GTAKE

Think Without Boundary

34010041 A01-EN

User Manual

GK500

Mini AC Motor Drives

1AC/3AC 220V 0.4~2.2kW 3AC 400V 0.75~3.7kW

Preface

Thank you for choosing GTAKE **GK500 Series Mini AC Motor Drives**. This user manual presents a detailed description of GK500 series with respect to product features, structural characteristics, functions, installation, parameter setting, troubleshooting, commissioning and daily maintenance, etc. Be sure to carefully read through the safety precautions before use, and use this product on the premise that personnel and equipment safety is ensured.

IMPORTANT NOTES
● Please assure the intactness of product enclosure and all safety covers before installation. Operation must conform to the requirements of this manual and local industrial safety regulations and/or electrical codes. ● Contents of this manual may be subject to appropriate modification as a result of product upgrade, specification change and update of the manual. ● In the event of damage or loss of user manual, users may ask local distributors, offices or our Technical Service Department for a new one. ● If any item as stated in this manual is not clear, please contact our Technical Service Department. ● If any anomaly occurs after power up or during the operation, it is essential to stop the machine and identify the fault or seek technical services as soon as possible. ● Telephone number of our International Technical Service Department: +86-0755-86392601.

Summary of Changes

The information below summaries changes made in May 2016 for *GK500 Series Mini AC Motor Drives User Manual,* version A01-EN.

Besides there are some changes on the manner of writing, error correction, and designation replacement like *control panel* instead of *keypad*, following is the material new or updated information in this user manual.

Chapter 2	1	Table 2-3 updated
Chapter 3	1	Fig. 3-5, Fig. 3-7, Fig. 3-8, Fig. 3-13 updated
	2	Fig. 3-9, Fig. 3-10 added

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Chapter 1 Safety Precautions

Safety Precautions

Safety signs in this manual:

⚠ **WARNING:** indicates the situation in which the failure to follow operating requirements may result in fire or serious personal injury or even death.

⚠ **ATTENTION:** indicates the situation in which the failure to follow operating requirements may cause moderate or slight injury and damage to equipment.

Users are requested to read this chapter carefully when installing, commissioning and repairing this product and perform the operation according to safety precautions as set forth in this chapter without breach. GTAKE will bear no responsibility for any injury and loss as a result of any inappropriate operation.

1.1 Safety Considerations

1.1.1 Prior to Installation

⚠ WARNING
● Do not use the drive whose component(s) is/are missing or damaged. Failure to comply with may result in more faults and/or personal injury even death.

⚠ ATTENTION
● Check if the product information indicated on the nameplate is consistent with the order requirements. If not, do not install it. ● Do not install the drive in the event that the packing list does not match with real equipment.

1.1.2 Installation

⚠ WARNING
● Only qualified personnel familiar with adjustable frequency AC drives and associated machinery should plan or implement the installation. Failure to comply may result in equipment damage and/or personnel injury even death.

- This equipment must be mounted on metal or other flame retardant objects. Failure to comply may result in fire.
- This equipment must be mounted in an area which is away from combustibles and heat sources. Failure to comply may result in fire.
- This equipment must in no case be mounted in the environment exposed to explosive gases. Failure to comply may result in explosion.
- Never adjust mounting bolts of this equipment, especially the ones with red markers. Failure to comply may result in equipment damage.

⚠ ATTENTION

- Handle the equipment gently and take hold of its sole plate so as to avoid foot injury or equipment damage.
- Mount the equipment where its weight can be withstood. Failure to comply may result in equipment damage and/or personnel injury if falling happens.
- Make sure the installation environment conform to the requirements as stated in Section 2.4. If not, de-rating is necessary. Failure to comply may result in equipment damage.
- Prevent drilling residues, wire ends and screws from falling into the equipment during installation. Failure to comply may result in faults or equipment damage.
- When mounted in a cabinet, this equipment should be provided with appropriate heat dissipation. Failure to comply may result in faults or equipment damage.

1.1.3 Wiring

⚠ WARNING

- Only qualified personnel familiar with adjustable frequency AC drives and associated machinery should plan or implement the wiring. Failure to comply may result in personnel injury and/or equipment damage.
- Wiring must strictly conform to this manual. Failure to comply may result in personnel injury and/or equipment damage.
- Make sure the input power supply has been completely disconnected before wiring. Failure to comply may result in personnel injury and/or equipment damage.
- All wiring operations must comply with EMC and safety regulations and/or electrical codes, and the conductor diameter should conform to recommendations of this manual. Failure to comply may result in personnel injury and/or equipment damage.
- Since overall leakage current of this equipment may be bigger than 3.5mA, for

safety's sake, this equipment and its associated motor must be well grounded so as to avoid the risk of electric shock.

- Be sure to implement wiring in strict accordance with the marks on this equipment's terminals. Never connect three-phase power supply to output terminals U/T1, V/T2 and W/T3. Failure to comply will result in equipment damage.
- Install braking resistors at terminals ⊕ /B1 and B2 only. Failure to comply may result in equipment damage.
- Wiring screws and bolts for main circuit terminals must be screwed tightly. Failure to comply may result in equipment damage.
- AC 220V signal is prohibited from connecting to other terminals than control terminals RA, RB and RC. Failure to comply will result in equipment damage.

⚠ ATTENTION

- Since all adjustable frequency AC drives from GTAKE have been subjected to hi-pot test before delivery, users are prohibited from implementing such a test on this equipment. Failure to comply may result in equipment damage.
- Signal wires should to the best of the possibility be away from main power lines. If this cannot be ensured, vertical cross-arrangement shall be implemented, otherwise interference noise to control signal may occur.
- If motor cables are longer than 100m, it is recommended output AC reactor be used. Failure to comply may result in faults.

1.1.4 Run

⚠ WARNING

- Drives which have been stored for more than 2 years should be used with voltage regulator to gradually boost the voltage when applying power to the drives. Failure to comply may result in equipment damage.
- Be sure to confirm the completion and correctness of the drive wiring and close the cover before applying power to the drive. Do not open the cover after applying power. Failure to comply may result in electric shock hazard.
- After applying the power, never touch the drive and peripheral circuits no matter what state the drive is under, otherwise there will be electric shock hazard.
- Prior to the run of the drive, check there is no person in surrounding area who can reach the motor and its load so as to prevent personal injury.
- Only qualified technicians familiar with adjustable frequency AC drives are allowed to perform signal test during operation. Failure to comply may result in

equipment damage and/or personal injury.

- Never change the drive parameters at will. Failure to comply may result in equipment damage.

ATTENTION

- Make sure the number of phases of power supply and rated voltage are consistent with product nameplate. If not, contact the seller or GTAKE.
- Check there are no short circuits in peripheral circuits connected with the drive, and make sure the connection is tight. Failure to comply may result in equipment damage.
- Make sure the motor and associated machinery are within allowable range of service prior to operation. Failure to comply may result in equipment damage.
- Never touch fans, heat sink and braking resistor with bare hands. Failure to comply may result in equipment damage and/or personal injury.
- It is not allowed to start & stop the driver frequently via direct switching power on or off. Failure to comply may result in equipment damage.
- Make sure the drive is in a non-output status before switch-on/switch-off of the drive output and/or contactor. Failure to comply may result in equipment damage.

1.1.5 Maintenance

WARNING

- Only qualified technicians are allowed to implement the maintenance, and troubleshooting.
- Never implement the maintenance, and troubleshooting before power supply has been cut off and discharged completely. Failure to comply may result in equipment damage and/or personal injury.
- To avoid an electric shock hazard, wait at least 10 minutes after the power has been cut off and make sure the residual voltage of the bus capacitors has discharged to 0V before performing any work on the drive.
- After the replacement of the drive, be sure to perform the same procedures in strict accordance with above-noted rules.

ATTENTION

- Do not touch the electric components with bare hands without electrostatic protective measures during maintenance, and troubleshooting. Failure to do this may result in component damage caused by ESD.

- All pluggable components can be inserted or pulled out only when power has been cut off.

1.2 Other Considerations

1.2.1 Input Power Supply

This series of drives are not applicable to applications out the range of operating voltage as set forth in this manual. If the input voltage is not in the required range, please use booster to rise or drop the voltage to the stated voltage range.

1.2.2 Surge Protection

This series of drives are furnished with surge suppressor that has certain resistance to lightning induction. However, users in areas with frequent occurrence of lightning need to mount an external surge suppressor in front of the drive power input side.

1.2.3 Operation of Contactor

As to the configuration of peripheral devices recommended by this manual, it is necessary to mount a contactor between the power supply and this drive input side. Such a contactor should not be used as a control device for start and stop of the drive, as frequent charging & discharging shall reduce the service life of internal electrolytic capacitors.

When it is necessary to mount a contactor between the drive output and the motor, it should be ensured the drive is in a non-output status before switch-on/switch-off of such a contactor. Failure to comply may result in drive damage.

1.2.4 Output Filter

Since the drive output is PWM high frequency chopping voltage, mounting filter devices such as an output filter and an output AC reactor between the motor and the drive shall effectively reduce output noise, avoiding interference to other surrounding equipments.

If the length of cable between the drive and the motor exceeds 100m, an output AC reactor is recommended to use with the purpose of preventing drive fault as a result of overcurrent caused by excessive distributed capacitance. An output filter is optional depending on field requirements.

Be sure not to mount phase-shifting capacitor or surge absorber at output side of the

drive since this may result in drive damage as a result of over-temperature.

1.2.5 Insulation of the motor

In view of the fact that the drive output is PWM high frequency chopping voltage accompanied by higher harmonics, the noise, temperature rise and vibration of the motor is higher compared with sinusoidal voltage. Particularly this debases motor insulation. Therefore, the motor should be subjected to insulation inspection before initial use or reuse after being stored for a long period of time. The motor in regular service should also be subjected to regular insulation inspection so as to avoid the drive damage as a result of motor insulation damage.

1.2.6 Derating

The drive heat dissipation by forced air cooling degrades ascribed to the thin air in high-altitude areas, as well as the electrolyte of electrolytic capacitors is more volatile, which can result in reduction in product life. Drive should be derated when used in an area at the altitude above 1000 meters. It is recommended to derate 1% for every 100m when the altitude is above 1000 meters.

Chapter 2 Product Information

2.1 Model Explanation

Model shown on product nameplate indicates the series name, applicable type of power supply, power class and the version of software and hardware, etc. via the combination of numbers, symbols and letters.

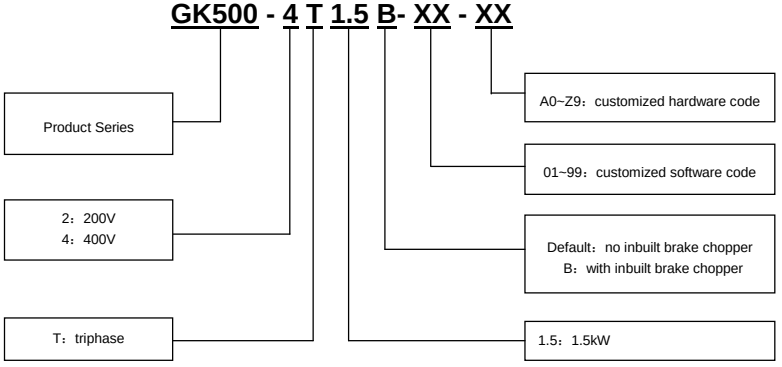


Fig. 2-1 Product model explanation

2.2 Nameplate Information

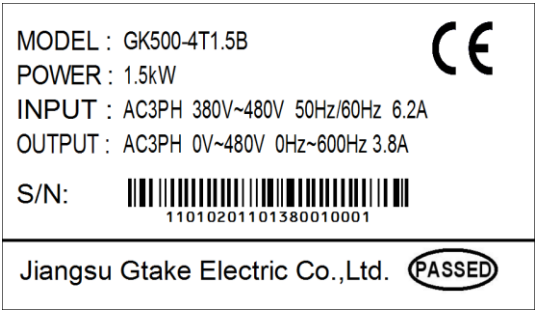


Fig. 2-2 Nameplate information

2.3 Information of Product Model

Table 2-1 Product model and technical data

Voltage	Model	Power rating （kW）	Output current （A）	Triphase input current （A）	Single-phase input current （A）	Applicable motor （kW）	Brake unit
200V*	GK500-2T0.4B	0.4	2.6	3.2	5.5	0.4	inbuilt
	GK500-2T0.75B	0.75	4.5	6.3	9.2	0.75	
	GK500-2T1.5B	1.5	7.5	9	14.5	1.5	
	GK500-2T2.2B	2.2	9.6	15	23	2.2	
400V	GK500-4T0.75B	0.75	2.5	3.5	/	0.75	
	GK500-4T1.5B	1.5	3.8	6.2	/	1.5	
	GK500-4T2.2B	2.2	5.5	9.2	/	2.2	
	GK500-4T3.7B	3.7	9	14.9	/	3.7	

* 200V drives are applicable for triphase 200V and single-phase 200V.

