EACON 易控

Professional AC Drive Manufacturer

Edition: Version 1.0 in 2022

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EC630 Series AC Drive

Quick Guide V1.0

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1. Preface

Thank you for using the EC6000 series high-performance current vector control AC drive.

Please carefully read this manual before the installation in order to ensure the correct installation and operation of the AC drive, give full play to its superior performance, and ensure safety. Please keep this guide permanently for future maintenance, service and overhaul.

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 and the content marked as “Danger”, “Notice”, etc in this manual must be read carefully. If you have any questions, please contact with the agents of our company, and our technicians are ready to serve you.

The instructions are subject to change, without notice.

You can contact us with any product questions through the following ways.

E-mail
overseas@eacon.cc

Official website
www.eacon.cc

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Dangerous and wrong use may cause casualties

Danger

- The power supply must be turned off when laying the wires.
- 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.
- Do not check the components and signals on the circuit board during operation.
- The terminal of AC drive must be grounded correctly.
- Do not refit or replace the control board and parts without permission, otherwise, there are risks such as electric shock and explosion.

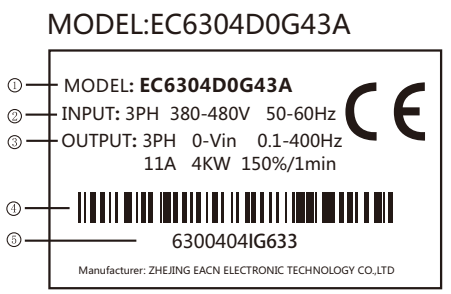
Wrong use may cause damage to AC drive or mechanical system

Notice

- Please do not test the voltage resistance of the interior components of AC drive, as the semi—conductor of AC drive is easy to be punctured and damaged by high voltage.
- Never connect the main circuit output terminals U, V, and W directly to the AC main circuit power supply.
- The circuit board of the AC 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.
- Only the qualified motor professionals can install the driver, lay the wire, repair and maintain the AC drive.
- The scrapping of AC drive shall be treated as industrial waste and burning is strictly prohibited.

2.Description of AC drive

2.1 Description of the label of AC drive



① AC drive Model

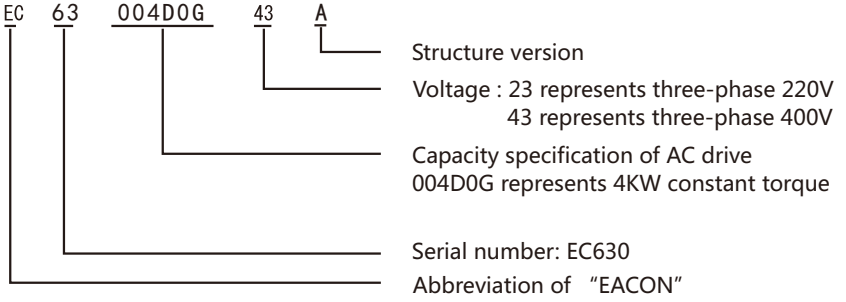
② Input power Spec.

③ Output power Spec.

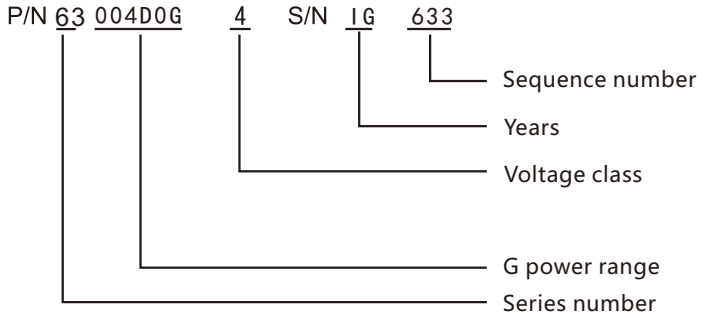
④ Barcode

⑤ Serial number of production control

2.2 Description of Model



2.3 Description of Serial number



2.4 Product standard specification

Voltage	220V	Voltage	380V
Power (Kw)	Rated output current(A)	Power (Kw)	Rated output current(A)
0.4	2.1	0.75	3.4
0.75	3.8	1.5	4.8
1.5	7.0	2.2	6.2
2.2	9.0	4.0	11.0
4.0	13.0	5.5	14.0
5.5	25.0	7.5	18.0
7.5	33.0	11	27.0
11	45.0	15	34.0
15	60.0	18.5	41.0
18.5	75.0	22	52.0
22	91.0	30	65.0
30	112.0	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
		350	670.0
		400	750.0

2.5 Technical Specifications

Item		Specifications
Input power	Voltage	Single/three phase 200 to 240V: 20% to +10% three phase 200 to 240V: 20% to +10%
	Frequency	45Hz to 62Hz
	Maximum unbalance	3%
Output power	Output Voltage	Three phase 0 to 100% input Voltage
	Output frequency	0 to 400Hz
Main control functions	Control model	V/F , vector control
	Starting torque	0.5Hz 150%
	Overload capacity	150% rated output current (60s), 200% rated output current(1s)
	Carrier frequency	2 to 16kHz
	Speed setting resolution	Digital: 0.01Hz,analog:0.5‰ of maximum operating frequency
	Open loop speed control accuracy	30 to 4000r synchronization: error ±8r synchronization
	Control command source	Operation panel, digital terminal, communication control word
	Set frequency soure	Operation panel, analog quantity, pulse, communication setting
	Acceleration and deceleration time	The acceleration and deceleration time of 8 groups was 0.05 to 3600.00s
Standard functions	Speed open-loop control, process closed-loop control, torque open-loop control motor self-learning, motor pre excitation, automatic slip compensation, automatic load compensation, automatic voltage stabilization function, multi-V/F curve, torque limit frequency tracking starting, automatic rest and restart, mechanical braking, UP/DOWN function, high speed pulse input ans output function, counter, built-in PID controller.	
Protect functions	Power supply phase loss protection, under voltage protection ,over voltage protection, over current protection, over load protection, output phase loss protection, output short circuit protection, output grounding protection, overheating protection, signal disconnection, AMA failure, cpu failure, button disable, copy failure, LCP communication error, parameter read only, value out of range, and cannot be executed during operation	
IO board control terminal	Input terminal	5 digital input terminals, one of which supports up to 100kHz high-speed pulse input; 2 analog input terminals support receiving voltage or current signals

Item		Specifications
IO board control terminal	Output terminal	1 channel digital output terminal, supporting up to 100 kHz high-speed pulse output, one relay output terminal one analog output terminal, supporting output voltage or current signal
	Power terminal	One 24V power supply terminal, with the maximum output current of 100 mA
	Communication terminal	One group of communication terminals, with the maximum baud rate of 115200 bit/s
Panel	6-bit 8-segment LED display	Display various data information such as frequency, alarm and status
	Indicator light	The indicator lights FWD, REV, Hz, A, R synchronously display various states of the inverter
	Monitoring function	Set value, output frequency feed back value, output current, DC bus voltage, out voltage, output power, input terminal status, output terminal status, analog input value, analog output value, three fault records and accumulated working time

2.6 Description of derating

1. Temperature derating: If the ambient temperature during use exceeds 50 ℃, the inverter must be derated for use.
2. Altitude derating: The cooling capacity of the air will decrease at low atmospheric pressure. No capacity reduction is required when the altitude is lower than 1000m,however, when the altitude is more than 1000m, the ambient temperature or maximum output current shall be reduced. For altitudes above 1000 meters,the output should be reduced by 1% every 100 meters, or the maximum ambient temperature should be reduced by 1 ℃ every 200 meters.

3. Mechanical and Electrical Installation

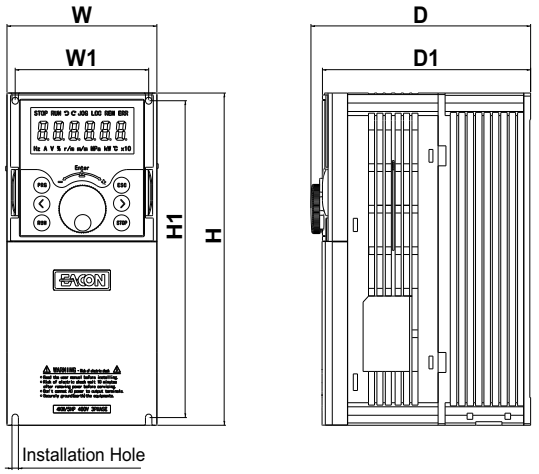
3.1 Mechanical installation

3.1.1 Installation Environment

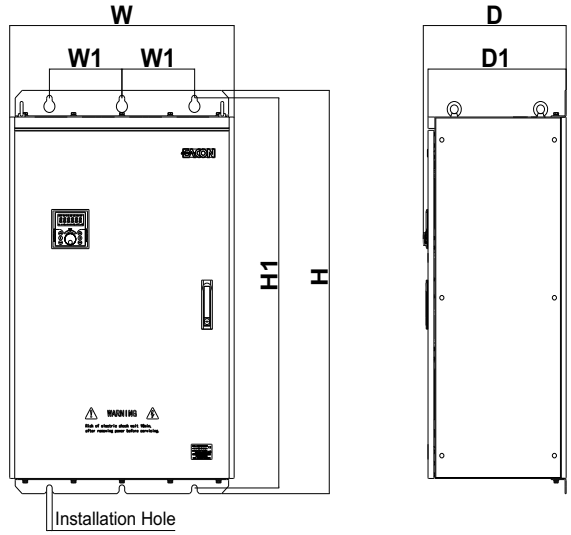
1. Please install the frequency converter at an ambient temperature of - 10 ℃~60 ℃;
2. Please install the frequency converter on the surface of the flame retardant object and verticallyinstall it on the mounting support with screws. There should be enough space around to dissipate heat;
3. Please install it at a place where it is not easy to vibrate, and the vibration should not be greater than 1.14g;
4. Avoid being installed in the place with direct sunlight, humidity, condensation or water drops;
5. Avoid places with corrosive, flammable and explosive gases in the air;
6. Avoid being installed in places with oil stain, dust and metal dust;
7. During installation, avoid dropping drilling residues, thread heads and screws into the converter, otherwise it may cause converter failure or damage;

3.1.2 Installation dimension of AC drive

A Structure



B Structure



220V Class

Structure	Power (Kw)	W (mm)	W1	H	H1	D	D1	Installation Hole
A Structure	0.4kW	105	93.5	216	206	156.7	148.8	Φ4.5
	0.75kW							
	1.5kW							
	2.2Kw							
	4.0Kw	126	110	260	246	183	173.3	Φ6
	5.5kW							
	7.5kW	153	137	341	327	203.3	193.6	Φ7
	11kW							
	15kW	180	120	422.2	419.7	203.6	194	Φ9
	18.5kW							
	22kW	191	120	471	450	241.4	231.6	Φ9
	30kW							

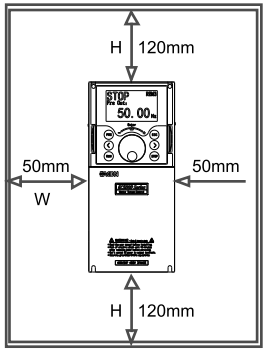
380V Class

Structure	Power (Kw)	W (mm)	W1	H	H1	D	D1	Installation Hole
A Structure	0.75kW	105	93.5	216	206	156.7	148.8	Φ4.5
	1.5kW							
	2.2kW							
	4.0kW							
	5.5kW	126	110	260	246	183	173.3	Φ6
	7.5kW							
	11kW	153	137	341	327	203.3	193.6	Φ7
	15kW							
	18.5kW	180	120	422.2	419.7	203.6	194	Φ9
	22kW							
	30kW	191	120	471	450	241.4	231.6	Φ9
	37kW							
B Structure	45kW	300	220	541	516	313.7	300	Φ11
	55kW							
	75kW	350	270	730	705	353.7	340	Φ11
	90kW							
	110kW							
	132kW	500	180	780	755	353.7	340	Φ11
	160kW	650	210	1060	1024	413.7	400	Φ16
	185kW							
	200kW							
	220kW	750	230	1170	1128	413.7	400	Φ18
	250kW							
	280kW							
	315kW	850	275	1280	1236	463.7	450	Φ20
	350kW							
	400kW							

3.1.3 Installation of complete machine

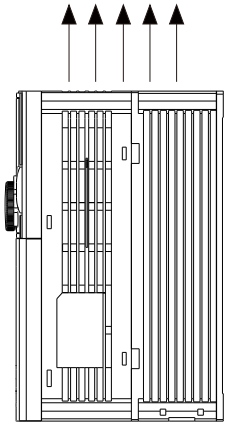
1. Single or side by side installation

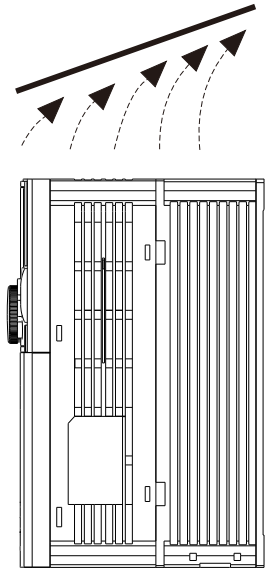
The frequency converter can be installed single or side by side, because of the air cooling, it is installed above and below the frequency converter to ensure the heat dissipation effect reserve a certain space, as shown in the following figure:



