Preface

Thank you for choosing GTAKE **GK900M Series spindle servo drive**. This user manual presents a detailed description of GK900M series with respect to product features, structural characteristics, functions, installation, parameter setting, troubleshooting, commissioning and daily maintenance, etc.

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 Technical Service Department: (+86) 0755-86392601.

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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 violation. GTAKE bears no responsibility for any injury and loss as a result of any violation operation.

1.1 Safety Considerations

1.1.1 Prior to Installation

⚠**WARNING**
● Do not touch control terminals, circuit boards and any other electronic parts and components with bare hands. ● Do not use the drive whose component(s) is/are missing or damaged. Failure to comply 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 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 conforms 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 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 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 may 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, RC and TA, TB, TC. Failure to comply may result in equipment damage.

⚠ ATTENTION

- Since all 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.
- The encoder must be provided with shielded cables whose shielded layer must be well grounded.

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 implement the wiring as per Section 3.5 before applying power to the drive. Failure to comply may result in equipment damage and/or electric shock hazard.
- 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 running of the drive, check there is no person in surrounding area who can reach the motor so as to prevent personal injury.
- During the running of the drive, foreign bodies should be prevented dropping into the equipment. Failure to comply may result in faults and/or equipment damage.
- Only qualified technicians familiar with 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 turned 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 turned 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 during maintenance, and troubleshooting. Failure to do this may result in component damage due to ESD.
- All pluggable components can be inserted or pulled out only when power has been turned 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 necessary, please use booster to rise or drop the voltage to regulated voltage range.

This series of drives support common DC bus input. Users are suggested to consult GTAKE technical personnel before use.

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 Motor Heating & Noise

If the motor does not match the rated capacity of the drive, especially when the rated power of the drive is greater than that of the motor, make sure to adjust the related parameter values of the motor in the drive or install a thermal relay in front of the motor to protect the motor. As the output voltage of the drive is PWM wave, which contains harmonics, so the motor's temperature rise, noise, and vibration will increase slightly compared with the operation in grid frequency.

1.2.6 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. A 500V voltage mode mega-ohmmeter is recommended to use for the measurement of the motor insulation, during which, it is essential to disconnect the motor from the drive. Normally, the insulation resistance of the motor should be bigger than 5MΩ.

1.2.7 Derating

Due to the thin air in high-altitude areas, the radiating performance of the drive with forced air cooling may degrade while 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.

1.2.8 Mechanical Vibration

This drive provides an output frequency ranging from 0Hz to 600Hz. If more than 50Hz is needed at site, the mechanical load-bearing capacity of the equipment must be taken into consideration. At some output frequencies, the drive may encounter mechanical resonance points of the load equipment, which can be avoided by setting the parameter of skip frequency.

1.2.9 Precautions for the disposal of drives

Electrolytic capacitors on the main circuit and PCB may explode when they are burnt. Toxic gases may be produced when plastic parts are burned. Please dispose of them as industrial waste.

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.

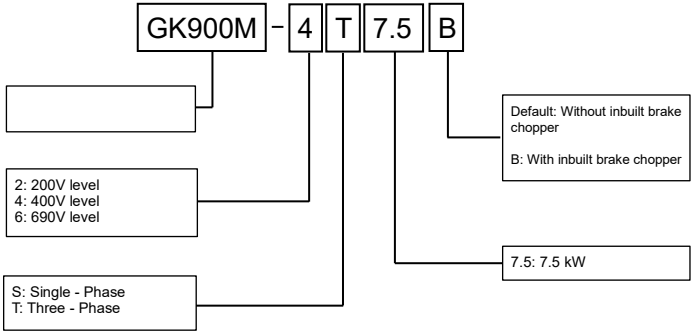


Fig. 2-1 Product model explanation

ATTENTION:

When the sub-series of GK900M model is default, the load type is divided into G and L. When there is a product sub-series, the load type is default.

2.2 Nameplate Information

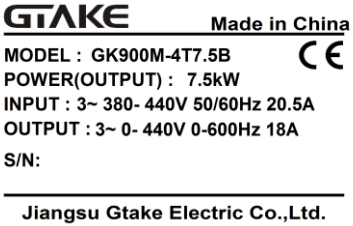


Fig. 2-2 Nameplate information

2.3 Information of Product Model

Table 2-1 Product model and technical data

■ GK900M-4T□□□G(B), three-phase 400V level (heavy-duty)

Model	Power Rating (kW)	Rated Output Current (A)	Rated Input current (A)	Applicable motor (kW)	Brake chopper	DC reactor	Frame No.
GK900M-4T0.75B	0.75	2.5	3.5	0.75	Inbuilt	/	S01
GK900M-4T1.5B	1.5	3.8	5	1.5			
GK900M-4T2.2B	2.2	5.5	6	2.2			
GK900M-4T3.7B	3.7	9	10.5	3.7			
GK900M-4T5.5B	5.5	13	14.6	5.5			S02
GK900M-4T7.5B	7.5	18	20.5	7.5			
GK900M-4T11B	11	24	29	11			
GK900M-4T15B-A	15	30	34	15			
GK900M-4T15B	15	32	35	15			S03
GK900M-4T18.5B	18.5	37	44	18.5			
GK900M-4T22B	22	45	50	22			
GK900M-4T30(B)*	30	60	65	30	Inbuilt optional		S04
GK900M-4T37(B)*	37	75	80	37			
GK900M-4T45(B)*	45	91	83	45		Inbuilt	S05
GK900M-4T55(B)*	55	112	102	55			
GK900M-4T75(B)*	75	150	143	75			S06
GK900M-4T90(B)*	90	176	160	90	Externally mounted		
GK900M-4T110	110	210	192	110			
GK900M-4T132	132	253	232	132			S07
GK900M-4T160	160	304	285	160			
GK900M-4T185	185	350	326	185			S08
GK900M-4T200	200	380	354	200			
GK900M-4T250	250	470	441	250			S09
GK900M-4T280	280	520	489	280			
GK900M-4T315	315	590	571	315			S10
GK900M-4T355	355	650	624	355			
GK900M-4T400	400	725	699	400			
GK900M-4T450	450	800	770	450			

GK900M-4T500	500	900	864	500			S11
GK900M-4T560	560	1020	980	560			
GK900M-4T630	630	1200	1152	630			
GK900M-4T710	710	1340	1287	710			
GK900M-4T800	800	1500	1550	800			S12
GK900M-4T900	900	1620	1744	900			
GK900M-4T1000	1000	1720	1938	1000			

* means brake chopper is optionally inbuilt for these models. Take 30kW as an example, the model without brake chopper is GK900M-4T30G, while with brake chopper is GK900M-4T30GB. Braking resistor needs to be mounted externally with reference to 3.5.3.

2.4 Technical Features of GK900M

Table 2-2 Technical features of GK900M

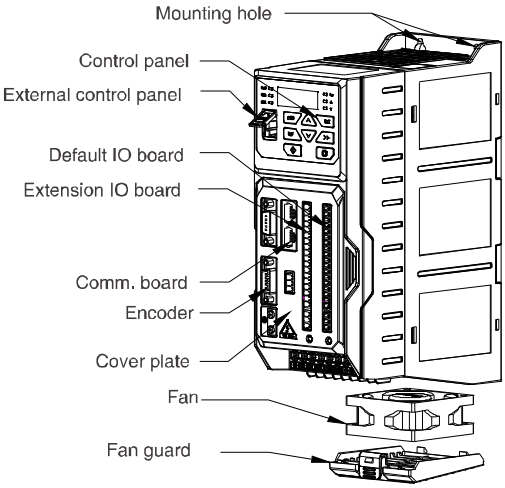
Power input	Rated input voltage	400V level: three phase 380V~440V
	Frequency	50Hz/60Hz, tolerance ±5%
	Voltage range	Continuous voltage fluctuation ±10%, short fluctuation -15%~+10%, i.e. 400V: 323V~484V;
		Voltage out-of-balance rate <3%, distortion rate as per the requirements of IEC61800-2
	Allowable frequency fluctuation	±5%
	Rated input current	See Section 2.3
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%
	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 Sensor-less vector control 2 Closed-loop vector control (including position control)

	Range of speed regulation	1:100 (V/f control, sensor-less vector control 1) 1:200 (sensor-less vector control 2) 1:1000 (closed-loop vector control)
	Speed accuracy	±0.5% (V/f control) ±0.2% (sensor-less vector control 1 & 2) ±0.02% (closed-loop vector control)
	Speed fluctuation	±0.3% (sensor-less vector control 1 & 2) ±0.1% (closed-loop vector control)
	Torque response	< 10ms (sensor-less vector control 1 & 2) < 5ms (closed-loop vector control)
	Torque control accuracy	±7.5% (sensor-less vector control 2) ±5% (closed-loop vector control)
	Starting torque	0.5Hz:180% (V/f control, sensor-less vector control 1) 0.25Hz: 180% (sensor-less vector control 2) 0Hz: 200% (closed-loop vector control)
	Positioning accuracy	±1 line pulse
Basic functions	Start frequency	0.00~ 600.00Hz
	Accel/Decel time	0.00~60000s
	Switching frequency	0.8kHz~16kHz
	Frequency setting	Digital setting + control panel ∧/∨ Digital setting + terminal UP/DOWN Communication Analog setting (AI1/AI2/AI3/AI4) Terminal pulse setting
	Motor start-up methods	Started from start frequency DC injection braking start Flying start
	Motor stop methods	Ramp to stop Coast to stop Ramp to stop + DC injection brake
	Dynamic braking capacity	Brake choppers for GK900M-4T75 and below are inbuilt or can be inbuilt. See table 2-1 Brake chopper working voltage: 200V class: 325~375V; 400V class: 650V~750V Service time: 0.0~100.0s

	DC brake capacity	DC injection braking start frequency: 0.00~600.00Hz DC injection braking current: 0.0~100.0% DC injection braking time: 0.00~30.00s
	Input terminals	5 digital inputs, one of which can be used for high-speed pulse input. Compatible with active open collectors NPN, PNP and dry contact input. 2 analog inputs, voltage/current programmable.
	Output terminals	2 digital outputs, one of which can be used for high-speed pulse output terminal, 0~50kHz square signal; can output set frequency, output frequency and so forth One relay output terminal
		1 analog output terminals, voltage/current programmable; can output set frequency, output frequency and so forth
	Encoder signal terminals	Supports different types of encoder signal inputs such as open collector, push-pull, differential, rotary, Sine-Cos, and absolute etc.
Extension functions	Input terminals	Expandable with five digital input terminals, two analog input terminals, two sets of STO input terminals, and one leakage current collection terminal
	Output terminals	Expandable with three digital output terminals, one analog output terminal, and one set of relay output terminals

Featured functions	Parameter copy, parameter backup, common DC bus, free switchover between two motors' parameters, flexible parameter displayed & hidden, various master & auxiliary frequency reference and switchover, reliable speed search started, a variety of Accel/Decel curves programmable, automatic correction of analog, 16-step speed control programmable (2-step support flexible frequency reference), count function, three faults recorded, over excitation brake, over voltage stall protection programmable, under voltage stall protection programmable, restart upon power loss, skip frequency, frequency binding, four kinds of Accel/Decel time, motor thermal protection, flexible fan control, process PID control, simple PLC, multi-functional key programmable, droop control, asynchronous and synchronous motor tune, field-weakening control, high-precision torque control, V/f separated control, torque control at sensor-less vector control, torque control at closed-loop vector control, two encoder signal inputs (support incremental, UVW hybrid and resolver, etc.), flexible deceleration ratio control, zero-speed clamping, angular positioning, simple feed forward control, pulse train position control	
Protection functions	Refer to Chapter 6- Troubleshooting	
Environment	Place of operation	Indoors, no direct sunlight, free from dust, corrosive gases, flammable gases, oil mist, water vapor, water drop and salt, etc.
	Altitude	0~2000m. De-rate 1% for every 100m when the altitude is above 1000 meters
	Ambient temperature	-10℃~40℃. The rated output current should be derated 1.5% for every 1℃ when the ambient temperature is 40℃~50℃
	Relative humidity	5%~95%, no condensation
	Vibration	Less than 5.9m/s2 (0.6g)
	Storage temperature	-40℃~+70℃
Others	Efficiency at rated Amps	7.5kW and below: ≥93% 11~ 45kW: ≥ 95% 55kW and above: ≥98%
	Installation	560kW and 630kW are cabinet type, the others are wall-mounted
	Installation	Book-type wall-mounted
	IP grade	IP20/IP00
	Cooling method	Forced air cooling

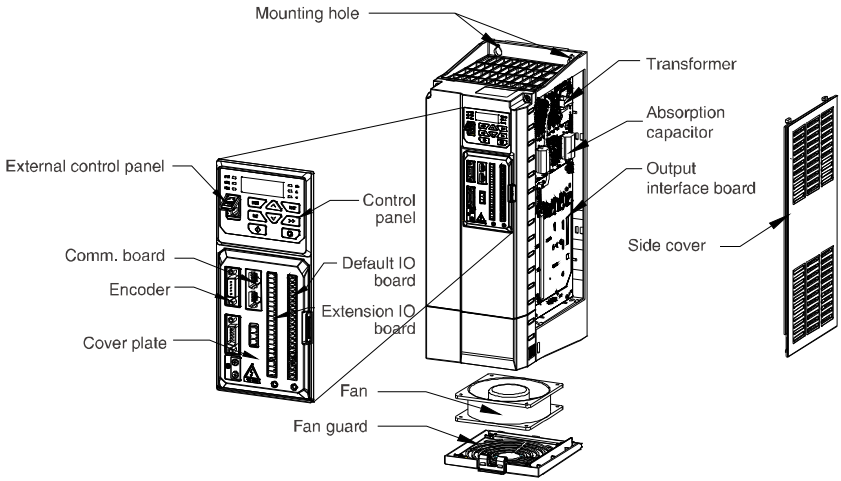
2.5 Parts Drawing



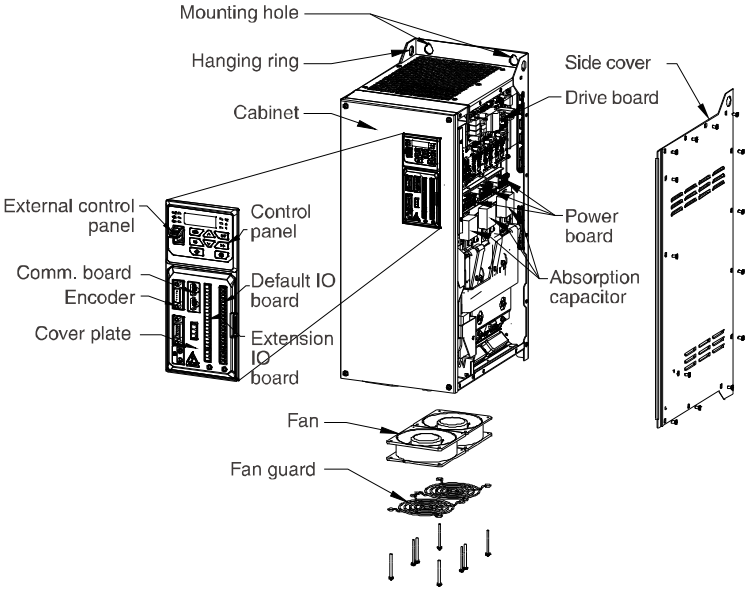
a) GK900M-4T15B-A and below

ATTENTION:

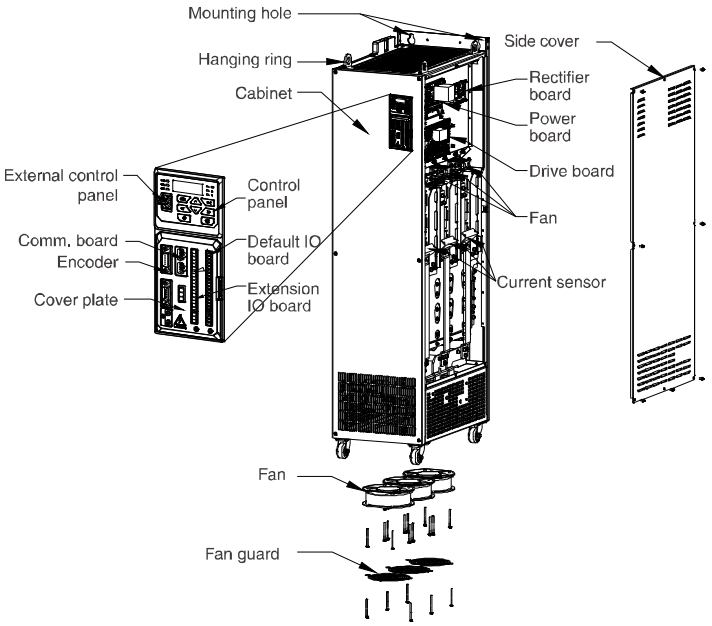
When the GK900M series drive is connected to the external control panel, open the flip cover of the network interface, and then connect the external control panel to the network interface with dual-port network cable.



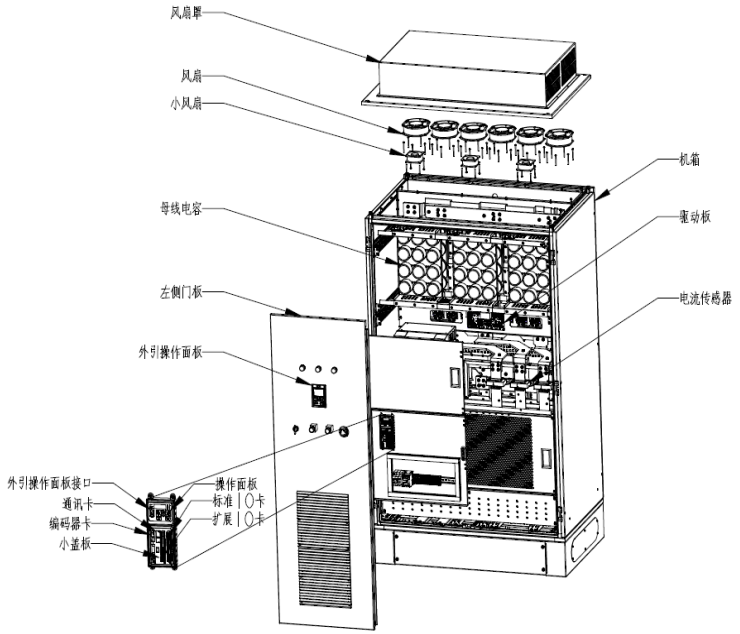
b) GK900M-4T15B~ GK900M-4T37 (B)



c) GK900M-4T45 (B) ~ GK900M-4T220



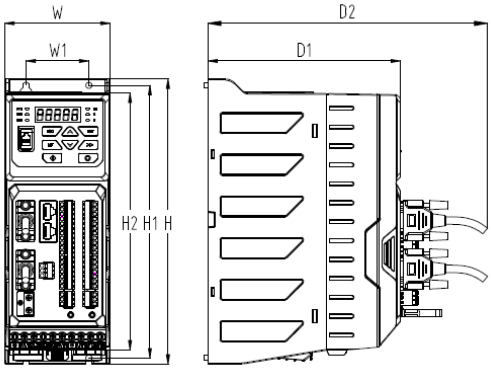
d) GK900M-4T250 ~ GK900M-4T710



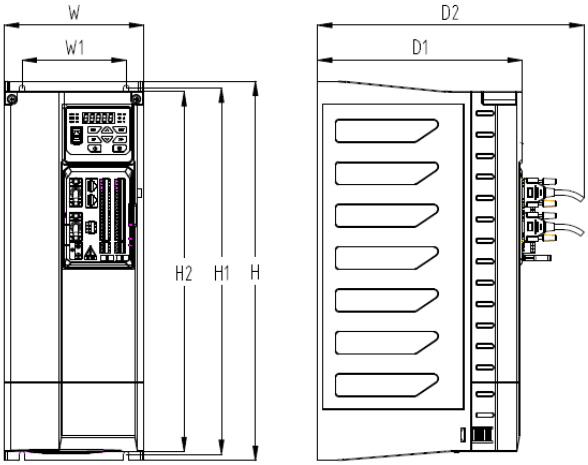
e）GK900M-4T800 ~ GK900M-4T1000

Fig.2-3 Parts drawing

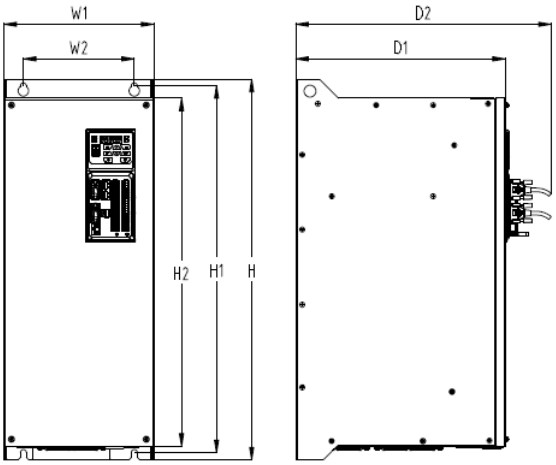
2.6 Appearance, Mounting Dimensions and Weight



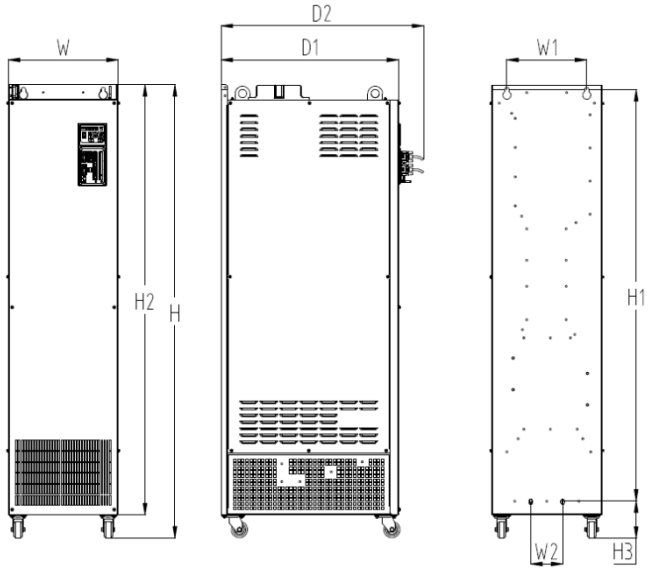
a) GK900M-4T15B-A and below



b) GK900M-4T15B~GK900M-4T37(B)



c) GK900M-4T45(B) ~GK900M-4T220



d) GK900M-4T250 and above

Fig.2-4 External dimensions

Table 2-3 Appearance, mounting dimensions and weight

Model	Frame No.	External and installation dimensions (mm)										Weight (kg)
		W	H	D1	D2	W1	W2	H1	H2	H3	d	
GK900M-4T0.75B	S01	84	226	153	213	50	/	216	204	/	4.5	1.6
GK900M-4T1.5B												1.6
GK900M-4T2.2B												1.6
GK900M-4T3.7B												1.6
GK900M-4T5.5B	S02	93	285	183	243	55	/	272	/	/	5.5	2.9
GK900M-4T7.5B												2.9
GK900M-4T11B												2.9
GK900M-4T15B-A												2.9
GK900M-4T15B	S03	135	365	217	277	111	/	350	/	/	5.5	8.0
GK900M-4T18.5B												8.0
GK900M-4T22B												8.0

GK900M-4T30(B)	S04	158	430	232	293	118	/	415	/	/	6.5	11.1
GK900M-4T37(B)												11.1
GK900M-4T45(B)	S05	230	545	300	365	175	/	525	490	/	10	32.0
GK900M-4T55(B)												32.0
GK900M-4T75(B)	S06	250	635	350	415	185	/	612	580	/	11	45.0
GK900M-4T90(B)												46.0
GK900M-4T110												46.0
GK900M-4T132	S07	300	738	399	464	230	/	715	682	/	11	67.0
GK900M-4T160												67.0
GK900M-4T185	S08	300	895	460	525	230	/	872	840	/	13	99.55
GK900M-4T200												99.55
GK900M-4T220												99.55
GK900M-4T250	S09	330	1245	533	598	240	96	1122	1175	109	13	131.1
GK900M-4T280												131.1
GK900M-4T315	S10	330	1365	533	598	240	96	1242	1295	109	13	181.7
GK900M-4T355												181.7
GK900M-4T400												181.7
GK900M-4T450												181.7

2.7 External Dimensions of Control Panel

The LED control panel model of GK900M series is KBU-BX1 whose appearance and external dimensions are shown in Fig. 2-5.