2.4 Technical Features of GK500

Table 2-2 Technical Features of GK500

Power input	Rated input voltage	3-phase AC208V/AC220V/AC230V/AC240V/AC380V /AC400V/AC415V/AC440V/AC460V/AC480V 1-phase AC220V/AC230V/AC240V
	Rated input current	See Section 2.3
	Frequency	50Hz/60Hz, tolerance ±5%
	Voltage range	Continuous voltage fluctuation ±10%, short fluctuation -15%~+10% Voltage out-of-balance rate <3%, distortion rate as per the requirements IEC61800-2
Power output	Applicable motor (kW)	See Section 2.3
	Rated current (A)	See Section 2.3
	Output voltage (V)	3-phase: 0~ rated input voltage, error < ±3%

Power output	Output frequency (Hz)	0.00~ 600.00Hz; unit: 0.01Hz
	Overload capacity	150% - 1min; 180% - 10s; 200% - 0.5s
Control characteristics	V/f patterns	V/f control Sensor-less vector control 1
	Speed regulation range	1:100 (V/f , sensor-less vector control 1)
	Speed accuracy	±0.5% (V/f control) ±0.2% (sensor-less vector control 1)
	Speed fluctuation	±0.3% (sensor-less vector control 1)
	Torque response	< 10ms (sensor-less vector control 1)
	Starting torque	0.5Hz: 180% (V/f control, sensor-less vector control 1)
Basic functions	Start frequency	0.00~ 600.00Hz
	Accel/ Decel time	0.00~60000s
	Switching frequency	0.7kHz~12kHz
	Frequency setting	Digital setting + control panel ∧/∨ Digital setting + terminal UP/DOWN Potentiometer Communication Analog setting (AI1)
	Motor start-up methods	Started from starting frequency DC brake start-up
	Motor stop methods	Ramp to stop Coast to stop Ramp stop + DC brake
	Dynamic braking capacity	Brake chopper working voltage: 400V input: 650V~750V 200V input: 325V～375V service time: 0.0~100.0s

	DC brake capacity	DC brake start frequency: 0.00~600.00Hz DC brake current: 0.0~100.0% DC brake time: 0.0~30.00s
Basic functions	Input terminals	4 digital inputs 1 analog, current/voltage programmable
	Output terminals	1 digital output 1 relay output
		1 analog output, voltage/current programmable; can output signals such as frequency setting, or output frequency, etc
Featured functions	various master & auxiliary commands, a variety of Accel/Decel curves programmable, analog auto correction, 8-step speed programmable, three faults history, over excitation brake, over voltage stall protection, under voltage stall protection, restart upon power loss, skip frequency, frequency binding, four kinds of Accel/Decel time, process PID, autotuning, field-weakening control	
Protection functions	Refer to Chapter 6- Troubleshooting	
Environment	Place of operation	Indoors, no direct sunlight, free from dust, no corrosive gases, no flammable gases, no oil mist, no water vapor, no water drop and salt, etc.
	Altitude	0~2000m De-rate 1% for every 100m when the altitude is above 1000 meters
	Ambient temperature	-10℃~50℃
	Relative humidity	0~95%, no condensation
	Vibration	Less than 5.9m/s2 (0.6g)
	Storage temperature	-40℃~+70℃
Others	Efficiency at rated Amps	At rated Amps ≥93%
	Installation	Wall-mounted, Din-rail
	IP grade	IP20
	Cooling method	Forced air cooling

2.5 Parts Drawing

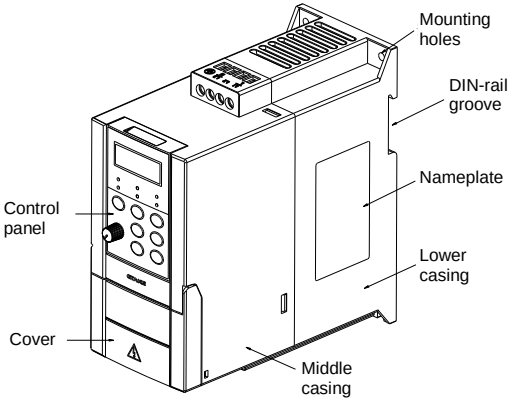


Fig. 2-3 Parts drawing

2.6 Configuration, Mounting Dimensions and Weight

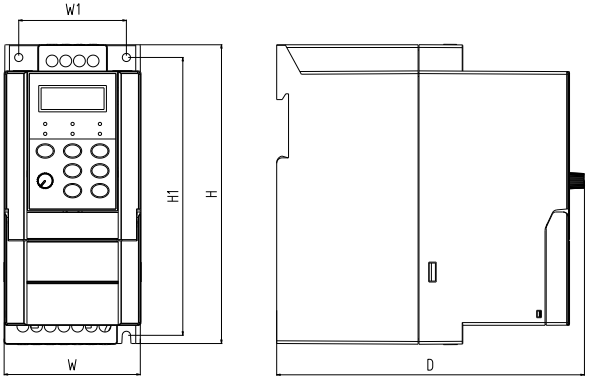


Fig. 2-4 External dimensions

Table 2-3 Dimensions and weight

Model	Dimensions（mm）						Weight
	W	H	D	W1	H1	Mounting holes (dia)	(kg)
GK500-2T0.4B	75	166	168	59	154	4.5	1.25
GK500-2T0.75B							
GK500-4T0.75B							
GK500-4T1.5B							
GK500-2T1.5B	85	188	172	69	175	4.5	1.7
GK500-2T2.2B							
GK500-4T2.2B							
GK500-4T3.7B							

2.7 External Dimensions of Control Panel

Control panel model of GK500 series mini AC motor drive is KBU-BX2 whose configuration and external dimensions are shown in Fig. 2-5. The cabinet hole dimensions are as shown in Fig. 2-6. when remote control panel mounting is required.

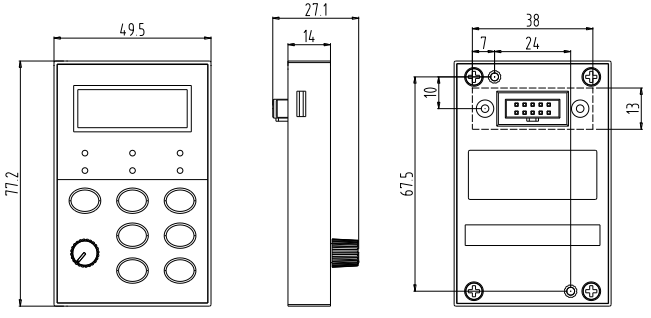


Fig. 2-5 External dimensions of KBU-BX2

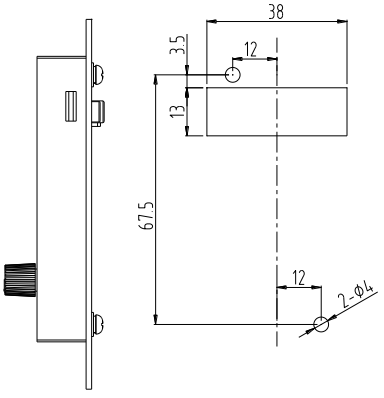


Fig. 2-6 Cabinet hole dimensions when control panel remote mounting required

Chapter 3 Installation and Wiring

3.1 Installation Environment

1） Ambient temperature should be in the range of -10℃~ 50℃.
2） Drive should be installed on surface of flame retardant object, with adequate surrounding space for heat dissipation.
3） Installation should be performed where vibration is less than 5.9m/s^2 (0.6g).
4） No moisture and direct sunlight.
5） Do not install in areas with grease dirt, dust, metal particles, or salty substances
6） Do not expose to an atmosphere with flammable gases, corrosive gases, explosive gases or other harmful gases.

3.2 Minimum Mounting Clearances

To ensure favorable heat dissipation, mount the drive upright on a flat, vertical and level surface as per Fig. 3.1.

GK500 series can be wall-mounted or DIN-rail mounted. When installation is performed inside cabinet, the product shall be mounted side by side to the greatest extent while adequate surrounding space shall be preserved for favorable heat dissipation.

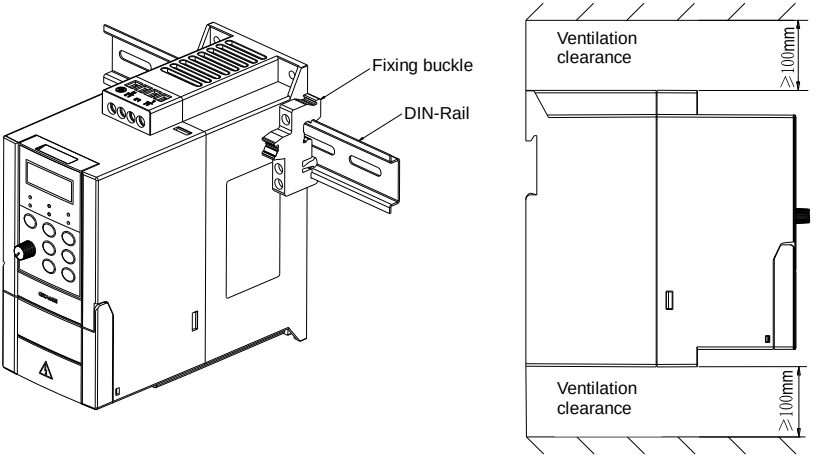


Fig. 3-1 Minimum mounting clearances

ATTENTION:

If several drives are mounted in one cabinet, parallel side-by-side mounting is recommended.

3.3 Remove & Mount the Control Panel and Cover

3.3.1 Remove and Mount the Control Panel

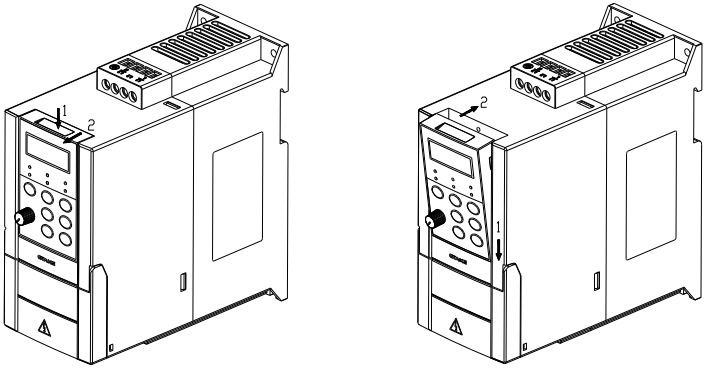
- **Remove control panel**

  Press the buckle of control panel as indicated by number "1" in Fig. 3-2 a), then pull the control panel out to release as indicated by "2".

- **Mount control panel**

  Slightly slant the control panel in the direction as indicated by number "1" in Fig. 3-2 b) and align it to clamping port at lower part of control panel bracket, then press it in as indicated by "2".

  When there is a "click" sound, it indicates clamping has been properly made.



a) Remove control panel *b) Mount control panel*

Fig. 3-2 Remove and mount control panel

3.3.2 Open & Close the Cover

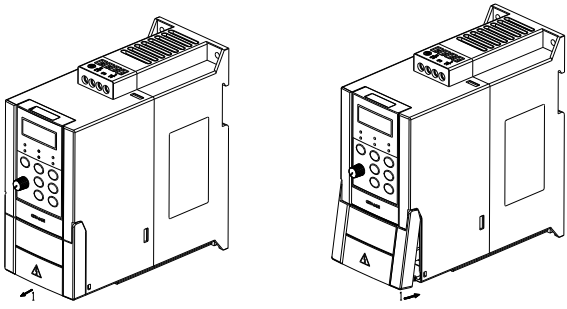
- **Open the cover**

  Pull out as indicated by “1” in Fig. 3-3 a) with thumb.

- **Close the cover**

  After the completion of wiring, press the cover as indicated by “1” in Fig. 3-3 b).

When there is a “click” sound, it indicates clamping has been well completed.



a) Open the cover *b) Close the cover*

Fig. 3-3 Open and close the cover

3.4 Selection of Peripheral Devices

Table 3-1 Selection of peripheral devices

Model	Breaker （A）	Contactor （A）	Brake unit	
			Power（W）	Resistor（Ω）
GK500-2T0.4B	16	10	70	≥200
GK500-2T0.75B	25	16	70	≥200
GK500-2T1.5B	32	25	260	≥100
GK500-2T2.2B	40	32	260	≥75
GK500-4T0.75B	16	10	300	≥150
GK500-4T1.5B	16	10	450	≥100
GK500-4T2.2B	16	10	600	≥75
GK500-4T3.7B	40	32	600	≥75

* All models have inbuilt brake chopper, and brake resistors should be sourced. Strictly conform to the requirement in the form. Failure to comply may result in equipment damage.

3.5 Terminal Configuration

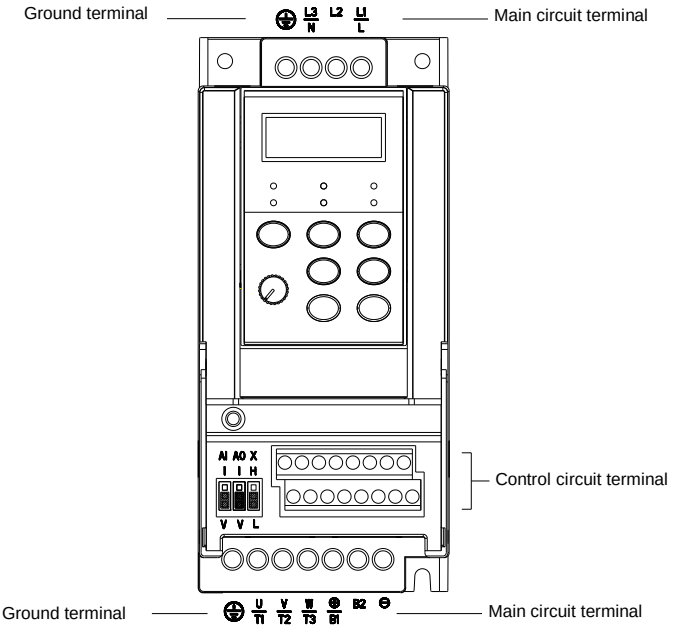


Fig. 3-4 Terminal configuration

3.6 Main Circuit Terminals and Wiring

WARNING

- Only qualified personnel familiar with AC motor drives are allowed to implement wiring. Failure to comply may result in equipment damage and/or personnel injury even death.
- Wiring should be in strict accordance with this manual, otherwise hazard of electric shock or equipment damage exists.
- Make sure input power supply has been completely disconnected before wiring operation. Failure to comply will result in personnel injury even death.
- All wiring operations and lines should comply with EMC and national and local industrial safety regulations and/or electrical codes. The conductor diameter should be in accordance with recommendations of this manual. Otherwise, hazard of equipment damage, fire, and/or personnel injury exists.

- Since leakage current of the drive may exceed 3.5mA, for safety's sake, the drive and the motor must be grounded so as to avoid hazard of electric shock.
- Be sure to perform wiring in strict accordance with the drive terminal marks. Never connect three-phase power supply to output terminals U/T1, V/T2 and W/T3. Failure to comply will result in equipment damage.
- Only mount braking resistors at terminals ⊕ /B1and B2.
- Wiring screws and bolts for main circuit terminals must be screwed tightly. Failure to comply may result in faults and/or equipment damage.

⚠ ATTENTION

- Signal wires should to the best of possibility be away from main power lines. In the event that this cannot be ensured, vertical cross arrangement should be adopted, reducing EMI interference to the signal wires as much as possible.
- In case the motor cable exceeds 100m, an appropriate output reactor should be mounted.