2. Up and down installation

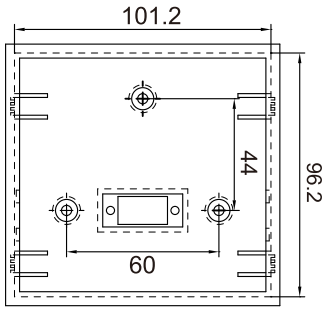
When multiple inverters are installed up and down, as the heat of the lower inverter will cause the temperature rise of the upper inverter to cause failure, measures such as installing thermal insulation deflector should be taken to ensure the heat dissipation effect, as shown in the following figure:





3.1.4 Installation of operation panel

Installation hole size of pull-out keyboard on operation panel:

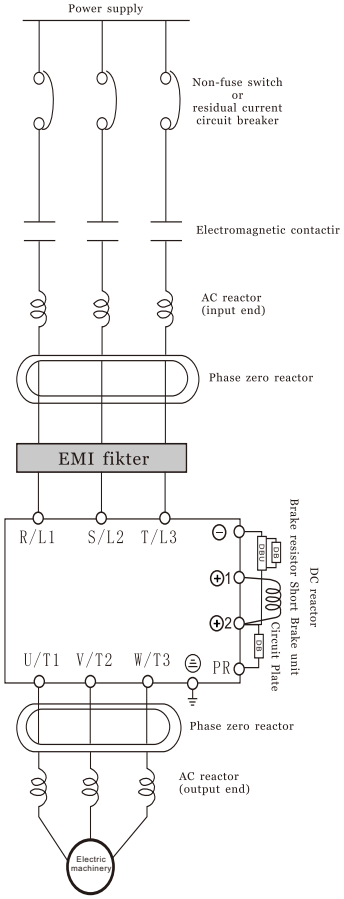


Sheet metal installation hole size:

101.2*96.2mm

3.2 Product peripheral devices

The following figure shows the standard configuration of the peripheral components of the inverter:



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.

Device name	Installation position	Function Description
Air switch	Input front end	In case of abnormal overcurrent of the subsequent stage equipment, it can cut off the power supply and protect the subsequent stage.
Contactor	Between air switch and inverter input side	During the power on and power off operation of the frequency converter, please do not close and disconnect the contactor frequently (less than twice per minute), which will cause the frequency converter failure. Do not control the start and stop of the frequency converter by closing and disconnecting the contactor, which will reduce the life of the frequency converter.
AC input reactor	Input side of frequency converter	Improve the power factor at the input side; Improve the influence of three-phase input AC power imbalance on the system; Suppress high-order harmonics; Reduce the external conduction and radiation interference and effectively suppress the impact of pulse current on the rectifier bridge.
Input filter	Input side of frequency converter	Reduce the conducted interference from the power supply end to the inverter, and improve the anti-interference capability of the inverter; Reduce external conduction and radiation interference of frequency converter.
Braking resistance	_	During braking, the energy fed back by the motor is effectively consumed to achieve rapid braking.
Output filter	Inverter output side	Reduce external conduction and radiation interference of frequency converter.

3.2.1 Selection of air switch, fuse and contactor

The following table provides guidance on air switch, fuse and contactor options:

Model	Air switch (A)	Fuse (A)	Contactor (A)
EC630-0D3723	10	10	10
EC630-0D7523	25	25	16
EC630-01D523	32	32	25
EC630-02D223	40	40	32
EC630-0D7543	10	10	10
EC630-01D543	10	10	10
EC630-02D243	16	16	10
EC630-04D043	25	25	25
EC630-05D543	32	32	25
EC630-07D543	40	40	32

3.2.2 Selection of brake components

The user can select different braking resistance values and power according to the actual situation. The calculation method is as follows, but the resistance value cannot be less than the minimum value in the recommended table, otherwise there is a risk of damage to the inverter, and the power can be greater. The greater the system inertia, the shorter the deceleration time and the more frequent the braking, the greater the braking resistance power and the smaller the resistance value.

1. Brake resistance value selection Calculation formula of brake resistance value: R=UDH × UDH÷(KB × Synchronous N) UDH is the upper limit value of DC bus, generally 700V for 380V machines and 400V for 220V machines; Synchronous N is the rated power of the motor; KB is the braking torque coefficient, which is 0.8~2.0, 1.0 for general machinery, 1.5 for large inertia, and 2.0 for steel plant and mining machinery;

2. Brake resistance power selection Brake power Pb=UDH × UDH ÷ R Theoretically, the brake resistance power can be the same as the brake power, but generally, when actually selected, it will be multiplied by a correction factor, that is, the brake resistance power Pr=a Pb
Correction coefficient a=0.12~0.9, 0.12 for infrequent acceleration and deceleration, and increase frequently. 0.9 is taken for equipment that needs to be in regenerative braking state for a long time, such as down escalator; Centrifuge and other equipment, 0.6;

3. Recommended Model Selection Table of Brake Components

Model	Recommended power of braking resistor	Recommended value of braking resistance
EC630-0D3723	100W	≧130Ω
EC630-0D7523	150W	≧80Ω
EC630-01D523	300W	≧50Ω
EC630-02D223	300W	≧50Ω
EC630-0D7543	150W	≧300Ω
EC630-01D543	250W	≧160Ω
EC630-02D243	500W	≧100Ω
EC630-04D043	500W	≧100Ω
EC630-05D543	700W	≧80Ω
EC630-07D543	900W	≧65Ω

3.2.3 Selection of input and output reactors

Selection guidance for AC input reactor (AC reactor):

Model	Rated current of reactor (A)	Maximum continuous current of reactor (A)	Inductance (mH)&3% impedance
EC630-0D3723	6	9.3	2.57
EC630-0D7523	11	16.5	1.44
EC630-01D523	17	25.5	0.87
EC630-02D223	24	36	0.68
EC630-0D7543	3	4.5	10.64
EC630-01D543	5.5	8.25	5.91
EC630-02D243	8	12	4.43
EC630-04D043	13	19.5	2.50
EC630-05D543	18.9	28.35	1.71
EC630-07D543	24.5	36.75	1.32

Selection guidance of AC output reactor:

Model	Rated current of reactor (A)	Maximum continuous current of reactor (A)	Inductance (mH)&3% impedance
EC630-0D3723	2.5	3.75	6.47
EC630-0D7523	4.5	6.75	3.23
EC630-01D523	7.5	11.25	2.16

3.2.4 Filter selection

Model	Input filter		Output filter	
	Rated current (A)	Recommended model *	Rated current (A)	Recommended model *
EC630-0D3723	10	NFI-010	5	NFO-005
EC630-0D7523	20	NFI-020	5	NFO-005
EC630-01D523	20	NFI-020	10	NFO-010
EC630-02D223	36	NFI-036	20	NFO-020
EC630-0D7543	5	NFI-005	5	NFO-005
EC630-01D543	10	NFI-010	5	NFO-005
EC630-02D243	10	NFI-010	10	NFO-010

Model	Input filter		Output filter	
	Rated current (A)	Recommended model *	Rated current (A)	Recommended model *
EC630-04D043	20	NFI-020	10	NFO-010
EC630-05D543	20	NFI-020	20	NFO-020
EC630-07D543	36	NFI-036	20	NFO-020

3.2.5 Installation of residual current circuit breaker

When using frequency converter, it is not recommended to install leakage circuit breaker. If the frequency converter is equipped with a leakage circuit breaker for leakage fault protection, in order to prevent the leakage circuit breaker from misoperation, please select the one with a current sensitivity rating of more than 200mA and an action time of 0.1s or longer.

3.3 Main Circuit

3.3.1 Description of control terminals

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.

3.3.2 Recommended specifications for main circuit terminal screws and wiring

Model	Input terminal (mm2)	Output terminal (mm2)	Input and output terminal screws	Input and output terminal torque(N·m)	Grounding terminal screw	Torque of grounding terminal (N · m)
EC630-0D3723	1	1	M3.5	0.8-1.0	M4	1.0-1.2
EC630-0D7523	1.5	1	M3.5	0.8-1.0	M4	1.0-1.2
EC630-01D523	1.5	1	M3.5	0.8-1.0	M4	1.0-1.2
EC630-02D223	2.5	1.5	M3.5	0.8-1.0	M4	1.0-1.2
EC630-0D7543	1	1	M3.5	0.8-1.0	M4	1.0-1.2
EC630-01D543	1	1	M3.5	0.8-1.0	M4	1.0-1.2
EC630-02D243	1	1	M3.5	0.8-1.0	M4	1.0-1.2
EC630-04D043	1.5	1.5	M4	1.0-1.2	M4	1.0-1.2
EC630-05D543	1.5	1.5	M4	1.0-1.2	M4	1.0-1.2
EC630-07D543	2.5	1.5	M4	1.0-1.2	M4	1.0-1.2

Note: This recommended specification is for single core VV wire to be used at 25 ℃. If other cables are used or the environment is high, please select the model according to the electrician's manual.

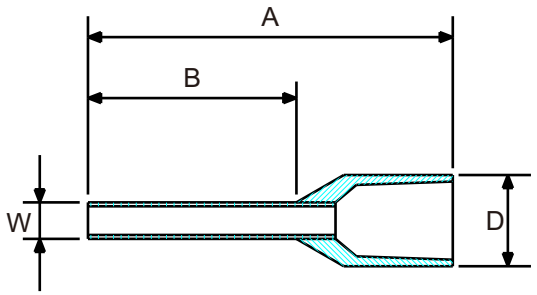
3.4 Control circuit

3.4.1 Control circuit terminal diagram

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	

3.4.2 Control circuit terminal specifications

Spring type terminal block is used for control terminal:
1. It is recommended to use tubular terminals for control lines, and the recommended specifications are as follows:



A	B	D (Maximum)	W
14	8	3.5	1.4

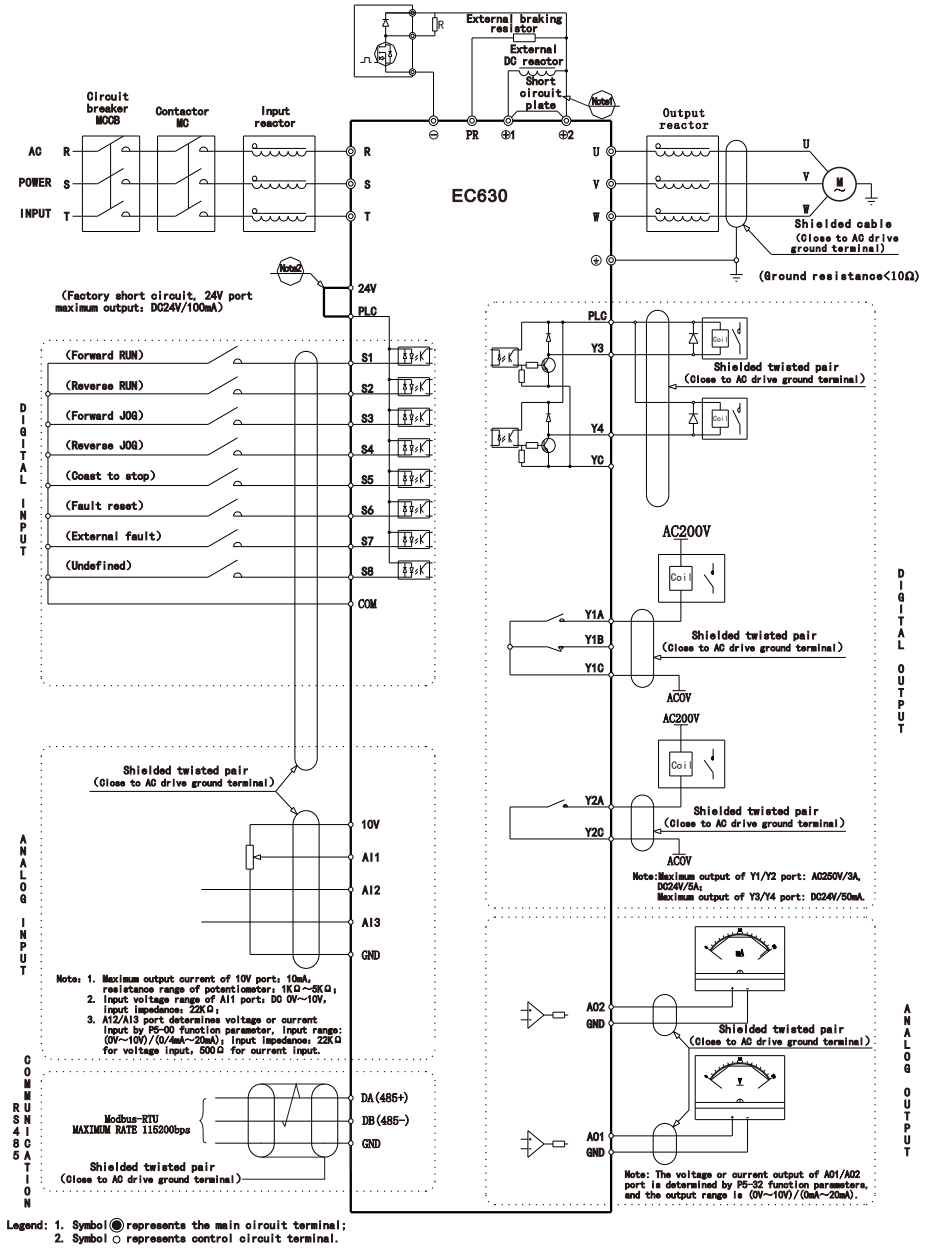
Wire diameter specification:

Type	Minimum wire diameter	Maximum wire diameter
Single core wire	0.52mm2	0.82mm2
Stranded wire	0.52mm2	0.82mm2
Terminal with insulating sleeve	0.52mm2	0.52mm2

2. When wiring, it can be locked by directly jacking;
3. Use a flat screwdriver to hold the lock catch to exit during wire withdrawal. Specification of flat screwdriver: head width 2.5mm, the head thickness is 0.4 mm;
4. Ideal stripping length: 9mm at the wiring end is the optimal wiring length.
5. When conducting bare wire wiring, the wiring shall be placed neatly in the middle of the wiring hole.

