6: Warranty Service

EACON

Manufacturer of high quality inverter

Warranty Card

User Name			
User Address			
User Contact		Tel	
Specification		Number	
Distributor			
Contacts		Date of delivery	

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