3.6.1 Main Circuit Terminals

Terminal marks	Specification
L1/L、L2、L3/N	Uniphase/Triphase AC power supply input (connect L1/L, L3/N when the input is uniphase)
⊕ /B1、B2	Brake resistor wiring terminals
⊕ /B1⊖	DC power supply input terminals
U/T1、V/T2、W/T3	Triphase AC output terminals
⏚	Ground terminal PE

3.6.2 Terminal Screw and Wiring Requirement

Table 3-2 Terminal screw and wiring requirement

Model	Power terminal			Ground terminal		
	Cable（mm^2）	Scew	Torque（kgf·cm）	Cable（mm^2）	Screw	Torque（kgf·cm）
GK500-2T0.4B	2.5	M3.5	15±0.5	2.5	M3.5	15±0.5
GK500-2T0.75B	2.5	M3.5	15±0.5	2.5	M3.5	15±0.5

Model	Power terminal			Ground terminal		
	Cable (mm^2)	Scew	Torque (kgf·cm)	Cable (mm^2)	Screw	Torque (kgf·cm)
GK500-2T1.5B	4	M3.5	15±0.5	2.5	M3.5	15±0.5
GK500-2T2.2B	6	M3.5	15±0.5	4	M3.5	15±0.5
GK500-4T0.75B	2.5	M3.5	15±0.5	2.5	M3.5	15±0.5
GK500-4T1.5B	4	M3.5	15±0.5	4	M3.5	15±0.5
GK500-4T2.2B	6	M3.5	15±0.5	4	M3.5	15±0.5
GK500-4T3.7B	6	M3.5	15±0.5	6	M3.5	15±0.5

3.7 Control Terminal Wiring

WARNING

- Only qualified personnel familiar with AC motor drives are allowed to implement wiring. Failure to comply may result in equipment damage and/or personnel injury even death.
- Wiring should be in strict accordance with this manual, otherwise hazard of electric shock or equipment damage exists.
- Make sure input power supply has been completely disconnected before wiring operation. Failure to comply will result in personnel injury even death.
- All wiring operations and lines should comply with EMC and national and local industrial safety regulations and/or electrical codes. The conductor diameter should be in accordance with recommendations of this manual. Otherwise, hazard of equipment damage, fire, and/or personnel injury exists.
- Screws or bolts for terminal wiring must be screwed tightly.
- AC 220V signal is prohibited from connecting to other terminals than control terminals RA, RB and RC.

ATTENTION

- Signal wires should to the best of possibility be away from main power lines. If this cannot be ensured, vertical cross arrangement should be adopted, reducing EMI interference to the signal wires as much as possible.

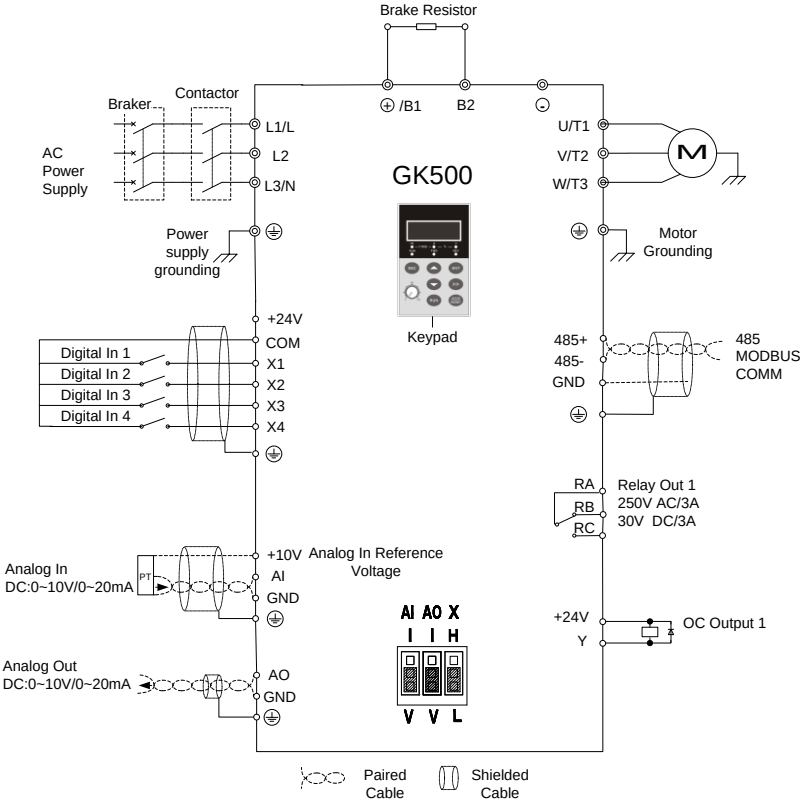


Fig. 3-5 Wiring diagram

3.8 Control Terminal Specification

Table 3-3 Control terminal specification

Category	Terminal	Terminal designation	Specification
Analog input	+10V	Analog input reference voltage	10.3V ±3%
			Maximum output current 25mA The resistance of external potentiometer should be larger than 400Ω
	GND	Analog ground	Connect with COM interiorly
	AI1	Analog input	0~20mA: input impedance - 500Ω, maximum input current - 25mA
			0~10V: input impedance - 100kΩ, maximum input voltage - 12.5V
			Can be jumped between 0~20mA and 0~10V, factory default: 0~10V
Analog output	AO	Analog output	0~20mA: impedance - 200Ω-500Ω
			0~10V: impedance- 10kΩ
			Can be jumped between 0~20 mA and 0~10V, factory default: 0~10V
	GND	Analog ground	Connect with COM interiorly
Digital input	+24V	+24V	24V±10%
			Maximal load 100mA
	COM	+24V ground	Connect with GND interiorly
	X1~X4	Digital input Terminal 1~4	Input: 24VDC, 5mA
			Freq range: 0~200Hz
			Voltage range: 22V~26V
Digital output	Y	Open collector output	Voltage range: 0~24V
			Current range: 0~50mA
Relay output	RA/RB/ RC	Control board relay output	RA-RB: NC; RA-RC: NO
			Contact capacity: 250VAC/3A, 30VDC/3A
Terminal 485 Interface	485+	485 differential signal +	Rate: 4800/9600/19200/38400/57600bps
	485−	485 differential signal -	Maximum distance - 500m (standard network cable used)
	GND	485 shielded grounding	Connected with COM interiorly

Category	Terminal	Terminal designation	Specification
Control panel interface	CN4	Control panel interface	Maximum communication distance is 5m when connected to Control panel
			Use GTAKE dedicated cable

3.9 Control Terminal Usage

3.9.1 Lay-out of Control Terminals

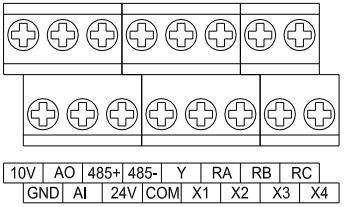


Fig. 3-6 Lay-out of control terminals

3.9.2 Control Terminal Screw and Wiring Requirement

Table 3-6 Terminal screw and wiring specification

Cable type	Cable requirement (mm^2)	Screw	Torque (kgf.cm)
Shielded cable	1.0	M3	5±0.5

3.9.3 Instructions of Analog Input/Output Terminals

Being particularly vulnerable to noise, analog input & output signals cables should be as short as possible, shielded, and their shielded layers should be properly grounded close to the side of drive. The cables should not exceed 20m.

Control cables shall be kept no less than 20cm away from main circuit and strong current lines (e.g. power lines, motor lines, relay lines and contactor lines) and should not be arranged in parallel with strong current lines. In case it is inevitable to intersect strong current line, vertical wiring is recommended to avoid drive faults as a result of noise.

Where analog input & output signals are severely interfered, the side of analog signal source should be provided with filter capacitor or ferrite core.

3.9.4 Instructions of Digital Input/Output Terminals

Digital input & output signals cables should be as short as possible, shielded, and their shielded layers should be properly grounded close to the side of drive. The cables should not exceed 20m. When active drive is selected, take necessary filtering measures against power crosstalk, for which dry contact control is recommended.

Control cables shall be kept no less than 20cm away from main circuit and strong current lines (e.g. power lines, motor lines, relay lines and contactor lines) and should not be arranged in parallel with strong current lines. In case it is inevitable to intersect strong current line, vertical wiring is recommended to avoid drive faults as a result of noise. Operating instructions for switching value input terminal.

- **Instructions of digital input terminal**
  - **Dry contact**

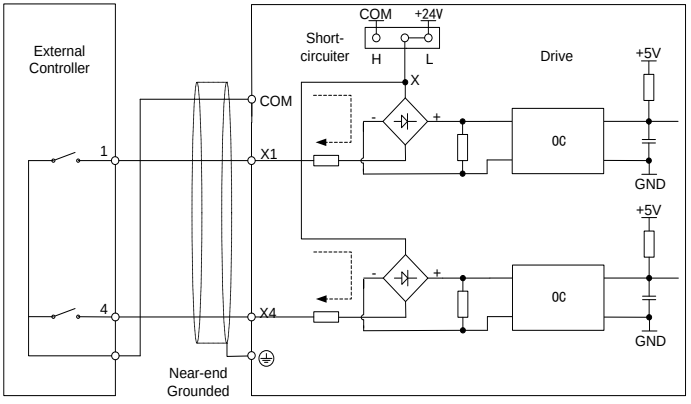


Fig. 3-7 Dry contact wiring (activated at X-terminal low level)

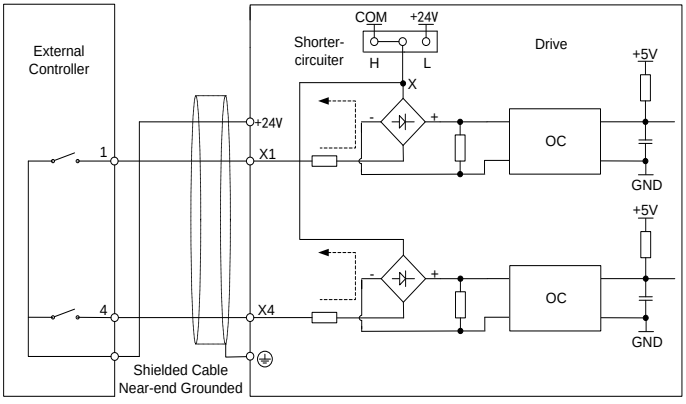


Fig. 3-8 Dry contact wiring (activated at X-terminal high level)

◆ **Open collector**

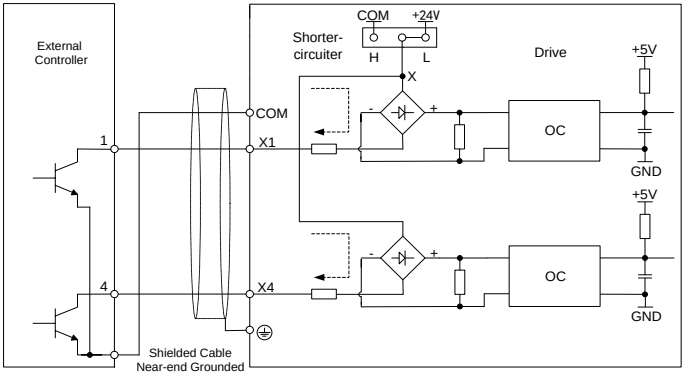


Fig. 3-9 Open collector NPN wiring

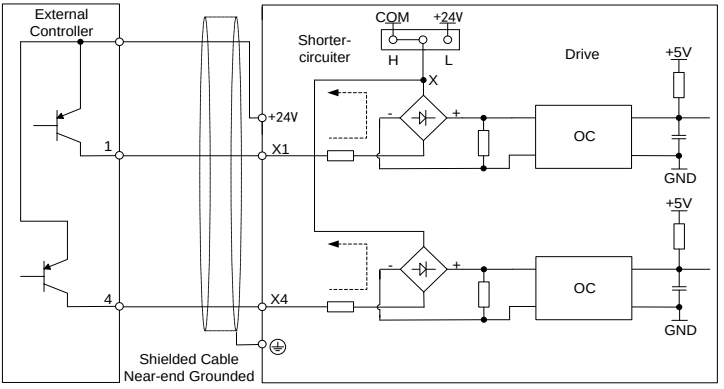
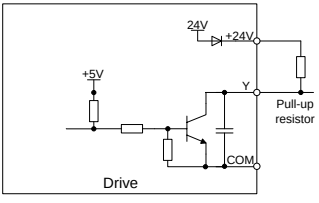
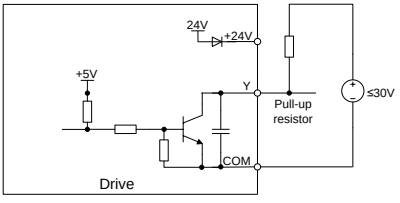


Fig. 3-10 Open collector PNP wiring

- **Instructions of digital output terminal**
  - **Instructions of Y output terminal**

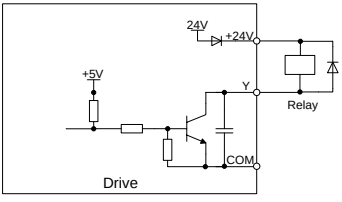


a) Internal power supply

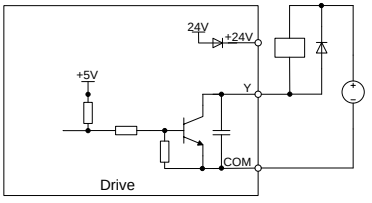


b) External power supply

Fig. 3-11 Wiring when Y output with pull-up resistor



a) Internal power supply



b) External power supply

Fig. 3-12 Wiring when Y output drive relay

ATTENTION:

When relay coil voltage is lower than 24V, a resistor as voltage divider selected based on coil impedance should be mounted between relay and output terminal,.

◆ **Wiring instruction of relay output terminal**

RA/RB/RC are relay contacts. RA and RB are normally closed, while RA and RC are normally open. See parameter C1-02 for details.

ATTENTION:

In case inductive load (e.g. electromagnetic relay or contactor) is to be driven, a surge voltage absorbing circuit such as RC absorbing circuit, piezoresistor or fly-wheel diode etc. shall be mounted. Absorbing devices should be mounted close to the end of relay or contactor.