Relay terminals use screw type terminal blocks:
1. Use a slotted screwdriver to lock the wiring. The specification of the slotted screwdriver is 3.5mm in head width and 0.6mm in head thickness;
2. Ideal stripping length: the optimal stripping length at the wiring end is 6-7mm.
3. When conducting bare wire wiring, the wiring shall be placed neatly in the middle of the wiring hole.
4. Wire diameter specification: 0.4 ～ 1.0mm2, torque: 0.4 N • m;

3.4.3 Standard wiring diagram



3.5 EMC guidance in electrical wiring

3.5.1 Introduction to EMC standards

EC630 series frequency converters implement the latest international standards: IEC/EN61800-3: 2004 (Adjustable speed electrical power drive systems part 3:EMC requirements and specific test methods)。

IEC/EN61800-3 mainly inspects the frequency converter from the aspects of electromagnetic interference and anti electromagnetic interference. The electromagnetic interference mainly tests the radiation interference, conduction interference and harmonic interference of the frequency converter (corresponding to the requirements of the frequency converter for civil use). Anti electromagnetic interference mainly affects the conducted immunity, radiation immunity, surge immunity, fast burst burst immunity ESD immunity and low frequency end immunity of power supply (specific test items include: 1. immunity test of input voltage sag, interruption and change; 2. immunity test of commutation gap; 3. harmonic input immunity test; 4. input frequency change test; 5. input voltage imbalance test; 6. input voltage fluctuation test).

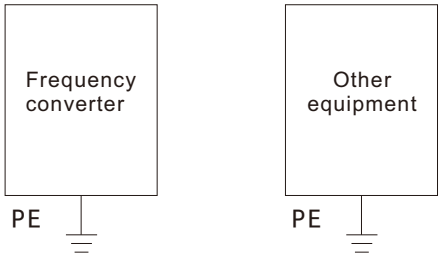
EC630 series frequency converters are tested according to the strict requirements of IEC/EN61800-3 above, installed and used according to the guidance shown in this section, and will have good electromagnetic compatibility in general industrial environment.

3.5.2 Noise suppression countermeasures

1.When peripheral equipment and frequency converter share the power supply of the same system, the noise generated by the frequency converter will spread to other equipment in the same system through the power line and cause misoperation. At this time, the following measures can be taken:
a. Install input noise filter at the input end of the frequency converter;
b. Add power filter at the power input end of the affected equipment;
c. Isolate the noise transmission path between other equipment and frequency converter with isolation transformer.
2.The wiring between peripheral equipment and frequency converter forms a loop, and the inevitable grounding leakage current of frequency converter will cause equipment misoperation. At this time, if the grounding of the equipment is disconnected, misoperation will be reduced.
3.The equipment and signal lines that are easy to be affected shall be installed as far away from the frequency converter as possible.
4. Shielded cables shall be used for signal lines and the shielding layer shall be reliably grounded. Signal lines and cables can also be sheathed in metal pipes. The distance between metal pipes shall be at least 20cm, and they shall be as far away from the frequency converter and its peripheral devices and cables as possible. Signal lines and power lines shall not be wired in parallel or bundled with power lines.
5.When the signal line must pass through the power cable, it shall keep orthogonal crossing.
6.The motor cable should be placed in a barrier with a greater thickness. If it is placed in a pipe with a thickness of more than 2mm or buried in a cement tank, the power line can also be placed in a metal pipe and grounded with a shielded cable.
7. Four core motor cable is used, one of which is grounded at the near end of the frequency converter, and the other side is connected to the motor shell.
8. Radio noise filter and linear noise filter, such as ferrite common mode choke, are respectively installed at the input and output ends of the frequency converter to suppress the radiated noise of the power line.

3.5.3 Grounding treatment

The recommended special grounding electrode is shown in the figure below:



1. The maximum standard size of grounding cable shall be used as far as possible to reduce the grounding system impedance;
2. The grounding wire shall be as short as possible;
3. The grounding point shall be as close to the frequency converter as possible;
4. One wire in the core motor cable shall be grounded at the inverter side, and the other side shall be connected to the motor grounding terminal. If the motor and inverter have special grounding electrodes, the effect will be better;
5. When the grounding terminals of all parts of the system are connected together, the leakage current will become a noise source, which will affect other equipment in the system. Therefore, the grounding terminals of the inverter and other equipment vulnerable to interference need to be separated;
6. The grounding cable shall be arranged far away from the input and output wiring of noise sensitive equipment.

3.5.4 Leakage current suppression countermeasures

The leakage current flows through the line to line and ground distributed capacitance at the input and output sides of the converter, and its size is related to the capacitance of the distributed capacitance and the carrier frequency. The leakage current is divided into two types: ground leakage current and line to line leakage current.

1. The ground leakage current does not only circulate in the inverter system, but may affect other equipment due to the ground loop. These leakage currents may cause the leakage protector and other equipment to malfunction. The higher the frequency of frequency converter carrier, the greater the leakage current to the ground; The longer the motor cable, the greater the parasitic capacitance, and the greater the leakage current to the ground. Therefore, reducing the carrier frequency and selecting the shortest motor cable are the most direct and effective methods to suppress the leakage current to the ground.
2. The high-order harmonic of the line to line leakage current flowing through the cables at the output side of the converter will accelerate the aging of the cables, and may also cause other equipment to malfunction. The higher the frequency of frequency converter carrier, the greater the leakage current between lines; The longer the motor cable, the greater the parasitic capacitance, and the greater the leakage current between lines. Therefore, reducing the carrier frequency and selecting the shortest motor cable are the most direct and effective methods to suppress the leakage current to the ground. Increasing the output reactor can also effectively restrain the leakage current between lines.
3. For EC630 series frequency converters, the RFI filter board can be cut off to reduce the leakage current by removing the RFI screws.

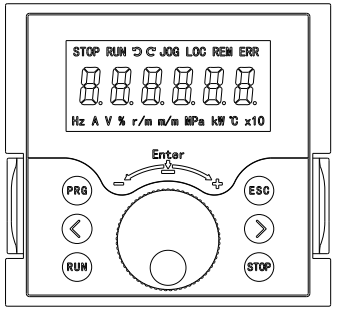
3.5.5 Measures for treatment of induced voltage

When the frequency converter is not grounded, because the frequency converter outputs pulse voltage, an induced voltage will be formed on the motor surface. You can reduce the induced voltage of the motor shell by connecting the PE end of the frequency converter to the motor shell and closing the RFI screw.

4. Operation and Display

4. 1 Operation panel

The operation panel can modify the parameters of the frequency converter, monitor the working state of the frequency converter, and control the operation of the frequency converter (start and stop). Its appearance is shown in the following figure:



In local operation state, the frequency is adjusted through the up and down keys on the panel, which is generally used for frequency converter debugging;

Remote operation status, control the frequency converter through external terminal or communication control;

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

Incremental potentiometer

It is used to increase or decrease data or parameters. Clockwise rotation means increase, and counterclockwise rotation means decrease.

4.2 Viewing alarm records

If the frequency converter fails, the operation panel will display a fault code to explain the cause, and the frequency converter can save the last 10 fault records. Check the fault records of the last 10 times through P9-00 to P9-09.

4.3 Display alphabet

0	1	2	3	4	5	6	7	8	9
A	B	C	D	E	F	G	H	I	J
K	L	M	N	O	P	Q	R	S	T
U	V	W	X	Y	Z	−	+	.	=

a	b	c	d	e	f	g	h	i	j
K	L	M	N	O	P	Q	R	S	T
U	V	W	X	Y	Z	−	+	.	=

5. Function Code Table

Function Code	Parameter Name	Setting Range	Unit	Default
P0 Setting parameters				
P0-00	Acceleration and deceleration time unit setting	Reserved	/	0
P0-01	LCP interface setting	Reserved	/	0
P0-02	Parameter locking	0: Invalid 1: Parameter lock	/	0
P1 motor parameters				
P1-00	Control model	0: Speed open-loop mode 1: Invalid 2: Invalid 3: Invalid	/	0
P1-01	Algorithm setting	0: VF control 1: Vector control (P1-03:0 asynchronous motor vector control; 1-03>0 synchronous motor vector control)	/	1
P1-02	Direction of rotation	0: Invalid 1: Reverse When this parameter is set to 1, the set value of P4-00 is just reverse. For example, when P4-00 is 1 and P1-02 is 1, the inverter operates in the forward direction, but P4-00 is 1, so the inverter cannot operate. For example, P4-00 is 2. When P1-02 is 1, the operation command will be output	/	0
P1-03	Motor setting	0: Asynchronous motor 1: Surface mounted synchronous motor 2: embedded synchronous motor 3: Invalid When it is set as synchronous motor, P1-01 is automatically set as 1	/	0
P1-04	PM damping coefficient	Reserved	%	120
P1-05	Synchronous low frequency filtering time	Reserved	S	0.8
P1-06	Synchronous high frequency filtering time	Reserved	S	0.8
P1-07	Filtering time of synchronous output voltage	Reserved	S	0.5
P1-08	Motor rated power setting	Reserved	/	*
P1-09	Current motor power setting value	When P1-08 is set successfully, P1-09 displays the set power of the current inverter	kW	*
P1-10	Motor rated voltage	Set according to motor nameplate	V	*

P1-11	Rated frequency of motor	According to the motor nameplate setting, when the rated speed of the motor under synchronous motor is greater than 65535R for synchronization, setting this value and the number of motor poles will automatically determine the rated speed of the motor	Hz	*
P1-12	Motor rated current	Set according to motor nameplate	A	*
P1-13	Rated speed of motor	Set according to motor nameplate	RPM	*
P1-14	Motor rated torque	Set according to the motor nameplate, or calculate T=9550 * P (kW)/n (RPM) according to the formula	NM	*
P1-15	Motor self-learning setting	0: Invalid 1: DQ Inductance and stator resistance self-learning 2: Stator resistance learning	/	0
P1-16	Motor stator resistance	Reserved	Ohm	*
P1-17	Motor rotor resistance	The parameter is invalid	Ohm	*
P1-18	Motor leakage inductance	The parameter is invalid	mH	*
P1-19	Main inductance of motor	The parameter is invalid	mH	*
P1-20	D axis inductance of PM motor	Direct axis inductance of synchronous motor	mH	*
P1-21	Q axis inductance of synchronous motor	Quadrature axis inductance of synchronous motor	mH	*
P1-22	Number of motor poles	This parameter sets the number of motor stages, not the number of motor poles. Motor stage=60 * (motor frequency)/speed of synchronous motor * 2	/	4
P1-23	No load back EMF of motor every 1000 revolutions	No load back EMF =360/(rated speed/1000)=24V/1000RPM, unit: 0.1V/1000RPM	V/1000 RPM	*
P1-24	Synchronous D axis inductance 1	The parameter is invalid	/	*
P1-25	PM Q axis inductance 1	The parameter is invalid	/	*
P1-26	Position detection gain	IPD starting current gain	/	100