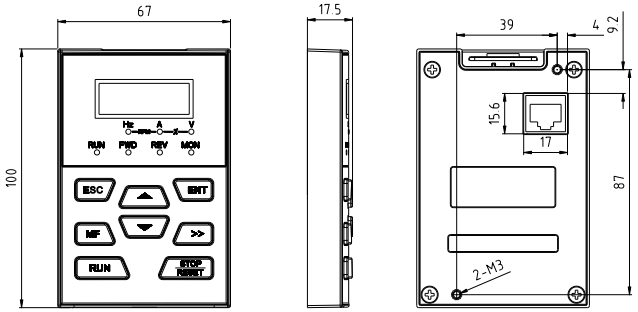
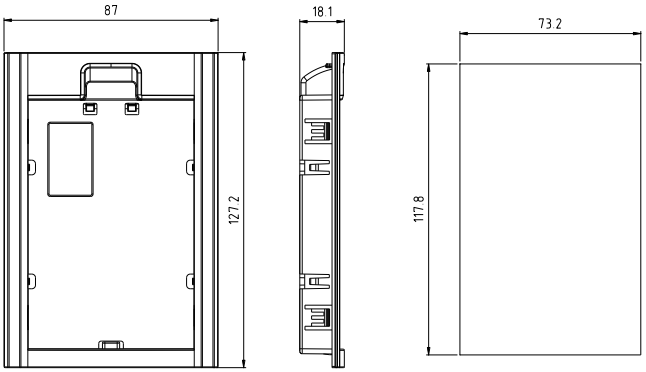


Fig. 2-5 External dimensions of KBU-BX1

2.8 External Dimensions of Control Panel Bracket

A bracket should be provided to support the electric panel and a hole in the cabinet needs to be opened when the control panel KBU-BX1 needs to be remotely used. Bracket model is KBU-DZ1 whose external dimensions are shown in Fig. 2-6 a). Fig. 2-6 b) shows applicable hole dimensions in the cabinet.



a) External dimensions of KBU-DZ1 b) Hole dimensions in the cabinet

Fig. 2-6 External dimensions of KBU-DZ1 and cabinet hole dimensions

Chapter 3 Installation and Wiring

3.1 Installation Environment

1) Ambient temperature is in the range of -10℃ to 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) Avoid installation in places exposed to direct sunlight, moisture, condensation, or water droplets.
5) Avoid installation in areas with oil contamination, heavy metal dust, excessive dust, or high salt content.
6) Do not expose to an atmosphere with flammable gases, corrosive gases, explosive gases or other harmful gases.
7) Prevent drilling residues, wire ends and screws falling into drive.
8) Ventilation part of the drive should be installed outside from harsh environment (e.g. textile facilities with fiber particles and chemical facilities filled with corrosive gases).

3.2 Minimum Mounting Clearances

3.2.1 Single drive mounting

When mounting the GK900M series drive, adequate surrounding space shall be reserved according to its power rating. Meanwhile, to ensure favorable heat dissipation, the drive shall be mounted upright but not upside down.

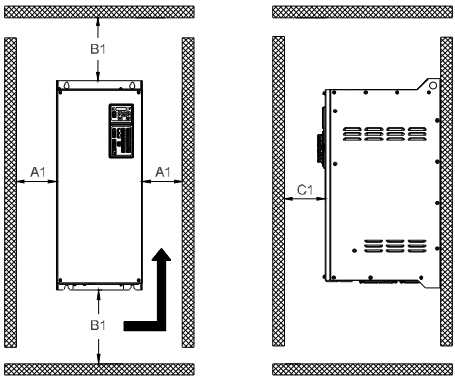


Fig. 3-1 Single drive mounting clearances (GK900M-4T0.75B to GK900M-4T220)

ATTENTION:

When a GK900M-4T220 or below needs to be mounted in parallel in a cabinet, it is required to ensure the mounting clearance in the table below. When multiple drives are mounted in the same cabinet, parallel side-by-side mounting is recommended. For details, please refer to Section 3.2.2.

Table 3-1 Single drive mounting clearances
(GK900M-4T0.75B~GK900M-4T220)

Power rating	Mounting clearances (mm)		
	A1	B1	C1
GK900M-4T0.75B~GK900M-4T3.7B	≥2	≥100	≥50
GK900M-4T5.5B~GK900M-4T15B-A	≥20	≥100	≥50
GK900M-4T15B~GK900M-4T22B	≥20	≥150	≥50
GK900M-4T30B~GK900M-4T37B	≥50	≥250	≥50
GK900M-4T45(B)~GK900M-4T220	≥80	≥400	≥50

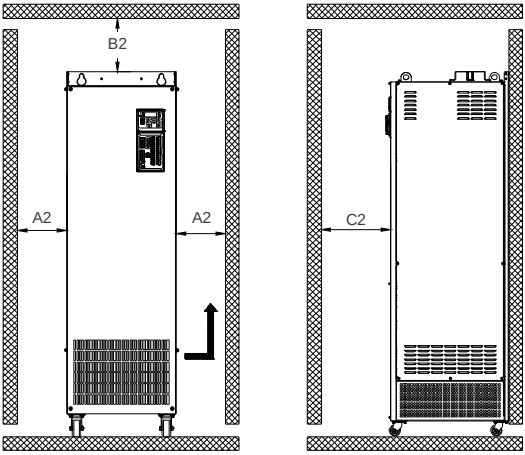


Fig. 3-2 Mounting clearances for GK900M-4T250 to GK900M-4T450

Table 3-2 Single drive mounting clearances
(GK900M-4T250B~ GK900M-4T450)

AC drive power rating	Mounting clearances (mm)		
	A2	B2	C2
GK900M-4T250~GK900M-4T450	≥20	≥300	≥50

3.2.2 Mounting multiple drives

The heat of GK900M drives is emitted from the bottom to the top. When multiple drives operate, it is recommended to mount the drives side-by-side. Besides, align the upper parts of the drives, especially when those drives are of different sizes, and ensure there is enough space left around to facilitate heat dissipation, as shown in Figure 3-3.

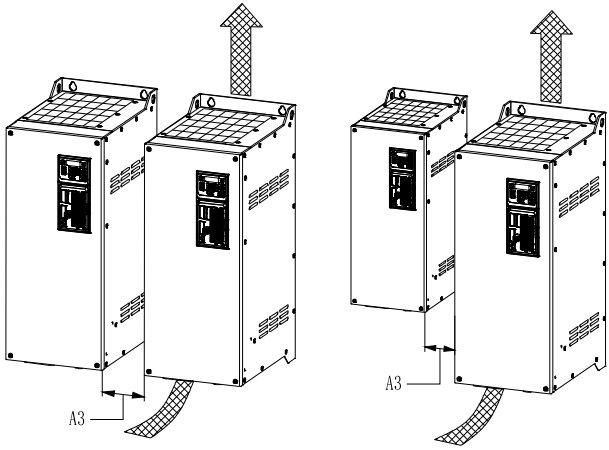


Fig. 3-3 Minimum mounting clearances of GK900M-4T0.75GB~GK900M-4T450G

Table 3-3 Minimum mounting clearances of multiple drives in parallel
(GK900M-4T0.75GB~GK900M-4T450G)

Power ratings	*Mounting clearances* A3 (mm)
GK900M-4T0.75B~GK900M-4T3.7B	≥2
GK900M-4T5.5B~GK900M-4T22B	≥20
GK900M-4T30B~GK900M-4T450	≥50

3.2.3 Vertical mounting

When the drives are mounted vertically as shown in Fig. 3-4, measures such as installing a heat insulation deflector is a must in case the heat emitted from the lower drive causes the temperature of the upper drive to rise, and results in faults such as over temperature or overload.

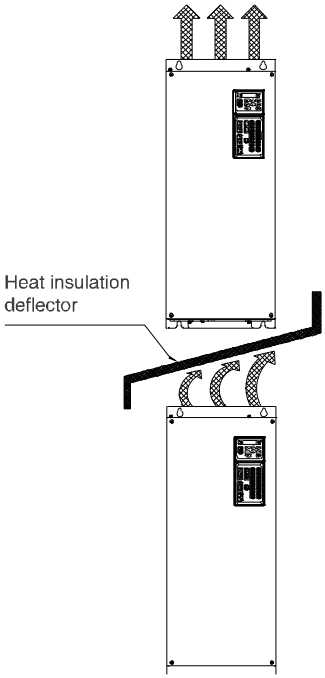


Fig. 3-4 Requirements of mounting drives vertically

ATTENTION:

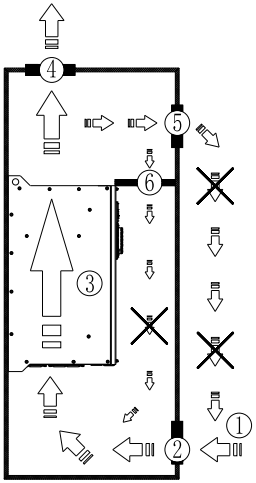
Models from GK900M-4T250G to GK900M-4T450G can be mounted in a single cabinet or in parallel side-by-side, but cannot be mounted vertically.

3.2.4 Attentions for mounting inside the cabinet

When the GK900M drive is mounted inside the cabinet, the heat is emitted from the bottom to the top. In order to avoid the circulation of hot air inside the cabinet, the following measures can be taken:

1. The grill can be used to guide the air flow at the air inlet and outlet;
2. The cold air inlet can be located at the lower part of the front cabinet. Mount additional exhaust fans on the top of the cabinet.
3. To prevent hot air from circulating inside the cabinet, install a heat insulation air deflector inside the cabinet.

The proper air duct is shown in the figure below.



① Main air inlet ② Air inlet filter ③ drive ④ Main air outlet

⑤ Front air outlet ⑥ Heat insulation air deflector

Fig. 3-5 Requirements for mounting inside the cabinet

Meanwhile, to ensure the working temperature rise of the drive mounted in the cabinet is within the allowable range, the air volume V required by the cabinet should meet the following requirements:

$V= (P_{LOSS}/T_{RISE})$ x1.82

Among which:

V--air volume required by the drive to maintain the allowable temperature rise, unit: CFM;

P_{LOSS} -- heat loss power of the drive, unit: W; refer to Table 3-4;

T_{RISE} -- allowable temperature rise of the drive inside the cabinet. For example, inside the cabinet are a 45kW and a 90kW drive separately. The ambient temperature is 35°C, and the maximum allowable operating temperature of the drive is 50°C, that is, T_{RISE}=15°C. According

to Table 3-4, the corresponding drive loss P_{LOSS} is 1363+2056=3419W. The drive cabinet needs to be equipped with a fan with air volume V=3419 X 1.82/15=415CFM.

ATTENTION:

The designed power consumption of single GK900M drive and corresponding minimum required air volume (unit: CFM) is shown in Table 3-4, which customers can refer to according to needs.

Table 3-4 Heat dissipation and minimum required air volume of each power rating

Drive model	HDC (W)	Min. air volume (CFM)	Drive model	HDC (W)	Min. air volume (CFM)
GK900M-4T0.75B	23	-	GK900M-4T75 (B)	2050	325
GK900M-4T1.5B	49	21	GK900M-4T90(B)	2056	325
GK900M-4T2.2B	72	21	GK900M-4T110	2838	325
GK900M-4T3.7B	116	21	GK900M-4T132	3359	595
GK900M-4T5.5B	170	42	GK900M-4T160	3787	595
GK900M-4T7.5B	261	58	GK900M-4T185	4124	692
GK900M-4T11B	337	78	GK900M-4T200	4701	692
GK900M-4T15B-A	417	90	GK900M-4T220	5133	692
GK900M-4T15B	417	105	GK900M-4T250	5625	975
GK900M-4T18.5B	500	105	GK900M-4T280	6598	975
GK900M-4T22B	632	105	GK900M-4T315	7215	946
GK900M-4T30(B)	737	185	GK900M-4T355	8384	946
GK900M-4T37(B)	979	185	GK900M-4T400	8473	946
GK900M-4T45(B)	1363	224	GK900M-4T450	8876	946
GK900M-4T55(B)	1789	224			

3.3 Remove & Mount Covers

Power ranges from 0.75 kW to 3.7 kW of GK900M Series Heavy-duty AC Motor Drives do not equip with terminal cover plates.

3.3.1 Remove & mount covers of GK900M-4T37(B) and below

- Open the cover

Removing method 1: Fix both thumbs on the terminal cover plate, and simultaneously press inward with both index fingers on the two side slots (along the PRESS direction indicated in Figure 3-6 below). The buckles will naturally detach from the slot, and then remove the cover from an upward diagonal direction away from the drive.

Removing Method 2: Align the flat-head screwdriver with the bottom of the indicated slot (on both sides), gently push inward, and the two side clips will naturally detach from the slot. At this point, you can remove the cover from an upward diagonal direction away from the drive.

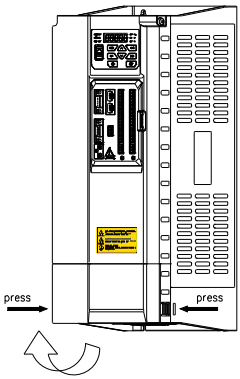


Fig. 3-6 Open the cover

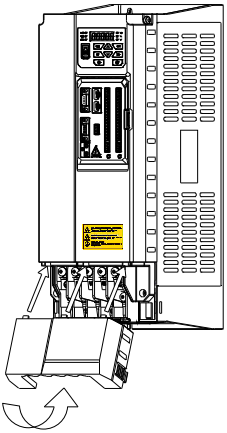


Fig. 3-7 Mount the cover

- Mount the cover

Once all the wiring is completed, insert the upper clips of the terminal cover plate into the three clips on the middle housing, as shown in Figure 3-7. Then, press the side cover plate clips into the slots by hand. When you hear a "click" sound, it indicates that the clips have securely engaged with the slots, and the cover plate installation is completed.

3.3.2 Open & Mount the Covers of GK900M-4T45(B)~GK900M-4T220

- Open the cover

Method: Use a cross screwdriver to remove the installation screws located at the four corners of the drive cover plate, as shown in Figure 3-8. Once the screws are removed, carefully set them aside, and then take out the cover upwards to remove it.

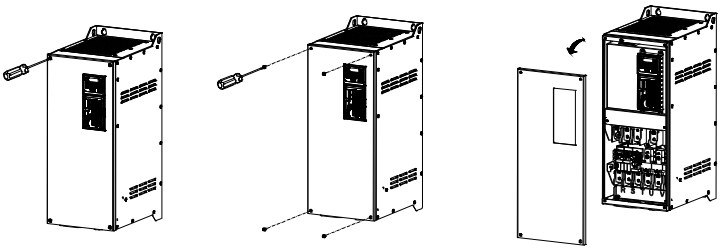


Fig. 3-8 Remove the cover

- Mount the cover

On the completion of wiring, set aside the cover. Use a cross screwdriver to tighten the four screws as shown in Figure 3-9. After the cover fits the housing, the cover is installed.

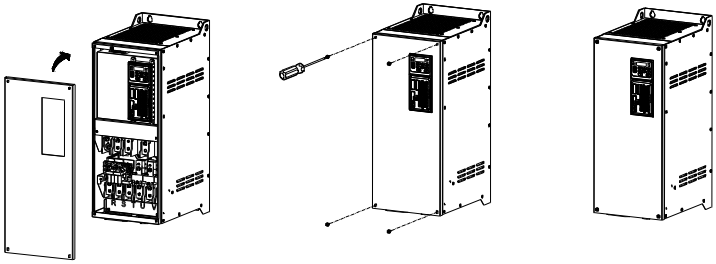


Fig. 3-9 Mount the cover

3.3.3 Open & Mount the Covers of GK900M-4T250 and above

- Open the cover

Use a cross screwdriver to remove the screws on the cover, as shown in Figure 3-8. After setting aside the screws, take out the cover.

- Mount the cover

On the completion of wiring, put aside the cover. Use a cross screwdriver to tighten the screws as shown in Figure 3-11. After the cover fits the housing, the cover is installed.

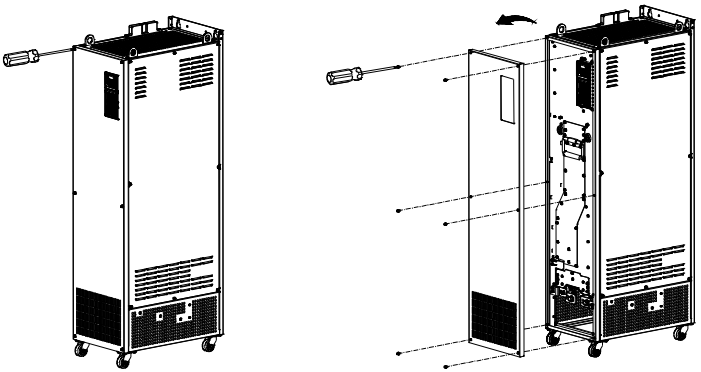


Fig. 3-10 Open the cover

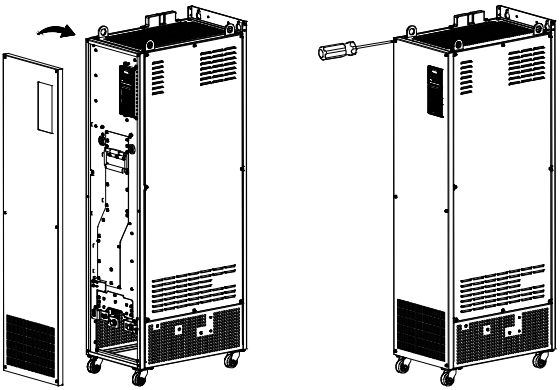


Fig. 3-11 Mount the cover

3.4 Remove and mount option boards

3.4.1 Remove and mount the default IO board and extension IO board

- Remove the extension IO board

After removing all pluggable terminals on the IO board, press the clips on both sides of the drive at the same time to remove the cover plate. Then take out the board from the internal slots and the fixed metal clips.

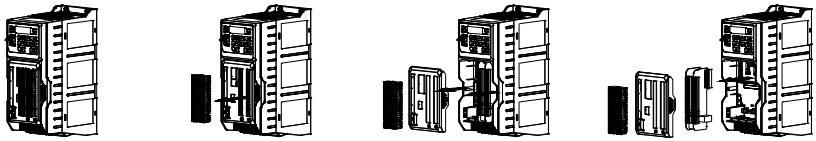


Fig. 3-12 Remove and mount the default IO board and extension IO board

ATTENTION:

Before removing all extension boards on the GK900M drive, first remove the pluggable terminals, cover plate, and wires from the extension board.

- Mount the option board

Insert the option board along the slot inside the housing, with the side containing DB connectors facing outward. If the socket is securely connected to pins on the control board and the option board is inserted into the metal clips, the option board is considered preliminarily installed. Afterward, you may close the small cover plate, mount and wire the terminals. (Notice: at this point, make sure the corresponding partition on the cover plate is already perforated, If not, you can break it or use a small knife to cut through the adhesive points.)

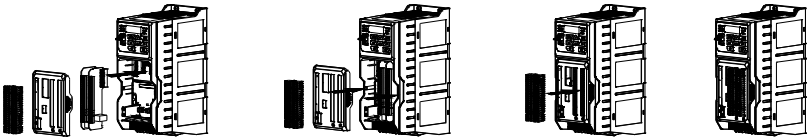


Fig. 3-13 Mount the default IO board and extension IO board

ATTENTION:

The final step for mounting all extension boards of the GK900M drives is the installation of the small cover plate and the pluggable terminals. To avoid repetitive actions, make sure all extension boards are correctly mounted before closing the cover.

The default I/O board is mounted before delivery. Please pay attention to the corresponding partition on the perforated cover plate when mounting the other boards, and use the bursting or cutting method according to the situation. Depending on the situation, you can break it or use a small knife to cut through the adhesive points.

Remove and mount the communication board

- Remove the extension board

After removing all pluggable terminals and wires on the communication board, press the clips on both sides of the drive at the same time to remove the cover plate. Then take out the communication board from the slot in the housing and the fixed metal clip.

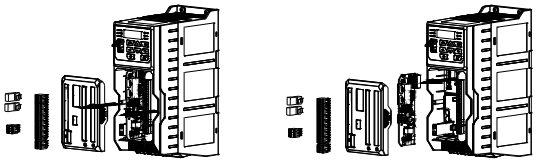


Fig. 3-14 Remove the communication board

- Mount the extension board

Insert the option board along the slot inside the housing, with the side containing DB connectors facing outward. If the socket is securely connected to pins on the control board and the option board is inserted into the metal clips, the option board is considered preliminarily installed. Afterward, you may close the small cover plate, mount and wire the terminals. (Notice: at this point, make sure the corresponding partition on the cover plate is already perforated, If not, you can break it or use a small knife to cut through the adhesive points.)

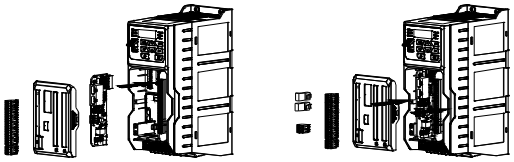


Fig. 3-15 Mount the communication board

Mount and remove the encoder board

The GK900M series drives support two types of encoder extension boards: the 18PIN pluggable terminal (referred to as "18PIN") and the DB15 metal connector (referred to as "DB15"). In this section, we will introduce these two wiring configurations separately.

Both types of encoder extension boards can be installed interchangeably. Before using an encoder extension board, customers need to correctly configure the corresponding partition on the small cover plate. It is recommended to use a knife to cut through the adhesive points. The specific procedure is shown in the following diagram:

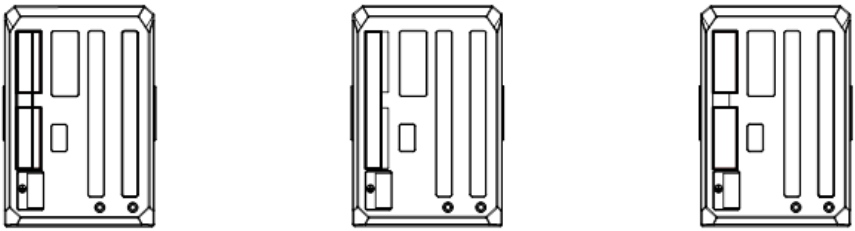


Fig. 3-16 Corresponding partition configuration of encoder extension board

3.4.3.1 Remove and mount the encoder board-18PIN

- Remove the option board

After removing all pluggable terminals, press the clips on both sides of the drive to remove the cover plate, and then remove the encoder option board from the slot in the housing and the fixed metal clips.

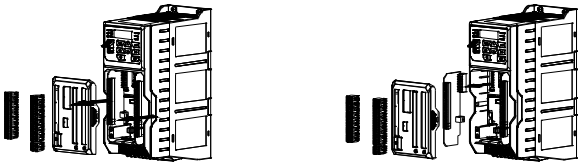


Fig. 3-17 Remove the encoder board -18PIN

- Mount the extension board

Insert the option board along the slot inside the housing, with the side containing DB connectors facing outward. If the socket is securely connected to pins on the control board and the option board is inserted into the metal clips, the option board is considered preliminarily installed. Afterward, you may close the small cover plate, mount and wire the terminals. (Notice: at this point, make sure the corresponding partition on the cover plate is already perforated, If not, you can break it or use a small knife to cut through the adhesive points. For details, please check Fig. 3-16.)

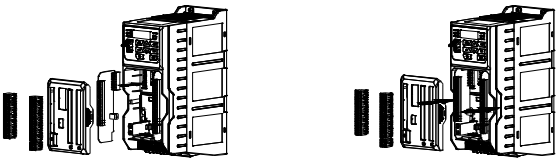


Fig. 3-18 Mount the encoder board-18PIN

3.4.3.2 Remove and mount the encoder board-DB15

- Remove the option board

After removing all pluggable terminals, press the clips on both sides of the drive to remove the cover plate, and then remove the encoder option board from the slot in the housing and the fixed metal clips.

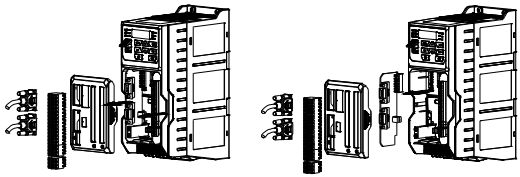


Fig. 3-19 Remove the encoder board -DB15

- Mount the extension board

Insert the option board along the slot inside the housing, with the side containing DB connectors facing outward. If the socket is securely connected to pins on the control board and the option board is inserted into the metal clips, the option board is considered preliminarily installed. Afterward, you may close the small cover plate, mount and wire the terminals. (Notice: at this point, make sure the corresponding partition on the cover plate is already perforated, If not, you can break it or use a small knife to cut through the adhesive points, for details, please refer to Fig. 3-16.)