3.10 Instruction of Signal Switches

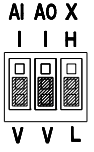


Fig. 3-13 Diagram of signal jumper switches

Designati	Function	Default
AI	I: current input (0-20mA), V: voltage input (0-10V)	0-10V
AO	I: current input (0-20mA), V: voltage input (0-10V)	0-10V
X	H: X terminal high level activated. L: X terminal low	L

3.11 EMI Solutions

Due to its working principle, the drive will inevitably produce certain noise that may influence and disturb other equipment. Moreover, since the internal weak electric signal of drive is also susceptible to the interference of drive itself and other equipment, EMI problems shall be inevitable. In order to reduce or avoid the interference of drive to external environment and protect drive against interference from external environment, this section makes a brief description of noise abatement, ground handling, leakage current suppression and the application of power line filters.

3.11.1 Noise Abatement

- When peripheral equipment and drive share the power supply of one system, noise from drive may be transmitted to other equipment in this system via power lines and result in misoperation and/or faults. In such a case, the following measures could be taken:
  1) Mount input noise filter at input terminal of the drive;
  2) Mount power supply filter at power input terminal of affected equipment;
  3)Use isolation transformer to isolate the noise transmission path between other equipment and the drive.
- As the wiring of peripheral equipment and drive constitutes a circuit, the unavoidable earthing leakage current of inverter will cause equipment misoperation and/or faults. Disconnect the grounding connection of equipment may avoid this misoperation and/or faults
- Sensitive equipment and signal lines shall be mounted as far away from drive as possible.
- Signal lines should be provided with shielded layer and reliably grounded. Alternatively, signal cable could be put into metallic conduits between which the distance shall be no less than 20cm, and shall be kept as far away from drive and its peripheral devices, cables as possible. Never make signal lines in parallel with power lines or bundle them up.
- Signal lines must orthogonally cross power lines if this cross inevitable.
- Motor cables shall be placed in thick protective screen like more than 2mm-thick pipelines or buried cement groove, also, power lines can be put into metallic conduit and grounded well with shielded cables.
- Use 4-core motor cables of which one is grounded at close side of the drive and the other side is connected to motor enclosure.
- Input and output terminals of drive are respectively equipped with radio noise filter and linear noise filter. For example, ferrite common mode choke can restrain radiation noise of power lines.

3.11.2 Grounding

Recommended ground electrode is shown in the figure below:

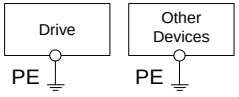


Fig. 3-14 Grounding

- Use to the fullest extent the maximum standard size of grounding cables to reduce the impedance of grounding system;
- Grounding wires should be as short as possible;
- Grounding point shall be as close to the drive as possible;
- One wire of 4-core motor cables shall be grounded at the drive side and connected to grounding terminal of motor at the other side. Better effect will be achieved if motor and drive are provided with dedicated ground electrodes;
- When grounding terminals of various parts of system are linked together, leakage current turns into a noise source that may influence other equipment in the system, thus, grounding terminals of the drive and other vulnerable equipment should be separated.
- Grounding cable shall be kept away from inlet & output of noise-sensitive equipment.

3.11.3 Leakage Current Suppression

Leakage current passes through the line-to-line and ground distributed capacitors at input & output sides of drive, and its size is associated with the capacitance of distributed capacitor and the carrier frequency. Leakage current is classified into ground leakage current and line-to-line leakage current.

- Ground leakage current not only circulates inside drive system, but may also influence other equipment via ground loop. Such a leakage current may result in malfunction of RCD and other equipment. The higher the carrier frequency of drive is, the bigger the ground leakage current would be. The longer the motor cables and the bigger the parasitic capacitance are, the bigger the ground leakage current would be. Therefore, the most immediate and effective method for suppression of ground leakage current is to reduce carrier frequency and minimize the length of motor cables.
- The higher harmonics of line-to-line leakage current that passes through between cables at output side of drive will Accel the aging of cables and may bring about malfunction of other equipment. The higher the carrier frequency of drive is, the bigger the line-to-line leakage current would be. The longer the motor cables and the bigger the parasitic capacitance are, the bigger the line-to-line leakage current would be. Therefore, the most immediate and effective method for suppression of ground leakage current is to reduce carrier frequency and minimize the length of motor cable. Line-to-line leakage current can also be effectively suppressed by mounting additional output reactors.

3.11.4 Use of Power Supply Filter

Since AC drives may generate strong interference and are also sensitive to outside interference, power supply filters are recommended. Pay close attention to the following

instructions during the use:

- Enclosure of the filter needs to be reliably grounded;
- Input lines of the filter shall be kept as far away from output lines as possible so as to avoid mutual coupling;
- Filter shall be as close to the drive side as possible;
- Filter and drive must be connected to the same common ground.

Chapter 4 Operation and Run Instructions

4.1 Operation of Control Panel

As a human-machine interface, control panel is the main part for the drive to receive command and display parameters.

Fig. 4-1 Control panel

4.2 Key Functions

On control panel there are 7 keys and 1 knob whose functions are as shown in Table 4-1.

Table 4-1 Key and potentiometer functions on control panel

Symbol	Key name	Meaning
ENT	Enter key	1) Parameter code edition enter 2) Confirmation of parameter value settings
ESC	Escape key	1) Return 2) Invalidate parameter editing value
▲	Up key	1) Increment of selected digital of parameter code 2) Increment of selected digital of parameter value 3) Increment of set frequency
▼	Down key	1) Decrement of selected digital of parameter code 2) Decrement of selected digital of parameter value 3) Decrement of set frequency

Symbol	Key name	Meaning
	Shift key	1) Selection of parameter code serial digital 2) Selection of parameter value edited digital 3) Selection of stop/run-status displayed parameters 4) Fault status switched to parameter displayed status
	Run key	Run
	Stop/reset key	1) Stop 2) Fault reset
	Potentiometer	1) Frequency set source 2) Process PID setting

4.3 Control panel Indicators

Control panel is furnished with 6 indicators with functions as stated below.

Table 4-2 Description of indicators

Indicator	Designation	Meaning
Hz	Frequency indicator	ON: currently displayed parameter is run frequency or the unit of current parameter is frequency Flash: currently displayed parameter is set frequency
A	Current indicator	ON: currently displayed parameter is current
V	Voltage indicator	ON: currently displayed parameter is voltage
Hz+A	Run speed indicator	ON: currently displayed parameter is run speed Flash: currently displayed parameter is set speed
A+V	Percentage indicator	ON: currently displayed parameter is percentage
All OFF	No unit	No unit
RUN	Run status indicator	ON: Run OFF: Stopped Flash: Stopping
FWD	Forward indicator	ON: If the drive in stop status, forward command enabled. If the drive in run status, the drive is running forward Flash: Forward is switching to reverse
REV	Reverse indicator	ON: If the drive in stop status, reverse command enabled. If the drive in run status, the drive is running reversely. Flash: Reverse is switching to forward

4.4 Potentiometer Setting

Potentiometer could be frequency setting source or process PID setting programmed by related parameters. When b0-01 is set to 3, potentiometer is source of master frequency setting. When b0-03 is set to 4, potentiometer is source of auxiliary frequency setting. When ones place, tens place, or hundreds place of b1-01 is set to 4, potentiometer would be working as frequency setting source of corresponding run command source. Please set F0-00 to 2 when potentiometer is working as process PID setting.

4.5 Prompt Message Status

Prompt message status shall be displayed at the completion of some operations. For instance, "dEFt2" would be displayed upon the completion of “restore to factory default (motor parameters inclusive). Table 4-3 shows meanings of the characters displayed on control panel.

Table 4-3 Prompt messages

Characters	Meaning	Characters	Meaning
LoC-1	Control panel locked 1 (all locked)	P-SEt	Password has been set
LoC-2	Control panel locked 2 (all locked except RUN, STOP/RESET)	P-CLr	Password cleared
LoC-3	Control panel locked 3 (all locked except STOP/RESET)	TUNE	Autotuning
LoC-4	Control panel locked 4 (all locked except shift key)	CLr-F	Clear fault record
PrtCt	Control panel protection	dEFt1	Restore to factory default (motor parameters exclusive)
UnLoC	Unlock control panel	dEFt2	Restore to factory default (motor parameter inclusive)
LoU	Drive undervoltage		

4.6 Parameter Setting

4.6.1 Parameter System

GK500 series drive parameter group: A0, b0~b2, C0~C4, d0~d2, E0~E1, F0~F1, H0, L0~L1, U0~U1. Each parameter group contains a number of parameters. Parameter codes are identified by the combination "parameter group character + parameter subgroup number + parameter number". For instance, "F1-07" indicates the seventh parameter code at subgroup 1, group F.

4.6.2 Parameter Display Structure

Parameters and the parameter values are subject to a two-tier structure. Parameters correspond to first-tier display, while parameter values correspond to second-tier display. The first-tier display is shown as Fig. 4-2, while the second-tier as Fig. 4-3:

Fig. 4-2 First-tier parameter display

Fig. 4-3 Second-tier parameter display ("3" is the value of b0-00)

Chapter 5 List of Parameters

GK500 parameter groups are listed below:

Category	Parameter group	Related pages
Group A: system parameters	A0: system parameters	P35
Group b: run parameter setting	b0: frequency setting	P35
	b1: start/stop control	P37
	b2: Accel/Decel parameters	P38
Group C: input and output terminals	C0: digital input	P39
	C1: digital output	P41
	C2: analog input	P42
	C3: analog output	P44
	C4: automatic correction of analog input	P44
Group d: motor and control parameters	d0: motor parameters	P45
	d1: motor V/f control parameters	P46
	d2: motor vector control parameters	P47
Group E: enhanced function and protection parameters	E0: enhanced function	P48
	E1: protection parameters	P48
Group F: application	F0: process PID	P50
	F1: multi-step frequency	P51
	F2: mechanical brake control	P52
Group H: communication parameters	H0: MODBUS communication parameters	P52
Group L: keys and display of control panel	L0: keys of control panel	P53
	L1: LED display setting	P54
Group U: monitoring	U0: status monitoring	P55
	U1: fault history	P57

Notice:

" * " means there is remark related to this parameter

Range: settable and displayable range of parameters

Factory default: The value when restored to factory default. Neither measured parameter value nor recorded value will be restored.

Attribution:

"△ " means the value of this parameter can be modified in stop and run status;

"×" means the value of this parameter can not be modified at running;

"◎" means this parameter is a measured value that cannot be modified;

Param	Designation	Range	Factory default	Attr
Group A: System Parameter				
Group A0: System Parameter				
A0-00	Setting of user password	0~FFFF	0000	△
A0-02	Parameter protection	0: All parameter programming allowed 1: Only A0-00 and this parameter programming allowed	0	×
A0-03	Parameter initialization	0: No operation 1: Clear fault history 2: Restore all parameters to factory default (motor parameters exclusive) 3: Restore all parameters to factory default (motor parameters inclusive)	0	×
A0-09	Motor control technique	0: V/f control 1: Sensor-less vector control	0	×
Group b Run Parameter Setting				
Group b0 Frequency Setting				
b0-00	FREQ set mode	0: Master frequency setting 1: Master & auxiliary computation result 2: Switch between master and auxiliary set 3: Switch between master frequency setting, and master & auxiliary computation result 4: Switch between auxiliary frequency setting, and master & auxiliary computation result	0	×
b0-01	Master FREQ set	0: Digital setting (b0-02) + ∧/∨ adjustment on control panel 1: Digital setting (b0-02) + terminal UP/DOWN adjustment 2: Analog input AI 3: Potentiometer 6: Process PID output 8: Multi-step speed 9: Communication	0	×

Param	Designation	Range	Factory default	Attr
b0-02	Master Freq digital setting	Lower limit Freq ~ upper limit Freq	50.00Hz	△
b0-03	Auxiliary frequency set	0: No setting 1: Digital setting (b0-04) + ∧/∨ adjustment on control panel 2: Digital setting (b0-04) + terminal UP/DOWN adjustment 3: AI 4: Potentiometer (at control panel) 7: Process PID output 9: Multi-step speed 10: Communication	0	×
b0-04	Auxiliary frequency digital setting	Lower limit frequency ~ upper limit frequency	0.00Hz	△
b0-05	Auxiliary frequency range	0: Relative to maximum frequency 1: Relative to master frequency	0	×
b0-06	Auxiliary frequency coeff	0.0%~100.0%	100.0%	×
b0-07	Computation of master and auxiliary frequency	0: Master + auxiliary 1: Master - auxiliary 2: Max {master, auxiliary} 3: Min {master, auxiliary}	0	×
b0-08	Maximum frequency	Upper limit frequency ~600.00Hz	50.00Hz	×
b0-09	Upper limit frequency	Lower limit freq ~ maximum freq	50.00Hz	×
b0-10	Lower limit frequency	0.00Hz~upper limit frequency	0.00Hz	×
b0-11	Operation when set frequency lower than lower limit frequency	0: Run at lower limit frequency 1: Run at 0 Hz 2: Stop	0	×
b0-12	Time-delay of stop when set frequency lower than lower limit frequency	0.0s ~ 6553.5s	0.0s	×
b0-13	Lower limit of skip frequency band 1	0.00Hz~upper limit frequency	0.00Hz	×
b0-14	Upper limit of skip frequency band 1	0.00Hz~upper limit frequency	0.00Hz	×
b0-15	Lower limit of skip frequency band 2	0.00Hz~upper limit frequency	0.00Hz	×
b0-16	Upper limit of skip frequency band 2	0.00Hz~upper limit frequency	0.00Hz	×
b0-17	Lower limit of skip frequency band 3	0.00Hz~upper limit frequency	0.00Hz	×

Param	Designation	Range	Factory default	Attr
b0-18	Upper limit of skip frequency band 3	0.00Hz~upper limit frequency	0.00Hz	×
b0-19	Jog frequency	0.00Hz~upper limit frequency	5.00Hz	△
Group b1 Start/Stop Control				
b1-00	Run command	0: Control panel control 1: Terminal control 2: Communication control	0	×
b1-01	Binding of run command and frequency setting	Ones place: frequency setting source bundled under control panel control: 0: No binding 1: Digital setting (b0-02) + ∧/∨ adjustment on control panel 2: Digital setting (b0-02) + terminal UP/DOWN adjustment 3: AI 4: Control panel potentiometer 7: Process PID output 9: Multi-step speed A: Communication input Tens place: frequency setting source bundled under terminal control (same as Ones place) Hundreds place: frequency setting source bundled under communication control (same as Ones place)	000	×
b1-02	Run direction	0: Forward 1: Reverse	0	Δ
b1-03	Reverse disabled	0: Reverse enabled 1: Reverse disabled	0	×
b1-04	Dead time between forward and reverse	0.0s~3600.0s	0.0s	Δ
b1-05	Start method	0: From start frequency 1: DC brake start	0	×
b1-06	Start frequency	0.00Hz~upper limit frequency	0.00Hz	×
b1-07	Holding time of start frequency	0.0s~3599.9s	0.0s	Δ
b1-08	DC brake current at start	0.0%~100.0%	0.0%	Δ
b1-09	DC brake time at start	0.00s~30.00s	0.00s	Δ