Function Code	Parameter Name	Setting Range	Unit	Default
P1-27	Synchronous D-axis current 1	The parameter is invalid	/	100
P1-28	Synchronous Q axis current 1	The parameter is invalid	/	100
P1-29	VF-V0	VF curve V0 setting	V	0.0
P1-30	VF-V1	VF curve V1 setting	V	12.0
P1-31	VF-V2	VF curve V2 setting	V	380.0
P1-32	VF-V3	VF curve V3 setting	V	380.0
P1-33	VF-V4	VF curve V4 setting	V	380.0
P1-34	VF-V5	VF curve V5 setting	V	380.0
P1-35	VF-F0	VF curve F0 setting	Hz	0.0
P1-36	VF-F1	VF curve F1 setting	Hz	0.5
P1-37	VF-F2	VF curve F2 setting	Hz	50.0
P1-38	VF-F3	VF curve F3 setting	Hz	50.0
P1-39	VF-F4	VF curve F4 setting	Hz	50.0
P1-40	VF-F5	VF curve F5 setting	Hz	50.0
P1-41	Low frequency current compensation of synchronous motor	This value is the output current value of synchronous motor at low frequency. Increasing this value can improve the motor torque at low frequency, and 100% corresponds to the rated current of the motor	%	80
P1-42	PM start mode	0: Initial position detection start IPD start 1: DC magnetic starting PARKING starting	/	0
P1-43	Start delay time	The frequency converter starts after delaying this time	S	0.0
P1-44	Startup mode	0: DC braking 1: Motor rotates freely	/	1
P1-45	Frequency tracking setting	0: Invalid 1: Frequency tracking, this function is turned on by default in synchronous motor mode	/	0
P1-46	Minimum starting frequency	If the frequency is lower than this value, the frequency converter will not start	Hz	0
P1-47	Stop mode	0: Motor rotates freely 1: DC braking	/	0

Function Code	Parameter Name	Setting Range	Unit	Default
P1-48	Parking enabling frequency	When the output frequency is lower than this value during deceleration stop, the motor will stop inertia	Hz	0
P1-49	Starting excitation current	The starting excitation current of the motor is used to set the excitation current of the asynchronous motor when starting at 0Hz, which is the percentage of the rated excitation current of the motor	%	100
P1-50	Switching frequency of starting excitation current	The switching frequency of excitation current is used to set the frequency switching point of normal excitation current. When the output frequency of the frequency converter is lower than the switching frequency, the excitation current linearly increases or decreases to 100% of the rated excitation current of the motor; When the frequency converter output frequency is higher than the switching frequency, the motor excitation current is 100% of the rated motor excitation current.	Hz	1.0
P1-51	Low speed load compensation	Low speed load compensation is used to compensate the voltage drop caused by the stator resistance, motor loss and line voltage drop of the inverter at low speed. When the output frequency is greater than 5Hz, the low speed load compensation is gradually switched to high speed load compensation.	%	100
P1-52	High speed load compensation	High speed load compensation is used to compensate the voltage drop caused by the stator resistance, motor loss and line voltage drop of the inverter at high speed. When the output frequency is greater than 5Hz, the low speed load compensation is gradually switched to high speed load compensation.	%	100
P1-53	Speed compensation	The speed compensation can dynamically adjust the output frequency of the frequency converter, so that the motor can operate at a constant speed under different loads	%	100
P1-54	Speed compensation filtering time	The higher the value, the slower the response of speed compensation, and the smaller the value, the faster the response	S	0.4
P1-55	Motor damping coefficient	Damping coefficient is used to restrain motor oscillation; The greater the value, the stronger the suppression of motor oscillation. However, if the value is too large, the control performance of the inverter will be affected	%	50
P1-56	Filter time of motor damper	This value changes the response speed of the control damper. The smaller the value, the faster the response; The higher the value is, the slower the response will be, but too small will cause instability in suppressing motor oscillation	S	0.005

Function Code	Parameter Name	Setting Range	Unit	Default
P2 Braking function and overvoltage protection				
P2-00	DC clamping reference current	Braking current level of P2-00 and P2-01, 100% corresponding to rated current	%	50
P2-01	DC braking reference current	DC braking current level, 100% corresponding to rated current	%	50
P2-02	DC braking holding time	DC braking holding time	S	2.0
P2-03	Start frequency of DC braking	Start DC braking below this frequency	Hz	0.0
P2-04	Synchronous start clamping reference current	When the DC braking synchronous motor starts to run below this frequency, the magnetic current is 100% of the corresponding rated current	%	80
P2-05	Synchronous start clamping time	Holding time of magnetic current during synchronous motor operation	S	3.0
P2-06	Braking mode setting	0: invalid 1: resistance braking	/	0
P2-07	Reserved	The parameter is invalid	/	150.0
P2-08	Resistance braking voltage threshold	Opening voltage of resistance braking	/	770/390
P2-09	Reserved	The parameter is invalid	/	710
P2-10	Overvoltage protection mode	0: Invalid 2: Mode 1 3: Mode 2	/	0
P2-11	Overvoltage mode 2 integral term	Integral value of overvoltage mode	S	0.05
P2-12	Overvoltage mode 2 proportional item	Proportional value of overvoltage mode	%	100
P2-13	Mechanical brake release delay	When the digital output (P5-11~P5-14) function is set to 4, the DC braking current reaches the P2-00 setting value after the inverter is started and the digital output is ON (DO or Relay) after the parameter setting value is delayed	S	0.0
P2-14	Mechanical brake holding delay	When the digital output (P5-11~P5-14) function is set to 4, when the output frequency of the inverter for deceleration shutdown is lower than P2-03, the inverter takes P2-01 as the reference value of DC braking current, and the digital output is OFF (DO or Relay) after the parameter value is delayed	S	0.0

Function Code	Parameter Name	Setting Range	Unit	Default
P3 set value and acceleration/deceleration parameters				
P3-00	Setpoint Mode	0: 0~P3-01 1: -P3-01~P3-01 Setpoint range selection	/	0
P3-01	Setpoint reference	Set Point reference value	/	50
P3-02	Multi segment speed 1	Multi section speed: 1 speed, 100% corresponds to P3-01	%	0.00
P3-03	Multi segment speed 2	Multi segment speed 2 speed, 100% corresponds to P3-01	%	0.00
P3-04	Multi segment speed 3	Multi segment speed 3 speed, 100% corresponds to P3-01	%	0.00
P3-05	Multi segment speed 4	Multi segment speed 4 speed, 100% corresponds to P3-01	%	0.00
P3-06	Multi segment speed 5	Multi segment speed 5 speed, 100% corresponds to P3-01	%	0.00
P3-07	Multi segment speed 6	Multi segment speed 6 speed, 100% corresponds to P3-01	%	0.00
P3-08	Multi segment speed 7	Multi segment speed 7 speed, 100% corresponds to P3-01	%	0.00
P3-09	Multi segment speed 8	Multi segment speed 8 speed,100% corresponds to P3-01	%	0.00
P3-10	Multi segment speed 9	Multi segment speed 9 speed, 100% corresponds to P3-01	%	0.00
P3-11	Multi segment speed 10	Multi segment speed 10 speed, 100% corresponds to P3-01	%	0.00
P3-12	Multi segment speed 11	Multi segment speed 11 speed, 100% corresponds to P3-01	%	0.00
P3-13	Multi segment speed 12	Multi segment speed 12 speed, 100% corresponds to P3-01	%	0.00
P3-14	Multi segment speed 13	Multi segment speed 13 speed, 100% corresponds to P3-01	%	0.00
P3-15	Multi segment speed 14	Multi segment speed 14 speed, 100% corresponds to P3-01	%	0.00
P3-16	Multi segment speed 15	Multi segment speed 15 speed, 100% corresponds to P3-01	%	0.00
P3-17	Multi segment speed 16	Multi segment speed 16 speed, 100% corresponds to P3-01	%	0.00
P3-18	Jog frequency	Jog frequency, output frequency in case of inching function	Hz	5.0

Function Code	Parameter Name	Setting Range	Unit	Default
P3-19	Frequency setting channel 1	0: Invalid 1: Terminal AI1 analog input 2: Terminal AI2 analog input 3: Terminal AI3 analog input 4: Communication given 5: Multi segment speed setting (P3-02-P3-17) 6: LCP	/	1
P3-20	Frequency setting channel 2		/	4
P3-21	Frequency setting channel 3		/	6
P3-22	Acceleration and deceleration time unit setting	0: Acceleration and deceleration time accuracy 0.1S; 1: Acceleration and deceleration time accuracy is 0.01S; This parameter will change the decimal point precision of 3.23/3.24/3.25/3.26/3.27/3.28/3.29/3.30	/	1
P3-23	Acceleration time 1	Acceleration time 1. If the function of selecting acceleration and deceleration time is not used by the external terminal, this parameter value is used as the acceleration time; The acceleration and deceleration time can be set via the external terminal S1-S7 to select the multi-stage acceleration and deceleration time	S	3.00
P3-24	Deceleration time 1	Deceleration time 1. If the external terminal is not used to select the acceleration and deceleration time, this parameter value is used as the deceleration time; The acceleration and deceleration time can be set via the external terminal S1-S7 to select the multi-stage acceleration and deceleration time	S	3.00
P3-25	Acceleration time 2	Acceleration time 2, which can be set through the external terminal S1-S7	S	3.00
P3-26	Deceleration time 2	Deceleration time 2, which can be set through the external terminal S1-S7	S	3.00
P3-27	Acceleration time 3	Acceleration time 3, which can be set through the external terminal S1-S7	S	3.00
P3-28	Deceleration time 3	Deceleration time 3, which can be set through the external terminal S1-S7	S	0.00
P3-29	Acceleration time 4	Acceleration time 4, which can be set through the external terminal S1-S7	S	3.00
P3-30	Deceleration time 4	Deceleration time 4, which can be set through the external terminal S1-S7	S	3.00
P3-31	Jog acceleration and deceleration time	Jog acceleration/deceleration time setting	S	3.00
P3-32	Operation command selection	0: LCP and external terminals 1: LCP 2: External terminal 3: Communication 4: Communication and external terminals	/	0

Function Code	Parameter Name	Setting Range	Unit	Default
P4 protection parameters				
P4-00	Motor direction selection	0: forward rotation 1: reverse rotation 2: forward rotation	/	2
P4-01	Minimum frequency setting	Minimum output frequency of frequency converter	Hz	0.0
P4-02	Maximum frequency setting	Maximum output frequency of frequency converter	Hz	65.0
P4-03	Upper limit of current	Above this value, the current limiting function will be started. 100% corresponding motor rated current	%	160
P4-04	Maximum frequency setting of actual output	Actual maximum output frequency of frequency converter	Hz	80.0
P4-05	Jump frequency 1	Reserved	Hz	0
P4-06	Jump frequency 2	Reserved	Hz	0
P5 terminal parameters				
P5-00	Digital terminal input filtering time	The higher the value, the stronger the S1-S8 terminal filtering	/	4
P5-01	Digital terminal logic setting	BIT0: corresponding to S1 BIT0: 1 indicates that the short circuit between S1 and SG is valid, 0 indicates that the short circuit between S1 and 24V is valid	/	255
P5-02	Digital output logic setting	Reserved	/	0
P5-03	S1 terminal function setting	0: Invalid 1: Running, 2: Reverse (three wire system) 3: Reverse (two-wire system), 4: Inching 5: Jog reversal 6: Multi segment speed 0 7: Multi segment speed 1 8: Multi segment speed 2 9: Multi segment speed 3 10: Acceleration and deceleration BIT0 11: Acceleration and deceleration BIT1 12: Inertia parking 13: External fault 20: Shutdown (anti logic, invalid short circuit with SG, valid disconnection) 21: Inertial stop (anti logic) 30: Reset (positive logic)	/	1
P5-04	S2 terminal function setting		/	3
P5-05	S3 terminal function setting		/	4
P5-06	S4 terminal function setting		/	5
P5-07	S5 terminal function setting		/	12
P5-08	S6 terminal function setting		/	30
P5-09	S7 terminal function setting		/	13
P5-10	S8 terminal function setting		/	0

Function Code	Parameter Name	Setting Range	Unit	Default
P5-11	Y3 terminal output function	0: Invalid 1: Running 2: Fault 3: Failure or early warning 4: Mechanical holding brake P1-44:0, the motor set the DC braking current percentage according to P2-00 and when the set value of P1-43 is reached, the digital output is valid, if the output frequency is less than P2-13 or the frequency converter fails, the digital output is invalid after function setting, the setting values of P1-43, P1-44 and P2-00 must be correct, otherwise E.32 fault is reported after the frequency converter runs. If it is under DC braking and reaches the control point If the output current is less than 90% of the P2-00 setting value after the dynamic time, the frequency conversion The controller will also alarm E.32 (mechanical braking fault)	/	0
P5-12	Y4 terminal output function		/	0
P5-13	Y1 terminal output function		/	2
P5-14	Y2 terminal output function		/	1
P6 Analog parameter				
P6-00	Minimum voltage of AI1 terminal	Input low terminal voltage value at AI1 terminal 0-10V. When the potentiometer is set to 0, the voltage value on AI terminal	V	0.04
P6-01	Maximum voltage of AI1 terminal	Input high-end voltage value at AI1 terminal 0-10V. When the potentiometer is set to the maximum, the voltage value on AI terminal	V	10.00
P6-02	Low reference value of AI1 terminal	The reference value corresponding to the input low terminal voltage value from AI1 terminal 0-10V or the input low terminal current value from AI2 terminal 0-20MA	%	0
P6-03	High end reference value of AI1 terminal	The reference value corresponding to the input of high-end voltage value from AI1 terminal 0-10V or high-end current value from AI2 terminal 0-20MA	%	100
P6-04	Filtering time of AI1 terminal	Filtering time of 0-10V input voltage or 0-20MA input voltage at AI1 terminal, the greater the value, the better the filtering effect, but the slower the response time of input voltage	S	0.01
P6-05	Minimum voltage of AI terminal	Input low terminal voltage value at AI2 terminal 0-10V. When the potentiometer is set to 0, the voltage value on AI terminal	V	0.04
P6-06	Maximum voltage of AI terminal	Input high-end voltage value at AI2 terminal 0-10V. When the potentiometer is set to the maximum, the voltage value on AI terminal	V	10.00
P6-07	Minimum current of AI2 terminal	AI2 terminal 0-20MA input low end current value	V	0.04
P6-08	Maximum current of AI2 terminal	AI2 terminal 0-20MA input high-end current value	A	20.00