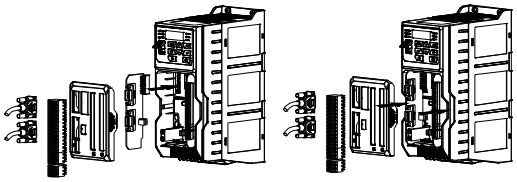


Fig. 3-20 Mount the encoder board-DB15

3.5 Configuration of Peripheral Devices

3.5.1 Standard Configuration of Peripheral Devices

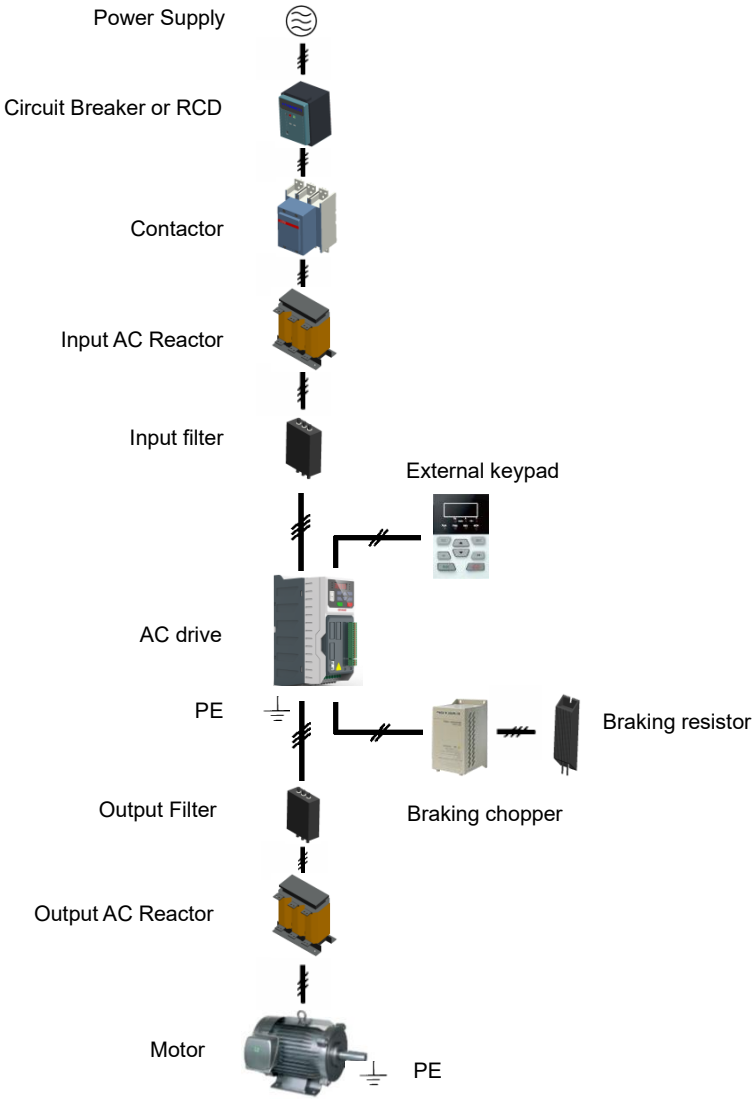


Fig. 3-21 Standard configuration of peripheral devices

3.5.2 Instructions of Peripheral Devices

Table 3-5 Instructions of peripheral devices

Device	Instructions
Power supply	Input three-phase AC power supply should be in the range as specified in this manual
Circuit breaker	Purpose: disconnect power supply and protect the equipment in case of abnormal overcurrent occurs Type selection: breaking current of circuit breaker is defined to be 1.5~2 times the rated current of the drive Breaking time characteristic of circuit breaker should be selected based on overload protection time characteristic of the drive
RCD	Purpose: since the drive outputs PWM HF chopping voltage, HF leakage current is inevitable Type selection: To prevent electric shock accidents and the occurrence of electrical fires, please select a suitable residual current protective device according to the site conditions. Type B dedicated RCD is recommended.
Contactor	For safety's sake, do not frequently close and break the contactor since this may bring about equipment faults Do not control the start & stop of the drive directly through switch on and off the contactor since this will result in a reduction on the product life
Input AC reactor or DC choke	Improve power factor Reduce the impact of imbalanced three-phase input AC power supply on the system Suppress higher harmonics and reduce the conducted and radiated interference to peripheral devices Restrict the impact of impulse current on rectifier bridges
Input filter	Reduce conducted interference from power supply to the drive, improve the immunity of the drive from noise Reduce conducted and radiated interference of the drive to peripheral devices
Brake chopper and braking resistor	Purpose: consume motor feedback energy to attain quick brake Type selection: Contact GTAKE technical personnel for type selection of brake chopper. Refer to type selection of braking resistor in Table 3.5.3 Selection of Peripheral Devices for the drive model with B at the end.
Output filter	Reduce conducted and radiated interference of the drive to peripheral devices
Output AC reactor	Avoid the motor insulation damage result from harmonic voltage Reduce frequent protection from the drive caused by leakage current The cable between the drive and the motor should not be too long. If the cable is too long, its distributed capacitance will be high, which can easily generate high harmonic currents. Generally, when the distance between the drive and the motor exceeds 100m, it is recommended to install an output AC reactor.
Motor	Should match the drive
External keypads	Support external LED and LCD keypads

3.5.3 Selection of Peripheral Devices

Table 3-6 Selection of peripheral devices

Drive model	Circuit breaker (A)	Contactor (A)	Braking resistor/Brake chopper *	
			Resistor configuration	Min. Resistance value (Ω)
GK900M-4T0.75B	6	9	150W 600Ω	96
GK900M-4T1.5B	10	9	300W 300Ω	96
GK900M-4T2.2B	13	12	440W 200Ω	64
GK900M-4T3.7B	25	26	740W 120Ω	40
GK900M-4T5.5B	32	26	1100W 80Ω	40
GK900M-4T7.5B	50	38	1500W 60Ω	40
GK900M-4T11B	63	50	2200W 40Ω	25
GK900M-4T15B-A	63	50	3000W 30Ω	20
GK900M-4T15B	63	50	3000W 30Ω	20
GK900M-4T18.5B	80	65	4000W 24Ω	20
GK900M-4T22B	80	80	4500W 20Ω	20
GK900M-4T30(B)	100	80	6000W 15Ω	13.2
GK900M-4T37(B)	160	95	7500W 15Ω**	13.2
GK900M-4T45(B)	160	115	9000W 10Ω	10
GK900M-4T55(B)	250	150	11000W 10Ω 10Ω**	10
GK900M-4T75(B)	250	170	15000W 6Ω	6
GK900M-4T90(B)	250	205	18000W 5Ω**	6
GK900M-4T110	400	245	Brake chopper is optional	
GK900M-4T132	400	300		
GK900M-4T160	500	410		
GK900M-4T185	500	410		
GK900M-4T200	500	410		
GK900M-4T220	630	410		
GK900M-4T250	630	475		
GK900M-4T280	800	620		
GK900M-4T315	800	620		
GK900M-4T355	800	620		
GK900M-4T400	1000	800		
GK900M-4T450	1000	800		

Drive model	Circuit breaker (A)	Contactor (A)	Braking resistor/Brake chopper *	
			Resistor	Min. Resistance (Ω)
GK900M-4T500	1200	1000	Brake chopper is optional	
GK900M-4T560	1200	1000		
GK900M-4T630	1500	1200		
GK900M-4T710	1800	1500		
GK900M-4T800	2500	2400		
GK900M-4T900	2500	2400		
GK900M-4T1000	2500	2400		

* When brake chopper is inbuilt, the power and resistance value of braking resistor should meet the requirement as stated in the table.

When brake chopper is mounted externally, the resistance value of the brake resistor shall be selected based on the brake chopper.

The recommended power rating for the braking resistor in the table is the minimum value recommended for use under accidental braking load conditions (braking torque 100% to 125%, braking frequency 10%). Users can choose different resistor values and power ratings based on the actual operating conditions of the braking resistor. On the premise of ensuring that the braking requirements are met, the braking resistor used should be greater than the minimum resistor limit specified in the table. Failure to comply may result in damage to the drive.

It should be noted that the braking resistor is not inbuilt and needs to be purchased separately.

If the braking resistor is left exposed for a long time, conductive dust may accumulate, leading to a short circuit to ground. In this case, it is necessary to add a dust cover or place the resistor in a resistor box, depending on the actual situation.

**The braking torque is 100% and the braking frequency is 10% for this configuration. (For other power ratings, it is recommended to configure a braking torque of 125% and a braking frequency of 10%.)

3.6 Terminal Configuration

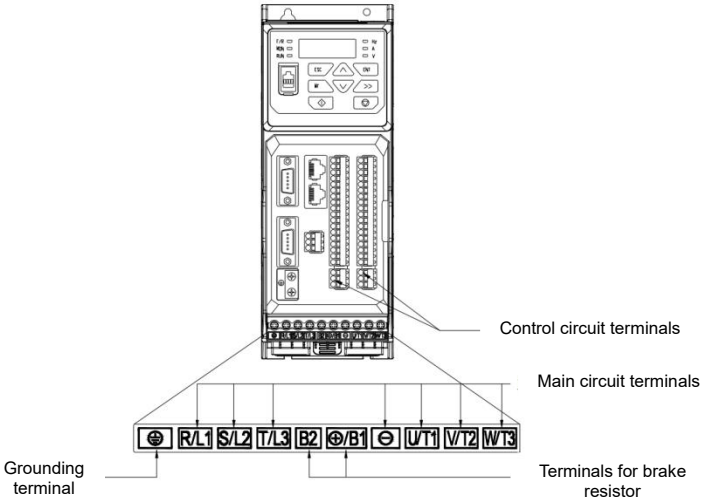


Fig. 3-22 Terminal configuration

3.7 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 ⊕ /B1, and B2 when needed. Failure to comply will result in equipment damage.
- Wiring screws and bolts for main circuit terminals must be screwed tightly. Failure to

comply may result in faults and/or equipment damage.

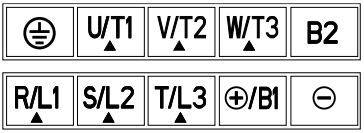
ATTENTION

- Signal wires should be away from main power lines to the best of possibility. 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.

3.7.1 Main Circuit Terminals of GK900M-4T0.75B ~ GK900M-4T3.7B

Terminal marks	Designation and function of terminals
R/L1, S/L2, T/L3	Three-phase AC input terminals
⊕ /B1, B2	Braking resistor connection terminals when brake unit is inbuilt*
⊕ / B1, ⊖	DC power supply input terminals**
U/T1, V/T2, W/T3	Three-phase AC output terminals
⏚	Ground terminal PE

3.7.2 Main Circuit Terminals of GK900M-4T5.5B~GK900M-4T37(B)

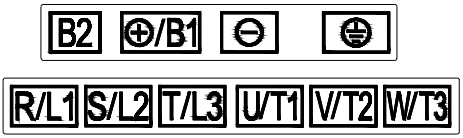


Terminal marks	Designation and function of terminals
R/L1, S/L2, T/L3	Three-phase AC input terminals
⊕ /B1, B2	Braking resistor connection terminals when brake unit is inbuilt*
⊕ /B1, ⊖	DC power supply input terminals
U/T1, V/T2, W/T3	Three-phase AC output terminals
⏚	Ground terminal PE

For GK900M-4T30G~GK900M-4T37G drives without “B” in the model, there is no built-in brake unit as factory default, brake resistor connected between B1 and B2 terminals is invalid.

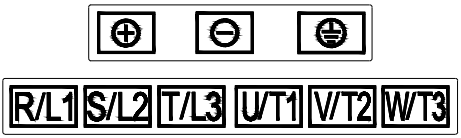
3.7.3 Main Circuit Terminals of GK900M-4T45(B)~GK900M-4T220

- **Main Circuit Terminals of GK900M-4T45B~GK900M-4T75B**



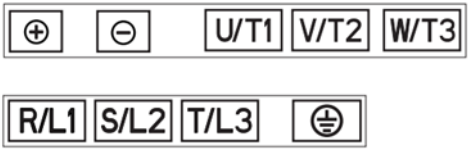
Terminal marks	Designation and function of terminals
R/L1, S/L2, T/L3	Three-phase AC input terminals
⊕ /B1, B2	Braking resistor connection terminals when brake unit is inbuilt*
⊕ /B1, ⊖	DC power supply input terminals
U/T1, V/T2, W/T3	Three-phase AC output terminals
⏚	Ground terminal PE

- **Main Circuit Terminals of GK900M-4T45~GK900M-4T110**



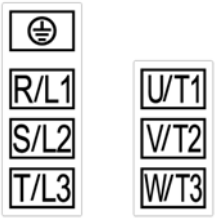
Terminal marks	Designation and function of terminals
R/L1, S/L2, T/L3	Three-phase AC input terminals
⊕, ⊖	DC power supply input terminals
U/T1, V/T2, W/T3	Three-phase AC output terminals
⏚	Ground terminal PE

- **GK900M-4T132G~GK900M-4T220**



Terminal marks	Designation and function of terminals
R/L1, S/L2, T/L3	Three-phase AC input terminals
⊕ , ⊖	DC power supply input terminals
U/T1, V/T2, W/T3	Three-phase AC output terminals
⏚	Ground terminal PE

3.7.4 Main Circuit Terminals of GK900M-4T250G ~GK900M-4T450G



Terminal marks	Designation and function of terminals
R/L1, S/L2, T/L3	Three-phase AC input terminals
U/T1, V/T2, W/T3	Three-phase AC output terminals
⏚	Ground terminal PE

3.7.5 Terminal Screw and Wiring Requirement

Table 3-7 Terminal screw and wiring requirement

Drive model	Rated input current	Power terminal			Ground terminal		
		Cable (mm2)	Screw	Torque (kgf.cm)	Cable (mm2)	Screw	Torque (kgf.cm)
GK900M-4T0.75GB	3.5	3x0.75	M3.5	10±0.5	0.75	M3.5	10±0.5
GK900M-4T1.5GB	5.0	3x0.75	M3.5	10±0.5	0.75	M3.5	10±0.5
GK900M-4T2.2GB	6.0	3x0.75	M3.5	10±0.5	0.75	M3.5	10±0.5

Drive model	Rated input current	Power terminal			Ground terminal		
		Cable (mm2)	Screw	Torque (kgf.cm)	Cable (mm2)	Screw	Torque (kgf.cm)
GK900M-4T3.7GB	10.5	3x1.5	M3.5	10±0.5	1.5	M3.5	10±0.5
GK900M-4T5.5GB	14.6	3x2.5	M4	14±0.5	2.5	M4	14±0.5
GK900M-4T7.5GB	20.5	3x4.0	M4	14±0.5	4.0	M4	14±0.5
GK900M-4T11GB	29	3x6.0	M4	14±0.5	6.0	M4	14±0.5
GK900M-4T15GB-A	34	3x10	M4	14±0.5	10	M4	14±0.5
GK900M-4T15GB	34	3x10	M4	14±0.5	10	M4	14±0.5
GK900M-4T18.5GB	44	3x10	M5	28±0.5	10	M5	28±0.5
GK900M-4T22GB	50	3x16	M5	28±0.5	16	M5	28±0.5
GK900M-4T30G(B)	65	3x16	M6	48±0.5	16	M6	48±0.5
GK900M-4T37G(B)	80	3x25	M6	48±0.5	16	M6	48±0.5
GK900M-4T45G(B)	83	3x35	M8	120±0.5	16	M8	120±0.5
GK900M-4T55G(B)	102	3x50	M8	120±0.5	25	M8	120±0.5
GK900M-4T75G(B)	143	3x70	M10	250±0.5	35	M10	250±0.5
GK900M-4T90G(B)	160	3x95	M10	250±0.5	50	M10	250±0.5
GK900M-4T110G	192	3x120	M10	250±0.5	70	M10	250±0.5
GK900M-4T132G	232	3x150	M10	250±0.5	95	M10	250±0.5
GK900M-4T160G	285	3x185	M10	250±0.5	95	M10	250±0.5
GK900M-4T185G	326	3x185	M10	250±0.5	95	M10	250±0.5
GK900M-4T200G	354	2x(3x95)	M10	250±0.5	95	M10	250±0.5
GK900M-4T220G	403	2x(3x120)	M10	250±0.5	120	M10	250±0.5
GK900M-4T250G	441	2x(3x120)	M12	440±0.5	120	M10	250±0.5
GK900M-4T280G	489	2x(3x150)	M12	440±0.5	150	M10	250±0.5
GK900M-4T315G	571	2x(3x185)	M12	440±0.5	185	M10	250±0.5
GK900M-4T355G	624	2x(3x185)	M12	440±0.5	185	M10	250±0.5
GK900M-4T400G	699	2x(3x240)	M12	440±0.5	240	M10	250±0.5

Drive model	Rated input current	Power terminal			Ground terminal		
		Cable (mm2)	Screw	Torque (kgf.cm)	Cable (mm2)	Screw	Torque (kgf.cm)
GK900M-4T450G	770	2x(3x240)	M12	440±0.5	240	M10	250±0.5

Note：Cable specification explanation: Referring to the Chinese standard, 3x10 represents 1 * 3-core wire, and 2x (3x95) represents 2 * 3-core wires;

3.8 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, RC and TA, TB, TC.

⚠ 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.
- Encoder must be provided with shielded cables whose shielded layer must be properly grounded.

3.8.1 Control Board Diagram

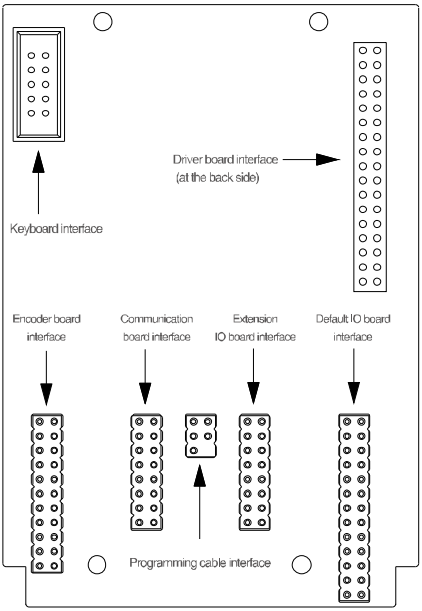


Fig. 3-23 Control Board Diagram

3.8.2 GK900M Wiring Diagram

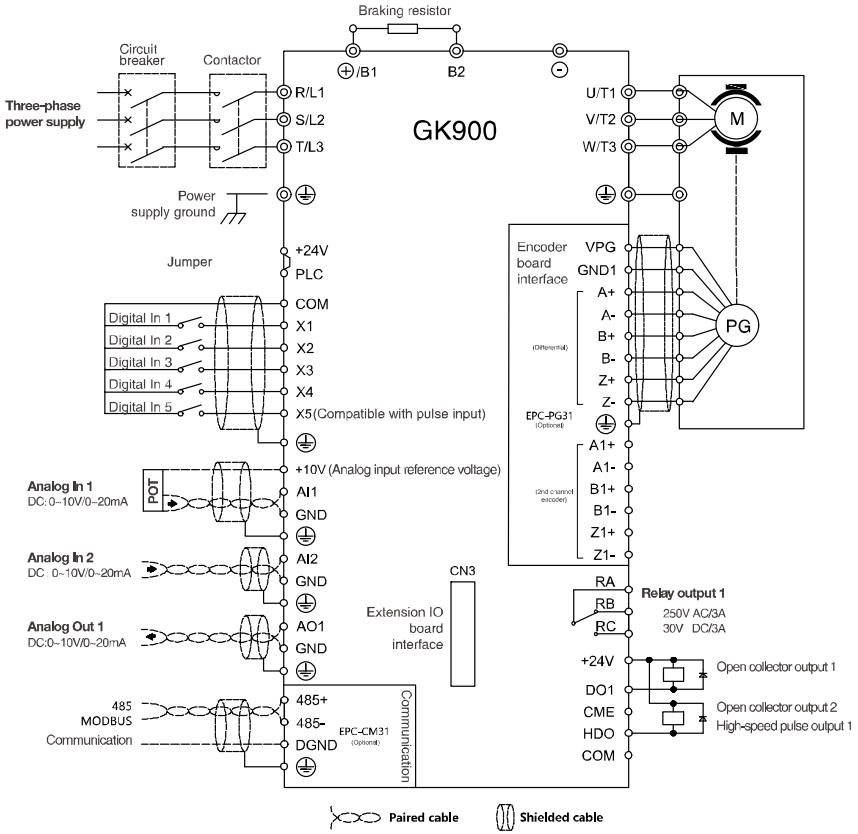


Fig. 3-24 Wiring Diagram

3.9 Control Terminal Specification

Table 3-8 Default IO board terminal specification (EPC-TM31)

Category	Terminal	Terminal designation	Specification
Analog input	+10V	Analog input reference voltage	10.3V ±3%
			Maximum output current 10mA The resistance of external potentiometer should be larger than 1kΩ
	GND	Analog ground	Isolated from COM interiorly

Category	Terminal	Terminal designation	Specification
	AI1	Analog input 1	0~20mA: input impedance - 500Ω, maximum input current - 25mA
			0~10V: input impedance - 22kΩ, maximum input voltage - 12.5V
			Switch S1 on control board for jumping between 0~20mA and 0~10V, factory default: 0~10V
	AI2	Analog input 2	0~20mA: input impedance: 500Ω, maximum input current: 25mA
			0~10V: input impedance: 22kΩ, maximum input voltage: 12.5V;
			Switch S3 on control board for jumping between 0~20mA and 0~10V, factory default: 0~10V
Analog output	AO1	Analog output 1	0~20mA: impedance: 200Ω~500Ω
			0~10V: impedance ≥ 10kΩ
			Switch S2 on control board for jumping between 0~20mA and 0~10V, factory default: 0~10V
	GND	Analog ground	Isolated from COM interiorly
Digital input	X1~X4	Digital input Terminals 1~4	Input: 24VDC, 10mA
			Range of frequency: 0~200Hz
			Voltage range: 10V~30V
	X5	Digital input/pulse input	Input: 24VDC, 10mA
			Pulse input: 0Hz～50kHz
	COM	+24V ground	Isolated from GND interiorly
Digital Output	DO1	Open collector output	Range of voltage: 0~24V
			Range of current: 0~50mA
	HDO	Open collector output / pulse output	Open collector output: same as DO1
			Pulse output: 0~50kHz;
	CME	DO1 reference ground	Reference ground of DO1
	COM	HDO reference ground	Reference ground of HDO
	COM	+24V ground	isolated from GND interiorly

Category	Terminal	Terminal designation	Specification
COM Terminal	PLC	COM of digital input terminal	For switching high & low levels, short-circuited with +24V via jumper S4 as default, i.e. low value of digital input activated
			When power is supplied externally, jumper S4 must be removed.
	+24V	+24V	24V±10%, isolated from GND interiorly, maximum load 200mA
Relay 1 output	RA/RB/RC	Relay output	RA-RB: NC
			RA-RC: NO
			Contact capacity: 250VAC/3A, 30VDC/3A

Table 3-9 Extension IO board terminal specification (EPC-TM32)

Category	Terminal	Terminal designation	Specification
Analog input	AI3	Analog input 3	0~20mA: input impedance - 500Ω, maximum input current - 25mA
			0~10V: input impedance - 22kΩ, maximum input voltage - 12.5V
			Switch S2 on control board for jumping between 0~20mA and 0~10V, factory default: 0~10V
			Switch S2 to S4 to be compatible with motor temperature sensor (PT100/PT1000/NTC, NTC jumper is the same as PT1000)
	AI4	Analog input 4	0-20mA: Input impedance 500 Ω, maximum input current 25mA
			-10-10V: Input impedance: 22kΩ, maximum input voltage 12.5V
			Switch S3 on control board for jumping between 0~20mA and 0~10V, factory default: 0~10V
	LCT	Current leakage detection	Rated current of transformer: 800A (≤355kW) or 1500A (≥400kW)
			Transformer turn ratio: 800:5 (≤355kW) or 1500：5(≥400kW)
Analog output	AO2	Analog output 2	0~20mA: impedance: 200Ω-500Ω
			0～10V: impedance: ≥10kΩ

			Switch S1 on control board for jumping between 0~20mA and 0~10V, factory default: 0~10V
	GND	Analog ground	Internal and COM isolation
Digital input	X6～X10	Digital input 6-10	Input: 24VDC，10mA
			Frequency range: 0-200Hz
			Voltage range: 10V~30V
	COM	+24V ground	isolated from GND interiorly
Digital Output	DO2~DO4	Open collector output	Voltage range: 0-24V
			Current range: 0-50mA
	CME	Reference GND of DO	Reference ground for DO2~DO4
STO input	+24	+24V	24V±10%, isolated from GND interiorly, Maximum load: 200mA
	STO1	STO signal input 1	STO function is on as default. If the STO function is not used, short-circuit STO1 and+24V externally, as well as short-circuit STO2 and+24V externally, input : 24VDC, 10mA
	STO2	STO signal input 2	
Relay 2 output	TA/TB/TC	Relay output	TA−TB: NC
			TA−TC: NO
			Contact capacity: 250VAC/3A，30VDC/3A

Table 3-10 485/CAN communication board terminal specification (EPC-CM31/32)

Category	Terminal	Terminal designation	Specification
EPC-CM31 (Dual RJ45 interface)	2 pin	485+	Rate: 4800/9600/19200/38400/57600/115200bps The maximum distance is 500 meters (using standard network cable).
	4 pin	485-	
	8 pin	DGND	Communication signal reference ground, isolated from GND interiorly
EPC-CM31A (Dual RJ45 interface)	3 pin	485+	Rate: 4800/9600/19200/38400/57600/115200bps The maximum distance is 500 meters (using standard network cable).
	4 pin	485-	
	2 pin	DGND	Communication signal reference ground, isolated from GND interiorly
EPC-CM31B (Terminal block)	3 pin	485+	Rate: 4800/9600/19200/38400/57600/115200bps
	2 pin	485-	
	1 pin	DGND	Communication signal reference ground, isolated from GND interiorly

EPC-CM32 (Dual RJ45 interface)	7 pin	CAN+	4800/9600/19200/38400/57600/115200bps The maximum distance is 500 meters (using standard network cable).
	5 pin	CAN-	
	2 pin	DGND	Communication signal reference ground, isolated from GND interiorly
EPC-CM32A (Terminal block)	3 pin	CAN+	Rate: Maximum 1M bps
	2 pin	CAN-	
	1 pin	DGND	Communication signal reference ground, isolated from GND interiorly

ATTENTION:

When 485 communication interface is used, DGND terminal must be well connected to 485 communication power supply ground of host computer. Failure to comply may result in damage of system 485 communication circuit. The same is true to CAN communication interface.