Param	Designation	Range	Factory default	Attr
b1-10	Flying start current	0.0~200.0%	100.0%	×
b1-11	Flying start decel time	0.1s~20.0s	2.0s	×
b1-13	Stop method	0: Ramp to stop 1: Coast to stop 2: Ramp to stop + DC brake	0	×
b1-14	Start frequency of DC brake stop	0.00Hz~upper limit frequency	0.00Hz	×
b1-15	Brake current	0.0%~100.0%	0.0%	Δ
b1-16	Brake time	0.00s~30.00s	0.00s	Δ
b1-17	Overexcitation brake	0: Disabled 1: Enabled	1	×
b1-18	Dynamic brake	0: Disabled 1: Enabled	0	×
b1-19	Dynamic brake threshold voltage	200V: 325V~375V, default: 375V 400V: 650V~750V, default: 720V	Model dependent	×
b1-20	Auto restart when power up again after power loss	0: Disabled 1: Enabled	0	×
b1-21	Time delay of auto restart when power up again	0.0s~10.0s	0.0s	Δ
Group b2 Accel/Decel Parameters				
b2-00	Accel/Decel time resolution	0:0.01s 1:0.1s 2:1s	1	×
b2-01	Accel time 1	0s~600.00s/6000.0s/60000s	6.0s	Δ
b2-02	Decel time 1	0s~600.00s/6000.0s/60000s	6.0s	Δ
b2-03	Accel time 2	0s~600.00s/6000.0s/60000s	6.0s	Δ
b2-04	Decel time 2	0s~600.00s/6000.0s/60000s	6.0s	Δ
b2-05	Accel time 3	0s~600.00s/6000.0s/60000s	6.0s	Δ
b2-06	Decel time 3	0s~600.00s/6000.0s/60000s	6.0s	Δ
b2-07	Accel time 4	0s~600.00s/6000.0s/60000s	6.0s	Δ
b2-08	Decel time 4	0s~600.00s/6000.0s/60000s	6.0s	Δ
b2-09	Decel time for emergency stop	0s~600.00s/6000.0s/60000s	6.0s	Δ
b2-10	Jog Accel time	0s~600.00s/6000.0s/60000s	6.0s	Δ
b2-11	Jog Decel time	0s~600.00s/6000.0s/60000s	6.0s	Δ
b2-12	Accel/Decel curve selection	0: Linear Accel/Decel 1: Broken-line Accel/Decel 2: S-curve Accel/Decel	0	×

Param	Designation	Range	Factory default	Attr
b2-13	Accel time switching frequency of broken-line Accel/Decel	0.00Hz~upper limit frequency	0.00Hz	Δ
b2-14	Decel time switching frequency of broken-line Accel/Decel	0.00Hz~upper limit frequency	0.00Hz	Δ
b2-15	Time of Accel S-curve first segment	0.00s~60.00s	0.20s	Δ
b2-16	Time of Accel S-curve last segment	0.00s~60.00s	0.20s	Δ
b2-17	Time of Decel S-curve first segment	0.00s~60.00s	0.20s	Δ
b2-18	Time of Decel S-curve last segment	0.00s~60.00s	0.20s	Δ
Group C Input and Output Terminals				
Group C0 Digital Input				
C0-00	Enabled condition of run command terminals when power up	0: Trigger edge detected + ON detected 1: ON detected	0	×
C0-01	Function of terminal X1	0: No function 1: JOG forward 2: JOG reverse 3: Run forward (FWD) 4: Run reverse (REV) 5: Three-wire control 6: Run suspended 7: External stop 8: Emergency stop 9: Stop command + DC brake 10: DC brake stop 11: Coast to stop 12: Terminal UP 13: Terminal DOWN 14: Clear UP/DOWN (including ∧/∨ key) adjustment 15: Multi-step freq terminal 1 16: Multi-step freq terminal 2 17: Multi-step freq terminal 3 19: Accel/Decel time determinant 1 20: Accel/Decel time determinant 2	0	×
C0-02	Function of terminal X2		0	×
C0-03	Function of terminal X3		0	×
C0-04	Function of terminal X4		0	×
C0-08	Function of terminal AI (Digital enabled)		0	×

Param	Designation	Range	Factory default	Attr
		21: Accel/Decel disabled(ramp stop not inclusive) 22: External fault input 23: Fault reset (RESET) 27: Run command switched to control panel control 28: Run command switched to terminal control 29: Run command switched to communication control 30: Frequency set mode shift 31: Master frequency set switched to digital setting b0-02 32: Auxiliary frequency set switched to digital setting b0-04 33: PID adjustment direction 34: PID paused 35: PID integration paused 36: PID parameter switch 68: Run prohibited 69: DC brake in run		
C0-09	Run command enabled condition when drive run condition restored	0: Trigger edge detected + ON detected 1: ON detected	0	×
C0-11	Filtering time of digital input terminal	0.000s~1.000s	0.010s	Δ
C0-12	Delay time of terminal X1	0.0s~3600.0s	0.0s	Δ
C0-13	Delay time of terminal X2	0.0s~3600.0s	0.0s	Δ
C0-14	Digital input terminal enabled status setting 1	Ones place: X1 0: Positive logic 1: Negative logic Tens place: X2 (same as Ones place) Hundreds place: X3 (same as Ones place) Thousands place: X4 (same as Ones place)	0000	×
C0-16	Digital input terminal enabled status setting 2	AI： 0: Positive logic 1: Negative logic	0	×

Param	Designation	Range	Factory default	Attr
C0-17	Terminal UP/DOWN FREQ adjustment action	Ones place: at stop 0: Cleared 1: Maintained Tens place: on power loss 0: Cleared 1: Maintained Hundreds place: integral function 0: No integral function 1: Integral function enabled Thousands place: run direction 0: Changing run direction prohibited 1: Changing run direction allowed	0100	Δ
C0-18	Terminal UP/DOWN frequency change step size	0.00Hz/s~100.00Hz/s	0.10 Hz/s	Δ
C0-19	FWD/REV terminal control mode	0: Two-wire mode 1 1: Two-wire mode 2 2: Three-wire mode 1 3: Three-wire mode 2	0	×
C0-20	Option of virtual input terminal	000~10F 0: Actual terminal in effect 1: Virtual terminal in effect Ones place: BIT0~BIT3: X1~X4 Tens place: Reserved Hundreds place: AI	000	×
Group C1 Digital Output				
C1-00	Y output function	0: No output	0	Δ
C1-02	Control board relay output function	1: Drive undervoltage 2: Drive run preparation completed 3: Drive is running 4: Drive running at 0Hz (there is no output at stop) 5: Drive running at 0Hz (there is output at stop) 6: Run direction 7: Frequency attained 8: Upper limit frequency attained 9: Lower limit frequency attained 10: Frequency detection FDT1	14	Δ

Param	Designation	Range	Factory default	Attr
		11: Frequency detection FDT2 13: Torque limited 14: Fault output 15: Alarm output 16: Drive (motor) overloaded alarm 17: Drive overheat alarm 18: Zero current detection 19: X1 20: X2 25: Consecutive run time attained 26: Accumulative run time attained		
C1-04	Y output time delay	0.0s~3600.0s	0.0s	Δ
C1-06	Relay output time delay	0.0s~3600.0s	0.0s	Δ
C1-08	Enabled state of digital output	Ones place: Y 0: Positive logic 1: Negative logic Tens place: Reserved Hundreds place: control board relay output (same as ones place)	000	×
C1-09	Detected object of frequency detection (FDT)	Ones place: FDT1 detected object 0: Speed set value (frequency after Accel/Decel) 1: Detected speed value Tens place: FDT2 detected object 0: Speed set value (frequency after Accel/Decel) 1: Detected speed value	00	Δ
C1-10	FDT1 upper value	0.00Hz~maximum FREQ	50.00Hz	Δ
C1-11	FDT1 lower value	0.00Hz~maximum FREQ	49.00Hz	Δ
C1-12	FDT2 upper value	0.00Hz~maximum FREQ	25.00Hz	Δ
C1-13	FDT2 lower value	0.00Hz~maximum FREQ	24.00Hz	Δ
C1-14	Detection width of frequency attained	0.00Hz~maximum FREQ	2.50Hz	Δ
C1-15	Zero current detection level	0.0%~50.0%	5.0%	Δ
C1-16	Zero current detection time	0.01s~50.00s	0.50s	Δ
Group C2 Analog Input				
C2-00	Analog input curve	Ones place: AI input curve 0: Curve 1 (2 points) 1: Curve 2 (4 points)	10	×

Param	Designation	Range	Factory default	Attr
		Tens place: Control panel potentiometer input curve (same as Ones place)		
C2-01	Curve 1 maximum input	Curve 1 minimum input ~ 110.0%	100.0%	△
C2-02	Corresponding set value of curve 1 maximum input	-100.0%~100.0%	100.0%	△
C2-03	Curve 1 minimum input	-110.0% ~ curve 1 maximum input	0.0%	△
C2-04	Corresponding set value of curve 1 minimum input	-100.0%~100.0%	0.0%	△
C2-05	Curve 2 maximum input	Range: input of curve 2 inflection point A~110.0%	100.0%	△
C2-06	Corresponding set value of curve 2 maximum input	Range: -100.0%~100.0%	100.0%	△
C2-07	Input of curve 2 inflection point A	Input of curve 2 inflection point B ~ curve 2 maximum input	0.0%	△
C2-08	Set value corresponding to input of curve 2 inflection point A	Range: -100.0%~100.0%	0.0%	△
C2-09	Input of curve 2 inflection point B	Range: Curve 2 minimum input ~ Input of curve 2 inflection point A	0.0%	△
C2-10	Set value corresponding to input of curve 2 inflection point B	Range: -100.0%~100.0%	0.0%	△
C2-11	Curve 2 minimum input	Range: -110.0%~ input of curve 2 inflection point B	0.0%	△
C2-12	Set value corresponding to curve 2 minimum input	Range: -100.0%~100.0%	0.0%	△
C2-21	AI terminal filtering time	0.000s~10.000s	0.01s	▲

Param	Designation	Range	Factory default	Attr
C2-22	Control panel potentiometer input filtering time	0.000s~10.000s	0.01s	Δ
Group C3 Analog Output				
C3-00	AO output function	0: No output 1: Set frequency 2: Output frequency 3: Output current (related to drive rated current) 4: Output torque 5: Output voltage 6: Output power 7: Bus voltage 9: Torque current 10: Magnetic flux current 11: AI 16:Communication input percentage 17: Output frequency before compensation	2	Δ
C3-03	AO offset	-100.0%~100.0%	0.0%	×
C3-04	AO gain	-2.000~2.000	1.000	×
C3-05	AO filtering time	0.0s~10.0s	0.0s	Δ
Group C4 Automatic Correction of Analog Input				
C4-00	Analog correction	0: No correction 1: Correct AI 2: Correct control panel potentiometer	0	×
C4-01	Sampling value of AI calibration point 1	Range: 0.00V~10.00V	1.00V	◎
C4-02	Input value of AI calibration point 1	Range: 0.00V~10.00V	1.00V	×
C4-03	Sampling value of AI calibration point 2	Range: 0.00V~10.00V	9.00V	◎

Param	Designation	Range	Factory default	Attr
C4-04	Input value of AI calibration point 2	Range: 0.00V~10.00V	9.00V	×
C4-05	Sampling value of calibration point 1 of control panel potentiometer	Range: 0.00V~10.00V	1.00V	◎
C4-06	Input value of calibration point 1 of control panel potentiometer	Range: 0.00V~10.00V	1.00V	×
C4-07	Sampling value of calibration point 2 of control panel potentiometer	Range: 0.00V~10.00V	9.00V	◎
C4-08	Input value of calibration point 2 of potentiometer	Range: 0.00V~10.00V	9.00V	×
Group d Motor and Control Parameters				
Group d0 Motor Parameters				
d0-00	Motor type	0: Ordinary motor 1: Variable frequency motor	0	×
d0-01	Motor power rating	0.4kW~6553.5kW	Model dependent	×
d0-02	Motor rated voltage	220V: 0V～260V default: 220V 400V: 0V～480V default: 380V	Model dependent	×
d0-03	Motor rated current	0.0A~6553.5A	Model dependent	×
d0-04	Motor rated frequency	0.00Hz~upper limit frequency	50.00Hz	×
d0-05	Motor pole number	1~80	4	×
d0-06	Motor rated speed	0~65535r/min	Model dependent	×
d0-07	Motor stator resistance R1	0.001Ω~65.535Ω	Model dependent	×
d0-08	Motor leakage inductance L1	0.1mH~6553.5mH	Model dependent	×
d0-09	Motor rotor resistance R2	0.001Ω~65.535Ω	Model dependent	×
d0-10	Motor mutual inductance L2	0.1mH~6553.5mH	Model dependent	×
d0-11	Motor no-load current	0.0A~6553.5A	Model dependent	×