Function Code	Parameter Name	Setting Range	Unit	Default
P6-09	Low reference value of AI2 terminal	Reference value corresponding to the input low terminal voltage value of 0-10V at AI2 terminal	%	0
P6-10	High end reference value of AI2 terminal	Reference value corresponding to 0-10V input high-end voltage value at AI2 terminal	%	100
P6-11	Filtering time of AI2 terminal	Filtering time of 0-10V input voltage at AI2 terminal, the greater the value, the better the filtering effect, but the slower the response time of input voltage	S	0.01
P6-12	Ai2 input selection	0: 0-10V VI input 1: 0-20MA AI input	/	0
P6-13	Minimum voltage of AI3 terminal	Input low terminal voltage value at AI3 terminal 0-10V. When the potentiometer is set to 0, the voltage value on AI terminal	V	0.04
P6-14	Maximum voltage of AI3 terminal	0-10V input high-end voltage value at AI3 terminal. When the potentiometer is set to the maximum, the voltage value on AI terminal	V	10.00
P6-15	Minimum current of AI3 terminal	AI3 terminal 0-20MA input low end current value	A	4.00
P6-16	Maximum current of AI3 terminal	AI3 terminal 0-20MA input high-end current value	A	20.00
P6-17	Low reference value of AI3 terminal	Reference value corresponding to the input low terminal voltage value of 0-10V at AI3 terminal	%	0
P6-18	High end reference value of AI3 terminal	Reference value corresponding to 0-10V input high-end voltage value at AI3 terminal	%	100
P6-19	Filtering time of AI3 terminal	Filtering time of 0-10V input voltage at AI3 terminal, the greater the value, the better the filtering effect, but the slower the response time of input voltage	S	0.01
P6-20	AI3 input selection	0:0-10V VI input; 1: 0-20MA AI input	/	0
P6-21	Ao1 output type	0:0-20MA AO1 output; 1: 4-20MA AO1 output; 2: 0-10V AO1 output	/	0
P6-22	AO1 output function selection	0: No function; 1: Output frequency; 2: Reference value; 3: Motor current; 4: Output power; 5: Motor speed; 6: Output voltage; 7: Bus control; 8: AI1 input; 9: AI2 input; 10: AI3 input; 11: Bus voltage; 12: Output torque;	/	0
P6-23	AO1 minimum output proportion	AO1 minimum output proportion (select specific output type according to output function) corresponds to AO1 minimum output, and AO1 maximum output proportion corresponds to AO1 maximum output	%	0.00
P6-24	Ao1 maximum output proportion		%	100.00

Function Code	Parameter Name	Setting Range	Unit	Default
P6-25	AO1 minimum output	AO1 minimum output proportion (select specific output type according to output function) corresponds to AO1 minimum output, and AO1 maximum output proportion corresponds to AO1 maximum output	V/MA	0.00
P6-26	AO1 maximum output		V/MA	10.0
P6-27	AO2 output type	0:0-20MA AO2 output; 1: 4-20MA AO2 output; 2: 0-10V AO2 output	/	0
P6-28	AO2 output function selection	0: No function; 1: Output frequency; 2: Reference value; 3: Motor current; 4: Output power; 5: Motor speed; 6: Output voltage; 7: Bus control; 8: AI1 input; 9: AI2 input; 10: AI3 input; 11: Bus voltage; 12: Output torque	Hz	0.5
P6-29	AO2 minimum output proportion	AO2 minimum output proportion (select specific output type according to output function) corresponds to AO2 minimum output, and AO2 maximum output proportion corresponds to AO2 maximum output	%	0.00
P6-30	AO2 maximum output proportion		%	100.00
P6-31	AO2 minimum output		V/MA	0.00
P6-32	AO2 maximum output		V/MA	10.0
P7 Communication parameters				
P7-00	Communication control command setting	Reserved	/	1
P7-01	Communication interruption time	Reserved	S	1.00
P7-02	Communication interruption function	Reserved	/	0
P7-03	Communication reset function setting	Reserved	/	0
P7-04	Communication protocol setting	0: FC protocol 1: Modbus RTU protocol	S	1.00
P7-05	Mailing address	Device address	/	1
P7-06	Communication baud rate	0: 2400 1: 4800 2: 9600 3: 19200 4: 38400 5: 57600 6: 76800 7: 115200	BPS	2
P7-07	Communication data format setting	0: Even check, 1 stop bit 8E1 1: Odd parity, 1 stop bit 801 2: No check, 1 stop bit 8N1 3: No check, 2 stop bits 8N2	/	0
P7-08	Minimum time of communication delay	Reserved	S	0.002

Function Code	Parameter Name	Setting Range	Unit	Default
P7-09	Maximum time of communication delay	Reserved	S	5.000
P7-10	Maximum time of communication delay	Reserved	/	0
P7-11	Communication data saving mode	Reserved	/	0
P8 System parameters				
P8-00	Carrier frequency	Frequency converter carrier frequency setting	kHz	5
P8-01	Overmodulation coefficient	Frequency converter over modulation setting, 100% corresponding VoutMax=Udc/1.414	%	100.0
P8-02	Dead time compensation	100% corresponds to the set value of dead time compensation time, and the current waveform distortion under low frequency can be corrected through this parameter	%	75
P8-03	Fault reset mode	0: Manual reset 1: After automatic reset once, if the fault occurs again, it will not be reset 2-10: Automatic reset 2-10 times 11: 15 times 12: 20 times 13: unlimited times	/	0
P8-04	Fault reset time	After the automatic reset function is enabled, the fault will be reset automatically after the time	S	10
P8-05	Operating mode	0: Invalid 1: Parameter initialization 2: Invalid 3: Invalid	/	0
P8-06	Failure mode	0: Alert 1: Trip	/	1
P8-07	System parameter setting	Reserved	/	0
P8-08	Current control proportional item	P4-03 When the function is triggered, the current limit proportional item	%	100
P8-09	Current control integral term	P4-03 Current limit integral item when function is triggered	S	0.02
P8-10	Current control filtering time	P4-03 Current filtering time when function is triggered	mS	5.0
P8-11	Self learning coefficient 1	Reserved	/	0.030
P8-12	Self learning coefficient 2	Reserved	/	0.020
P8-13	Self learning coefficient 3	Reserved	/	0.040
P8-14	Self learning coefficient 4	Reserved	/	0.080
P8-15	Synchronous output voltage compensation coefficient	When the Pm motor is controlled, the compensation value of the output voltage. When the value increases, the output voltage increases, and when the value decreases, the output voltage decreases	%	10

Function Code	Parameter Name	Setting Range	Unit	Default
P8-16	Active current optimization control	0: Invalid 1: Active current control is effective	/	0
P8-17	Active current optimization gain	Gain of active current control. The greater the value is, the faster the change will be. Excessive value will cause current oscillation	/	0.20
P8-18	Active current optimization damping	Gain of active current control. The greater the value is, the faster the response will be. If the value is too high, it will cause current oscillation	/	100
P8-19	Optimized switching frequency of active current	When P8-16 is set to 1, when the output frequency is greater than this value, active current control is started, and the factory value is 15% of the rated frequency	Hz	*
P8-20	Bus voltage compensation mode	0: Bus voltage compensation off 1: Bus voltage compensation mode 1 2: Bus voltage compensation mode 2	/	0
P8-21	Minimum carrier frequency	Minimum carrier frequency of frequency converter	kHz	2
P8-22	Deadband compensation cut-off frequency	When it is higher than this setting value, the dead time compensation is turned off	Hz	*
P8-23	Protection mode setting	Reserved	/	0
P8-24	Special function setting	Special functions 1. Set P8-07:6666; 2. Set 56578 and reset the fault code, operation time, power count, etc. after power off or power on, or set 47465 and then reset the inverter (with the effect of power on after power off), and modify the gain of P11-02 current sensor after setting 24256; 3. After setting 34368, the monitoring data from P11-04 to P11-13 will be cleared	/	0
P8-25	Under voltage protection function selection	0: LCP displays E.20 when undervoltage occurs during the operation of the inverter, and the inverter stops outputting. When the voltage recovers, continue to execute according to the current control state; 1: When the undervoltage condition occurs during the operation of the frequency converter, LCP displays E.20, and the frequency converter reports a fault and trips. This parameter can not be modified in operation	/	0
P9 System data				
P9-00	Fault code 1	Fault code 1, the last 10th fault code	/	*
P9-01	Fault code 2	Fault code 2, fault code of the ninth time	/	*
P9-02	Fault code 3	Fault code 3, the eighth fault code at the last time	/	*

Function Code	Parameter Name	Setting Range	Unit	Default
P9-03	Fault code 4	Fault code 4, the seventh fault code at the last time	/	*
P9-04	Fault code 5	Fault code 5, the sixth fault code last	/	*
P9-05	Fault code 6	Fault code 6, the last fifth fault code	/	*
P9-06	Fault code 7	Fault code 7, the fourth fault code last	/	*
P9-07	Fault code 8	Fault code 8, the last third fault code	/	*
P9-08	Fault code 9	Fault code 9, the last second fault code	/	*
P9-09	Fault code 10	Fault code 10, last fault code	/	*
P9-10	Special fault code	Reserved	/	*
P9-11	Frequency converter model	Frequency converter model,EC6000	/	EC60
P9-12	Software version number	Software version number	/	*
P9-13	Frequency converter operation days	Frequency converter operation days, this parameter cannot be reset by parameter restoration factory value	Day	0
P9-14	Frequency converter operation hours	Operation time of frequency converter, this parameter can not be reset to the factory value through parameter restoration	Hour	0
P9-15	Converter output power count	The total output power of the frequency converter, and this parameter cannot be reset to the factory value through parameter restoration	kW	0
P9-16	Frequency converter power on times	Frequency converter power on times, this parameter cannot be reset through parameter recovery factory value	Second	0
PA monitoring data				
PA-00	Current control mode	Current inverter control monitoring	/	0
PA-01	Current setting value 1	Setting reference value of current frequency converter	/	0.0
PA-02	Current setpoint 2	Percentage of the set reference value (P3-01) of the current frequency converter	%	0
PA-03	Current state mode	Current inverter status monitoring	/	0
PA-04	Current system logic state	Reserved	/	0
PA-05	Current motor speed	Monitor the current motor speed based on P1-13	RPM	0
PA-06	Current motor speed percentage	Monitor the percentage of current motor speed, 100.00% corresponds to P1-13	%	0.00
PA-07	Current inverter output power	Monitor the current inverter output power (apparent power)	kW	0

Function Code	Parameter Name	Setting Range	Unit	Default
PA-08	Current inverter output voltage	Monitor the current inverter output voltage	V	0
PA-09	Current inverter output frequency 1	Monitor the current inverter output frequency	Hz	0
PA-10	Current inverter output current	Monitor the current inverter output current	A	0
PA-11	Current inverter output frequency 2	Monitor the percentage of current inverter output frequency (P1-11)	%	0
PA-12	Current inverter output torque	Monitor the current inverter output torque	NM	0
PA-13	Current converter DC high voltage	Monitor the current converter bus voltage	V	0
PA-14	Current converter temperature	Monitor the current inverter temperature	C	0
PA-15	Current inverter load output	Monitor the load value of the current motor based on P1-09	%	0
PA-16	Rated current of frequency converter	Rated current of frequency converter (effective value)	A	0
PA-17	Maximum current of frequency converter	Maximum output current of frequency converter (peak value)	A	0
PA-18	Digital input terminal status	Reserved	/	0
PA-19	AI1 terminal input signal	Input signal type of AI1 terminal	/	0
PA-20	AI1 terminal input voltage/current	Input voltage value or current value of AI1 terminal	V/mA	0
PA-21	AI2 terminal input signal	Input signal type of AI2 terminal 0: Voltage 1: Current	/	0
PA-22	AI2 terminal input voltage/current	Input voltage value or current value of AI2 terminal	V/mA	0
PA-23	AI3 terminal input signal	Input signal type of AI3 terminal 0: Voltage 1: Current	/	0
PA-24	AI3 terminal input voltage/current	Input voltage value or current value of AI3 terminal	V/mA	0
PA-25	DO output status	BIT0: 1 and 0 correspond to DO1 on and off BIT1: 1 and 0 correspond to DO2 on and off	/	0
PA-26	AO1 output value	Monitor the 0-10V voltage value or 0-20MA current value of AO1	V/mA	0
PA-27	AO2 output value	Monitor the 0-10V voltage value or 0-20MA current value of Ao2	V/mA	0
PB fault and protection				
PB-00	Detection of locked rotor of synchronous motor	0: Invalid 1: Synchronous motor locked rotor detection function is enabled	/	0