This user manual includes information on optional boards (see Appendix section). Users can choose different communication extension boards and encoder extension boards based on needs. Separate manuals are provided for each type of extension board, and users can refer to the corresponding manual for specific usage instructions.

3.10 Control Terminal Usage

3.10.1 Lay-out of Control Terminals

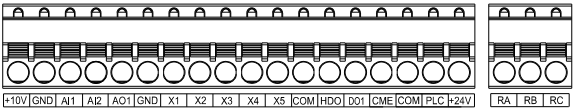


Fig. 3-25 Lay-out of control terminals (Default IO board EPC-TM31)

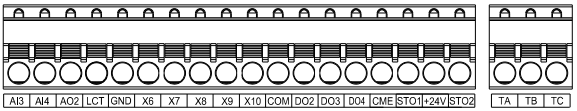


Fig. 3-26 Lay-out of control terminals (Extension IO board EPC-TM32)

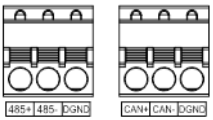


Fig. 3-27 Lay-out of control terminals (485 communication board EPC-CM31B & CAN communication board EPC-CM32A)

ATTENTION:

The above figure shows the corresponding wiring terminals. If the communication board adopts a dual RJ45 network port wiring method, please refer to the pin definitions in Table 3-10.

3.10.2 Control Terminal Wiring Requirement

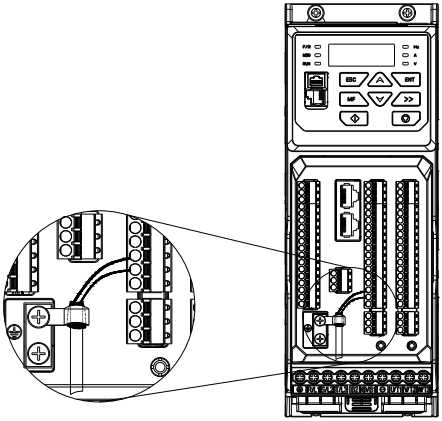


Fig. 3-28 Shielded Cable Grounded

ATTENTION:

The shielded cable needs to be connected to PE at the side near the drive.

Table 3-11 Control Terminal Wiring Specification

Cable type	Cable requirement (mm^2)
Shielded cable	1.0

3.10.3 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 so as to avoid drive faults as the 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.

3.10.4 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.

- **Instructions of digital input terminal**

◆ **Dry contact**

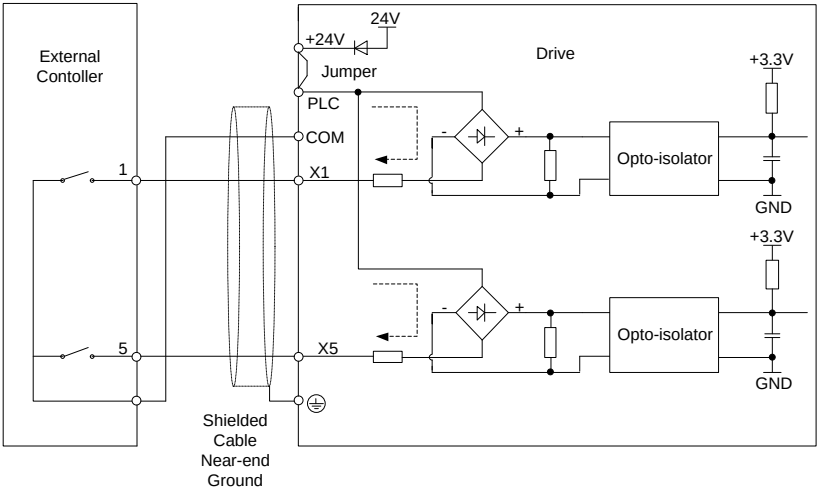


Fig. 3-29 Internal power supply dry contact

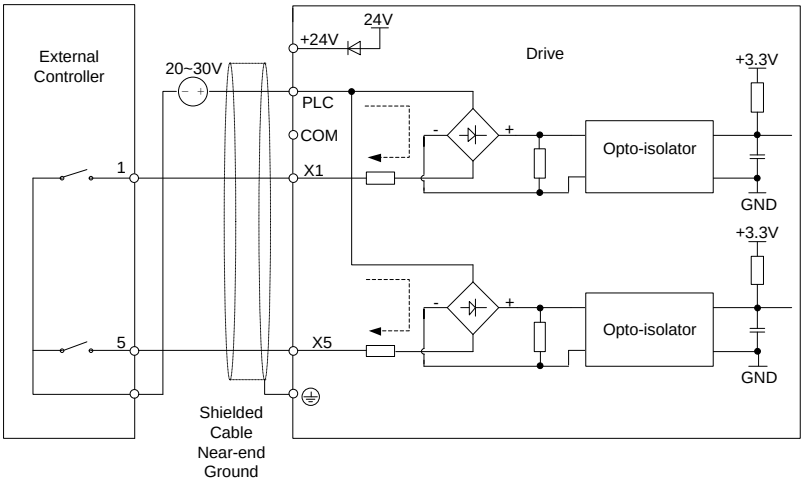


Fig. 3-30 External power supply dry contact

ATTENTION:

When X5 terminal is set to pulse input, it can accept a pulse signal from 0 to 50kHz.

When external power supply is used, the jumper S4 between +24V and PLC must be removed. Otherwise, it may result in equipment damage.

For wiring methods of the power supply of extension IO board and NPN, the jumper S4 between +24V and PLC must be removed. Otherwise, it may result in equipment damage.

The voltage range of external power supply should be within the range of DC20~30V. Otherwise, normal operation could not be assured and/or result in equipment damage.

◆ **Open collector NPN connection**

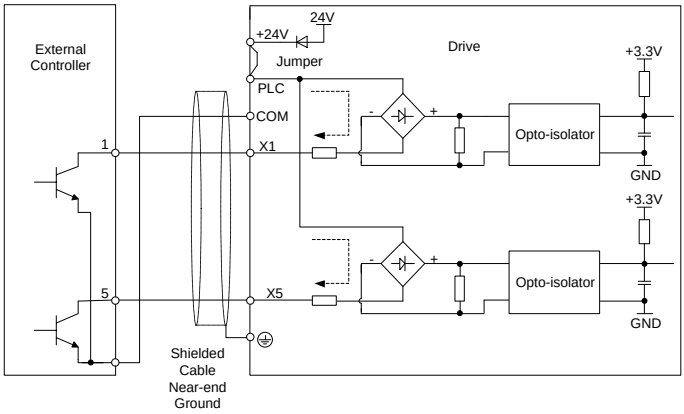


Fig. 3-31 Internal power supply open collector NPN connection

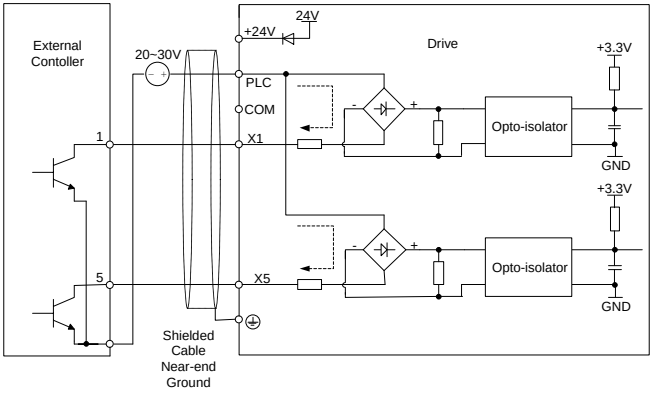


Fig. 3-32 External power supply open collector NPN connection

ATTENTION:

When X5 terminal is set to pulse input, it can accept a pulse signal from 0 to 50kHz.

When external power supply is used, the jumper S4 between +24V and PLC must be removed. Otherwise, it may result in equipment damage.

For wiring of the power supply of extension IO board and NPN, the jumper S4 between +24V and PLC must be removed. Besides, the voltage range of external power supply should be within the range of DC20~30V. Otherwise normal operation could not be assured and/or hazard of equipment damage exists.

◆ **Open collector PNP connection**

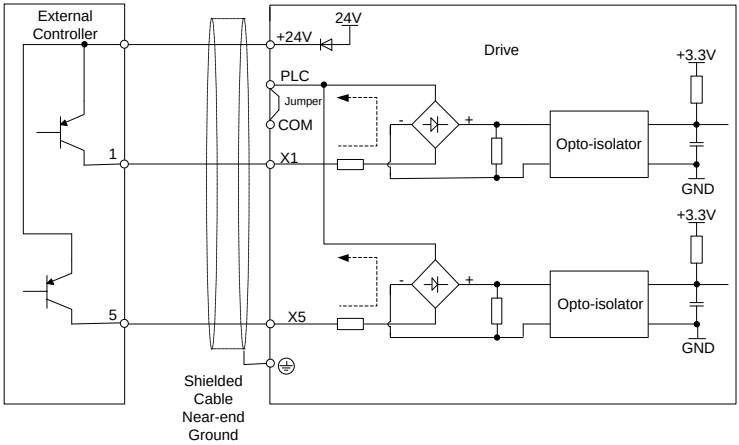


Fig. 3-33 Internal power supply open collector PNP connection

ATTENTION:

When PNP wiring is selected, the jumper S4 between +24V and PLC must be switched to between PLC and COM. Otherwise normal operation could not be assured and/or hazard of equipment damage exists.

The PNP wiring for the extension IO board is the same as method of the default IO board.

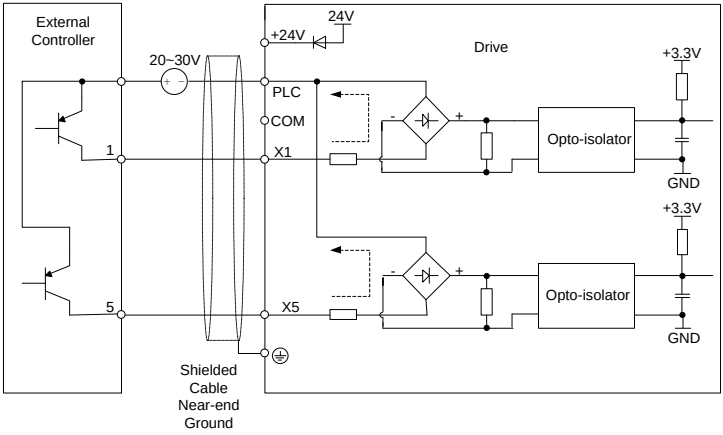


Fig. 3-34 External power supply open collector PNP connection

ATTENTION:

When X5 terminal is set to pulse input, it can accept a pulse signal from 0 to 50kHz.

When external power supply is used, the jumper S4 between +24V and PLC must be removed. Otherwise, it may result in equipment damage.

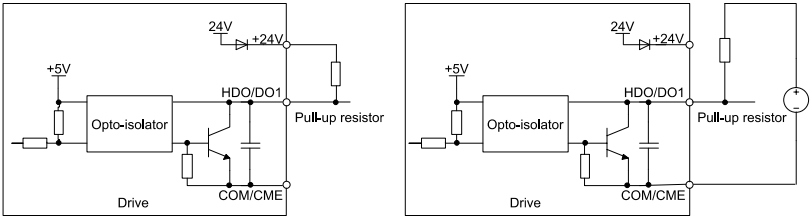
The PNP wiring for the extension IO board is the same as the method of default IO board.

The voltage range of external power supply should be DC20~30V. Otherwise, normal operation could not be assured and/or result in equipment damage.

For PNP wiring method of the external power supply to the extension IO board, the jumper S4 between +24V and PLC must be removed. Besides, the voltage range of external power supply should be within the range of DC20~30V. Otherwise normal operation could not be assured and/or hazard of equipment damage exists.

- **Instructions of digital output terminal**

◆ **Instructions of HDO and DO output terminals**



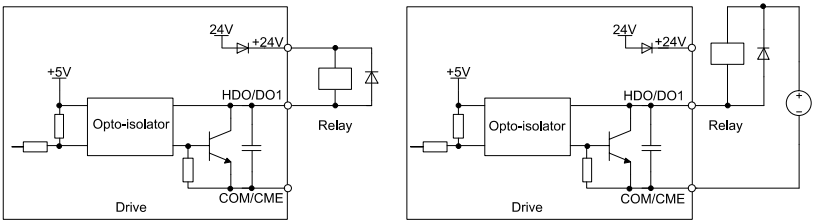
a) Internal power supply b) External power supply

Fig. 3-35 Wiring when HDO and DO1 output with pull-up resistors

ATTENTION:

When set to pulse output, HDO terminal shall output 0~50kHz pulse signal.

CME and COM are not connected together as default. When DO1 terminal uses the internal power supply, short-circuit COM and CME.



a) Internal power supply b) External power supply

Fig. 3-36 Wiring diagram when HDO and DO1 drive relay

ATTENTION:

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

In addition, a freewheeling diode must be installed with correct polarity according to the diagram. The driving capacity should not exceed 50mA.

CME and COM are not connected together as default. When DO1 terminal uses the internal power supply, short-circuit COM and CME.

◆ **Wiring instruction of relay output terminal**

Control boards of GK900M series drives are provided with two programmable relay dry contact outputs.

Default IO board is configured with one relay, with contacts RA/RB/RC, among which RA and RB are normally closed, while RA and RC are normally open. The function definitions are as shown in parameter C1-02 in Chapter 4.

Extension IO board is configured with one relay, with contacts TA/TB/TC, among which TA and TB are normally closed, while TA and TC are normally open contacts. The function definitions are as shown in parameter C1-03 in Chapter 4.

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 (note that its leakage current shall be less than holding current of controlled contactor or relay), piezo-resistor or fly-wheel diode etc. shall be mounted (be sure to pay close attention to polarity in case of DC electromagnetic circuit). Absorbing devices should be mounted close to the ends of relay or contactor.

3.10.5 Instruction of IO board jumper signal switch

Table 3-12 Instructions of Jumpers of default IO board (EPC-TM31)

Designation	Function	Default setting
S1	Selection of AI1 AI1_I: 0～20mA AI1_V: 0～10V	0～10V
S2	Selection of AO1 AO1_I: 0～20mA AO1_V: 0～10V	0～10V
S3	Selection of AI2 AI2_I: 0～20mA AI2_V: 0～10V	0～10V
S4	Selection between high and low levels of digital input COM P24: PLC and +24V short-circuited COM1: PLC and COM short-circuited (For external power supply, jumper S4 shall be removed.)	Short-circuited with +24V

Table 3-13 Instructions of Jumpers of Extension IO board (EPC-TM32)

Designation	Function	Default setting
S1	Selection of AO2 AO2_I: 0～20mA AO2_V: 0～10V	0～10V
S2	Selection of AI3 AI3_I: 0～20mA AI3_V: 0～10V	0～10V
S3	Selection of AI4 AI4_I: 0～20mA AI4_V: 0～10V	0～10V
S4	Selection of temperature sensor (corresponding to AI3, share the same jumper with S2) PT100: KTY84-130 motor temperature sensor /PT100 motor temperature sensor PT1000: PT1000 motor temperature sensor/ NTC motor temperature sensor	None

3.11 EMC 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, EMC 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 well 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 and cables as possible. Never make signal lines in parallel with power lines or bundle them.
- Signal lines must orthogonally cross power lines if this cross is 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:

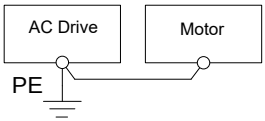


Fig. 3-37 Grounding

- 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 input & 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 switching 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 switching 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 switching 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 switching 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 switching 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 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 well 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

4.1.1 Key Functions on Control Panel

On control panel there are 8 keys whose functions are as shown in Table 4-1.

Table 4-1 Key functions on control panel

Indicator	Designation	Meaning
ENT	Enter key	1) Parameter edition enter 2) Confirmation of parameter settings 3) Confirmation of MF key function
ESC	Escape key	1) Return function 2) Invalid parameter edit value
∧	Increase key	1) Increase of selected bit of function code 2) Increase of selected bit of parameter 3) Increase of set frequency
∨	Decrease key	1) Decrease of selected bit of function code 2) Decrease of selected bit of parameter value 3) Decrease of set frequency
>>	Shift key	1) Selection of parameter serial bit 2) Selection of parameter serial bit 3) Selection of stop/run status display parameter value 4) Fault status switches to parameter display status
RUN	Run key	Run

STOP RESET	Stop/reset key	1) Stop 2) Fault reset
MF	Multi-function key	See Table 4-2 " MF key function definition"

Table 4-2 MF key function definition

L0-00 set value	Function of MF key	Meaning
0	Disabled	MF key disabled
1	Forward JOG	Forward JOG function
2	Reverse JOG	Reverse JOG function
3	Forward/Reverse switch	Run direction forward and reverse switching
4	Emergency STOP 1	Press MF to STOP, with decel time b2-09
5	Emergency STOP 2	Coast to stop, the drive cuts off output
6	Run command setting mode switch	Control panel control -> Terminal control -> Communication control -> Control panel control, press ENT to confirm within 5 seconds

4.1.2 Control Panel Indicators

Control panel is furnished with 7 indicators whose descriptions are as below

Table 4-3 Description of indicators

Indicator	Designation	Meaning
Hz	Frequency indicator	ON: currently displayed parameter value is running frequency or the current parameter unit is frequency Flash: currently displayed parameter value is set frequency
A	Current indicator	ON: currently displayed parameter value is current
V	Voltage indicator	ON: currently displayed parameter value is voltage
Hz+A	Running speed indicator	ON: currently displayed parameter value is running speed Flash: currently displayed parameter value is setting speed
A+V	Percentage indicator	ON: currently displayed parameter value is a percentage value
All OFF	No unit	No unit

Indicator	Designation	Meaning
MON	Run command setting mode indicator	ON: Control panel OFF: Terminal Flash: Communication
RUN	Run status indicator	ON: Run OFF: Stop Flash: Stopping
F/R	Forward/Reverse indicator	ON: If the drive is in stop status, forward command is enabled. If the drive is in run status, the drive is running forward. OFF: If the drive is in stop status, reverse command is enabled. If the drive is in run status, the drive is running reversely. Flash: Forward is being transferred to reverse. Reverse is being transferring to forward.

4.1.3 Control Panel Display Status

Control panel indicates eight types of status, STOP parameters display, RUN parameters display, Fault display, parameter number edition, parameter setting, Password authentication, Direct frequency modification and Prompt message. The operation relating to these statuses and the switching among these statuses is described as follows.

4.1.3.1 Display of STOP Parameters

The drive normally gets into STOP parameters display once run has been stopped. By default, set frequency is displayed in such a status, and other parameters can be displayed through setting of L1-02 parameters and the » key. For example, when users need to check set frequency as well as the values of bus voltage and AI1 value in stop status, make L1-02=0013 (refer to setting method of parameters) and press the » key to display the value of bus voltage and then press » again to display the value of AI1.

Fig. 4-2 Stop parameter display status (Displaying setting frequency – 50.00Hz)

Run status would be enabled immediately upon the receipt of run command in stop status. Press ENT to get into parameter edit status (get into password authentication status if parameter under password protection). Directly get into frequency modification status when receive UP/DOWN command from terminal, or and press on Control panel. Switch to fault display status once a fault occurs or an alarm is given.

4.1.3.2 Run Parameters Display Status

In case there is no fault, the drive will get into run parameters display status upon receipt of run command. Default display is run frequency, and other parameters can be displayed through setting of L1-00 and L1-01 and press » to shift. For example, in run status, when users need to check bus voltage, motor speed, and input terminals status, please set L1-00= 0084 and L1-01= 0004, and press » to shift to the display of bus voltage, then press » again to display motor speed, and then press » to display input terminals state value.

Fig. 4-3 Run parameter display status (Displaying run frequency – 50.00Hz)

Stop status will be enabled immediately upon receipt of stop command in such a status.

Press ENT to get into parameter edit status (get into password authentication status if parameter under password protection). Directly get into frequency modification status when receiving UP/DOWN command from terminal, or pressing or Switch to fault alarm display status once a fault occurs or an alarm is given.

4.1.3.3 Fault Alarm Display Status

In case a fault occurs or an alarm is given, the drive will get into fault or alarm display status.

Fig. 4-4 Fault or alarm display status (CCL: Contactor act fault)

In such a status, the drive gets into stop status upon receipt of pressing ENT , and would get into parameter edit status when receiving pressing ENT command again (if parameter is under password protection, the drive would get into password authentication status). Directly get into frequency modification status when receiving UP/DOWN command from terminal, or pressing or .

4.1.3.4 Parameter Edit Status

Enter parameter edit status immediately upon pressing ENT in STOP status, run parameters display status, and direct frequency modification status. This status could also be entered upon receipt of consecutive twice pressing ENT in fault display status. The drive shall quit current status and be previous status upon receipt of pressing ESC .

Fig. 4-5 Parameter edit status

4.1.3.5 Parameter Value Setting Status

Enter parameter value setting status upon receipt of pressing ENT when in parameter value edit status. When pressing ENT or ESC command is received in such a state, escape

parameter edit status.

Fig. 4-6 Parameter setting status (b0-02 is set to 49.83Hz)

4.1.3.6 Password Authentication Status

On condition that parameters are under password protection, users would have to go through password authentication when they want to modify function code parameter value. Only A0-00 is visible in such a state.

Under password protection, the password authentication status will be first entered upon the receipt of pressing ENT in STOP parameter display status, run parameter display status, or direct frequency modification status (refer to the setting method of parameters). It will enter parameter edit status upon the completion of password authentication.

4.1.3.7 Direct Frequency Modification Status

In the status of STOP, fault or run, the drive will enter frequency modification status when terminal UP/DOWN is enabled, or pressing ∧ or ∨.

Fig. 4-7 Direct frequency modification status

4.1.3.8 Prompt Message Status

Prompt message status shall be displayed at the completion of some certain operations. For instance, the “bASIC” prompt message would be displayed upon the completion of setting parameter A0-01 to 0.

Fig. 4-8 Prompt message status

Prompt message characters and their meanings are shown as specified in Table 4-4.

Table 4-4 Prompt characters

Prompt symbol	Meaning	Prompt symbol	Meaning
bASIC	When A0-01 is set to 0	Cpyb1	Backup parameter value
dISP1	When A0-01 is set to 1	LoAd	Parameter upload to control panel
USEr	When A0-01 is set to 2	dnLd1	Parameter download from control panel (motor parameter excluded)
ndFLt	When A0-01 is set to 3	dnLd2	Parameter download from control panel (motor parameter included)
LoC-1	Control panel locked 1 (full 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	Motor tune in process
LoC-4	Control panel locked 4 (all locked except shift >>)	LoU	Drive undervoltage
PrtCt	Control panel protection	CLr-F	Clear fault record
UnLoC	Control panel lock cleared	dEFt1	Restore to factory default parameters (motor parameter excluded)

rECy1	Read the backup parameter value to parameter	dEFt2	Restore to factory default parameters (motor parameter included)

Table 4-5 shows meanings of the characters displayed on control panel.

Table 4-5 Meanings of displayed characters

Displayed character	Character Meaning	Displayed character	Character Meaning	Displayed character	Character Meaning	Displayed character	Character Meaning
	0		A		I		T
	1		b		J		t
	2		C		L		U
	3		c		N		v
	4		d		n		y
	5		E		o		-
	6		F		P		8.
	7		G		q		.
	8		H		r		
	9		h		S		

4.1.4 Setting Method of Parameters

4.1.4.1 Parameter System

GK900M series drive parameter group: A0~A1, b0~b2, C0~C4, D0~D5, E0~E2, F0~F4, H0, L0~L1, U0~U2-

Each parameter group contains a number of parameters. Parameters are identified by the combination “parameter group character + parameter subgroup number + parameter number”. For instance, “F3-07” indicates the seventh function code at subgroup 3, group F.