Param	Designation	Range	Factory default	Attr
d0-12	Motor flux weakening coeff 1	0.0000~1.0000	Model dependent	×
d0-13	Motor flux weakening coeff 2	0.0000~1.0000	Model dependent	×
d0-14	Motor flux weakening coeff 3	0.0000~1.0000	Model dependent	×
d0-22	Motor parameter autotuning	0: No autotuning 1: Static autotuning 2: Rotary autotuning	0	×
d0-23	Motor overload protection mode	0: No protection 1: Judged from motor current	1	×
d0-24	Motor overload protection detection time	0.1min~15.0min	5.0min	×
d0-27	Flying start Kp	0.00~100.00	0.00	×
d0-28	Flying start Ki	0.00~100.00	2.00	×
Group d1 Motor V/f Control Parameters				
d1-00	V/f curve setting	0: Linear V/f 1: Multi-stage V/f (d1-01~d1-08)	0	×
d1-01	V/f frequency value f3	0.00Hz~motor rated frequency	50.00Hz	×
d1-02	V/f voltage value V3	0.0%~100.0%	100.0%	×
d1-03	V/f frequency value f2	d1-05~d1-01	0.00Hz	×
d1-04	V/f voltage value V2	0.0%~100.0%	0.0%	×
d1-05	V/f frequency value f1	d1-07~d1-03	0.00Hz	×
d1-06	V/f voltage value V1	0.0%~100.0%	0.0%	×
d1-07	V/f frequency value f0	0.00Hz~d1-05	0.00Hz	×
d1-08	V/f voltage value V0	0.0%~100.0%	0.0%	×
d1-09	Torque boost	0.0%~30.0%	0.0%	△
d1-10	Slip compensation gain	0.0%~400.0%	100.0%	△
d1-12	Current limitation mode	0: Disabled 1: Set by d1-13 2: Set by AI	1	×
d1-13	Digital setting of current limited value	20.0%~200.0%	160.0%	×
d1-14	Current limit coeff on flux weakening	0.001~1.000	0.500	△

Param	Designation	Range	Factory default	Attr
d1-15	Energy saving percentage	0%~40.0%	0.0%	Δ
d1-16	V/f oscillation suppression gain 1	0~3000	0	Δ
d1-17	V/f oscillation suppression gain 2	0~3000	0	Δ
Group d2 Motor Vector Control Parameters				
d2-01	ASR high-speed proportional gain Kp1	0.0~20.0	2.0	Δ
d2-02	ASR high-speed integration time Ti1	0.000s~8.000s	0.500	Δ
d2-03	ASR low-speed proportional gain Kp2	0.0~20.0	2.0	Δ
d2-04	ASR low-speed integration time Ti2	0.000s~8.000s	0.500	Δ
d2-05	ASR switch frequency 1	0.00Hz~d2-06	5.00Hz	Δ
d2-06	ASR switch frequency 2	d2-05~upper limit frequency	10.00Hz	Δ
d2-07	ASR input filtering time	0.0ms~500.0ms	0.3ms	Δ
d2-08	ASR output filtering time	0.0ms~500.0ms	0.3ms	Δ
d2-09	ACR proportion coeff Kp	0.000~4.000	1.000	Δ
d2-10	ACR integration coeff Ki	0.000~4.000	1.000	Δ
d2-11	Pre-excitation time	0.000s~5.000s	0.200s	Δ
d2-12	Driven torque restriction source	0: d2-14 digital setting 1: AI 5: Communication	0	×
d2-13	Braking torque restriction source	0: d2-15 digital setting 1: AI 5: Communication	0	×
d2-14	Digital setting of driven torque	0.0%~200.0%	180.0%	Δ
d2-15	Digital setting of braking torque	0.0%~200.0%	180.0%	Δ
d2-16	Torque limit coefficient in flux weakening	0.0%~100.0%	50.0%	Δ
d2-17	Driven slip compensation gain	10.0%~300.0%	100.0%	Δ
d2-18	Brake slip compensation gain	10.0%~300.0%	100.0%	Δ

Param	Designation	Range	Factory default	Attr
Group E Enhanced Function and Protection Parameters				
Group E0 Enhanced Function				
E0-00	Switching frequency	0.7kHz~12.0kHz	8.0kHz	△
E0-01	PWM optimization	Ones place: switching frequency relation with temperature 0: Self-adaption 1: No adaption Tens place: PWM modulation mode 0: Five-segment and seven-segment self-switchover 1: Five-segment mode 2: Seven-segment mode Hundreds place: over-modulation adaption 0: Disabled 1: Enabled	020	×
E0-02	Action when run time attained	Ones place: action when consecutive run time attained: 0: Run continued 1: Stop and fault reported Tens place: action when accumulative run time attained: 0: Run continued 1: Stop and fault reported Hundreds place: unit of run time 0: Second 1: Hour	000	×
E0-03	Consecutive run time setting	0.0s(h)~6000.0s(h)	0.0	×
E0-04	Accumulative run time setting	0.0s(h)~6000.0s(h)	0.0	×
Group E1 Protection Parameters				
E1-00	Overvoltage stall	0: Prohibited 1: Allowed	1	×
E1-01	Overvoltage stall protection voltage	220V: 100%~120% default: 116% 400V: 120%~150% default: 135%	Model dependent	×

Param	Designation	Range	Factory default	Attr
E1-02	Undervoltage stall	0: Disabled 1: Enabled	0	×
E1-03	Overload alarm	Ones place: detection option: 0: Always detect 1: Detect at constant speed only Tens place: compared with: 0: Motor rated current 1: Drive rated current Hundreds place: drive action 0: Alarm but run continued 1: Alarm and coast to stop	000	×
E1-04	Overload alarm threshold	20.0%~200.0%	180.0%	△
E1-05	Overload alarm activation time	0.1s~60.0s	5.0s	△
E1-06	Protected action 1	Ones place: reserved Tens place: action at IGBT temperature measurement circuit fault: 0: Fault reported and coast to stop 1: Alarm but run continued Hundreds place: reserved Thousands place: abnormal terminal communication (TrC): 0: Fault reported and coast to stop 1: Alarm but run continued	0000	×
E1-07	Protected action 2	Ones place: reserved Tens place: current detection circuit failed 0: Fault reported and coast to stop 1: Alarm but run continued Hundreds place: reserved Thousands place: output phase loss: 0: Fault reported and coast to stop 1: Alarm but run continued	0000	×
E1-08	Fault memory after power loss	0: Not memorized after power loss 1: Memorized after power loss	0	×
E1-09	Fault auto-reset times	0~20	0	×
E1-10	Auto-reset interval	2.0s~20.0s	2.0s	×
E1-11	Relay action on drive fault	Ones place: when undervoltage	010	×

Param	Designation	Range	Factory default	Attr
		fault occurs 0: No action 1: Action enabled Tens place: when fault locked 0: No action 1: Action enabled Hundreds place: at interval of auto-reset 0: No action 1: Action enabled		
E1-13	Drive overheat alarm threshold	0.0℃~100.0℃	80.0℃	△
Group F Application				
Group F0 Process PID				
F0-00	PID setting	0: F0-01 digital setting 1: AI 2: Control panel potentiometer 5: Communication	0	×
F0-01	PID digital setting	0.0%~100.0%	50.0%	△
F0-02	PID feedback	0: AI 8: Communication	0	×
F0-03	PID adjustment	Ones place: output frequency 0: Must be the same direction as setting run direction 1: Opposite direction allowed Tens place: integration selection 0: Integral continued when frequency attains upper/lower frequency 1: Integral stopped when frequency attains upper/lower limit	11	×
F0-04	PID positive and negative adjustment	0: Positive adjustment 1: Negative adjustment	0	×
F0-05	Filtering time of PID setting	0.00s~60.00s	0.00s	△
F0-06	Filtering time of PID feedback	0.00s~60.00s	0.00s	△
F0-07	Filtering time of PID output	0.00s~60.00s	0.00s	△
F0-08	Proportional gain Kp1	0.0~100.0	50.0	△
F0-09	Integration time Ti1	0.001s～50.000s	0.500s	△

Param	Designation	Range	Factory default	Attr
F0-10	Differential time Td1	0.0s~100.0s	0.0s	△
F0-11	Proportional gain Kp2	0.0~100.0	50.0	△
F0-12	Integration time Ti2	0.001s～50.000s	0.500s	△
F0-13	Differential time Td2	0.0s~100.0s	0.0s	△
F0-14	PID parameter switch selection	0: No switch, determined by parameters Kp1, Ti1 and Td1 1: Auto-switched on the basis of input offset 2: Switched by terminal	0	×
F0-15	Input offset under PID auto-switch	0.0%~100.0%	20.0%	△
F0-16	Sampling period T	0.006s～50.000s	0.008s	△
F0-17	PID offset limit	0.0%~100.0%	0.0%	△
F0-18	PID derivative limit	0.0%~100.0%	0.5%	△
F0-19	PID initial value	0.0%~100.0%	0.0%	×
F0-20	Holding time of PID initial value	0.0s~3600.0s	0.0s	△
F0-21	PID feedback loss detection value	0.0%~100.0%	0.0%	△
F0-22	PID feedback loss detection time	0.0s~30.0s	1.0s	△
F0-23	Cutoff FREQ when opposite to rotary set direction	0.00Hz~mximum frequency	50.00Hz	△
F0-24	PID computation option	0: No computation in stop status 1: Computation continued in stop status	0	△
Group F1 Multi-step Frequency				
F1-00	Frequency set source of multi-step 0	0: Digital setting F1-02 1: Digital setting b0-02 + control panel ∧/∨ adjustment 2: Digital setting b0-02 + terminal UP/DOWN adjustment 3: AI 4: Control panel potentiometer 7: Process PID output 8: Communication	0	×
F1-01	Frequency set source of multi-step 1	0: Digital setting F1-03 1: Digital setting b0-04 + control	0	×

Param	Designation	Range	Factory default	Attr
		panel ∧/∨ adjustment 2: Digital setting b0-04 + terminal UP/DOWN 3: AI 4: Control panel potentiometer 7: Process PID output 8: Communication		
F1-02	Multi-step frequency 0	Lower limit frequency ~ upper limit frequency	0.00Hz	△
F1-03	Multi-step frequency 1	Lower limit frequency ~ upper limit frequency	0.00 Hz	△
F1-04	Multi-step frequency 2	Lower limit frequency ~ upper limit frequency	0.00 Hz	△
F1-05	Multi-step frequency 3	Lower limit frequency ~ upper limit frequency	0.00 Hz	△
F1-06	Multi-step frequency 4	Lower limit frequency ~ upper limit frequency	0.00 Hz	△
F1-07	Multi-step frequency 5	Lower limit frequency ~ upper limit frequency	0.00 Hz	△
F1-08	Multi-step frequency 6	Lower limit frequency ~ upper limit frequency	0.00 Hz	△
F1-09	Multi-step frequency 7	Lower limit frequency ~ upper limit frequency	0.00 Hz	△
Group F2 Mechanical Brake Control				
F2-00	Mechanical control selection	0: disabled 1: enabled	0	×
F2-01	Mechanical brake open frequency	0.00Hz~10.00Hz	2.50Hz	△
F2-02	Mechanical brake open current	0.0%~200.0%	120.0%	△
F2-03	Mechanical brake open action time	0.0s~10.0s	1.0s	△
F2-04	Mechanical brake close frequency	0.00Hz~10.00Hz	2.00Hz	△
F2-05	Mechanical brake close waiting time	0.0s~10.0s	0.0s	△
F2-06	Mechanical brake close action time	0.0s～10.0s	1.0s	△

Param	Designation	Range	Factory default	Attr
Group H Communication Parameters				
Group H0 MODBUS Communication Parameters				
H0-01	RS-485 port communication configuration	Ones place: baud rate 0: 4800bps 1: 9600bps 2: 19200bps 3: 38400bps 4: 57600bps Tens place: data format 0: 1-8-2-N format, RTU 1: 1-8-1-E format, RTU 2: 1-8-1-O Format, RTU 3: 1-7-2-N format, ASCII 4: 1-7-1-E format, ASCII 5: 1-7-1-O format, ASCII Hundreds place: connection type 0: Direct cable connection (232/485) 1: MODEM (232) Thousands place: communication data handling at power loss 0: Not stored at power loss 1: Stored at power loss	0002	×
H0-02	485 terminal communication address	0~247, 0 is broadcast address	1	×
H0-03	Time out detection of 485 terminal communication	0.0s~1000.0s	0.0s	×
H0-04	Time delay of 485 terminal communication	0ms~1000ms	0ms	×
H0-05	Master/Slave option	0: Independently used 1: As master 2: As slave	0	×
H0-06	Parameter store address when this drive working as master	0:b0-02 1:F0-01	0	×
H0-07	Proportional factor of received frequency	0.0%~1000.0%	100.0%	△

Param	Designation	Range	Factory default	Attr
Group L Keys and Display of Control Panel				
Group L0 Keys of Control Panel				
L0-01	Keys locked selection	0: Not locked 1: All locked 2: Keys locked except RUN, STOP/RESET 3: Keys locked except STOP/RESET 4: Keys locked except >>	0	△
L0-02	Function of STOP key	0: STOP key active only at control panel control 1: STOP key deactive under any run command source	0	△
L0-03	FREQ adjustment through keys ∧/∨	Ones place: option at stop 0: Clear at stop 1: Holding on stop Tens place: option at power loss 0: Clear at power loss 1: Holding at power loss Hundreds place: integral option 0: Integral disabled 1: Integral enabled Thousands place: run direction 0: Direction changing prohibited 1: Direction changing permitted	0100	△
L0-04	Step size of FREQ adjustment through keys ∧/∨	0.00Hz/s~10.00Hz/s	0.10Hz/s	△
Group L1 LED Display Setting				
L1-00	LED displayed parameter settings on running status	Setting of binary system: 0: Display disabled 1: Display enabled Ones place: BIT0: Running frequency (Hz) BIT1: Set frequency (Hz) BIT2: Bus voltage (V) BIT3: Output current (A) Tens place: BIT0: Output torque (%)	000F	△

Param	Designation	Range	Factory default	Attr
		BIT1: Output power (kW) BIT2: Output voltage (V) BIT3: Motor speed (r/min) Hundreds place: BIT0: AI (V) BIT1: Control panel potentiometer (V) BIT2: Input terminal status BIT3: Output terminal status Thousands place: BIT0: PID setting (%) BIT1: PID feedback (%) BIT2: Reserved BIT3: Reserved Note: when this parameter is set to 0000, run frequency (Hz) would be displayed as default		
L1-02	LED displayed parameter settings on stop status	Setting of binary system: 0: Display disabled 1: Display enabled Ones place: BIT0: Set frequency (Hz) BIT1: Bus voltage (V) BIT2: Input terminal status BIT3: Output terminal status Tens place: BIT0: AI (V) BIT1: Control panel potentiometer (V) BIT2: Reserved BIT3: Reserved Hundreds place: BIT0: PID setting (%) BIT1: PID feedback (%) BIT2: Reserved BIT3: Reserved Thousands place: Reserved Note: when this parameter is set to 0000, the set frequency would be displayed as default (Hz)	0003	△