Function Code	Parameter Name	Setting Range	Unit	Default
PB-01	Detection time of locked rotor of synchronous motor	When the duration of locked rotor of synchronous motor exceeds the detection time, the frequency converter trips, Err67	/	0.50
PB-02	Current sensor gain	Current sensor gain percentage, 100.00% corresponds to EEPROM current gain value, 1: P8-07:6666 2: P8-24:24256 3. Set the value of P11-02 to calibrate the gain value of the current sensor. After setting, power off and then on is required to take effect	%	100.00
PB-03	System mode setting	Reserved	/	0
PB-04	Current value at fault	See P8-24 for the output current value in case of frequency converter tripping fault and clearing fault	A	0.00
PB-05	Bus voltage value in case of fault	See P8-24 for bus voltage value in case of frequency converter tripping fault and clearing fault	V	0
PB-06	Current inverter output voltage	See P8-24 for the set frequency value in case of frequency converter tripping fault and clearing fault	Hz	0
PB-07	Set frequency value in case of failure	See P8-24 for the set frequency value in case of frequency converter tripping fault and clearing fault	Hz	0
PB-08	Fault code during monitoring and recording	Refer to P8-24 for fault code of frequency converter monitoring data record and clearing fault	/	0
PB-09	Operation state of frequency converter in case of fault	1-6: Inverter startup detection status 7: Diamagnetic operation 8: Frequency tracking, 9: Angle check 10: Please refer to P8-24 for clearing during operation of frequency converter	/	0
PB-10	Historical minimum bus voltage when the frequency converter is running	Refer to P8-24 for the lowest historical bus voltage detected during inverter operation	V	0
PB-11	The highest bus voltage in history when the frequency converter is running	Refer to P8-24 for the highest historical bus voltage detected during inverter operation	V	0
PB-12	Warning code 1 generated by frequency converter	The meaning of the code is the same as that of the fault. The current warning code generated by the inverter is recorded. If the inverter is powered off normally, the E.20 warning will not be recorded. Please refer to P8-24 for clearing	/	0

Function Code	Parameter Name	Setting Range	Unit	Default
PB-13	Warning code 2 generated by frequency converter	The meaning of the code is the same as that of the fault. The last warning code generated by the frequency converter is recorded. If the frequency converter is powered off normally, the E.20 warning will not be recorded. Please refer to P8-24 for clearing	/	0
PC Reserved				
PC-00	Reserved	Reserved	/	0
PD display				
PD-00	Reserved	Reserved	/	0
PD-01	LCP frequency setting value is saved after power failure	0: LCP frequency setting value is not saved in case of power failure 1: LCP frequency setting value is saved after power failure	/	1
PD-02	Reserved	Reserved	/	0
PD-03	Shuttle function setting	Reserved	/	1
PD-04	LCP frequency setting value	When P3-19 or P3-20 or P3-21 is set to 6 (LCP), this parameter is the LCP frequency setting value	/	0.00
PD-05	Display speed setting	Reserved	/	10.000
PD-06	Setting of display content during keyboard operation	Reserved	/	B421
PD-07	Display content setting when the keyboard stops	Reserved	/	B30

6. Quick application guide

6. 1 Synchronous debugging instructions

Step	Function Code	Function	Set value	Notes
1	P8-05	Parameter initialization	1	After the setting is completed, the power is cut off until the inverter keyboard does not display, and then the power is turned on E.54 is display. The initialization of inverter parameters is completed, and the fault disappears when the ESC key is pressed.
STEP1		**Motor data setting**		
2	P1-03	Motor structure	According to the moter namepete	0: asynchronous motor, 1: surface mounted synchronous motor, 2: Inline synchronous motor, 3: invalid, When set as synchronous motor, P1-01 is automatically set as 1 Confirm the motor type. If the inductance of Axis D is equal to that of Axis Q P1-03 is set as 1, or if the motor is confirmed to be a surface mounted motor, P1-03 is set as 1, otherwise, it is set to 2 (embedded motor, i.e. Lq>Ld)
3	P1-08	Motor rated power setting		According to the moter namepete
4	P1-09	Current motor power setting value		
5	P1-10	Motor rated voltage		
6	P1-11	Rated frequency of motor		
7	P1-12	Motor current		Determined by motor nameplate parameters, unit: 0.1A
8	P1-13	motor speed		Determined by motor nameplate parameters, in RPM
9	P1-14	Motor torque		Calculation formula: for example, if the rated power of the motor is 150kW and the rated speed is 15000 revolutions, then P1-14=9550 * 150/15000=95.5, unit: 0.1NM
10	P1-22	Motor stage		It is determined by the motor nameplate parameter. This parameter sets the number of motor stages, not the number of motor poles
11	P1-23	No load back EMF of motor every 1000 revolutions	*	Back EMF at 1000RPM For example, if the no-load back EMF of the motor is 360V and the rated speed is 15000, the value is 360/(15000/1000)=24V/1000RPM, in 0.1V/1000RPM

Step	Function Code	Function	Set value	Notes
STEP2		Motor self-learning		
12	P1-15	电机自学习	1	Set 1 to be completely self-learning and 2 to be simple self-learning. After setting, press RUN, E.78 will be displayed after self-learning, which proves that self-learning is successful, and it will disappear after pressing ESC
STEP3		Function setting		
13	P8-16	Active current optimization control	1	0: Invalid; 1: Active current control is effective
14	PD-01	Keyboard frequency setting value is saved after power failure	1	0: Keyboard frequency setting value is not saved in case of power failure 1: Keyboard frequency setting value is saved after power failure
STEP4		Communication settings - set as required		
16	P7-04	Communication protocol setting	1	0: FC protocol; 1: Modbus RTU protocol
17	P7-05	Mailing address	1	Device address
18	P7-06	Communication baud rate	2	0:2400, 1:4800, 2:9600, 3: 19200, 4: 38400, 5: 57600, 6: 76800, 7: 115200
19	P7-07	Communication data format setting	2	0: even parity, 1 stop bit, 1: odd parity, 1 stop bit, 2: No check, 1 stop bit, 3: No check, 2 stop bits
STEP4		General parameter setting - set as required		
23	P3-02	Set frequency		Set the operating frequency of frequency converter
24	P3-19	SetPoint Select mode 2		0: Invalid, 1: Terminal AI1 analog input, 2: Terminal AI2 analog input, 3: Terminal AI3 analog input, 4: Communication given, 5: Multi segment speed setting (P3-02~P3-17), 6: LCP
25	P3-20	SetPoint Select mode 2		
26	P3-21	SetPoint Select mode 3		
27	P3-23	Acceleration time		Set according to customer demand, unit: 0.01S
28	P3-24	Deceleration time		Set according to customer demand, unit: 0.01S
29	P3-32	Control source setting		0: LCP and external terminals, 1: LCP, 2: External terminal, 3: Communication, 4: Communication and external terminals
30	P4-00	Motor direction selection		0: forward rotation, 1: reverse rotation, 2: forward rotation

6.2 Operation panel start and stop control

1. Press the "RUN" key on the operation panel to start the inverter;
2. Rotate the button to adjust the output frequency. Each time you press it, the frequency increases or decelerates by 0.1Hz;
3. Press the "STOP" key on the operation panel to stop the inverter;

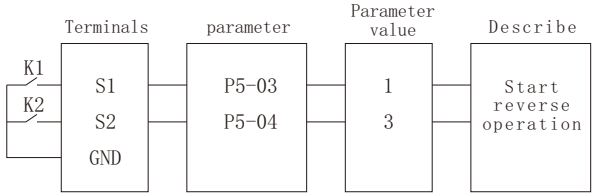
Note: In the local operation state, the encoder is the only source of frequency of the converter. Local operation status is generally used for debugging.

6.3 Digital input terminal start stop control

The starting and stopping of frequency converter is controlled by digital input terminal, which can be generally divided into the following four modes. In either mode, the digital input terminal is used to control the start and stop of the inverter, and the parameter P3-32=0 or 2 is set to set the inverter to the remote operation state.

6.3.1 Two wire mode 1

This mode is the most commonly used two-wire mode. The forward and reverse operation of the motor is determined by terminals S1 and S2. Wiring and parameter settings are as follows:

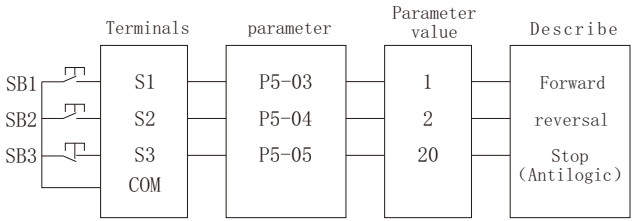


K1	K1	Run Command
To break off	To break off	Stop
Close	To break off	Forward
To break off	Close	reversal
Close	Close	Stop

6.3.2 Three wire mode 1

The terminal S3 of this mode is the operation enable terminal, and the motor operation

direction is controlled by S1 and S2 respectively. Wiring and parameter settings are as follows:

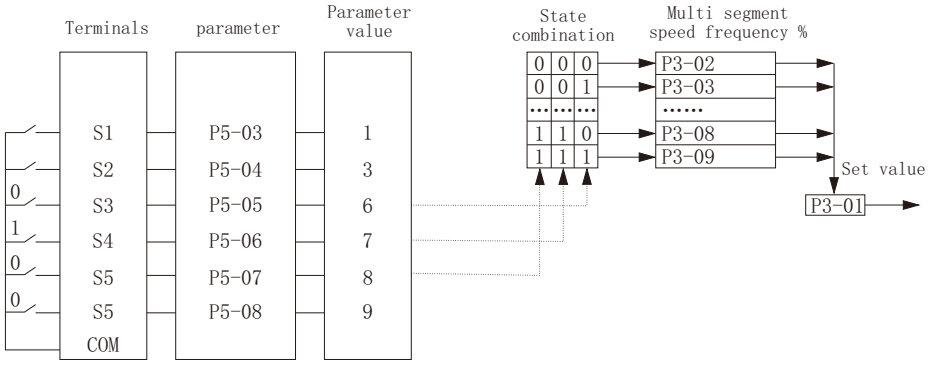


SB1	SB2	SB3	Run Command
×	×	to break off	Stop
⎍	×	close	Forward
×	⎍	close	Reversal

6.4 Multi-stage speed operation

Multi stage speed control can be used for applications where it is not necessary to continuously adjust the operating frequency of the frequency converter and only several frequency values are needed. P3-19 ~P3-21, one of the parameters needs to be set to 5: multi section speed setting.

The following eight operating frequency examples are selected through the combination of three S input signals. Set the parameters corresponding to port S to 6~ 9 (multi segment command terminals 0~3), while the required multi segment frequency the parameters P3-02 ~ P3-17 are set as shown in the following figure:



In the above figure, terminals S1 and S2 are set according to two-wire mode 1, S3~S6 are used as the signal input terminals of multi segment speed frequency, from 4-bit binary number are formed in turn, and the multi segment speed frequency is selected according to the state combination value.when (S1, S2, S3)=(0, 1, 0) the number of state combinations is 2, at this time, select the percentage of multi segment instructions set by P3-03 × P3-01 The set value is calculated.

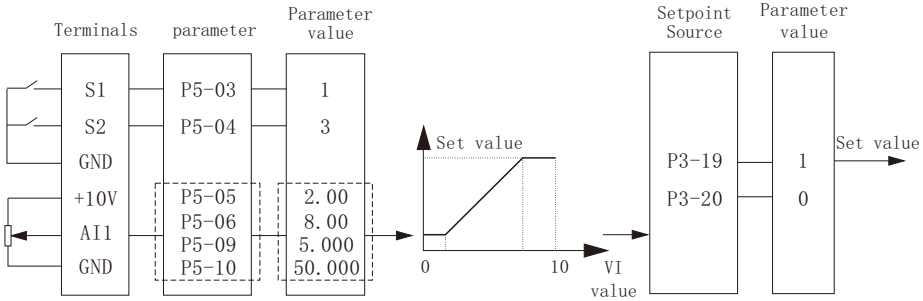
or example, if P3-03=20.00% and P3-01=50.000, the set value is 10.00.

At most 4 S ports can be set as multi segment speed frequency input terminals, and less than 4 S ports are allowed to set multi segment speed frequency.

For the missing set bits, it is calculated according to the state 0.