4.1.4.2 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.
First-tier display shown in Fig. 4-9:

Fig. 4-9 First-tier display of parameter

Second-tier display shown in Fig. 4-10:

Fig. 4-10 Second-tier display of parameter (“3” is the value of b0-00)

4.1.4.3 Example of Setting of Parameter

Parameter values are divided into decimal (DEC) and hexadecimal (HEX) values. When a parameter value is expressed by a hexadecimal, all its bits are independent of each other during edition and the range of value would be (0~F). Parameter value is composed of the ones, tens, hundreds and thousands place. Shift Key is used to select the bit to be changed, while and are used to increase or decrease numerical value.

- Example of parameter password setting
  - ◆ Setting of password (A0-00 is set to 1006)

1) In non-parameter edit status, it displays current parameter A0-00 when pressing ENT .
2) Press ENT to display parameter value 0000 that belongs to A0-00;
3) Press ▲ for six times to change the rightmost digit "0" to "6";
4) Press » to move the flashing digit to the leftmost bit;
5) Press ▲ once to change "0" in leftmost bit to "1";
6) Press ENT to save the value of A0-00, then Control panel will switch to display the next parameter A0-01;
7) Press ▼ to change A0-01 to A0-00;
8) Repeat steps 2) till 6). A0-01 will be displayed after control panel displaying **P-Set**;
9) There are three methods for users to bring the password setting above into effect:
① Press ESC + ENT + ▲ simultaneously (PrtCt displayed), ② won't operate control panel within 5 minutes, ③ restart the drive.

Flow chart of user password setting:

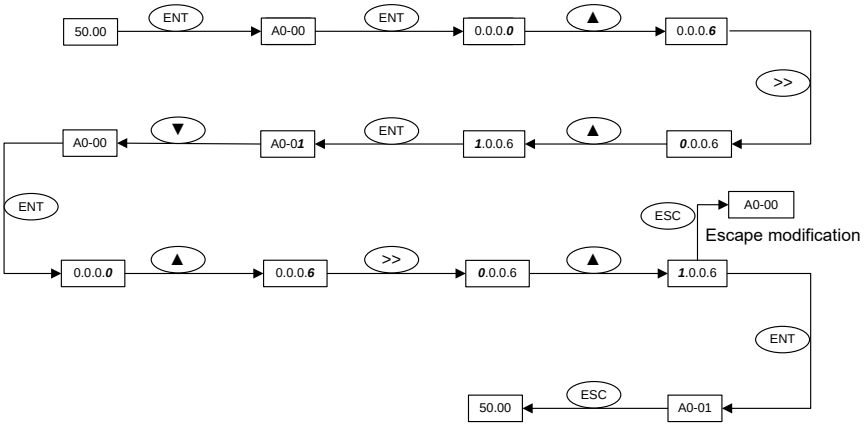


Fig. 4-11 Flow chart of user password setting

ATTENTION:

User's password is successfully set when step 8 finished, but will not take effect until the completion of step 9.

◆ **Password authentication**

In non-parameter edit status, press ENT to enter first-tier display A0-00, then press ENT to enter second-tier display 0.0.0.0. Control panel will implement the display of other parameters only when correct password entered.

◆ **Clear password**

Upon the successful password authentication, access password setting code A0-00. Password can be cleared by writing value 0000 into A0-00 for twice.

- **Example of parameter setting**

◆ **Example 1**: modify upper limit frequency from 600Hz to 50Hz (change b0-09 from 600.00 to 50.00)

1) In non-parameter edit status, press ENT to display current parameter A0-00;
2) Press » to move flashing digit to modification bit (A flashes);
3) Press ∧ once to change “A” to “b”;
4) Press » to move flashing to modification bit (0 in ones place flashing);
5) Press ∧ nine times to change “0” to “9”;
6) Press ENT to view the parameter value (600.00) of b0-09;
7) Press » to move flashing digit to modification digit (6 flashing);
8) Press ∨ six times to change “6” to “0”;
9) Press » once to move flashing digit rightwards by one bit;
10) Press ∧ for five times to change “0” to “5”;
11) Press ENT to save the value (50.00) of b0-09. Then the control panel will automatically switch to display the next function code (b0-10);
12) Press ESC to exit parameter edit status.

Flow chart is shown below:

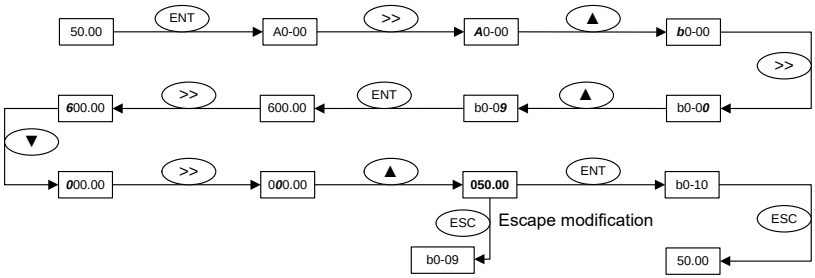


Fig. 4-12 Flow chart of upper limit frequency modification

◆ **Example 2: user parameter initialization**

1) In non-parameter edit status, press ENT to display current parameter A0-00;
2) Press ∧ three times to change “0” in the rightmost bit of A0-00 to “3”;
3) Press ENT to display parameter value 0 of A0-03;
4) Press ∧ once to change “0” to “2” or “3” (“2” motor parameter excluded, “3” means motor parameter included);
5) Press ENT to save the value of A0-03.Then control panel will automatically display parameter A0-00;
6) Press ESC to escape parameter edit status.

Flow chart is shown below:

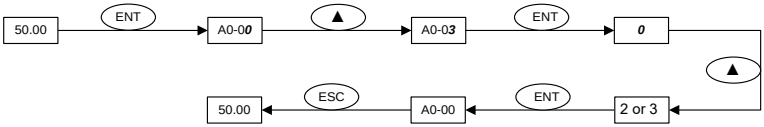


Fig. 4-13 Flow chart of user parameter initialization

◆ **Example 3**: setting method of hexadecimal parameter

Take L1-02 (LED STOP display parameter) for example, if LED control panel is required to display: setting frequency, bus voltage, AI1, running linear speed, and setting linear speed. Since all bits are independent of each other, the ones place, tens place, hundreds place and thousands place should be set separately. Determine the binary numbers of each bit and then convert the binary numbers into a hexadecimal number. See Table 4-6, the corresponding relation between binary numbers and a hexadecimal number.

Table 4-6 Corresponding relation between binary and hexadecimal

Binary numbers				Hexadecimal (LED bit display value)
BIT3	BIT2	BIT1	BIT0	
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	A
1	0	1	1	B
1	1	0	0	C
1	1	0	1	D
1	1	1	0	E
1	1	1	1	F

Set the value in the ones place:

As shown in Fig. 4-14, "setting frequency" and "bus voltage" are respectively determined by BIT0 and BIT1 in ones place of L1-02. If BIT0=1, setting frequency will be displayed. The bits

that correspond to the parameters which are not required to display shall be set to 0. Therefore, the value in ones place should be 0011, corresponding to 3 in a hexadecimal number. Set the ones place to 3.

Set the value in tens place:

As shown in Fig. 4-14, since it is required to display "AI1", the binary set value of tens place is 0001, corresponding to 1 in a hexadecimal number. Thus, bit of tens place shall be set to 1.

Set the value in hundreds place:

As shown in Fig. 4-14, the parameter required to display does not involve hundreds place, so the hundreds place shall be set to zero.

Set thousands place:

As shown in Fig. 4-14, since required to display “running linear speed” and “setting linear speed”, the binary set value of thousand place shall be 0011 that corresponds to 3 in a hexadecimal number.

To sum up, L1-02 should be set to 3013.

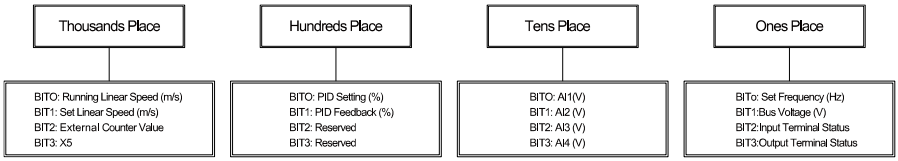


Fig. 4-14 Setting of hexadecimal parameter L1-02

Under parameter setting status, the parameter value cannot be modified if the value has no flashing digit. Possible causes include:

1) The parameter cannot be modified, such as actual detection parameters, running recording parameters, etc;
2) This parameter cannot be modified in run status but could be changed when motor stopped;
3) Parameter under protection. When parameter A0-02 is set to 1, parameters cannot be modified as the parameter protection against misoperation enabled. To edit parameter in such a circumstance, it is necessary to set A0-02 to 0 as first step.

4.1.4.4 Lock/Unlock Control Panel

- **Lock control panel**

  All or some keys of CONTROL PANEL can be locked by any of the following three methods. See the definition of parameter L0-01 for further information.

  Method 1: set the parameter value of L0-01 to non-zero, then press

  ESC + ENT + ∧ simultaneously.

Method 2: do not operate CONTROL PANEL within five minutes after L0-01 is set to non-zero.

Method 3: cut the power off and then applying power on after L0-01 parameter is set to non-zero.

Refer to flow chart 4-15 for locking CONTROL PANEL.

- **Unlock control panel**

  To unlock control panel, press ESC + » + ▼ simultaneously. Unlocking won't change the value of parameter L0-01. In other words, control panel will be locked again if the condition of locking control panel is fulfilled. To unlock control panel completely, L0-01 value must be modified to 0 after unlocking.

Refer to flow chart 4- 16 of unlocking control panel

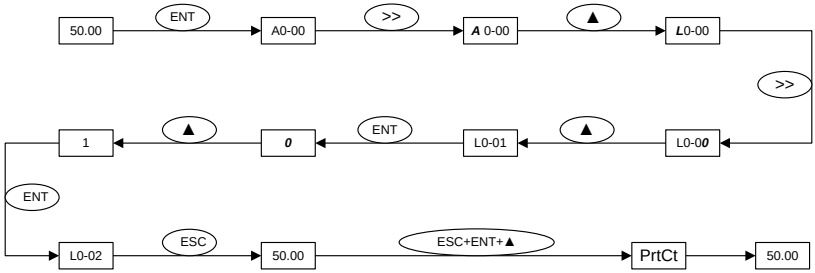


Fig. 4-15 Flow chart of locking control panel

Fig. 4-16 Flow chart of unlocking control panel

4.2 First-time Power up

Perform wiring in strict accordance with technical requirements as set forth in Chapter 3 – mount and Wiring.

4.2.1 Flow chart of first-time power up of asynchronous motor

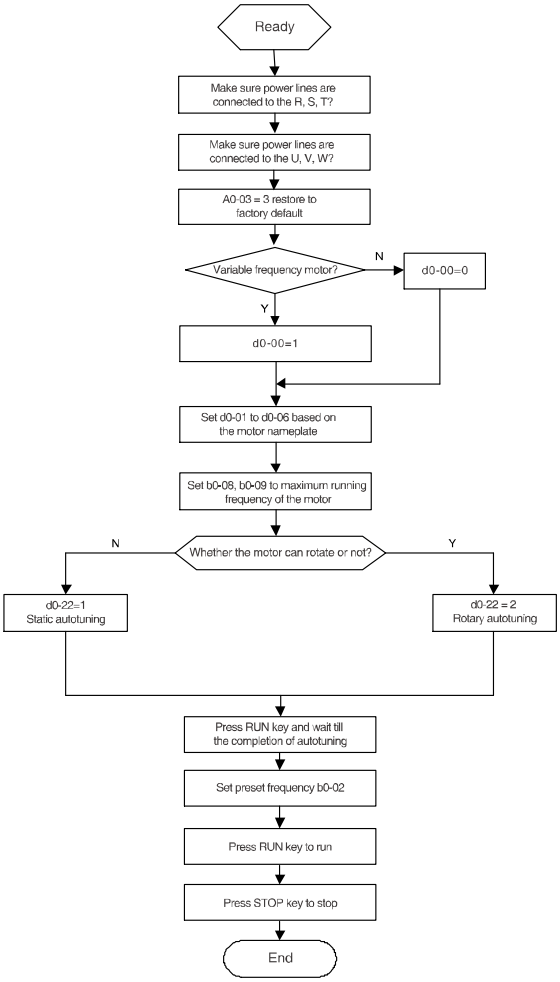


Fig. 4-17 Flow chart of first-time power up for asynchronous motor

Chapter 5 List of Parameters

GK900M parameter groups are listed below:

Category	Parameter Group	Reference Page
Group A: System Parameters and Parameter Management	A0: System Parameters	P75-77
	A1: User-defined Display Parameters	P77-77
Group b: Run Parameter Setting	b0: Frequency Reference	P77-80
	b1: Start/Stop Control	P81-83
	b2: Accel/Decel Parameters	P83-84
Group C: Input & Output Terminals	C0: Digital Input	P85-90
	C1: Digital Output	P91-94
	C2: Analog and Pulse Input	P94-96
	C3: Analog and Pulse Output	P96-97
	C4: Automatic Correction of Analog Input	P98-99
Group d: Motor and Control Parameters	d0: Parameters of Motor 1	P99-102
	d1: V/f Control Parameters of Motor 1	P102-104
	d2: Vector Control Parameters of Motor 1	P104-108
	d3: Parameters of Motor 2	P108-111
	d4: V/f Control Parameters of Motor 2	P111-113
	d5: Vector Control Parameters of Motor 2	P113-117
Group E: Enhanced Function and Protection Parameters	E0: Enhanced Function	P117-118
	E1: Protection Parameters	P119-123
	E2: Enhanced Functions of Motor Control	P123-125
Group F: Application Parameters	F1: Multi-step Frequency	P127-128
	F4: Position Control	P135-142
Group H: Communication Parameters	H0: Communication Parameters	P142-144
	H1: Communication Data	
Group L: Keys and Display of Control panel Parameters	L0: Keys of Control Panel	P145-146
	L1: Control Panel Display Setting	P147-149
Group U: Monitoring	U0: Status Monitoring	P150-155

Category	Parameter Group	Reference Page
	U1: History fault	P156-159
	U2: Drive Version Information	P159-160

🕮 ATTENTION:

Change attribute:

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

"×" means the value of this parameter cannot be modified when drive is running;

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

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

Scope: the scope of setting and display of parameter values.

Param.	Designation	Scope	Factory Default	Attr
Group A: System Parameters and Parameter Management				
Group A0: System Parameters				
A0-00	Setting of user password	0000～FFFF	0000	△
A0-01	Parameter display	0: Display all parameters 1: Only display A0-00 and A0-01 （Valid for A1-20～A1-21 parameter group display/hide） 2: Only display A0-00, A0-01 and user-defined parameters A1-00~A1-19 3: Only display A0-00, A0-01, and the parameters different from factory default	0	△
A0-02	Parameter protection	0: All parameter programmable 1: Only A0-00 and this parameter programmable	0	△
A0-03	Parameter restoration	0: No operation 1: Clear fault record	0	×

Param.	Designation	Scope	Factory Default	Attr
		2: Restore all parameters to factory default (prior to U0 group, excluding motor parameters) 3: Restore all parameters to factory default (prior to U0 group, including motor parameters) 4: Restore all parameters to backup parameters (prior to U0 group)		
A0-04	Parameter backup	0: No operation 1: Backup all parameters (prior to U0 group)	0	×
A0-05	Parameter copy	0: No operation 1: Upload parameter 2: Download parameter (excluding motor parameters) 3: Download parameter (including motor parameters)	0	×
A0-08	Motor 1 / motor 2 selection	0: Motor 1 1: Motor 2	0	×
A0-09	Motor control technique	Ones place: motor 1 control technique Tens place: motor 2 control technique 0: V/f control 3. Closed-loop vector control 4: SVC for PMSM Note: Torque control is not available if set to 0 or 1)	03	×
Group A1: User-defined Display Parameters				

Param.	Designation	Scope	Factory Default	Attr
A1-00-A1-19	User-defined display parameter 1-20	Setting range of thousands place: 0, A, b, C, d, E, F, H, L, U Setting range of hundreds place: 0~9 Setting range of tens place: 0~9 Setting range of ones place: 0~9	0	×
A1-20	Parameter group display/hide setting 1	0～FFFF	FFFF	×
A1-21	Parameter group display/hide setting 2	0～FFFF	FFFF	×
Group b Run Parameter Setting				
Group b0 Frequency Reference				
b0-00	FREQ set mode	0: Master frequency reference 1: Master & auxiliary computation result 2: Switch between master and auxiliary frequency reference 3: Switch between master frequency reference, and master & auxiliary computation result 4: Switch between auxiliary frequency reference, and master & auxiliary computation result	0	×

Param.	Designation	Scope	Factory Default	Attr
b0-01	Master FREQ set	0: Digital setting (b0-02) + control panel ∧/∨ adjustment 1: Digital setting (b0-02) + terminal UP/DOWN adjustment 2: AI1(on default IO board) 3: AI2 (on default IO board) 4: AI3 (on extension IO board) 5: A4 (on extension IO board) 6: X5 pulse input 7: Process PID output 8: PLC 9: Multi-step speed 10: Communication input 11: PA/PB input 12. Rotating knob keypad input	00	×
b0-02	Master FREQ digital setting	b0-10～b0-09	50.00Hz	△
b0-03	Auxiliary FREQ set	0: No command 1: Digital setting (b0-02) + Control panel ∧/∨ adjustment 2: Digital setting (b0-04) + terminal UP/DOWN adjustment 3: AI1(on default IO board) 4: AI2(on default IO board) 5: AI3 (on extension IO board) 6: AI4 (on extension IO board) 7: X5 pulse input 8: Process PID output	00	×

Param.	Designation	Scope	Factory Default	Attr
		9: PLC 10: Multi-step speed 11: Communication 12: Rotating knob keypad input		
b0-04	Auxiliary FREQ digital setting	Lower limit frequency ~ upper limit frequency	0.00Hz	△
b0-05	Auxiliary FREQ range	0: Relative to maximum frequency 1: Relative to master frequency	0	×
b0-06	Auxiliary FREQ coeff	0.0%~100.0%	100.0%	△
b0-07	Computation of master and auxiliary FREQ	0: Master + auxiliary 1: Master - auxiliary 2: Max {master, auxiliary} 3: Min {master, auxiliary}	0	×
b0-08	Maximum FREQ	Upper limit frequency ~600.00Hz	1000Hz	×
b0-09	Upper limit FREQ	Lower limit frequency ~ maximum frequency	1000Hz	×
b0-10	Lower limit FREQ	0.00Hz~upper limit frequency	0.00Hz	×
b0-11	Operation when set FREQ lower than lower limit FREQ	0: Run at lower limit frequency 1: Run at 0 Hz 2: Stop	0	×
b0-12	Time-delay of stop when set FREQ lower than lower limit FREQ	0.0s ~ 6553.5s	0.0s	×
b0-13	Lower limit of skip FREQ band 1	0.00Hz~upper limit frequency	0.00Hz	×
b0-14	Upper limit of skip FREQ band 1	0.00Hz~upper limit frequency	0.00Hz	×
b0-15	Lower limit of skip FREQ band 2	0.00Hz~upper limit frequency	0.00Hz	×

Param.	Designation	Scope	Factory Default	Attr
b0-16	Upper limit of skip FREQ band 2	0.00Hz~upper limit frequency	0.00Hz	×
b0-17	Lower limit of skip FREQ band 3	0.00Hz~upper limit frequency	0.00Hz	×
b0-18	Upper limit of skip FREQ band 3	0.00Hz~upper limit frequency	0.00Hz	×
b0-19	Jog FREQ	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 set	Ones place: frequency reference source bundled under control panel control: Tens place: frequency reference source bundled under terminal control: Hundreds place: frequency reference source bundled under communication control: 0: No binding 1: Digital setting (b0-02) + control panel ∧/∨ adjustment 2: Digital setting (b0-02) + terminal UP/DOWN adjustment 3: Analog input AI1 4: Analog input AI2 5: Analog input AI3 (on extension IO board) 6: Analog input AI4 (on extension IO	000	×

Param.	Designation	Scope	Factory Default	Attr
		board) 7. X5 pulse input 8: Process PID output 9: PLC A: Multi-step frequency B: Communication input C. PA/PB input D. Rotating knob keypad input		
b1-02	Run direction	0: Forward 1: Reverse	0	△
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	△
b1-05	Start method	0: From start frequency (b1-06) 1: DC injection braking start 2: Flying start	0	×
b1-06	Start FREQ	0.00Hz~upper limit frequency	0.00Hz	×
b1-07	Holding time of start FREQ	0.0s～3600.0s	0.0s	△
b1-08	DC braking current at start	0.0%～100.0%	0.0%	△
b1-09	DC braking time at start	0.00s～30.00s	0.00s	△
b1-10	Flying start current	0.0%～200.0%	100.0%	△
b1-11	Flying start Decel time	0.1s～20.0s	2.0s	△
b1-12	Flying start V/F coeff	0.0%～100.0%	1.0%	△
b1-13	Stop method	0: Ramp to stop 1: Coast to stop 2: Ramp to stop + DC injection brake	0	×

Param.	Designation	Scope	Factory Default	Attr
b1-14	Start FREQ of DC brake stop	0.00Hz~upper limit frequency	0.00Hz	△
b1-15	DC brake current	0.0%～100.0%	0.0%	△
b1-16	DC brake time	0.00s～30.00s	0.00s	△
b1-17	Overexcitation brake	0: Disabled 1: Enabled based on DC bus voltage 2: Enabled on 120% rated voltage 3: Enabled on 125% rated voltage 4: Enabled on 130% rated voltage 5: Enabled on 135% rated voltage 6: Enabled on 140% rated voltage 7:Enabled on 145% rated voltage 8: Enabled on 150% rated voltage	1	×
b1-18	Dynamic brake	0: disabled 1: enabled	0	×
b1-19	Dynamic brake threshold voltage	650V～750V	680V	×
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	△
b1-22	Flying start mode	Ones place: first -time power up search frequency 0: Search from zero frequency 1: Search from the set frequency 2: Search from the maximum frequency Tens place: Search from the opposite	00	×

Param.	Designation	Scope	Factory Default	Attr
		direction enabled 0: search from one direction 1: Search from two directions		
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 for 15kW and below, 20.0s for 18.5kW and above)	Model dependent	△
b2-02	Decel time 1			△
b2-03	Accel time 2	0.0～600.00 s/ 6000.0 s/60000 s	6.0s	△
b2-04	Decel time 2	0.0～600.00 s/ 6000.0 s/60000 s	6.0s	△
b2-05	Accel time 3	0.0～600.00 s/ 6000.0 s/60000 s	6.0s	△
b2-06	Decel time 3	0.0～600.00 s/ 6000.0 s/60000 s	6.0s	△
b2-07	Accel time 4	0.0～600.00 s/ 6000.0 s/60000 s	6.0s	△
b2-08	Decel time 4	0.0～600.00 s/ 6000.0 s/60000 s	6.0s	△
b2-09	Decel time for emergency stop	0.0～600.00 s/ 6000.0 s/60000 s	6.0s	△
b2-10	Jog Accel time	0.0～600.00 s/ 6000.0 s/60000 s	6.0s	△
b2-11	Jog Decel time	0.0～600.00 s/ 6000.0 s/60000 s	6.0s	△
b2-12	Accel/Decel curve	0: Linear Accel/Decel 1: Broken-line Accel/Decel 2: S-curve Accel/Decel A 3: S-curve Accel/Decel B	0	×
b2-13	Accel time switching FREQ of broken-line Accel/Decel	0.00Hz ~ Maximum	0.00Hz	△

Param.	Designation	Scope	Factory Default	Attr
b2-14	Decel time switching FREQ of broken-line Accel/Decel	0.00Hz ~ maximum frequency	0.00Hz	△
b2-15	Time of Accel S-curve first segment	0.00s～60.00s (S-curve A)	0.20s	△
b2-16	Time of Accel S-curve last segment	0.00s～60.00s (S-curve A)	0.20s	△
b2-17	Time of Decel S-curve first segment	0.00s～60.00s (S-curve A)	0.20s	△
b2-18	Time of Decel S-curve last segment	0.00s～60.00s (S-curve A)	0.20s	△
b2-19	Proportion of Accel S-curve first segment	0.0%～100.0% (S-curve B)	20.0%	△
b2-20	Proportion of Accel S-curve last segment	0.0%～100.0% (S-curve B)	20.0%	△
b2-21	Proportion of Decel S-curve first segment	0.0%～100.0% (S-curve B)	20.0%	△
b2-22	Proportion of Decel S-curve last segment	0.0%～100.0% (S-curve B)	20.0%	△
Group C: Input & Output Terminals				
Group C0: Digital Input				