Param	Designation	Range	Factory default	Attr
Group U Monitoring				
Group U0 Status Monitoring				
U0-00	Run frequency	0.00Hz~600.00Hz	0.00Hz	◎
U0-01	Set frequency	0.00Hz~600.00Hz	0.00Hz	◎
U0-02	Bus voltage	0V~65535V	0V	◎
U0-03	Output voltage	0V~65535V	0V	◎
U0-04	Output current	0.0A~6553.5A	0.0A	◎
U0-05	Output torque	0.0%~300.0%	0.0%	◎
U0-06	Output power	0.0%~300.0%	0.0%	◎
U0-09	Master frequency setting	0.00Hz~600.00Hz	0.00Hz	◎
U0-10	Auxiliary frequency setting	0.00Hz~600.00Hz	0.00Hz	◎
U0-11	Drive status	Ones place: run status 0: Accelerating 1: Decelerating 2: Constant speed run Tens place: drive status 0: Stop 1: Running 2: Autotuning	00	◎
U0-12	AI input voltage	0.00V~10.00V	0.00V	◎
U0-13	Control panel Potentiometer input voltage	0.00V~10.00V	0.00V	◎
U0-15	AO output	0.0%~100.0%	0.0%	◎
U0-18	Digital input terminal status	0~F	0	◎
U0-19	Digital output terminal status	0~7	0	◎
U0-20	PID set	0.0%~100.0%	0.0%	◎
U0-21	PID feedback	0.0%~100.0%	0.0%	◎
U0-22	PID input offset	-100.0%~100.0%	0.0%	◎
U0-30	Cumulative power-up time	0h~65535h	0h	◎
U0-31	Cumulative run time	0h~65535h	0h	◎
U0-33	IGBT temperature	-40.0℃~100.0℃	0.0℃	◎
U0-36	Run command log at LoU	0~1	0	◎
U0-37	Fault code log at LoU	0~100	0	◎

Param	Designation	Range	Factory default	Attr
U0-39	Current detection fault source	0: No fault source 1: IU 2: IV 3: IW	0	◎
U0-42	Higher-bit digital of control panel ∧/∨ stored value	0,-	0	◎
U0-43	Lower-bit digitals of control panel ∧/∨ stored value	-999.9Hz～600.0Hz	0.00Hz	◎
U0-44	Higher-bit digital of terminal UP/DOWN stored value	0,-	0	◎
U0-45	Lower-bit digitals of terminal UP/DOWN stored value	-999.9Hz～600.0Hz	0.00Hz	◎
Group U1 Fault History				
U1-00	Fault 1 code(latest)	0: No fault 1: Accel overcurrent 2: Constant-speed overcurrent 3: Decel overcurrent 4: Accel overvoltage 5: Constant-speed overvoltage 6: Decel overvoltage 7: Module protection 8: Autotuning failed 9: Drive overloaded 10: Motor overloaded 11: Current detection abnormal 12: Ground short-circuit protection at output side 14: Phase loss at output side 16: Heat sink overheated protection 18: Module temperature detection disconnection 24: External equipment malfunction 26: Consecutive run time attained 27: Accumulative run time attained 31: Port communication abnormal	0	◎

Param	Designation	Range	Factory default	Attr
		37: Reference protection 38: 5V power supply out-of-limit 40: AI input out-of-limit 41: Undervoltage protection 45: PID feedback loss 46: Interior communication abnormal		
U1-01	Fault 1 run frequency	0.00Hz~600.00Hz	0.00Hz	◎
U1-02	Fault 1 output current	0.0A~6553.5A	0.0A	◎
U1-03	Fault 1 bus voltage	0V~10000V	0V	◎
U1-05	Fault 1 IGBT temperature	-40.0℃~100.0℃	0.0℃	◎
U1-06	Fault 1 input terminal status	0~FFFF	0000	◎
U1-07	Fault 1 output terminal status	0~FFFF	0000	◎
U1-08	Fault 1cumulative run time	0h~65535h	0h	◎
U1-09	Fault 2 code	Same as U1-00	0	◎
U1-10	Fault 2 run frequency	0.00Hz~600.00Hz	0.00Hz	◎
U1-11	Fault 2 output current	0.0A~6553.5A	0.0A	◎
U1-12	Fault 2 bus voltage	0V~10000V	0V	◎
U1-14	Fault 2 IGBT temperature	-40.0℃~100.0℃	0.0℃	◎
U1-15	Fault 2 input terminal status	0~FFFF	0000	◎
U1-16	Fault 2 output terminal status	0~FFFF	0000	◎
U1-17	Fault 2 cumulative run time	0h~65535h	0h	◎
U1-18	Fault 3 code	Same as U1-00	0	◎
U1-19	Fault 3 run frequency	0.00Hz~600.00Hz	0.00Hz	◎
U1-20	Fault 3 output current	0.0A~6553.5A	0.0A	◎
U1-21	Fault 3 bus voltage	0V~1000V	0V	◎
U1-23	Fault 3 IGBT temperature	-40.0℃~100.0℃	0.0℃	◎
U1-24	Fault 3 input terminal status	0~FFFF	0000	◎
U1-25	Fault 3 output terminal status	0~FFFF	0000	◎
U1-26	Fault 3 cumulative run time	0h~65535h	0h	◎

Remark:

C0-19	FWD/REV terminal control mode	Range: 0~3	Factory default: 0

There are four different types when run command is determined by FED/REV terminal. This terminal control mode takes no effect on JOG.

0: Two-wire mode 1

FWD terminal inputs forward run command, while REV terminal inputs reverse run command.

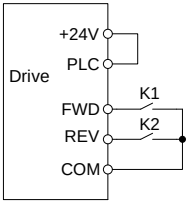


Fig. 5-1

Table 5-1

FWD	REV	Run command
OFF	OFF	Stop
OFF	ON	Reverse
ON	OFF	Forward
ON	ON	Stop

1: Two-wire mode 2

FWD terminal inputs run command, while REV terminal inputs run direction.

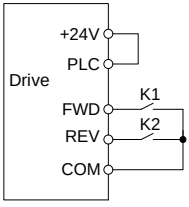


Fig. 5-2

Table 5-2

FWD	REV	Run command
OFF	OFF	Stop
OFF	ON	Stop
ON	OFF	Forward
ON	ON	Reverse

2: Three-wire mode 1

FWD terminal controls forward run of the drive, REV terminal controls reverse run, and digital input terminal "three-wire run" controls the stop. Input signals of all these three terminals take effect when trigger edge is detected.

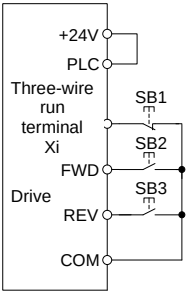


Fig. 5-3 Three-wire mode 1

SB1 is a stop button, by pressing which the drive will stop;

SB2 is a FORWARD button, by pressing which forward run will be activated;

SB3 is a REVERSE button, by pressing which reverse run will be activated.

Xi is a digital input terminal. In this case, it is necessary to define the function of corresponding terminal as "three-wire run" terminal.

3: Three-wire mode 2

FWD terminal controls the run, while run direction is determined by REV terminal. Digital input terminal "three-wire run" controls the stop.

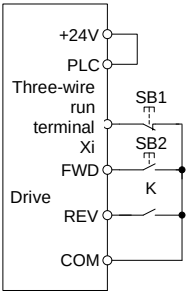


Fig. 5-4 Three-wire mode 2

SB1 is a stop button, by pressing which the drive will stop;

SB2 is a RUN button, by pressing which the drive will run. When switch K is open, run is forward, while when it is closed, run is reverse.

Xi is a digital input terminal. In this case, it is necessary to define the function of corresponding terminal as "three-wire run" terminal.

C1-10	FDT1 upper bound	Range: 0.00Hz~maximum freq	Factory default: 50.00Hz

C1-11	FDT1 lower bound	Range: 0.00Hz~ maximum freq	Factory default: 49.00Hz

These parameters should be used with frequency detection signal FDT1 and FDT2.
Take FDT1 for example, when the drive output frequency exceeds upper bound of FDT1, it will output ON signal, and it will output OFF signal when the output frequency is lower than lower bound of FDT1. Please set C1-10 to be larger to some certain extent than C1-11, avoiding frequent ON/OFF change. See Fig. 5-5:

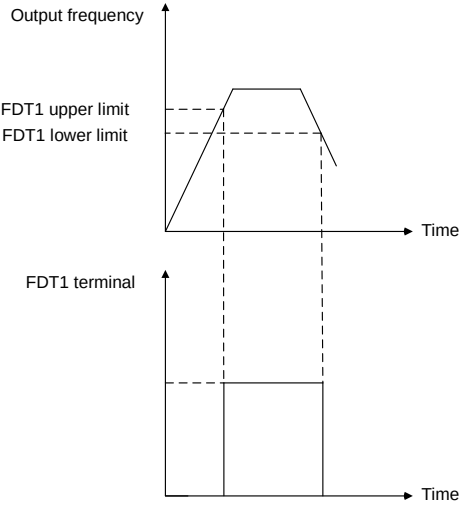


Fig. 5-5

C2-00	Analog input curve selection	Range: 00~11	Factory default: 00

Curves of analog input AI are selected by this parameter.

◆ Ones place: AI input curve selection

0: Curve 1 (2 points)

Defined by C2-01~C2-04. See Fig. 5-6, Fig 5-7, Fig 5-8, and Fig 5-9.

1: Curve 2 (4 points)

Defined by C2-05~C2-12. See Fig 5-10 and Fig 5-11.

◆ Tens place: Potentiometer input curve selection: same as AI

Curve 1 is defined by C2-01~C2-04.

Input value of C2-01, C2-03:

AI: voltage input 0~10V and current input 0~20mA can be jumped.

When it is 0~10V: 0V corresponds to 0%, 10V corresponds to 100%.

When it is 0~20mA: 0mA corresponds to 0%, 20mA corresponds to 100%.

Potentiometer only supports 0~10V voltage input. Corresponding set values of C2-02, C2-04:

When corresponding set value is frequency: 100% is maximal frequency, -100% is negative maximal frequency;

When corresponding set value is current: 100% means 2 times drive rated current, less than or equal to 0% means 0A;

When corresponding set value is torque: 100% means 2 times rated torque, -100% means -2 times rated torque;

When corresponding set value is output voltage: 100% corresponds to motor rated voltage, less than or equal to 0% corresponds to 0V.

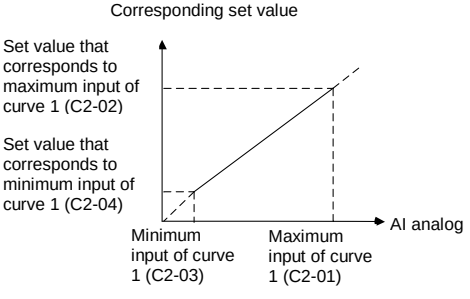


Fig. 5-6

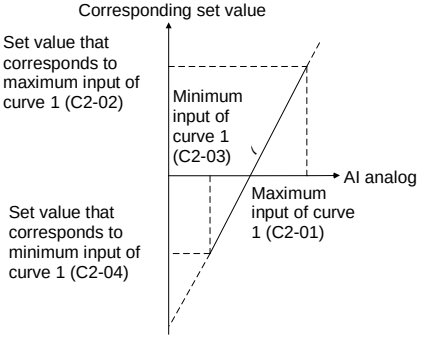


Fig. 5-7

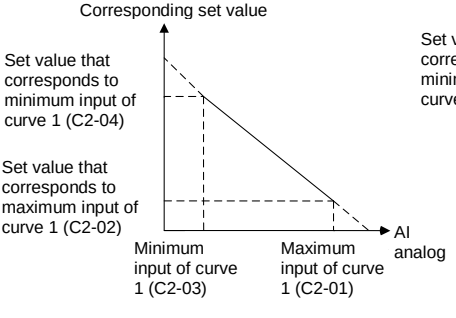


Fig. 5-8

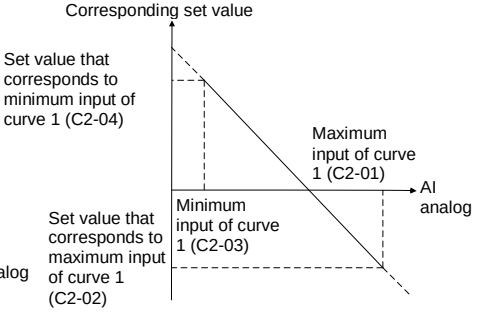


Fig. 5-9

Specification of curve 2 input value is as below.

Voltage input:

1) AI: 0% corresponds to 0V or 0mA, 100% corresponds to 10V or 20mA.

2) Potentiometer: 0% corresponds to 0V, 100% corresponds 10V.

Curve 2 is defined by C2-05~C2-12. Curve 2 input and its corresponding set value is the same as curve 1. However, the difference is Curve 1 is a straight line, while Curve 2 is a broken line with 2 inflection points.

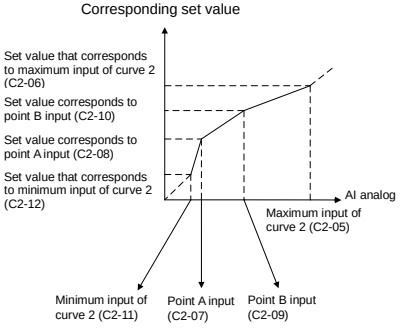


Fig. 5-10

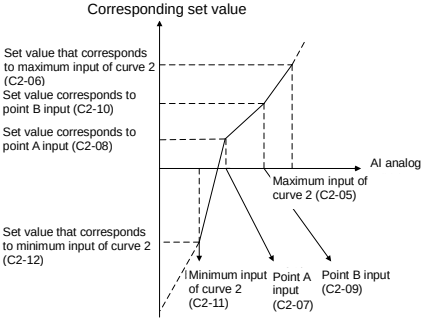


Fig. 5-11

C3-03	AO offset	Range: -100.0%~100.0%	Factory default: 0.0%
C3-04	AO gain	Range: -2.000~2.000	Factory default: 1.000

When users need to change AO measuring range or correct the error of meter, it can be realized by setting of C3-03 and C3-04. When using factory default set: 0~10V (or 0~20mA) of AO corresponds to “0~maximun”. By expressing standard output of AO as x, the adjusted AO output as y, the gain as k, and the offset as b (100% of offset corresponds to 10V or 20mA), there is the equation: y=kx+b

Example:

Set C3-00 to 2: output frequency. Standard AO output: AO outputs 0V when output frequency is 0, and outputs 10V when output frequency is maximum frequency. If AO1 is requested to output 2V when output frequency is 0Hz, and to output 8V when output frequency is the maximum frequency.