6.5 Analog frequency given

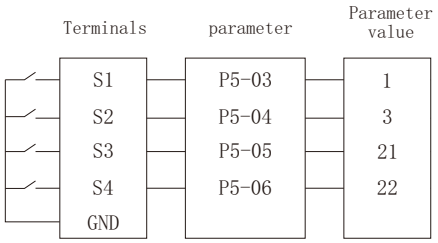
The most common frequency setting method is to adjust the operating frequency of frequency converter through analog input. Generally, analog input is adjusted through potentiometer or PLC analog output. The wiring and parameter settings are as follows:

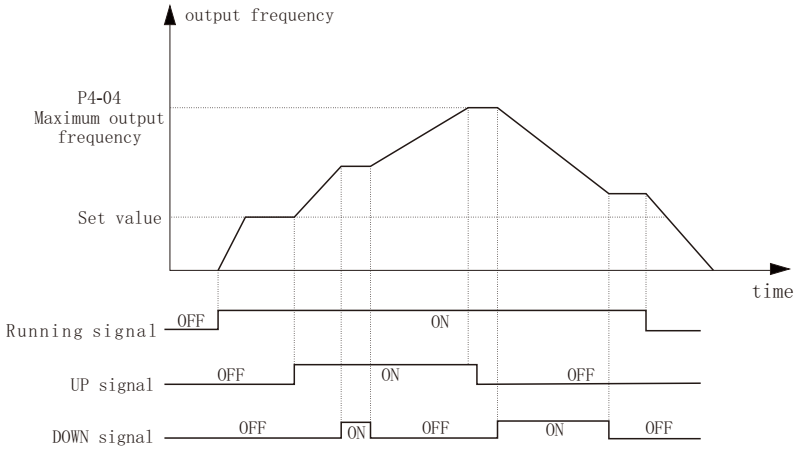


Note: The parameters of the dotted box should be determined according to the actual situation

6.6 UP/DOWN function

The UP/DOWN function can be used when speed fine-tuning is required through external terminal control under a fixed set value. Wiring and parameter settings are as follows





Note: When UP and DOWN signals are valid at the same time, the frequency will not rise or fall.

6.7 Restore parameters to factory values

1. Set parameter P8-05=1;
2. The inverter is powered off (no display is required) and powered on again, and the panel displays E.54;
3. Press ESC to complete parameter initialization;

6.8 Fault reset

1. Manual reset, setting: directly press the panel ESC key to reset the current fault;
2. Set automatic reset after power failure. Setting: P8-03=1: automatic reset once; P9-04=1: Automatic reset time is 1s

6.9 Self learning of motor parameters

1. Press the "STOP" key to stop the inverter;
2. Set parameters P1-09~P1-13 according to motor nameplate data;
3. Set parameter P1-15=1~2;
4. Press the "RUN" key to start motor self-learning, and the screen displays "TUNE";
5. When the panel displays "E.78", press the "ESC" key, and motor self-learning is completed.

7. Fault Alarm and Handling

7.1 Fault list

EC630 series frequency converter faults are divided into three types: warning, fault and error. They are in the form of code on the inverter panel in the form of codes.

Fault description: the frequency converter has exceeded the design limit for some reason. After the fault occurs, the frequency converter trips and must be reset to reset before re-operation. When the fault occurs, the panel display " E. XX "(XX refers to a number, see the following table for details).

If the fault has a great impact on the frequency converter, the frequency converter will be locked after tripping. This fault is called tripping lock sizing fault. The trip lock type fault has additional protection. By default, the power must be turned off before resetting the fault, and the reset can be carried out only after the power is turned on again.

Fault code	Fault name	Cause of failure	Countermeasures
10	Internal fault of frequency converter	1. The frequency converter is interfered 2. Hardware damage	1. Please refer to Section 3.5 for correct wiring 2. Seek technical support
11	External fault	Digital input function is used to select the option External fault input	
12	Short circuit of braking resistor	Braking function is invalid due to short circuit of braking resistor	Replace the brake resistor This fault only exists on 22kW and below models
13	Short circuit of brake unit	The brake transistor is short circuited, resulting in invalid brake function	This fault only exists in 22kW and below models
14	Ground fault	1. Electric leakage of motor wire to ground 2. Motor insulation to ground	1. Reduce the carrier frequency or replace the cable or reduce the cable length 2. Replace the cable or motor
16	Output short circuit	Short circuit of motor or output terminal	Check the motor wiring, motor wire and motor insulation
18	Overcurrent	1. Acceleration and deceleration time is too short 2. The VF curve is set too high during VF control 3. The load compensation and slip compensation are set too large during vector control 4. Low input voltage 5. The sudden load change of the equipment is too large during operation 6. Start the rotating motor 7. The inverter output circuit is grounded or short circuited 8. The selection of frequency converter is too small	1. Extend acceleration and deceleration time 2. Reduce VF curve setting too high 3. Reduce load compensation and slip compensation 4. Adjust the voltage to the normal range 5. Reduce sudden load change 6. Select the speed tracking start or wait for the motor to stop before starting 7. Check the motor wiring and insulation of the motor wire 8. Select higher power frequency converter

Fault code	Fault name	Cause of failure	Countermeasures
19	Overvoltage	1. The deceleration time is too short 2. The load inertia is too large 3. The load fluctuates too much 4. There is an external force driving the motor during the operation of the equipment 5. The input voltage is too high 6. Unreasonable parameter setting	1. Extend deceleration time 2. Add brake resistor 3. Check the load 4. Cancel additional power or add brake resistor 5. Detect the input voltage 6. Adjust parameters related to load and motor
20	Undervoltage	1. Instantaneous power failure 2. Low input voltage and load 3. Inverter hardware is abnormal	1. Reset fault 2. Adjust the voltage to the normal range or open the low-voltage mode 3. Seek technical support
23	Broken line fault	The signal on analog input terminal VI or AI is interrupted. See parameter P6-00 and P6-01 for details	This fault only exists in 22kW and below models
28	Communication control word timeout (see parameters P7-01 and P7-02 for details)	1. The upper computer works abnormally 2. The communication wiring is abnormal 3. The communication parameter group 08 is set incorrectly 4. Communication interference	1.Check the upper computer program 2.Check the communication cable 3.Set communication parameters correctly 4.Use shielded wire or seek technical support
30	Brake resistance open circuit	Brake resistor is not connected or working	This fault only exists in 22kW and below models
32	Mechanical braking current is too low	Parameter P2-13 is set unreasonably	Set P2-13 correctly according to the actual situation
34	Input phase loss	1. The three-phase input power supply is abnormal 2. Inverter hardware is abnormal	1. Check and eliminate the problems in the peripheral circuit; 2. Seek technical support
35	Frequency converter overload	1. The VF curve is set too high during VF control 2. The load compensation and slip compensation are set too large during vector control 3. Overload 4. Improper setting of motor parameters	1. Reduce VF curve setting too high 2. Reduce load compensation and slip compensation 3. Reduce the load or use a higher power converter 4. Correct setting according to the motor nameplate
40	Motor overload	1. The VF curve is set too high during VF control 2. The load compensation and slip compensation are set too large during vector control 3. Improper setting of motor parameters 4. The motor is locked or the load suddenly changes too much 5. Overload	1. Reduce VF curve setting too high 2. Reduce load compensation and slip compensation 3. Correct setting according to the motor nameplate 4. Check the cause of motor stalling or load 5. Reduce the load or use a higher power motor

Fault code	Fault name	Cause of failure	Countermeasures
41	Current limit	Output current exceeds the setting value of parameter P4-03	Correctly set motor parameters or handle according to E.18 frequency converter over current countermeasures
51	Motor phase loss	1. Motor three-phase imbalance 2. Loose motor wiring 3. Very short acceleration and deceleration time, heavy load 4. Motor power is far less than inverter power	1. Replace the motor 2. Check the motor wiring 3. It is recommended to turn off the motor phase loss protection 4. Please set P1-12 motor current correctly
54	Restore parameters to factory values	User performs parameter restoration to factory value	Press "OFF" to reset

8 Daily Maintenance

Due to the influence of ambient temperature, humidity, salt mist, dust and vibration, the components inside the converter will be aged, leading to potential failures of the converter or reducing its service life. Therefore, in the process of use and storage, the frequency converter should be maintained daily and regularly.

8.1 Daily inspection and maintenance

Daily inspection items:
1. Whether the sound changes abnormally during motor operation;
2. Whether there is vibration during motor operation;
3. Whether the installation environment of frequency converter has changed;
4. Whether the cooling fan of frequency converter works normally;
5. Whether the frequency converter is overheated;
6. Frequency converter output voltage, output current, output frequency, and monitor whether the display is greater than the normal value;
7. Whether there is dust, scrap iron and corrosive liquid inside the frequency converter;

8.2 Regular maintenance

Users can regularly check the frequency converter in a short term or 3-6 months according to the use environment and working conditions to eliminate hidden trouble.

Note:

1. Before maintenance, please confirm that the inverter has been powered off and fully discharged;
2. Do not leave metal objects such as screws, gaskets, wires and tools in the frequency converter, otherwise the equipment may be damaged;
3. It is forbidden to carry out any transformation on the internal part of the frequency converter, otherwise the normal operation of the frequency converter will be affected, and there may even be danger of equipment damage.

Inspection items	Measures
Whether the control terminal screws are loose	Tighten with a screwdriver
Whether the main circuit terminal screws are loose	Tighten with screwdriver or sleeve
Whether the screw of grounding terminal is loose	Tighten with screwdriver or sleeve
Whether the mounting screws of frequency converter are loose	Tighten with screwdriver or sleeve
Whether the power cable and control cable are damaged	Replace damaged cable
Whether there is dust on the circuit board	Clean up
Whether the air duct is blocked	Clean up

8.3 Replacement of wearing parts

Vulnerable parts of frequency converter mainly include cooling fan, electrolytic capacitor, relay or contactor. Their service life is closely related to the service environment and maintenance conditions. Maintaining a good working environment is conducive to improving the service life of parts. In order to improve the overall life of the inverter. The wearing parts such as cooling fan, electrolytic capacitor, relay or contactor shall be inspected daily according to the requirements in the following table. If there is any abnormality, please replace them in time.

The service life indicated in the following table is only for good service environment.

Device name	Life	Cause of damage	Evaluation criteria
Cooling fan	4～5 years	Bearing wear; Blade aging;	Whether there are cracks on fan blades; Whether there is abnormal vibration sound during operation;
Electrolytic capacitor	4～5 years	Poor input power quality; High ambient temperature; Frequent load jump; Electrolyte aging;	Whether there is liquid leakage; Whether the safety valve has protruded; Determination of electrostatic capacitance; Measurement of insulation resistance;
Relay or contactor	5～10 million times	Corrosion and dust affect contact effect; Contact action is too frequent;	Opening and closing failure;

8.4 Inverter storage and transportation

This product must be placed in the packaging box before installation. If it is not used temporarily, please pay attention to the following items during storage:

1. It must be placed in a dry and dust-free place;
2. Storage environment temperature: - 25 ℃～65 ℃;
3. The relative humidity of the storage environment is 5%～95%, and there is no condensation;
4. The storage environment does not contain corrosive gas and liquid;
5. It is better to put it on the shelf and properly pack it for storage;
6. Transportation environment temperature: - 25 ℃～70 ℃;
7. The relative humidity of the transportation environment is less than 95% (when the ambient temperature is 40 ℃).

Note: It is better not to store the frequency converter for a long time. Long time storage will lead to deterioration of the electrolytic capacitor. If long-term storage is required, it must be ensured that the converter is powered on once a year for at least 5 hours. The input voltage must be slowly increased to the rated voltage with a voltage regulator.

8.5 Inverter scrapped

The raw materials used in the drive unit of the frequency converter are recyclable, which can save energy and natural resources. Packaging materials are degradable and recyclable. Generally, all metal parts (such as steel, aluminum, copper and their alloys/precious metals) can be recycled. Plastic, rubber, cardboard and other packaging materials can also be recycled. Printed circuit boards and DC capacitors need to be processed selectively according to EC62635 standard. For more detailed guidance on environment and recycling, please contact Easy Control. Disposal methods must comply with international and local regulations. Incineration is strictly prohibited.

Appendix A Modbus Communication Instructions

EC630 series frequency converter provides RS485 communication interface, and adopts standard Modbus communication protocol for master-slave communication. The user can realize centralized control through PC/PLC, etc. Through this protocol, the user can set the inverter control command, operating frequency, modify or read function code parameters, read the inverter working status and fault information, etc.

A. 1 Application mode

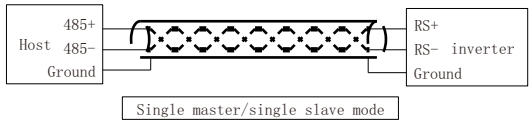
A. 1.1 Interface mode

The frequency converter communication hardware interface is RS485. The RS485 interface works in asynchronous serial, half duplex mode, and the data signal adopts differential transmission mode.

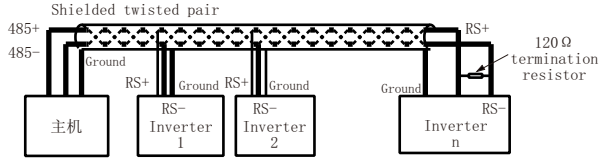
In order to avoid external interference to communication signals, it is recommended to use twisted pairs for communication connection, and avoid using parallel lines as much as possible. When long-distance communication is required, it is recommended to use shielded cables and connect the shielding layer to the communication ground of the inverter.