Param.	Designation	Scope	Factory Default	Attr
C0-00	Enabled condition of run command terminals when power up	This function is only for digital terminals with parameter value 1~4 (forward/reverse jog, and forward/reverse run), and also is only for initial run after power up 0: Trigger edge detected + ON detected When run command is controlled by terminals, the drive will start to run when it detects that the terminal electric level jumps from OFF to ON and is kept ON after power up. 1: ON detected When run command is controlled by terminals, the drive will start to run when detecting the command terminal at ON state after power up.	0	×
C0-01	Function of terminal X1	0: No function 1: JOG forward 2: JOG reverse 3: Running forward (FWD) 4: Running reverse (REV) 5: Three-wire control 6: Running suspended 7: External stop 8: Emergency stop 9: DC injection brake stop 1 10: DC injection braking stop 2 11: Coast to stop	3	×
C0-02	Function of terminal X2		4	×
C0-03	Function of terminal X3		59	×
C0-04	Function of terminal X4		60	×
C0-05	Function of terminal X5		72	×
C0-06	Function of terminal X6 (on extension IO board)		0	×
C0-07	Function of terminal X7 (on extension IO board)		0	×

Param.	Designation	Scope	Factory Default	Attr
C0-08	Function of terminal X8 (on extension IO board)	12: Terminal UP 13: Terminal DOWN 14: UP/DOWN (including ∧/∨ key) adjustment clear 15: Multi-step frequency terminal 1 16: Multi-step frequency terminal 2 17: Multi-step frequency terminal 3 18: Multi-step frequency terminal 4 19: Accel/Decel time determinant 1 20: Accel/Decel time determinant 2 21: Accel/Decel disabled 22: External fault input 23: Fault reset (RESET) 24: Pulse input (valid only for X5) 25: Motor 1/2 switchover 26: Speed/Torque control switch 27: Run command switched to control panel control 28: Run command switched to terminal control 29: Run command switched to communication control 30: FREQ reference mode shift 31: Master FREQ reference switched to digital setting b0-02 32: Auxiliary FREQ reference switched to digital setting b0-04 33: PID adjustment direction 34: PID paused	0	×
C0-09	Function of terminal X9 (on extension IO board)		0	×
C0-10	Function of terminal X10 (on extension IO board)		0	×
C0-11	Function of terminal AI1 (Digital enabled)		0	×
C0-12	Function of terminal AI2 (Digital enabled)		0	×
C0-13	Function of terminal AI3 (Digital enabled)		0	×
C0-14	Function of terminal AI4 (Digital enabled)		0	×

Param.	Designation	Scope	Factory Default	Attr
		35: PID integration paused 36: PID parameter switch 37: Count input 38: Count clear 39: Reserved 40: Reserved 41: Zero-speed clamping enabled 42: Spindle orientation enabled 43: Stop position terminal selection 1 for spindle orientation 44: Stop position terminal selection 2 for spindle orientation 45: Origin signal input 46: Forward carry 47: Reverse carry 48: Carry terminal selection 1 49: Carry terminal selection 2 50: Carry terminal selection 3 51: Pulse position control pulse input 52: Position reference direction input 53: Clear positioning pulse 54-56: Reserved 57: Spindle gear ratio terminal selection 58: Find the origin 59: Spindle orientation enabled and run 60: Pulse tracking enabled and run 61: Zero speed clamping enabled and		

Param.	Designation	Scope	Factory Default	Attr
		run 62: Reserved 63: PLC paused 64: PLC disabled 65: PLC stop memory clear 66-67: Reserved 68: Running prohibited 69: DC injection brake when running 70: Analog input curve switchover 71: Pulse tracking enabled 72: Disable position loop output 73: Analog signal gain switch 74: Analog gain switch and run 75: Reserved 76: Stop position terminal selection 3 for spindle orientation 77~99: Reserved		
C0-15	Filtering time of digital input terminal	0.000～1.000s	0.010s	△
C0-16	Delay time of terminal X1	0.0s～3600.0s	0.0s	△
C0-17	Delay time of terminal X2	0.0s～3600.0s	0.0s	△
C0-18	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)	0000	△

Param.	Designation	Scope	Factory Default	Attr
		Thousands place: X4 (same as ones place)		
C0-19	Digital input terminal enabled status setting 2	Ones place: X5 0: Positive logic 1: Negative logic Tens place: X6 (same as ones place) Hundreds place: X7 (same as ones place) Thousands place: X8 (same as ones place)	0000	△
C0-20	Digital input terminal enabled status setting 3	Ones place: X9 ((on extension IO board) 0: Positive logic 1: Negative logic Tens place: X10 ((on extension IO board) Hundreds place: AI1 Thousands place: AI2	0000	△
C0-21	Digital input terminal enabled status setting 4	Ones place: AI3 ((on extension IO board) 0: Positive logic 1: Negative logic Tens place: AI4 (on extension IO board) 0: Positive logic 1: Negative logic Hundreds place: Reserved Thousands place: Reserved	00	△

Param.	Designation	Scope	Factory Default	Attr
C0-22	Terminal UP/DOWN frequency adjustment control	Ones place: action when stop 0: Clear 1: Holding Tens place: action on power loss 0: Clear 1: Holding Hundreds place: integral function 0: No integral function 1: Integral function enabled Thousands place: run direction 0: Unable to change the direction 1: Enable to change the direction	0000	△
C0-23	Terminal UP/DOWN frequency change step size	0.00Hz/s～100.00Hz/s	0.03 Hz/s	△
C0-24	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	×
C0-25	Option of virtual input terminal	000~3FFF 0: Actual terminal in effect 1: Virtual terminal in effect Ones place: BIT0~BIT3: X1~X4 Tens place: BIT4~BIT6: X5~X8, Hundreds place: BIT0~BIT3: X9~X10,AI1,AI2 Thousands place: BIT0～BIT1: AI3, AI4 (Note: X6-X10, AI3-AI4 are on the extension IO board)	0000	×

Param.	Designation	Scope	Factory Default	Attr
C0-26	Enabled condition of run command terminal after fault reset	0: Trigger edge detected + ON detected 1: ON detected	0	△
Group C1: Digital Output				
C1-00	HDO output function	0: No output 1: Drive undervoltage 2: Drive run preparation completed 3: Drive is running 4: Drive in 0Hz running (no output at stop) 5: Drive in 0Hz running (output at stop) 6: Run direction 7: Frequency attained 8: Upper limit frequency attained 9: Lower limit frequency attained 10: Frequency higher than FDT 1 11: Frequency higher than FDT 2 12: Speed being restricted (torque control mode) 13: Torque being restricted (speed control mode) 14: Fault output 15: Alarm output 16: Drive (motor) overloaded alarm 17: Drive thermal alarm 18: Zero current detection 19: X1 20: X2 21: Motor 1/ 2 indication	35	△
C1-01	DO1 output function		34	△
C1-02	DO2 output function (on extension IO board)		0	△
C1-03	DO3 output function (on extension IO board)		0	△
C1-04	DO4 output function (on extension IO board)		0	△
C1-05	Relay output function selection on default IO board		14	△
C1-06	Relay output function selection on extension IO board		15	△

Param.	Designation	Scope	Factory Default	Attr
		22-24: Reserved 25: Consecutive run time attained 26: Accumulative run time attained 27: Reserved 28: Position completed 29: Position approaching 30: PLC step completed 31: PLC cycle completed 32: Reserved 33: The upper/lower limit of set frequency obtained 34: Positioning completed 35: Carry completed 36-99: Reserved		
C1-07	HOD output delay time	0.0～3600.0s	0.0s	△
C1-08	DO1 output delay time	0.0～3600.0s	0.0s	△
C1-09	DO2 output delay time (on extension IO board)	0.0～3600.0s	0.0s	△
C1-10	DO3 output delay time (on extension IO board)	0.0～3600.0s	0.0s	△
C1-11	DO4 output delay time (on extension IO board)	0.0～3600.0s	0.0s	△
C1-12	Relay output delay time of default IO board	0.0～3600.0s	0.0s	△
C1-13	Relay output delay time of extension board	0.0～3600.0s	0.0s	△

Param.	Designation	Scope	Factory Default	Attr
C1-14	Digital output terminal enabled status setting 1	Ones place: HDO 0: Positive logic 1: Negative logic Tens place: Relay output R1 on default IO board (Same as ones place) Hundreds place: Relay output R2 (Same as ones place) Thousands place: Reserved	0000	×
C1-15	Digital output terminal enabled status setting 2	Ones place: DO1 0: Positive logic 1: Negative logic Tens place: DO2 (Same as ones place) Hundreds place: DO3 (Same as ones place) Thousands place: DO4 (Same as ones place)	0000	×
C1-16	Detective object of frequency doubling technology (FDT)	Ones place: FDT1 detective object 0: Set value of speed (frequency after Accel/Decel) 1: Detected speed value Tens place: FDT2 detective object 0: Set value of speed (frequency after Accel/Decel) 1: Detected speed value	00	△
C1-17	FDT1 upper value	0.00Hz～b0-08	50.00Hz	△
C1-18	FDT1 lower value	0.00Hz～b0-08	49.00Hz	△
C1-19	FDT2 upper value	0.00Hz～b0-08	25.00Hz	△
C1-20	FDT2 lower value	0.00Hz～b0-08	24.00Hz	△

Param.	Designation	Scope	Factory Default	Attr
C1-21	Detection width of frequency attained	0.00Hz～b0-08	2.50Hz	△
C1-22	Zero current detection level	0.0%～50.0%	5.0%	△
C1-23	Zero current detection time	0.01s～50.00s	0.50s	△
Group C2: Analog and Pulse Input				
C2-00	Analog input curve	Ones place: AI1 input curve 0: Curve 1 (2 points) 1: Curve 2 (4 points) 2: Curve 3 (4 points) 3: AI Curve X terminal switchover Tens place: AI2 input curve (same as ones place) Hundreds place: AI3 input curve (same as ones place, IO option board) Thousands place: AI4 input curve (same as ones place, IO option board)	1000	×
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%	△

Param.	Designation	Scope	Factory Default	Attr
C2-06	Corresponding set value of curve 2 maximum input	-100.0%～100.0%	100.0%	△
C2-07	Input of curve 2 inflection point A	input of curve 2 inflection point B ~ maximum input of curve 2	0.0%	△
C2-08	Set value corresponding to input of curve 2 inflection point A	-100.0%～100.0%	0.0%	△
C2-09	Input of curve 2 inflection point B	minimum input of curve 2~input of curve 2 inflection point A	0.0%	△
C2-10	Set value corresponding to input of curve 2 inflection point B	-100.0%～100.0%	0.0%	△
C2-11	Curve 2 minimum input	-110.0%～input of curve 2 inflection point B	-100.0%	△
C2-12	Set value corresponding to curve 2 minimum input	-100.0%～100.0%	-100.0%	△
C2-13	Curve 3 maximum input	input of curve 3 inflection point A～ 110.0%	100.0%	△
C2-14	Set value corresponding to curve 3 maximum input	-100.0%～100.0%	100.0%	△
C2-15	Input of curve 3 inflection point A	input of curve 3 inflection point B～ maximum input of curve 3	0.0%	△
C2-16	Set value corresponding to input of curve 3 inflection point A	-100.0%～100.0%	0.0%	△
C2-17	Input of curve 3 inflection point B	minimum input of curve 3~input of curve 3 inflection point A	0.0%	△

Param.	Designation	Scope	Factory Default	Attr
C2-18	Set value corresponding to input of curve 3 inflection point B	-100.0%～100.0%	0.0%	△
C2-19	Curve 3 minimum input	-110.0%～input of curve 3 inflection point B	0.0%	△
C2-20	Set value corresponding to curve 3 minimum input	-100.0%～100.0%	0.0%	△
C2-21	AI1 terminal filtering time	0.000s～10.000s	0.100s	△
C2-22	AI2 terminal filtering time	0.000s～10.000s	0.100s	△
C2-23	AI3 terminal filtering time (on extension IO board)	0.000s～10.000s	0.100s	△
C2-24	AI4 terminal filtering time (on extension IO board)	0.000s～10.000s	0.100s	△
C2-25	X5 maximum input	X5 minimum input～50.0kHz	50.0kHz	△
C2-26	Set value corresponding to X5 maximum input	-100.0%～100.0%	100.0%	△
C2-27	X5 minimum input	0.0 kHz～X5 maximum input	0.0kHz	△
C2-28	Set value corresponding to X5 minimum input	-100.0%～100.0%	0.0%	△
C2-29	X5 filtering time	0.000s～1.000s	0.001s	△
C2-30	Analog gain switchover value	0.0%～100.0%	100.0%	△
Group C3: Analog and Pulse Output				
C3-00	AO1 output function	0: No output 1: FREQ reference 2: Output frequency 3: Output current (relative to freq. rated value) 4: Output torque (absolute value) 5: Output voltage 6: Output power	2	△
C3-01	AO2 output function		1	△
C3-02	HDO output function		0	△

Param.	Designation	Scope	Factory Default	Attr
		7: Bus voltage 8: Torque command 9: Torque current 10: Magnetic flux current 11: AI1 12: AI2 13: AI3 14: AI4 15: X5 16: Communication input percentage 17: Output frequency before compensation 18: Output current (relative to motor rated current) 19: Output torque (direction hinted) 20: Set torque (direction hinted) 21~99: Reserved		
C3-03	AO1 offset	-100.0%～100.0%	0.0%	△
C3-04	AO1 gain	-2.000～2.000	1.000	△
C3-05	AO1 filtering time	0.0s～10.0s	0.0s	△
C3-06	AO2 offset (on extension IO board)	-100.0%～100.0%	0.0%	△
C3-07	AO2 gain (on extension IO board)	-2.000～2.000	1.000	△
C3-08	AO2 filtering time (on extension IO board)	0.0s～10.0s	0.0s	△
C3-09	HDO maximum output pulse frequency	0.1KHz～50.0KHz	50.0kHz	△
C3-10	HDO output center point	0: No center point 1: Center point is (C3-09)/2, and the corresponding parameter value is positive when frequency is higher than center point. 2: Center point is (C3-09)/2, and the	0	×

Param.	Designation	Scope	Factory Default	Attr
		corresponding parameter value is positive when frequency is lower than center point		
C3-11	HDO output filtering time	0.00s～10.00s	0.00s	△
Group C4: Automatic Correction of Analog Input				
C4-00	Analog corrected channel	0: No correction 1: Correct AI1 2: Correct AI2 3: Correct AI3 4: Correct AI4	0	×
C4-01	Sampling value of AI1 calibration point 1	0.00V～10.00V	1.00V	◎
C4-02	Input value of AI1 calibration point 1	0.00V～10.00V	1.00V	×
C4-03	Sampling value of AI1 calibration point 2	0.00V～10.00V	9.00V	◎
C4-04	Input value of AI1 calibration point 2	0.00V～10.00V	9.00V	×
C4-05	Sampling value of AI2 calibration point 1	0.00V～10.00V	1.00V	◎
C4-06	Input value of AI2 calibration point 1	0.00V～10.00V	1.00V	×
C4-07	Sampling value of AI2 calibration point 2	0.00V～10.00V	9.00V	◎
C4-08	Input value of AI2 calibration point 2	0.00V～10.00V	9.00V	×

Param.	Designation	Scope	Factory Default	Attr
C4-09	Sampling value of AI3 calibration point 1	0.00V～10.00V	1.00V	◎
C4-10	Input value of AI3 calibration point 1	0.00V～10.00V	1.00V	×
C4-11	Sampling value of AI3 calibration point 2	0.00V～10.00V	9.00V	◎
C4-12	Input value of AI3 calibration point 2	0.00V～10.00V	9.00V	×
C4-13	Sampling value of AI4 calibration point 1	-10.00V～10.00V	1.00V	◎
C4-14	Input value of AI4 calibration point 1	-10.00V～10.00V	1.00V	×
C4-15	Sampling value of AI4 calibration point 2	-10.00V～10.00V	9.00V	◎
C4-16	Input value of AI4 calibration point 2	-10.00V～10.00V	9.00V	×
Group d Motor and Control Parameters				
Group d0: Parameters of Motor 1				
d0-00	Type of motor 1	0: Ordinary ACIM 1: Variable frequency ACIM	1	×
d0-01	Power rating of motor 1	0.4KW～6553.5KW	Model dependent	×
d0-02	Rated voltage of motor 1	0V～480V(for drives 380V level)	380V	×
d0-03	Rated current of motor 1	0.0A～6553.5A	Model dependent	×
d0-04	Rated frequency of motor 1	0.00Hz～600.00Hz	50.00Hz	×
d0-05	Pole number of motor 1	1～400	4	×
d0-06	Rated speed of motor 1	0r/min～65535r/min	Model dependent	×

Param.	Designation	Scope	Factory Default	Attr
d0-07	Stator resistance R1 of async motor 1	0.001Ω～65.535Ω	Model dependent	×
d0-08	Leakage inductance L1 of async motor 1	0.1mH～6553.5mH	Model dependent	×
d0-09	Rotor resistance R2 of async motor 1	0.001Ω～65.535Ω	Model dependent	×
d0-10	Mutual inductance L2 of async motor 1	0.1mH～6553.5mH	Model dependent	×
d0-11	No-load current of async motor 1	0.0A～6553.5A	Model dependent	×
d0-12	Power factor of async motor 1	0.001～1.000	0.880	×
d0-22	Autotune of motor 1	0: No autotune 1: Static autotune 2: Rotary autotune	0	×
d0-23	Overload protection mode of motor 1	0: No protection 1: Judged by motor current 2: Judged by temperature transducer	1	×
d0-24	Overload protection detection time of motor 1	0.1～15.0min	5.0min	×
d0-25	Temperature transducer signal input of motor 1	Ones place: sensor channel 0: No sampling 1: Analog input TEMP (on extension PG board) 2: Analog input EAI (on extension IO board) Tens place: sensor type: 0: PT100 1: PT1000	00	×

Param.	Designation	Scope	Factory Default	Attr
		2: KTY84 3: NTC		
d0-26	Thermal protection threshold of motor 1 temperature transducer	0~200.0℃	120.0℃	×
d0-27	Motor 1 encoder type	Ones place: Encoder Type: 0: ABZ incremental encoder 1: UVW incremental encoder 2: Rotary transformer 3: With CD signal SINCOS 4: Without CD SINCOS Tens Place: Rotary change ratio: 0: None 1: 0.23 2: 0.28 3: 0.5 Hundreds Place: 0: Manually set encoder type 1: Automatically set encoder type Thousands place: reserved	1020	×
d0-28	Encoder resolution of motor 1	1～16000	2500	×
d0-29	Encoder direction of motor 1	Ones Place: AB direction 0: Forward 1: Reverse Tens Place: UVW direction (Only valid for UVW encoder) 0: Forward 1: Reverse	0	×

Param.	Designation	Scope	Factory Default	Attr
d0-30	Numerator of motor 1 mechanical gear ratio	1～65535	1000	×
d0-31	Denominator of motor 1 mechanical gear ratio	1～65535	1000	×
d0-32	Disconnection detection of motor 1 encoder	0.0s～8.0s (0.0s means this function is invalid)	0.0s	△
d0-33	Motor 1 Sin bias	0~4095	2048	△
d0-34	Motor 1 Cos bias	0~4095	2048	△
d0-35	Motor 1 Sin gain	0~4095	1440	△
d0-36	Motor 1 Cos gain	0~4095	1440	△
d0-37	Sin, Cos and Z phase difference of motor 1	0.0～360.0	180.0	△
d0-38	Motor temperature coefficient	0.000～2.000	1.000	△
Group d1: V/f Control Parameters of Motor 1				
d1-00	V/f curve setting	0: Linear V/f 1: Multi-step V/f (d1-01~d1-08) 2: 1.2nd power 3: 1.4th power 4: 1.6th power 5: 1.8th power 6: 2.0nd power 7: V/F separation method 1 8: V/F separation method 2	0	×
d1-01	V/f frequency value f3	0.00Hz~rated frequency of motor	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%	×

Param.	Designation	Scope	Factory Default	Attr
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% is automatic torque boost	0.0%	△
d1-10	Slip compensation gain	0.0%～400.0%	100.0%	△
d1-11	Droop control	0.00Hz～maximum frequency	0.00Hz	△
d1-12	Current limitation mode	0: Disabled 1: Set by d1-13 2: Set by AI1 3: Set by AI2 4: Set by AI3 5. Set by AI4 6: Set by X5	1	×
d1-13	Digital setting of current limit value	20.0%～200.0%	160.0%	△
d1-14	Current limit coeff on flux weakening	0.001～1.000	0.500	△
d1-15	Energy saving percentage	0%～40.0%	0.0%	△
d1-16	V/f oscillation suppression gain 1	0～3000	38	△
d1-17	V/f oscillation suppression gain 2	0～3000	0	△

Param.	Designation	Scope	Factory Default	Attr
d1-18	Voltage setting on V/f separated pattern	0: by D1-19 digital setting 1: by AI1 2: by AI2 3: by AI3 4: by AI4 5: by process PID output 6: by AI1+ process PID output	0	×
d1-19	Digital set voltage on V/f separated pattern	0.0%～ 100.0%	0.0%	△
d1-20	Voltage variation time on V/f separated pattern	0.00S ～ 600.00s	0.01s	△
Group d2: Vector Control Parameters of Motor 1				
d2-00	Speed/torque control	0: speed control 1: torque control	0	×
d2-01	ASR high-speed proportional gain Kp1	0.0～20.0	1.0	△
d2-02	ASR high-speed integration time Ti1	0.000s～8.000s	0.200s	△
d2-03	ASR low-speed proportional gain Kp2	0.0～20.0	1.0	△
d2-04	ASR low-speed integration time Ti2	0.000s～8.000s	0.200s	△
d2-05	ASR switching frequency 1	0.00Hz～d2-06	5.00Hz	△
d2-06	ASR switching frequency 2	d2-05~upper limit frequency	10.00Hz	△
d2-07	ASR input filtering time	0.0ms～500.0ms	3.0ms	△
d2-08	ASR output filtering time	0.0ms～500.0ms	1.0ms	△

Param.	Designation	Scope	Factory Default	Attr
d2-09	D-axis ACR proportion coefficient Kp	0.000～8.000	1.000	△
d2-10	D-axis ACR integration coefficient Ki	0.000～8.000	1.000	△
d2-11	Pre-excitation time	0.000s～5.000s	0.000s	△
d2-12	Driven torque restriction source	0: d2-14 digital setting 1: AI1 2: AI2 3: AI3 4: AI4 5: X5 pulse input 6. Communication	0	×
d2-13	Braking torque restriction source	0: d2-15 digital setting 1: AI1 2: AI2 3: AI3 4: AI4 5: X5 pulse input 6: Communication	0	×
d2-14	Digital setting of driven torque limit value	0.0%～200.0%	150.0%	△
d2-15	Digital setting of braking torque limit value	0.0%～200.0%	150.0%	△
d2-16	Torque limit coefficient in flux weakening	0.0%～100.0%	50.0%	△
d2-17	Driven slip compensation gain	10.0%~300.0%	100.0%	△
d2-18	Brake slip compensation gain	10.0%~300.0%	100.0%	△

Param.	Designation	Scope	Factory Default	Attr
d2-19	Torque reference source	0: Set by d2-20 1: AI1 2: AI2 3: AI3 4: AI4 5: X5 pulse input 6: Communication	0	×
d2-20	Digital setting of torque	-200.0%～200.0%	0.0%	△
d2-21	Forward speed limitation source under torque control	0: Set by d2-23 1: AI1 2: AI2 3: AI3 4: AI4 5: X5 pulse input 6: Communication	0	×
d2-22	Reverse speed limitation source under torque control	0: Set by d2-24 1: AI1 2: AI2 3: AI3 4: AI4 5: X5 pulse input 6: Communication	0	×
d2-23	Forward speed limited value under torque control	0.00Hz ~b0-08	50.00Hz	△
d2-24	Reverse speed limited value under torque control	0.00Hz～b0-08	50.00Hz	△

Param.	Designation	Scope	Factory Default	Attr
d2-25	Set torque accel/decel time	0.00s～120.00s	0.10s	△
d2-26	Energy saving percentage for ACIM	0%～100.0%	100.0%	△
d2-27	Starting point of energy-saving torque	0~4096	0	△
d2-28	Ending point of energy-saving torque	0~4096	1100	△
d2-29	Q-axis ACR proportion coefficient Kp	0.000～8.000	1.000	△
d2-30	Q-axis ACR integration coefficient Ki	0.000～8.000	1.000	△
d2-31	D axis decoupling coefficient	0~65.535	1.000	△
d2-32	Q axis decoupling coefficient	0~65.535	1.000	△
d2-33	Maximum voltage utilization rate	0~110.0%	100.0%	△
d2-36	Weak magnetic loop coefficient	0～65535	100	△
d2-38	Upper limit of weak magnetizing current for synchronous motor	-8000~8000	-6000	△
d2-39	MTPA coefficient for synchronous motor	0: Auto leaning 1：Id=0 2～32767：MTPA coefficient	0	△
d2-40	MTPV mode	0: Disable 1: Enable	0	△
d2.42	MTPV proportion coefficient	0~65535	100	△