There is: 2=k×0+b; 8=k×10+b. Through these two equations, we obtain: k = 0.6, b = 2V, i.e. C3-03 is set to 20.0% while C3-04 is set to 0.600.

Additional examples are shown as below:

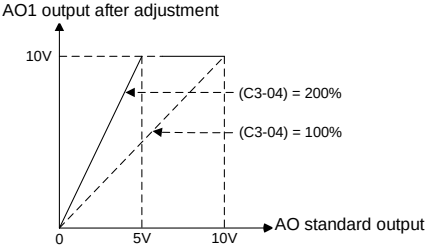


Fig. 5-12 Diagram of influence of AO gain on output

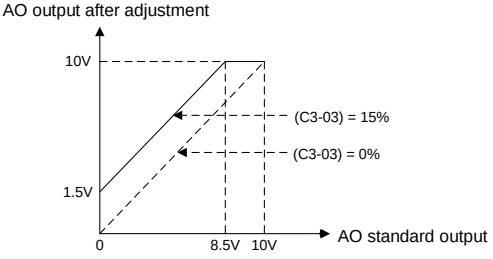


Fig. 5-13 Diagram of influence of AO offset on output

C4-00	Analog corrected channel	Range: 0~2	Factory default: 0

Take potentiometer as example, autocorrection process is as below:

1) Set C4-00 to 2 in stop status and press ENT key to confirm. In this way, potentiometer is selected as correction channel.
2) Input a relatively low analog voltage (e.g. about 1V) via potentiometer, and input the theoretical value of this analog voltage by C4-06 after the stabilization of this voltage input, and then press ENT key to confirm.
3) Input a relatively high analog voltage (e.g. about 5V) via potentiometer, and input the theoretical value of this analog voltage by C4-08 after the stabilization of this voltage input, and then press ENT key to confirm.
4) Upon the successful correction, parameter value of C4-00 will be restored to zero.

ATTENTION:

- Set the theoretical value or actual value of analog voltage in C4-06 and C4-08. This value can be either the set value of analog output of peripheral equipment, or the actual voltage value of analog input measured by a multimeter or other instruments.
- C4-05 and C4-07 are the sampling values of analog input voltage. These values is for reference only. Do not write the value of C4-05 directly into C4-06, or write the value of C4-07 directly into C4-0

Chapter 6 Troubleshooting

6.1 Fault Causes and Troubleshooting

Once drive fault occurs, please identify the causes of fault carefully and make a detailed record of fault symptom. To seek services, please contact the dealer.

Parameters U1-00, U1-09 and U1-18 are used to view the fault history of fault 1 (fault 1 = the most recent fault), fault 2 (fault 2 = the second most recent fault), and fault 3 (fault 3 = the third most recent fault). Faults are recorded with numeric codes (0~46), while the fault information that corresponds to each numeric fault code is specified in the table below.

Table of Fault Codes

Fault code	Fault Display	Fault description	Causes	Solutions
1	oC1	Accel overcurrent	Torque boost is too big under V/f control	Reduce torque boost value
			Starting frequency is too high	Drop starting frequency
			Accel time is too short	Prolong the Accel time
			Motor parameters are improperly set	Set the parameters correctly according to motor nameplate
			Output short circuit (phase-to-phase short circuit or output ground short circuit)	Check motor connection and output ground impedance
			Overload is too heavy	Reduce the load
			Inappropriate V/f curve under V/f control	Set V/f curve correctly
			Restart the rotating motor	Reduce current limited value or start through speed search

Fault code	Fault Display	Fault description	Causes	Solutions
2	oC2	Constant speed overcurrent	Output short circuit (phase-to-phase short circuit or output ground short circuit)	Check motor connection and output ground impedance
			Overload is too heavy	Reduce the load
			Power rating of the drive is relatively small	Select appropriate drive power rating
			Input voltage is too low	Check power grid voltage
3	oC3	Decel overcurrent	Output short circuit (phase-to-phase short circuit or output ground short circuit)	Check motor connection and output ground impedance
			Load inertia is too big	Use dynamic brake
			Decel time is too short	Prolong the Decel time
			Input voltage is too low	Check power grid voltage
4	ov1	Accel overvoltage	Load inertia is too big	Use dynamic brake
			Abnormal input voltage	Check power grid voltage
			Output short circuit (phase-to-phase short circuit or output ground short circuit)	Check motor connection and output ground impedance
5	ov2	Constant speed overvoltage	Load variation is too big	Check the load
			Abnormal input voltage	Check power grid voltage
			Output short circuit (phase-to-phase short circuit or output ground short circuit)	Check motor connection and output ground impedance

Fault code	Fault Display	Fault description	Causes	Solutions
			Improper parameter setting of regulator under SVC control	Properly set regulator parameters
6	ov3	Decel overvoltage	Load inertia is too big	Use dynamic braking
			Abnormal input voltage	Check power grid voltage
			Output short circuit (phase-to-phase short circuit or output ground short circuit)	Check motor connection and output ground impedance
			Improper parameter setting of regulator under SVC control	Properly set regulator parameters
			Decel time is too short	Prolong the Decel time
7	FAL	Module protection	Output short circuit (phase-to-phase short circuit or output ground short circuit)	Check motor connection and output ground impedance
			Fan damaged or air duct blocked	Clear the air duct or replace the fan
			Direct connection of inverter module	Seek services
			Switching power supply damaged	Seek services
			Control board abnormal	Seek services
			Ambient temperature is too high	Reduce ambient temperature
			Loose connection of control board	Pull out and reinsert the cables of control board
			Overvoltage or overcurrent	Handle it with the solutions of overvoltage or overcurrent

Fault code	Fault Display	Fault description	Causes	Solutions
8	tUN	Autotune failed	Bad motor connection	Check motor connection
			Identification during rotation of the motor	Identification in stationary status of the motor
			Bias between motor parameters and their setting is too big	Set the parameters correctly according to motor nameplate
9	oL1	Drive overloaded	Torque boost is too big under V/f control	Reduce torque boost value
			Starting frequency is too high	Drop starting frequency
			Accel/Decel time is too short	Prolong the Accel/Decel time
			Motor parameters are improperly set	Set the parameters correctly according to motor nameplate
			Output short circuit (phase-to-phase short circuit and output ground short circuit)	Check motor connection and output ground impedance
			Load is too heavy	Reduce the load
			Inappropriate V/f curve under V/f control	Set V/f curve correctly
			Restart the rotating motor	Reduce current limited value or start through speed search
10	oL2	Motor overloaded	Torque boost is too big under V/f control	Reduce torque boost value
			Inappropriate V/f curve under V/f control	Set V/f curve correctly
			Motor parameters are improperly set	Set the parameters correctly

Fault code	Fault Display	Fault description	Causes	Solutions
			Improper setting of motor overloaded protection time	Properly set the motor overloaded protection time
			Motor stalled or sharp variation of load	Identify the causes of motor stalling or check the load condition
			Long-term running of ordinary motor at low speed with heavy load	Select variable frequency motor
11	CtC	Current detection abnormal	Abnormal connection of control board	Seek services
			Switching power supply damaged	Seek services
			Hall device damaged	Seek services
			Output ground leakage current is too big	Seek services
14	oPL	Output phase loss	Motor cable connection abnormal	Check motor connection
			Imbalance among motor three phases	Check or replace the motor
			Incorrect setting of vector control parameters	Correctly set vector control parameters
16	oH1	Heat sink thermal protection	Ambient temperature is too high	Drop ambient temperature
			Fan damaged	Replace the fan
			Air duct blocked	Clear air duct
			Temperature sensor abnormal	Seek services
			Inverter module abnormal	Seek services

Fault code	Fault Display	Fault description	Causes	Solutions
18	oH3	Module temperature detection disconnected	Module detection circuit damaged	Seek services
			Thermistor damaged	Seek services
			Ambient temperature is too low	Raise ambient temperature
24	PEr	External equipment error	External fault terminal is enabled	Check the status of external fault terminal
			Stall condition lasts too long	Check if the load is abnormal
26	to2	Consecutive running time attained	"Consecutive running time attained" enabled	See specification of Group E0
27	to3	Cumulative running time attained	"Cumulative running time attained" enabled	See specification of Group E0
31	TrC	Port communicatio n abnormal	Improper setting of baud rate	Set properly
			Port disconnected	Reconnected
			Upper computer not working	Make it work
			Drive communication parameter error	Set properly
			Control board failed	Seek services
37	oCr	Benchmark protection	SMPS failed	Seek services
			Control board failed	Seek services
38	SP1	5V power supply out-of-limit	Control board abnormal	Seek services
			Switching power supply damaged	Seek services
40	AIP	AI input out-of-limit	Control board failed	Seek services
			SMPS failed	Seek services
41	LoU	Undervoltage	In-voltage abnormal	Check power supply
			SMPS failed	Seek services

Fault code	Fault Display	Fault description	Causes	Solutions
45	Plo	PID detection out-of-limit	PID feedback channel abnormal	Check feedback channel
			PID parameters not properly set	Set properly
46	ICF	Interior COMM. alarm	Internal communication chip failed	Seek services
			Severe surrounding EMI	Check surrounding equipment and seek services

ATTENTION:

When a fault occurs, please identify the causes and seek solutions according the guidance in the table. If the fault fails to be solved, do not apply power to the drive again. Contact the supplier for service in time.

Chapter 7 Maintenance

Ambient temperature, humidity, salt mist, dust, vibration, aging and wear of internal components may result in drive faults. Routine maintenance shall be performed during the use and storage.

ATTENTION:

Please make sure the power supply of the drive has been cut off, and DC bus voltage has discharged to 0V before the maintenance.

7.1 Routine Inspection

Please use the drive in the environment recommended by this manual, and perform routine inspection in accordance with the table below.

Inspection items	Inspection aspects	Inspection methods	Criteria
Operating environment	Temperature	Thermometer	-10℃~50℃
	Humidity	Hygrometer	5%~95%, condensation not allowed
	Dust, oil stains, moisture and water-drop	Visual inspection	No filthy mud, oil stains and water drop
	Vibration	Observation	Smooth running. No abnormal vibration
	Gas	Smell, visual inspection	No peculiar smell and abnormal smoke
Drive	Noise	Listen	No abnormal noise
	Gas	Smell, visual inspection	No peculiar smell and abnormal smoke
	Appearance	Visual inspection	No defect and deformation
	Heat dissipation and temperature rise	Visual inspection	No dust and/or fiber particles in air duct, normal working of fans, normal air speed and volume, no abnormal temperature rise

Inspection items	Inspection aspects	Inspection methods	Criteria
Motor	Thermal status	Smell	No abnormal heating and scorching smell
	Noise	Listen	No abnormal noise
	Vibration	Observe, listen	No abnormal vibration and sound
Run status parameters	Power supply input current	Ammeter	In the range of requirement
	Power supply input voltage	Voltmeter	In the range of requirement
	Drive output current	Ammeter	In the range of requirement
	Drive output voltage	Voltmeter	In the range of requirement
	Temperature	Thermometer	The difference between U0-33 displayed temperature and ambient temperature does not exceed 40℃

7.2 Regular Maintenance

Users should perform regular inspection of the drive every 3~6 months, so as to eliminate the potential faults.

🕮 **ATTENTION:**

- Please make sure power supply of the drive has been cut off, and DC bus voltage has been discharged to 0V prior to maintenance.
- Never leave screws, gaskets, conductors, tools and other metal articles inside the drive. Failure to comply may result in equipment damage.
- Never modify the interior components of the drive in any condition. Failure to comply may result in equipment damage.

Inspection items	Measures
Check if control terminal screws are loose	Tighten
Check if main circuit terminal screws are loose	Tighten
Check if ground terminal screws are loose	Tighten
Check if drive mounting screws are loose	Tighten
Check if there are damage on power cables and control cables	Replace the damaged cables
Check if there is dust on circuit board	Clear it up
Check if air duct is blocked	Clear it up
Check if drive insulation is damaged	Test the ground terminal with 500V megameter after all input and output terminals are short-circuited via conductors. Ground test on individual terminals is strictly prohibited since this may cause damage to inverter.
Check if motor insulation is damaged	Remove input terminals U/V/W of motor from drive and test the motor alone with 500V megameter. Failure to comply may result in drive damage.
Check if the storage period of the drive is over two years	Carry out power-on test, during which, the voltage should be boosted to rated value gradually using a voltage regulator; be sure to run at no load for more than 5 hours.

7.3 Replacement of Vulnerable Parts

Vulnerable parts of drive include cooling fan, electrolytic capacitor, relay or contactor etc. The service lives of these parts are subject to environment and working conditions. To maintain a favorable operating environment is conducive to improving the service life of

parts and components; routine inspection and maintenance also contributes to effective improvement of parts' service life. To prolong the service life of entire drive, the cooling fan, electrolytic capacitor, relay or contactor and other vulnerable parts should be subjected to routine inspection according to the table below. Please replace the abnormal parts (if any) in time.

Vulnerable parts	Service life	Cause of damage	Criteria
Fan	30,000~40,000h	Wear of bearing and aging of blade	Check if fan blades have cracks Check if there is abnormal vibration and noise on working

7.4 Storage

Storage environment should meet the requirements as set forth in the table below.

Items	Requirements	Recommended storage method and environment
Storage temperature	-40~+70℃	In case of long-term storage, areas with an ambient temperature of less than 30℃ are recommended Avoid the storage in areas where temperature shock may result in condensation and freezing
Storage humidity	5~95%	Product could be sealed with plastic film and dessicant
Storage environment	A space with low vibration and low content of salt where there is no direct exposure to sunlight, dust, no corrosive or flammable gas, oil stain, vapor and water drop	Product could be sealed with plastic film and dessicant

ATTENTION:

Since long-term storage may lead to the deterioration of electrolytic capacitor, the inverter must be powered on once in case storage period exceeds 2 years. During the power-on, input voltage must be boosted to rated value gradually using a voltage regulator, and be sure to have the inverter operate at no load for more than 5 hours.

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