A. 1.2 Networking mode

There are two networking modes for frequency converters: single master/single slave mode and single master/multi slave mode.



Single master/single slave mode

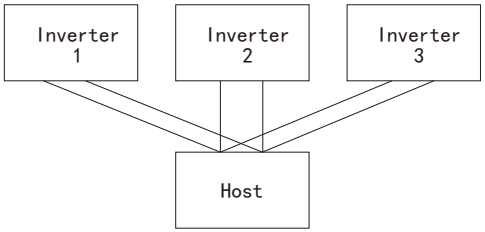


Note:
no matter which mode, the frequency converter is used as the slave;

When using single master/multi slave mode, shielded wire should be used as far as possible. Baud rate and data verification of all equipment on the line must be consistent, and communication address cannot be repeated. When the communication distance is

Far, it is recommended to connect the terminal resistance of the equipment farthest from the host (select the jumper on for the inverter terminal resistance);

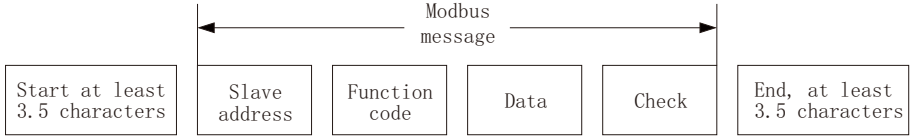
Note: RS485 industrial bus standard requires daisy chain connection between devices, and star connection is not allowed.



Wrong connection: star connection

A. 2 Protocol Format

Modbus protocol only supports RTU format. The data frame format in RTU format is shown in the figure below:



Explain:

Frame header:	3.5 characters time
Slave address	Mailing address: 0-247 (0 is the broadcast address)
Function code	Modbus protocol function code
Data content (N-1)	Data content of 2 * N bytes: inverter function code parameter address, number of parameters, parameter value, etc;
Data content (N-2)	
…	
Data content 0	
CRC CHK high bit	CRC check value
CRC CHK low	
Frame tail	3.5 characters time

A. 3 Protocol function code

The inverter supports the following function codes:

Function code	Significance	Significance
03	Read Holding Register	Read inverter parameters and operation status, etc
06	Write a single holding register	Rewrite parameters of single frequency converter
10	Write multiple holding registers	Rewrite multiple converter parameters

A. 4 Register address definition

The register addresses in this description are calculated from 0.

A. 4.1 Inverter parameters and register address translation rules

Inverter parameters are mapped to Modbus registers. The reading and writing characteristics and range of the inverter parameters still follow the instructions in the user manual. The conversion relationship between converter parameters and Modbus registers is as follows:

Register address=parameter number × 10 - 1

For example: the register address of the maximum reference value of parameter P3-03 is 303 (0 × 012F)

Parameter PA-13 The register address of motor frequency is 1013 (0 × 03F5)

A. 4.2 Other register address descriptions

In addition to the mapping of inverter parameters to Modbus registers, some additional registers are set in the inverter to facilitate the user to control the operation of the inverter, monitor the inverter status, and quickly read and write some parameters.

Register	Explain	R/W
6	Internal error code of the last communication error	R
7	Register address of the last communication error	R
8*	Parameter index	R,W
51000*	Control command	W
51001*	Communication setting value (unit: 0.01)	W
51002	Reserved	W

Register	Explain	R/W
51003	Digital output terminal control bit 0: DO1 output control bit 1: DO2 output control bit 2: Reserved bit 3: Reserved bit 4: Relay1 output control bit 5: Relay2 output control bit 6-15: Reserved	W
51004	VO terminal control 0~10000 indicates 0.00~100.00%	W
51005	AO terminal control 0~10000 indicates 0.00~100.00%	W
51006	DO1 pulse output control 0~10000 indicates 0.00~100.00%	W
51100*	Inverter status	R
51101*	Frequency converter fault code	R
51102	Output frequency (0 ~ Fmax, unit: 0.1Hz)	R
51103	Output current (90kW and above, unit: 0.1A; others, unit: 0.01A)	R
51104	Output voltage (unit: 1V)	R
51105	Output power (90kW and above, unit: 0.1kW; others, unit: 0.01kW)	R
51006	Motor speed (unit: 1r synchronization)	W
51007	Bus voltage (unit: 1V)	W
51108	Reference value	R
51109	Feedback value	R

*Register 51000 Control Command Description

Bit	Explain
Bit11～8	0000B: main speed P3-02 0001B: first section speed P3-03 0010B: second section speed P3-04 0011B: third section speed P3-05 … 1111B: the fifteenth section speed P3-17
Bit13～12	00B: Acceleration and deceleration 1 01B: Acceleration and deceleration 2 10B: Acceleration and deceleration 3 11B: Acceleration and deceleration 4
Bit14	Reserved
Bit15	1B Enable Bit8 ~ 13 0B deenergizing Bit8 ~ 13

*The operating frequency of register 51001 indicates that when using communication control frequency converter, first set 4 communication settings in P3-19 ~ P3-21 reference value source, and then set the communication settings by writing register 51001. The value range of this register is 0.00～P4-04, and the unit is 0.01.

*Register 51100 Inverter Status Description

Bit	Explain
Bit0	0B: None 1B: Warning
Bit1	0B: None 1B: Warning
Bit3～2	00B: Stop 01B: Forward running 10B: Reverse operation 11B: Reserved
Bit7～4	Reserved
Bit11～8	0000B: Running at main speed 0001B: Running at the first segment speed 0010B: Running at the second section speed 0011B: Running at the third section speed … 1111B: Running at the 15th segment speed
Bit15～12	Reserved

*Register 51101 Inverter fault code description register 51101 is used to store inverter fault code or warning code. For example, when the converter has E.13 fault, the value of register 51101 is 13; When the frequency converter reports E.59 warning, the value of register 51101 is 59.

A. 5 Communication proportional value

In Modbus communication, the communication data is expressed in hexadecimal system, but the decimal system cannot be expressed in hexadecimal system. For example, if you want to set the parameter P3-02=60.34, you need to enlarge 60.34 by 100 times to an integer 6034, so that you can use the hexadecimal 0x1792 (decimal 6034) to represent 60.34.

Multiply a non integer by a multiple to get an integer, which is called the communication proportional value

The communication proportional value is based on the decimal places of the values in "Setting Range" or "Factory Value" in the parameter table. If there are n decimal places after the decimal point, the communication proportional value m is 10 to the nth power.

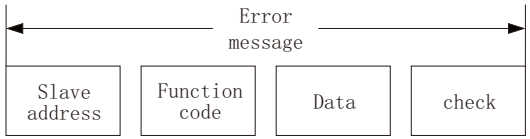
For example, if the range of parameter P2-03 is "0.0～400.0" and the factory value

is 0.0, then it has 1 decimal place and the communication proportion value is 10. If the parameter is read as 20 by Modbus communication, the actual P2-03 value is 20 ÷ 10=2.0. If you want to set this parameter to 5.5, you need to enlarge it by 10 times and program it to an integer 55 (0x0037) before sending it again.

A. 6 Error message response

During communication, there may be wrong operations, for example, some parameters are read-only, but the upper computer sends a write command, and the inverter will reply an error message.

The error message format is as follows:



Error message function code=request function code+0x80

Error	Explain
0x01	Illegal function code, which is not implemented in the inverter.
0x02	Illegal data address. The requested data address is not allowed.
0x03	Illegal number range. The number of registers or coils requested for operation is out of range.
0x04	Operation failed.

A. 7 Examples of use

A. 7.1 Example of reading holding register 03H

Read frequency converter output frequency

The inverter output frequency can be viewed by reading register 51102.A

Sending data: 01 03 C7 9E 00 01 D8 90 (hex)

Received data: 01 03 02 01 F4 B8 53 (hex)

Send data

Field	Explain
01	Inverter address
03	Function code
C7 9E	Register address 51102 (0xC79E)
00 01	The number of registers to read is 1
D8 90	CRC check code

Accept Data

Field	Explain
01	Inverter address
03	Function code
02	Bytes of received data
01 F4	0x01F4 is converted to a decimal number of 500. Register 51102 has one decimal place, so the actual value is 500 ÷ 10=50.0.

The output frequency of the converter can also be viewed by reading parameter PA-08.
Sending data: 01 03 03 F0 00 01 84 7D (hex)
Received data: 01 03 02 01 F4 B8 53 (hex)
Send data

Field	Explain
01	Inverter address
03	Function code
03 F0	Register address, the register address of parameter PA-08 is 1008 (0x03F0)
00 01	The number of registers to read is 1
D9 DE	CRC check code

Accept Data

字段	说明
01	Inverter address
03	Function code
02	Bytes of received data
01 F4	0x01F4 is converted to a decimal number of 500. Parameter PA-08 has one decimal place, so the actual value of parameter PA-08 is 500 ÷ 10=50.0.
B8 53	CRC check code

Reading the inverter status can obtain the inverter status by reading registers 51100 and 51101.
Sending data: 01 03 C7 9C 00 02 39 51 (hex)
Received data: 01 03 04 00 02 00 0D 9A 36 (hex)

Send data

Field	Explain
01	Inverter address
03	Function code
C7 9C	Register address 51100 (0xC79C)
00 02	The number of registers to read is 2
39 51	CRC check code

Accept Data

Field	Explain
01	Inverter address
03	Function code
04	Bytes of received data
00 02 00 0D	The value of register 51100 is 0x0002. Note: the value of bit 0 is 0B, i.e. no warning Bit 1 value is 1B, that is, there is a fault Bit 3~2 value: 00B, i.e. Stop Bit 11~8 value: 0000B, i.e. running at main speed The value of register 51101 is 0x000D, i.e. 13 At this time, the frequency converter reports E.13 fault
9A 36	CRC check code

A. 7.2 Write a single hold register 06H for example

Control the frequency converter to run forward at section speed 1
Command the register 51000 to realize the operation of the frequency converter at section speed 1
Sending data: 01 06 C7 38 81 01 94 E3 (hex)
Received data: 01 06 C7 38 81 01 94 E3 (hex)

send data

Field	Explain
01	Inverter address
06	Function code
C7 38	Register address 51100 (0xC738)
81 01	Control command 0x8101 Note: Bit 7~0 value is 0x01, i.e. forward running Bit 11~8 value: 0001B, that is, the first section speed P3-02 Bit 13~12 value: 00B, i.e. acceleration/deceleration 1 Bit 15 value: 1B, that is, bits 13 to 8 are enabled
D8 90	CRC check code

Accept Data

Field	Explain
01	Inverter address
06	Function code
C7 38	Register address 51000 (0xC738)
81 01	Control command written
94 E3	CRC check code

A. 7.3 Write multiple hold registers 10H for example

Start the frequency converter and set its operating frequency. The operating status of the frequency converter can be controlled through the register 51000, and the operating frequency of the frequency converter can be set through the register 51001.

Sending data: 01 10 C7 38 00 02 04 00 01 13 88 DB BE (hex)
Received data: 01 10 C7 38 00 02 FD 71 (hex)

Send data

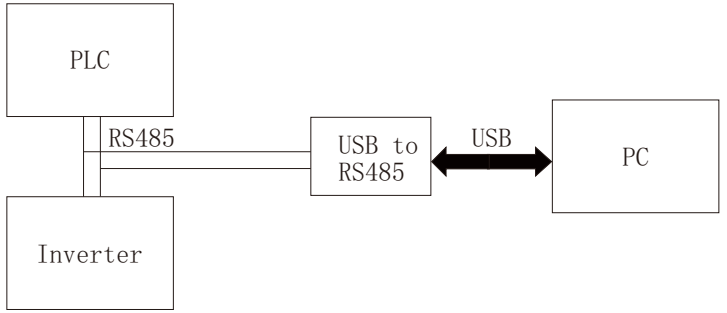
Field	Explain
01	Inverter address
10	Function code
C7 38	Register address 51000 (0xC738)
00 02	Number of registers to write
04	Number of bytes to write
00 01 13 88	Register 51000=0x0001 Note: Bit 7~0 value is 0x01, i.e. forward running Bit 11~8 value: 0000, i.e. main speed 03.10 [0] Bit 13~12 value: 00B, i.e. acceleration/deceleration 1 Bit 15 value is 0, i.e., bit 13~8 is de energized Register 51001=0x1388 Note: 0x1388 is converted to 5000 decimal digits, and the precision of register 51001 is 0.01Hz, so the operating frequency is set to 50.00Hz.
DB BE	CRC check code

Accept Data

Field	Explain
01	Inverter address
06	Function code
C7 38	Register address 51000 (0xC738)
00 02	Number of registers to write
FD 71	CRC check code

A. 8 Commissioning

General users call the communication module or function provided by the equipment development software when using PLC or touch screen and other devices to communicate with the inverter. When PLC or touch screen and other equipment cannot communicate with the frequency converter, it is difficult to determine whether it is the equipment software problem or the frequency converter problem. At this time, you can use the serial port debugging assistant (the software can be downloaded on the Internet) and other software at the PC end to assist in diagnosis.



Modbus wiring diagram of commissing system

11. Warranty Service

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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