Param.	Designation	Scope	Factory Default	Attr
d2.43	MTPV integration coefficient	0~65535	10	△
d2-44	Closed -loop adjustment variable	Ones place: Asynchronous motor feedback enabled Tens place: PMSM feedback enabled Hundreds place: Integral separation of speed loop enabled	101	△
d2-45	Waveform delay compensation coefficient	0~8.000	0.500	△
d2-46	Current loop bandwidth of synchronous motor	0~3200.0	100.0	×
d2-47	Speed loop desaturation coefficient	0~65535	10	△
d2-48	Detection methods of initial magnetic pole position of rotor	0: Disable initial position detection of rotor 1: Initial position detection of pulse injection	1	△
d2-49	Initial position detection time	0~4000	400	△
d2-50	Limitation of position detection time	0~4000	2000	△
d2-52	Current limit percentage	0.0%~200.0%	180.0%	△
d2-53	Cut-off frequency of pull-in current	0~upper limit	0	△
d2-54	Start-stop enhanced torque current	0~200.0%	50.0%	△

Param.	Designation	Scope	Factory Default	Attr
d2-55	Idle current for zero-speed lock	0~200.0%	10.0%	△
d2-56	Start-stop enhanced torque current duration	0~8.000s	4.000s	△
d2-57	Observer tuning parameter 1	0~65535	30	△
d2-58	Observer tuning parameter 2	0~65535	40	△
d2-59	Observer tuning parameter 3	0~65535	10	△
d2-60	Observer tuning parameter 4	0~65535	20	△
d2-61	Observer tuning parameter 5	0~655.35	230.00	△
d2-62	Open-loop synchronous mode selection	Ones place: Enable dead zone compensation Tens place: Start-up slip action 0: No action 1: Fault report 2: Automatic restart	1	△
d2-63	Low-speed excitation current for open-loop synchronous	-4096~4096	400	△
d2-64	Detection current of inductance identification	0.20~2.00	0.80	△
d2-67	Torque limit at low speed	0.0%～200.0%	150.0%	△
Group d3: Parameters of Motor 2				

Param.	Designation	Scope	Factory Default	Attr
d3-00	Type of motor 2	0: Ordinary ACIM 1: Variable frequency ACIM	1	×
d3-01	Power rating of motor 2	0.4KW～6553.5KW	Model dependent	×
d3-02	Rated voltage of motor 2	0V～480V (for 380V model)	380V	×
d3-03	Rated current of motor 2	0.0A～6553.5A	Model dependent	×
d3-04	Rated frequency of motor 2	0.00Hz～600.00Hz	50.00Hz	×
d3-05	Pole number of motor 2	1～400	4	×
d3-06	Rated speed of motor 2	0rpm～65535rpm	Model dependent	×
d3-07	Stator resistance R1 of async motor 2	0.001ohms～65.535ohms	Model dependent	×
d3-08	Leakage inductance L1 of async motor 2	0.1mH～6553.5mH	Model dependent	×
d3-09	Rotor resistance R2 of async motor 2	0.001ohms～65.535ohms	Model dependent	×
d3-10	Mutual inductance L2 of asynchronous motor 2	0.1mH～6553.5mH	Model dependent	×
d3-11	No-load current of async motor 2	0.0A～6553.5A	Model dependent	×
d3-12	Power factor of async motor 2	0.001~1.000	0.880	×
d3-22	Autotune of motor 2	0: No autotune 1: Static autotune 2: Rotary autotune	0	×
d3-23	Overload protection mode of motor 2	0: No protection 1: Judged by motor current 2: Judged by temperature transducer	1	×

Param.	Designation	Scope	Factory Default	Attr
d3-24	Overload protection detection time of motor 2	0.1～15.0min	5.0min	×
d3-25	Temperature transducer signal input of motor 2	Ones place: 0: No. (no sampling) 1: AI TEMP (on PG extension board) 2: EAI (on extension IO board) Tens place: Sensor type: 0: PT100 1: PT1000 2: KTY84 3: NTC	00	×
d3-26	Thermal protection threshold of motor 2 temperature transducer	0~200.0℃	120.0℃	×
d3-27	Motor 2 encoder type	Ones place: Encoder Type: 0: ABZ incremental encoder 1: UVW incremental encoder 2: Rotary transformer 3: With CD signal SINCOS 4:Without CD signal SINCOS Tens Place: Rotary change ratio: 0: None 1: 0.23 2: 0.28 3: 0.5 Hundreds Place: 0: Manually set encoder type 1: Automatically set encoder type Thousands place:	1020	×

Param.	Designation	Scope	Factory Default	Attr
		bit12 0: Low-speed CAP speed measurement + high-speed QEP speed measurement 1: Full-range QEP speed measurement bit13 0: Sincosine uses subdivision speed measurement 1: Sincosine does not use subdivision speed measurement bit14~15 0: 1/4 fixed filter 1: Turn on adaptive pin filter 2: 1/8 fixed filter		
d3-28	Motor 2 encoder resolution	1～16000	2500	×
d3-29	Motor 2 encoder direction	Ones Place: AB direction 0: Forward 1: Reverse Tens Place: UVW direction (Only valid for UVW encoder) 0: Forward 1: Reverse	0	×
d3-30	Numerator of motor 2 mechanical gear ratio	1～65535	1000	×
d3-31	Denominator of motor 2 mechanical gear ratio	1～65535	1000	△

Param.	Designation	Scope	Factory Default	Attr
d3-32	Motor 2 encoder disconnection detection	0.0s～8.0s (0.0s means this function is invalid)	0.0s	△
d3-33	Motor 2 sin bias	0~4095	2048	△
d3-34	Motor 2 Cos bias	0~4095	2048	△
d3-35	Motor 2 Sin gain	0~4095	1440	△
d3-36	Motor 2 Cos gain	0~4095	1440	△
d3-37	Motor 2 Sin Cos and Z phase difference	0.0～360.0	180.0	△
d3-38	Motor temperature coefficient	0.000～2.000	1.000	×
Group d4: V/f Control Parameters of Motor 2				
d4-00	V/f curve setting	0: Linear V/f 1: Multi-step V/f (d1-01~d1-08) 2: 1.2nd power 3: 1.4th power 4: 1.6th power 5: 1.8th power 6: 2.0nd power 7: V/F separation method 1 8: V/F separation method 2	0	×
d4-01	V/f frequency value f3	0.00Hz~rated frequency of motor	50.00Hz	×
d4-02	V/f voltage value V3	0.0%~100.0%	100.0%	×
d4-03	V/f frequency value f2	d4-05～d4-01	0.00Hz	×
d4-04	V/f voltage value V2	0.0%～100.0%	0.0%	×
d4-05	V/f frequency value f1	d4-07～d4-03	0.00Hz	×
d4-06	V/f voltage value V1	0.0%～100.0%	0.0%	×
d4-07	V/f frequency value f0	0.00Hz～d4-05	0.00Hz	×
d4-08	V/f voltage value V0	0.0%～100.0%	0.0%	×

Param.	Designation	Scope	Factory Default	Attr
d4-09	Torque boost	0.0%~30.0%; 0.0% means auto torque boost	0.0%	△
d4-10	Slip compensation gain	0.0%～400.0%	100.0%	△
d4-11	Droop control	0.00Hz～10.00Hz	0.00Hz	△
d4-12	Current limitation mode	0: Disabled 1: Set by d4-13 2: Set by AI1 3: Set by AI2 4: Set by AI3 5: Set by AI4 6: X5	1	×
d4-13	Digital set current limit value	20.0%～200.0%	160.0%	△
d4-14	Current limit coeff on flux weakening	0.001～1.000	0.500	△
d4-15	Energy saving percentage	0%～40.0%	0.0%	△
d4-16	V/f oscillation suppression gain 1	0～3000	38	△
d4-17	V/f oscillation suppression gain 2	0～3000	0	△
d4-18	Voltage setting on V/f separated pattern	0: by D1-19 digital setting 1: by AI1 2: by AI2 3: by AI3 4: by AI4 5: by process PID output 6: by AI1+ process PID output	0	×

Param.	Designation	Scope	Factory Default	Attr
d4-19	Digital set voltage on V/f separated pattern	0.0%～ 100.0%	0.0%	△
d4-20	Voltage variation time on V/f separated pattern	0.00S ～ 600.00s	0.01s	△
Group d5: Vector Control Parameters of Motor 2				
d5-00	Speed/torque control	0: speed control 1: torque control	0	×
d5-01	ASR high-speed proportional gain Kp1	0.0～20.0	1.0	△
d5-02	ASR high-speed integration time Ti1	0.000s～8.000s	0.200	△
d5-03	ASR low-speed proportional gain Kp2	0.0～20.0	1.0	△
d5-04	ASR low-speed integration time Ti2	0.000s～8.000s	0.200	△
d5-05	ASR switching frequency 1	0.00Hz～d5-06	5.00Hz	△
d5-06	ASR switching frequency 2	d5-05～upper limit	10.00Hz	△
d5-07	ASR input filtering time	0.0ms～500.0ms	0.3ms	△
d5-08	ASR output filtering time	0.0ms～500.0ms	0.0ms	△
d5-09	ACR proportion coeff Kp	0.000～8.000	1.000	△
d5-10	ACR integration coeff Ki	0.000～8.000	1.000	△
d5-11	Pre-excitation time	0.000s～5.000s	0.000s	△
d5-12	Driven torque restriction source	0: d5-14 digital setting 1: AI1 2: AI2	0	×

Param.	Designation	Scope	Factory Default	Attr
		3: AI3 4: AI4 5: X5 pulse input 6: Communication		
d5-13	Braking torque restriction source	0: d5-15 digital setting 1: AI1 2: AI2 3: AI3 4: AI4 5: X5 pulse input 6: Communication	0	×
d5-14	Digital setting of driven torque limit value	0.0%～200.0%	150.0%	△
d5-15	Digital setting of braking torque limit value	0.0%～200.0%	150.0%	△
d5-16	Torque limit coefficient in flux weakening	0.0%～100.0%	50.0%	△
d5-17	Driven slip compensation gain	10.0%～300.0%	100.0%	△
d5-18	Brake slip compensation gain	10.0%～300.0%	100.0%	△
d5-19	Torque reference source	0: Set by d5-20 1: AI1 2: AI2 3: AI3 4: AI4 5: X5 pulse input 6: Communication	0	×
d5-20	Digital setting of torque	-200.0%～200.0%	0.0%	△

Param.	Designation	Scope	Factory Default	Attr
d5-21	Forward speed limitation source	0: Set by d5-23 1: AI1 2: AI2 3: AI3 4: AI4 5: X5 pulse input 6: Communication	0	×
d5-22	Reverse speed limitation source	0: Set by d5-24 1: AI1 2: AI2 3: AI3 4: AI4 5: X5 pulse input 6: Communication	0	×
d5-23	Forward speed limited value	0.00Hz～b0-08	50.00Hz	△
d5-24	Reverse speed limited value	0.00Hz～b0-08	50.00Hz	△
d5-25	Set torque accel/decel time	0.00s～120.00s	0.10s	△
d5-26	Energy saving percentage for ACIM	0%～100.0%	100.0%	△
d5-27	Starting point of energy-saving torque	0~4096	0	△
d5-28	Ending point of energy-saving torque	0~4096	1100	△
d5-29	Q-axis ACR proportion coefficient Kp	0.000～8.000	1.000	△

Param.	Designation	Scope	Factory Default	Attr
d5-30	Q-axis ACR integration coefficient Ki	0.000～8.000	1.000	△
d5-31	D axis decoupling coefficient	0~65.535	1.000	△
d5-32	Q axis decoupling coefficient	0~65.535	1.000	△
d5-33	Maximum voltage utilization rate	0~110.0%	100.0%	△
d5-36	Weak magnetic loop coefficient	0~65535	100	△
d5-38	Upper limit of weak magnetizing current for synchronous motor	-8000~8000	-6000	△
d5-39	MTPA coefficient for synchronous motor	0: Auto leaning 1：Id=0 2～32767：MTPA coefficient	0	△
d5-40	MTPV mode	0: Disable 1: Enable	0	△
d5-42	MTPV ratio coefficient	0~65535	100	△
d5-43	MTPV integral coefficient	0~65535	10	△
d5-44	Closed -loop adjustment variable	Ones place: Asynchronous motor feedback enabled Tens place: PMSM feedback enabled Hundreds Place: Integral separation of speed loop enabled	101	△
d5-45	Waveform delay compensation coefficient	0~8.000	0.500	△

Param.	Designation	Scope	Factory Default	Attr
d5-46	Current loop bandwidth of synchronous motor	0~3200.0	100.0	×
d5-47	Speed loop desaturation coefficient	0~65535	10	△
d5-48	Detection methods of initial magnetic pole position of rotor	0: Disable initial position detection of rotor 1: Initial position detection of pulse injection	1	△
d5-49	Initial position detection time	0~4000	400	△
d5-50	Limitation of position detection time	0~4000	2000	△
d5-52	Current limit percentage	0.0%~200.0%	180.0%	△
d5-53	Cut-off frequency of pull-in current	0~upper limit	0	△
d5-54	Start-stop enhanced torque current	0~200.0%	50.0%	△
d5-55	Idle current for zero-speed lock	0~200.0%	10.0%	△
d5-56	Start-stop enhanced torque current duration	0~8.000s	4.000s	△
d5-57	Observer tuning parameter 1	0~65535	30	△
d5-58	Observer tuning parameter 2	0~65535	40	△

Param.	Designation	Scope	Factory Default	Attr
d5-59	Observer tuning parameter 3	0~65535	10	△
d5-60	Observer tuning parameter 4	0~65535	20	△
d5-61	Observer tuning parameter 5	0~655.35	230.00	△
d5-62	Open-loop synchronous mode selection	Ones place: Enable dead zone compensation Tens place: Start-up slip action 0: No action 1: Fault report 2: Automatic restart	1	
d5-63	Low-speed excitation current for open-loop synchronous	-4096~4096	400	△
d5-64	Detection current of inductance identification	0.20~2.00	0.80	△
d5-67	Torque limit at low speed	0.0%～200.0%	150.0%	△
Group E: Enhanced Function and Protection Parameters				
Group E0: Enhanced function				
E0-00	Switching FREQ	Range: 0.8KHz～16.0KHz ≤30kW: factory default: 6.0KHz 37KW～45KW: factory default: 5.0 kHz 55kW~75kW: factory default: 4.0 kHz	Model dependent	△

Param.	Designation	Scope	Factory Default	Attr
		≥90kW: factory default: 3.0KHz		
E0-01	PWM optimization	Ones place: switching FREQ adjusted with temperature 0: Self-adaption 1: No adjustment Tens place: PWM modulation mode 0: Five-segment and seven-segment automatic switchover 1: Five-segment mode 2: Seven-segment mode Hundreds place: over-modulation adjustment 0: Disabled 1: Enabled 2: Deep over-modulation Thousands place: PWM switching frequency relation with output frequency 0: Self-adaption 1: No adaption	0210	×
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	000	×

Param.	Designation	Scope	Factory Default	Attr
		Hundreds place: unit of run time 0: Second 1: Hour		
E0-03	Consecutive run time setting	0.0～6000.0s (h)	0.0s (h)	△
E0-04	Accumulative run time setting	0.0～6000.0s (h)	0.0s (h)	△
E0-12	Random switch frequency adjustment coefficient	0~100	0	△
Group E1: Protection Parameters				
E1-00	Overvoltage stall	O: Prohibited 1: Allowed 2: Only valid for decel	1	×
E1-01	Overvoltage stall protection voltage	120%~150%	130%	△
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%	△

Param.	Designation	Scope	Factory Default	Attr
E1-05	Overload alarm detecting time	0.1s～60.0s	5.0s	△
E1-06	Protection action 1	Ones place:encoder disconnected(CLL)/PG board abnormal 0: Alarm and coast to stop 1: CLL alarms but run continued 2: PGE alarms but run continued 3: CLL and PGE alarm but run continued Tens place: PIM temperature measurement circuit fault (oH3) 0: Alarm and coast to stop 1: Alarm but run continued Hundreds place: abnormal EEPROM (Epr) 0: Alarm and coast to stop 1: Alarm but run continued Thousands place: abnormal terminal communication (TrC) 0: Alarm and coast to stop 1: Alarm but run continued	0000	×
E1-07	Protection action 2	Ones place: abnormal power supply when running (SUE) 0: Alarm and coast to stop 1: Shield the fault Tens place: current detection circuit failed (CtC) 0: Alarm and coast to stop	3001	×

Param.	Designation	Scope	Factory Default	Attr
		1: Alarm but run continued Hundreds place: abnormal contactor (CCL): 0: Alarm and coast to stop 1: Alarm but run continued Thousands place: input/output phase loss (ISF, oPL): 0: Protection for neither input supply fault nor output phase loss 1: No protection for input phase loss, protection enabled for output phase loss 2: Protection enabled for input phase loss, no protection for output phase loss 3: Protection enabled for both input phase loss and output phase loss		
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 fault occurs 0: No action 1: Action enabled Tens place: when fault locked 0: No action 1: Action enabled Hundreds place: auto-reset interval	010	×

Param.	Designation	Scope	Factory Default	Attr
		0: No action 1: Action enabled		
E1-12	Cooling fan control	0: Auto run (Based on inverter bridge temperature) 1: Always run after power up	0	△
E1-13	Drive overheat alarm threshold	0.0℃~100.0℃	80.0℃	△
E1-14	Protection action 3	0 ~ FFFF The first F from the right: Bit0: Not shield GDP fault 0 , shield 1 Bit1 ~ 3: Reserved The second F from the right: Bit0: Not shield AIP fault 0, shield 1 Bit1: Not shield OL3 fault 0, shield 1 Bit2 ~ 3: Reserved The third F from the right: Bit0: Not shield fault 0 of extension IO board, shield 1 Bit1 ~ 3: Reserved The fourth F from the right: Bit0: fault 0 of brake tube is not shielded, shield 1 Bit1 ~ 3: Reserved	0000	×
E1-15	Single -phase current overload point	0.0%～400.0%	150.0%	△
E1-16	Single -phase current overload time	0.000s～50.000s	1.000s	△

Param.	Designation	Scope	Factory Default	Attr
E1-17	Over speed/excessive speed difference	Ones place: Over speed (OS) action selection 0: Coast to stop and report the fault 1: Continue to run Tens place: Excessive speed deviation (DEV) action selection 0: Coast to stop and report the fault 1: Continue to run	00	×
E1-18	Over speed (OS) detection value	0.0%～108.0%	105.0%	△
E1-19	Over speed (OS) detection time	0.0S～20.00S	1.00s	△
E1-20	Detection value of excessive speed difference	0.0%～50.0%	20.0%	△
E1-21	Detection time of excessive speed difference	0.0S～20.00S	5.00s	△
E1-22	Quick current limiting function	0~1000	1	×
E1-23	Sampling delay settings	0~500	100	×
E1-24	Five -stage frequency threshold	0~65535	8.00Hz	△
E1-25	Overvoltage stall coefficient	0~200	30	△
Group E2: Enhanced Functions of Motor Control				
E2-16	Motor feedback frequency filtering	0.0ms～500.0ms	0.3ms	△

Param.	Designation	Scope	Factory Default	Attr
E2-17	Torque closed-loop selection	0: Disable 1: Enable	1	△
E2-18	Torque loop Kp	0~65535	1000	△
E2-19	Torque loop Ki	0~65535	50	△
E2-20	Active damping proportion coefficient	0~65535	0	△
E2-21	Active damping amplitude limit adjustment	0~65535	512	△
E2-22	Speed overshoot suppression coefficient	0.0ms～500.0ms	0.0ms	△
E2-23	Reference of Id	-4096~4096	0	△
Group F Application Parameters				
Group F1: Multi-step Frequency				
F1-00	FREQ 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: AI1 4: AI2 5: AI3 (on extension IO board) 6: AI4 (on extension IO board) 7: X5 pulse input 8: Process PID output 9: Communication	0	×

Param.	Designation	Scope	Factory Default	Attr
F1-01	FREQ set source of multi-step 1	0: Digital setting F1-03 1: Digital setting b0-04 + control panel ∧/∨ adjustment 2: Digital setting b0-04 + terminal UP/DOWN 3: AI1 4: AI2 5: AI3 (on extension IO board) 6: AI4 (on extension IO board) 7: X5 pulse input 8: Process PID output 9: Communication	0	×
F1-02 ～ F1-17	Multi-step FREQ 0-15	Lower limit~upper limit (-100.0%～100.0%) Percentage relative to the upper limit frequency in b0-09	0.0%	△
Group F4: Position Control				
F4-00	Position command selection	Ones place: Signal type selection 0: AB orthogonal reference 1: Direction+pulse (B: direction+A:pulse) reference Tens place: position command 0: Not reverse 1: Reverse Hundreds Place: Pulse command 0: Not reverse 1: Reverse Thousands Place: Speed mode switch to position mode 0: Directly Switching	0000	×

Param.	Designation	Scope	Factory Default	Attr
		1: Smooth Switching		
F4-01	Position feedback channel	Ones place: PG board type selection 0: Single encoder feedback 1: Dual encoder feedback Tens place: Orientation encoder feedback selection 0: Motor encoder 1: Second encoder Hundreds place: Pulse-tracking encoder feedback selection 0: Motor encoder 1: Second encoder Thousands place: Reserved	0001	×
F4-02	Numerator of gear ratio of command and feedback pulses	1～10000	1	△
F4-03	Denominator of gear ratio of command and feedback pulses	1～10000	1	△
F4-04	Gear ratio numerator 1 of motor and spindle	1～10000	1	△
F4-05	Gear ratio denominator 1 of motor and spindle	1～10000	1	△
F4-06	Gear ratio numerator 2 of motor and spindle	1～10000	1	△

Param.	Designation	Scope	Factory Default	Attr
F4-07	Gear ratio denominator 2 of motor and spindle	1～10000	1	△
F4-08	Spindle encoder resolution	1～10000	2500	△
F4-09	Spindle encoder direction	0: Positive 1: Reverse	0	×
F4-10	Spindle encoder disconnection detection	0.0s ~ 8.0s (0.0s means this function is invalid)	0.0s	△
F4-11	Frequency division output selection	Ones place: Frequency division output encoder selection 0: motor encoder 1: spindle encoder Tens place: Frequency division output direction selection 0: Forward 1: Reverse	00	△
F4-12	Frequency division coefficient	0~65535	0	△
F4-13	Resolution after frequency multiplication	1～16000	1	△
F4-14	Position mode completion range	0~9999	20	×
F4-15	Position mode completion time	0.001~5.000S	0.100s	×

Param.	Designation	Scope	Factory Default	Attr
F4-16	Max.output frequency of pulse tracking	0～B0-09	110.00Hz	×
F4-17	ASR High-speed proportional gain of pulse tracking	0.0～20.0	1.0	△
F4-18	ASR High-speed integral time of pulse tracking	0.000s～8.000s	0.200s	△
F4-19	ASR Low-speed proportional gain of pulse tracking	0.0～20.0	1.0	△
F4-20	ASR Low-speed integral time of pulse tracking	0.000s～8.000s	0.200s	△
F4-21	Feed-forward gain of pulse tracking	0～2.00	1.00	△
F4-22	High-speed proportional gain of pulse tracking	0～100.00	1.00	△
F4-23	Low-speed proportional gain of pulse tracking	0～100.00	1.00	△
F4-24	Proportional gain low-speed switching frequency	0～F4-25	0.500Hz	×
F4-25	Proportional gain high-speed switching frequency	F4-24~b0-09	1.000Hz	×
F4-26	Feed-forward filter time	0～255	0	△
F4-27	Filter time of command inertia	0～255	0	×

Param.	Designation	Scope	Factory Default	Attr
F4-28	Filter time of command average value	0～1.023S	0.010s	×
F4-29	Position-loop output amplitude limit	0～50.00HZ	10.00Hz	△
F4-30	ASR low-speed proportional gain of orientation	0.0～20.0	1.0	△
F4-31	ASR low-speed integral time of orientation	0.000s～8.000s	0.200s	△
F4-32	Selection of switching to position	Ones place: Selection of switching to position 0: Direct switch 1: Positioning first and then switch Tens place: Anti -reverse of position enabled 0: Disable 1: Enable Hundreds place: Orientation mode selection 0: Straight line orientation 1: Exponential curve orientation	00	△
F4-33	Direction selection of spindle orientation	0: Forward 1: Reverse 2: Current direction 3: Nearest direction	0	×
F4-34	Orientation frequency	0.01～b0-09	5.00Hz	×
F4-35	Orientation response time	0.1~1000.0S	3.0s	△

Param.	Designation	Scope	Factory Default	Attr
F4-36	High-speed proportional gain of orientation	0～100.00	1.00	△
F4-37	Low-speed proportional gain of orientation	0～100.00	1.00	△
F4-38	Low-speed switching frequency of orientation	0～F4-39	0.50Hz	×
F4-39	High-speed switching frequency of orientation	F4-38～F4-34	1.00Hz	×
F4-40	Orientation position 1	0 ~ Pulses per rotation	0	△
F4-41	Orientation position 2	0 ~ Pulses per rotation	0	△
F4-42	Orientation position 3	0 ~ Pulses per rotation	0	△
F4-43	Orientation position 4	0 ~ Pulses per rotation	0	△
F4-44	Orientation position 5	0 ~ Pulses per rotation	0	△
F4-45	Orientation position 6	0 ~ Pulses per rotation	0	△
F4-46	Orientation position 7	0 ~ Pulses per rotation	0	△
F4-47	Orientation position 8	0 ~ Pulses per rotation	0	△
F4-48	Orientation S-curve selection	0: No S curve 1: S curve	0	△
F4-49	Proportion of initial segment of orientation Decel S-curve	0.0%～100.0% (F4-49+F4-50≤100%)	20.0%	△
F4-50	Proportion of ending segment of orientation Decel S-curve	0.0%～100.0%	20.0%	△
F4-51	Accel time for orientation/returning to origin	0.1~1000.0S	3.0s	×

Param.	Designation	Scope	Factory Default	Attr
F4-52	Decel time for orientation/returning to origin	0.1~1000.0S	3.0s	×
F4-53	Rigidness adjustment for position mode	0~1024	150	△
F4-54	Return to origin selection	Ones place:: 0: Return to origin triggered by terminal 1: Return to origin at each startup 2: Return to origin at the end of each carry Tens place: Origin signal selection 0: External terminal input (Dual direction) 1: Encoder Z signal 2: External terminal input (Single direction)	00	×
F4-55	Return to origin direction	0: Forward when returning to origin 1: Reverse when returning to origin	0	×
F4-56	Return to origin frequency 1	F4-57～b0-09	10.00Hz	×
F4-57	Return to origin frequency 2	0.00Hz～F4-56	1.00Hz	×
F4-58	Zero speed clamping function selection	0: Zero speed clamping function disabled 1: Zero speed clamping function enabled 2: Zero speed clamping enabled when terminal is valid	0	△

Param.	Designation	Scope	Factory Default	Attr
F4-59	Zero speed clamping start frequency	0.00Hz～b0-09	0.30Hz	△
F4-60	Zero speed clamping gain	0~30.00	1.00	△
F4-61	Zero speed clamping error tolerance	0~10000	2	△
F4-62	Simple carry function selection	0: Disable 1: Enable	0	△
F4-63	Carry Accel/Decel time	0.1~1000.0S	2.0s	×
F4-64	Carry quantity 0 high bits	0～9999	0	△
F4-65	Carry quantity 0 low bits	0～9999	0	△
F4-66	Carry quantity 1 high bits	0～9999	0	△
F4-67	Carry quantity 1 low bits	0～9999	0	△
F4-68	Carry quantity 2 high bits	0～9999	0	△
F4-69	Carry quantity 2 low bits	0～9999	0	△
F4-70	Carry quantity 3 high bits	0～9999	0	△
F4-71	Carry quantity 3 low bits	0～9999	0	△
F4-72	Carry quantity 4 high bits	0～9999	0	△
F4-73	Carry quantity 4 low bits	0～9999	0	△
F4-74	Carry quantity 5 high bits	0～9999	0	△
F4-75	Carry quantity 5 low bits	0～9999	0	△
F4-76	Carry quantity 6 high bits	0～9999	0	△
F4-77	Carry quantity 6 low bits	0～9999	0	△
F4-78	Carry quantity 7 high bits	0～9999	0	△
F4-79	Carry quantity 7 low bits	0～9999	0	△
F4-80	Acceleration filtering	0.0～5000.0	20.0	△
F4-81	Inertia compensation coefficient	0~65535	2.000	△

Param.	Designation	Scope	Factory Default	Attr
F4-85	Position enable selection for bus control	The setting method of the relevant position command when controlled by bus Digit 0: Pulse follower, 0 bus control, 1 terminal control Digit 1: Orientation, 0 bus control, 1 terminal control Digit 2: Simple carry, 0 bus control, 1 terminal control Digit 3: Find origin, 0 bus control, 1 terminal control Digit 4: Zero servo, 0 bus control, 1 terminal control	0	×
Group H: Communication Parameters				
Group H0: MODBUS Communication Parameters				
H0-00	SCI port selection	0: No communication 1: Local 485 port (CM31) 2: PNET-C03 / MTP-C03 / DEV 3: ECT / PN(CM35) / MTP (CM39) 4: CAN (CM32) 5: M3(CM33) / CANOPEN(CM36) / Profibus DP (CM37) (After changing communication method, the AC drive should be restarted)	0	×
H0-01	SCI port communication configuration	Ones place: baud rate 0: 4800bps 1: 9600bps	0001	×

Param.	Designation	Scope	Factory Default	Attr
		2: 19200bps 3: 38400bps 4: 57600bps 5: 115200bps 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: 1-8-1-N Format, RTU Hundreds place: connection type 0: Direct cable connection (232/485) 1: MODEM (232) Thousands place: saving method 0: Not saved at power loss 1: Saved at power loss		
H0-02	Local address of 485 port communication	0~247, 0 is broadcast address	1	×
H0-03	Time out detection of communication	0.0s～100.00s	5.00s	△
H0-04	Time delay of 485 port communication	0ms～1000ms	0ms	△
H0-05	Master/Slave option	0: PC controls this drive 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 FREQ	0～1000.0%	100.0%	△

Param.	Designation	Scope	Factory Default	Attr
H0-08	485 Automatic reset enable	0: disable 1: enable	0	×
H0-09	Transmission Bytes via Comm Card (M3)	0: 48 bytes (with subcommands) 1: 32 bytes	0	△
H0-10	Communication card fault detection time	0.00～100.00s	5.00s	△
H0-11	Restore comm card factory IP (MTP)	0: Disabled 1: Restore factory IP after power cycle	0	△
H0-13	Bus Speed Unit Selection (EC)	0：rpm 1：pulse/s	0	△
H0-14	Address Mapping Selection (M3)	0: None 1: Mapping 1	0	△
Group H1: Communication				
H1-00	EtherCAT synchronization delays updating data	0.0%~100.0%	0.0%	△
Group L Keys and Display of Control panel				
Group L0: Keys of Control panel				
L0-00	MF key setting	0: No function 1: Forward jog 2: Reverse jog 3: Forward/reverse switchover 4: Emergency stop 1 (set Decel time by b2-09) 5: Emergency stop 2 (coast to stop) 6: Run command sources shifted	0	△

Param.	Designation	Scope	Factory Default	Attr
L0-01	Keys locked option	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 activated only at control panel control 1: STOP key activated under any run command source	0	△
L0-03	FREQ adjustment through keys ∧/∨	Ones place Bit0: option on ramp to stop 0: zeroing the adjustment value 1: holding the adjustment value Ones place Bit1: option at master & auxiliary frequency reference 0: zeroing the adjustment value 1: holding the adjustment value Tens Place: option on power loss 0: zeroing the adjustment value 1: holding the adjustment value Hundreds Place: integrating option 0: Integrating disabled 1: Integrating enabled Thousands place: run direction 0: Direction changing prohibited 1: Direction changing permitted	0100	△

Param.	Designation	Scope	Factory Default	Attr
L0-04	Step size of FREQ adjustment through keys ∧/∨	0.00Hz/s～10.00Hz/s	0.10 Hz/s	△
Group L1 Control Panel Display Setting				
L1-00	Display parameter setting 1 on run status	Binary system setting: 0: No Display 1: Display Ones place: BIT0: Run FREQ (Hz) BIT1: FREQ reference (Hz) BIT2: Bus voltage (V) BIT3: Output current (A) Tens place: BIT0: Output torque (%) BIT1: Output power (kW) BIT2: Output voltage (V) BIT3: Motor speed (r/min) Hundreds place: BIT0: AI1 (V) BIT1: AI2 (V) BIT2: AI3 (V) BIT3: AI4 (V) Thousands place: BIT0: running FREQ 2 (Hz) BIT1: DI BIT2: External count value BIT3: Reserved Note: when this parameter is set to	00CF	△

Param.	Designation	Scope	Factory Default	Attr
		0000, run FREQ (Hz) would be displayed as default		

Param.	Designation	Scope	Factory Default	Attr
L1-01	Display parameter setting 2 on run status	Binary system setting: 0: No Display 1: Display Ones place: BIT0: Run linear speed (m/s) BIT1: Set linear speed (m/s) BIT2: Input terminal status BIT3: Output terminal status Tens place: BIT0: PID reference (%) BIT1: PID feedback (%) BIT2: Reserved BIT3: Reserved Hundreds place: BIT0: Torque reference (%) BIT1: Reserved BIT2: Reserved BIT3: Reserved Thousands place: reserved BIT1: Reserved BIT2: Reserved BIT3: Reserved	0000	△

Param.	Designation	Scope	Factory Default	Attr
L1-02	Display parameter setting on stop status	Binary system setting: 0: No Display 1: Display Ones place: BIT0: FREQ reference (Hz) BIT1: Bus voltage (V) BIT2: Input terminal status BIT3: Output terminal status Tens place: BIT0: AI1 (V) BIT1: AI2 (V) BIT2: AI3 (V) BIT3: AI4 (V) Hundreds place: BIT0: PID reference (%) BIT1: PID feedback (%) BIT2: Reserved BIT3: Reserved Thousands place: BIT0: Run linear speed (m/s) BIT1: Set linear speed (m/s) BIT2: External count value BIT3: X5 Note: when this function code is set to 0000, the FREQ reference would be displayed as default (Hz)	0003	△
L1-03	Linear speed coeff	0.1~999.9%	100.0%	△

Param.	Designation	Scope	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	-300.0%～300.0%	0.0%	◎
U0-06	Output power	0.0%~300.0%	0.0%	◎
U0-07	Master FREQ reference source	0: Digital setting + adjustment through ∧/∨ on control panel 1: Digital setting + terminal UP/DOWN adjustment 2: Analog input AI1 3: Analog input AI2 4: Analog input AI3 (on extension IO board) 5. Analog input AI4 (on extension IO board) 6: X5 pulse input 7: Process PID output 8: PLC 9: Multi-step FREQ 10: Communication 11: PA/PB input	00	◎

Param.	Designation	Scope	Factory Default	Attr
U0-08	Auxiliary FREQ reference source	0: No set 1: Digital setting + adjustment through ∧/∨ on control panel 2: Digital setting + terminal UP/DOWN adjustment 3: Analog input AI1 4: Analog input AI2 5: Analog input AI3 (on extension IO board) 6: Analog input AI4 (on extension IO board) 7: X5 pulse input 8: Process PID output 9: PLC 10: Multi-step FREQ 11: Communication	00	◎
U0-09	Master FREQ reference	0.00Hz～600.00Hz	0.00Hz	◎
U0-10	Auxiliary FREQ reference	0.00Hz～600.00Hz	0.00Hz	◎
U0-11	Drive status	Ones place: run status 0: Accelerating 1: Decelerating 2: Constant speed running Tens place: drive status 0: Stop 1: Running 2: Autotune	00	◎
U0-12	AI1 input voltage	0.00V～10.00V	0.00V	◎
U0-13	AI2 input voltage	0.00V～10.00V	0.00V	◎

Param.	Designation	Scope	Factory Default	Attr
U0-14	AI3 input voltage (on extension IO board)	0.00V～10.00V	0.00V	◎
U0-15	AI4 input voltage (on extension IO board)	-10.00V～10.00V	0.00V	◎
U0-16	AO1 output	0.0%～100.0%	0.0%	◎
U0-17	AO2 output (on extension IO board)	0.0%～100.0%	0.0%	◎
U0-18	X5 high-frequency pulse input frequency	0.0KHz～50.0KHz	0.0kHz	◎
U0-19	Digital input terminal status	Range: 0000～3FFF Note: 1) 0 means invalid, 1 means valid; 2) bit0~bit13: X1,X2,…,X10,AI1,AI2,AI3,AI4	0000	◎
U0-20	Digital output terminal status	Range: 00～FF Note: 1) 0 means open, 1 means closed; 2) BIT0 ~ Bit7: DO1,DO2,DO3,DO4, HDO Reserved, R1, R2	00	◎
U0-21	PID set	0.0%～100.0%	0.0%	◎
U0-22	PID feedback	0.0%～100.0%	0.0%	◎
U0-23	PID input offset	-100.0%～100.0%	0.0%	◎
U0-24	PLC step	0～15	0	◎
U0-25	V/F separated target voltage	0.0%～ 100.0%	0.0%	◎
U0-26	V/F separated actual output voltage	0.0%～ 100.0%	0.0%	◎
U0-27	Frequency before speed search stop	0～600.00Hz	0.00Hz	◎

Param.	Designation	Scope	Factory Default	Attr
U0-28	Resolution of spindle encoder	0~60000	0	◎
U0-29	Resolution of motor encoder	0~60000	0	◎
U0-30	Torque reference value	0.0%～300.0%	0.0%	◎
U0-31	Cumulative power-up time	0～65535h	0h	◎
U0-32	Cumulative run time	0～65535h	0h	◎
U0-33	Environment temperature	-40.0℃～200.0℃	0.0℃	◎
U0-34	Inverter bridge temperature	-40.0℃～200.0℃	0.0℃	◎
U0-35	Motor temperature	-40.0℃~200.0℃	0.0℃	◎
U0-36	Terminal count value	0~65535	0	◎
U0-37	Run command log at LoU	0~1	0	◎
U0-38	Fault code log at LoU	0~100	0	◎
U0-39	Code execution time	0~65535	0	◎
U0-40	CtC fault source	0: No fault 1: V phase 2: W phase 3: U phase	0	◎
U0-43	Higher-bit numbers of control panel ∧/∨ stored value	-1～1	0	◎
U0-44	Lower-bit numbers of control panel ∧/∨ stored value	0.00～655.35	0.00Hz	◎

Param.	Designation	Scope	Factory Default	Attr
U0-45	Higher-bit numbers of terminal UP/DOWN stored value	-1～1	0	◎
U0-46	Lower-bit numbers of terminal UP/DOWN stored value	0.00～655.55	0.00Hz	◎
U0-47	Position control pulse error	-9999～+9999	0	◎
U0-48	Feed-forward pulse FREQ of pulse tracking	0.00Hz～600.00Hz	0	◎
U0-49	Motor absolute position display	0~65535	0	◎
U0-50	Spindle absolute position display	0~65535	0	◎
U0-51	Higher-bit of carry amount command	0～9999	0	◎
U0-52	Lower-bit of carry amount command	0～9999	0	◎
U0-53	Current carry amount higher-bit	0～9999	0	◎
U0-54	Current carry amount lower-bit	0～9999	0	◎
U0-55	Motor feedback FREQ	0.00Hz～600.00Hz	0.00Hz	◎
U0-56	Spindle feedback FREQ	0.00Hz～600.00Hz	0.00Hz	◎
U0-57	Reference pulse FREQ	0.00Hz～600.00Hz	0.00Hz	◎
U0-60	Reserved	0～65535	0	◎
U0-61	Reserved	0～65535	0	◎
U0-62	Communication status of PN communication board	0～65535	0	◎

Param.	Designation	Scope	Factory Default	Attr
U0-63	Initial position angle	0～6000.0	0	◎
U0-64	CPU load rate	0～100.0%	0.0%	◎
U0-65	PG interruption error accumulated	0~65535	0	◎
U0-66	PG interruption cycle	0~65535	0	◎
U0-67	Communication error accumulated of PG board	0~65535	0	◎
U0-68	Current position mode	Ones place: 1: orientation 2: pulse tracking 3: return to origin 4: simple carry 5: Zero speed clamping Tens Place: Status in each mode	0	◎
U0-69	A signal sampling value	0~4095	0	◎
U0-70	B signal sampling value	0~4095	0	◎
U0-71	C signal sampling value	0~4095	0	◎
U0-72	D signal sampling value	0~4095	0	◎
U0-75	PG card version	0~FFFF	0	◎
U0-76	Motor speed reference	-30000~30000	0	◎
U0-77	Motor speed feedback	-30000~30000	0	◎
U0-80	Communication cycle	0μs～65535μs	0	◎
U0-81	Bus target position monitoring low	0～65535	0	◎
U0-82	Bus target position monitoring high	0～65535	0	◎
U0-83	UVW real-time status	0～7	0	◎

Param.	Designation	Scope	Factory Default	Attr
Group U1 Fault history				
U1-00	History fault 1 (latest)	0: No fault 1: Accel overcurrent (oC1) 2: Const-speed overcurrent (oC2) 3: Decel overcurrent (oC3) 4: Accel overvoltage (ou1) 5: Const-speed overvoltage (ou2) 6: Decel overvoltage (ou3) 7: Module protection (FAL) 8: Autotune failed (tUN) 9: Drive overloaded (oL1) 10: Motor overloaded (oL2) 11: Current detection circuit failed (CtC) 12: Output ground short-circuit protection (GdP) 13: Input power supply fault (ISF) 14: Output phase loss (oPL) 15: Inverter module overload protection (oL3) 16: Module (IGBT) thermal protection (oH1) 17: Motor (PTC) thermal protection (oH2) 18: PIM temperature measurement circuit fault (oH3) 19: Encoder disconnected (CLL) 20: STO 1 circuit abnormal (ST1)	0	◎

Param.	Designation	Scope	Factory Default	Attr
		21: STO 2 circuit abnormal (ST2) 22: Safety Torque Off (ST0) 23: Extension IO board connection abnormal (I0E) 24: External equipment error (PEr) 25: Consecutive run time set by the agent reached (to1) 26: Consecutive run time attained (to2) 27: Cumulative run time attained (to3) 28: Abnormal power supply at run (SUE) 29: EEPROM read/write fault (EPr) 30: Abnormal contactor (CCL) 31: Abnormal port communication (TrC) 32: Control panel communication abnormal (PdC) 33: Parameter copy failure (CPHDO) 34: Reserved 35: Software version compatibility failure (SFt) 36: Hardware overcurrent fault (oC4) 37: Hardware overvoltage fault (ou4) 38: PG board connection fault (PGE) 39: Reserved 40: AI input out-of-limit (AIP) 41: Undervoltage protection (LoU) 42: Over-speed (oSP)		

Param.	Designation	Scope	Factory Default	Attr
		43: Speed bias is large (SPL) 44: DC inject brake short-circuit fault (bCF) 45: PID feedback lost (PIo) 46: Communication abnormal (CbE) 47: PG board software version abnormal (PGu)		
U1-01	Run FREQ at fault 1	0.00Hz～600.00Hz	0.00Hz	◎
U1-02	Output current at fault 1	0.0A～6553.5A	0.0A	◎
U1-03	Bus voltage at fault 1	0V～10000V	0V	◎
U1-04	Ambient temperature at fault 1	-40.0℃～100.0℃	0.0℃	◎
U1-05	Inverter bridge temperature at fault 1	-40.0℃～100.0℃	0.0℃	◎
U1-06	Input terminal status at fault 1	0000～FFFF	0000	◎
U1-07	Output terminal status at fault 1	0000～FFFF	0000	◎
U1-08	Cumulative run time at fault 1	0～65535h	0h	◎
U1-09	Code of fault 2	Same as U1-00	0	◎
U1-10	Run FREQ at fault 2	0.00Hz～600.00Hz	0.00Hz	◎
U1-11	Output current at fault 2	0.0A～6553.5A	0.0A	◎
U1-12	Bus voltage w at fault 2	0V～10000V	0V	◎

Param.	Designation	Scope	Factory Default	Attr
U1-13	Temperature 1 of heat sink at fault 2	-40.0℃～100.0℃	0.0℃	◎
U1-14	Temperature 2 of heat sink at fault 2	-40.0℃～100.0℃	0.0℃	◎
U1-15	Input terminal status at fault 2	0～FFFF	0000	◎
U1-16	Output terminal status at fault 2	0～FFFF	0000	◎
U1-17	Cumulative run time at fault 2	0～65535h	0h	◎
U1-18	Code of fault 3	Same as U1-00	0	◎
U1-19	Run FREQ at fault 3	0.00Hz～600.00Hz	0.00Hz	◎
U1-20	Output current at fault 3	0.0A～6553.5A	0.0A	◎
U1-21	Bus voltage w at fault 3	0V～10000V	0V	◎
U1-22	Temperature 1 of heat sink at fault 3	-40.0℃～100.0℃	0.0℃	◎
U1-23	Temperature 2 of heat sink at fault 3	-40.0℃～100.0℃	0.0℃	◎
U1-24	Input terminal status at fault 3	0000～FFFF	0000	◎
U1-25	Output terminal status at fault 3	0000～FFFF	0000	◎
U1-26	Cumulative run time at fault 3	0～65535h	0h	◎
Group U2 Version Information				
U2-00	Invert Series Number	0000～0xFFFF	Model dependent	◎

Param.	Designation	Scope	Factory Default	Attr
U2-01	Software Version	0000～0xFFF	Model dependent	◎
U2-02	Software NonStandar Version	0000～0xFFF	Model dependent	◎
U2-03	KeyPad Software Version	0000～0xFFFF	Model dependent	◎
U2-04	HardWare Version	0000～0xFFF	Model dependent	◎
U2-05	Type Code High	0～9999	0	◎
U2-06	Type Code Low	0～65535	0	◎
U2-07	Factory YearMonth	0～65535	0	◎
U2-08	Batch No	0～65535	0	◎
U2-09	Serial No	0～65535	0	◎
U2-10	Communication board hardware version	0000～0xFFFF	0	◎
U2-11	PG board software version number	0000～0xFFFF	0	◎
U2-12	PG board dedicated software version number	0000～0xFFFF	0	◎
U2-13	I/O board hardware version	0000～0x000F	0	◎
U2-14	I/O board software version	0000～0xFFFF	0	◎
U2-15	Communication board software version number	0000～0xFFFF	0	◎
U2-16	Communication board dedicated software version number	0000～0xFFFF	0	◎

Chapter 6 Machine tool specific parameters

Group C Input & Output Terminals

Group C2 Analog and Pulse Input

C2-00	Analog input curve	Range: 0000~3333	Factory default: 1000

Curves of analog input AI1, AI2 and AI3 are selected by this parameter.

◆ Ones place: AI1 input curve

0: Curve 1 (2 points)
Defined by C2-01~C2-04.

1: Curve 2 (4 points)
Defined by C2-05~C2-12.

2: curve 3 (4 points)
Defined by C2-13~C2-20.

3: AI1 curve X terminal switchover
Curve 2 and curve 3 selection can be switched via terminal “analog input curve switchover”. When this terminal is deactivated, curve 2 takes effect, while when this terminal is activated, curve 3 will work.

◆ Tens place: AI2 input curve
Same as specification of AI1.

◆ Hundreds place: AI3 input curve
Same as specification of AI1.

◆ Thousands place: AI4 input curve

◆ Same as specification of AI1.

C2-01	Curve 1 maximum input	Range: curve 1 minimum input ~110.0%	Factory default: 100.0%
C2-02	Corresponding set value of curve 1 maximum input	Range: -100.0%~100.0%	Factory default: 100.0%
C2-03	Curve 1 minimum input	Range: -110.0%~curve 1 maximum input	Factory default: 0.0%
C2-04	Corresponding set value of curve 1 minimum input	Range: -100.0%~100.0%	Factory default: 0.0%

Curve 1 is defined by above-noted 4 parameters. Input values C2-01 and C2-03:
AI1~AI3 are 0~10V or 0~20mA programmable by jumper on control board.
If 0~10V is selected: 0V corresponds to 0%, while 10V corresponds to 100%.

If 0~20mA is selected: 0mA corresponds to 0%, while 20mA corresponds to 100%.
AI4 only supports -10V~10V input or 0~20mA; for AI4, -10V corresponds to -100%, while 10V corresponds to 100%.

Corresponding set values C2-02 and C2-04:
When the corresponding set value is frequency: 100% is the maximum frequency, while -100% is the maximum negative frequency.
When the corresponding set value is current: 100% means 2 times the rated current of drive while “less than or equal to 0%” corresponds to zero current.
When corresponding set value is torque: 100% means 2 times the rated torque, while -100% means negative “2 times the rated torque”.
When the corresponding set value is output voltage (e.g. the voltage setting in case of V/f separated pattern): 100% corresponds to rated voltage of motor. “less than or equal to 0%” corresponds to 0V voltage.

Curve diagram is shown as below:

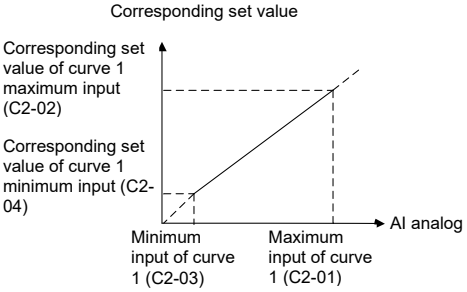


Fig. 6-1

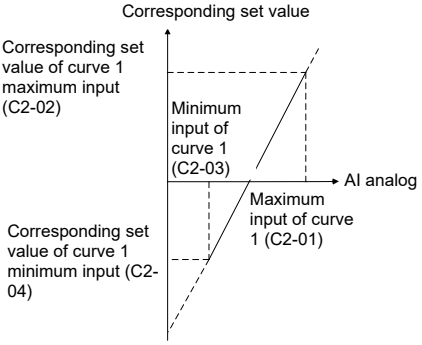


Fig. 6-2

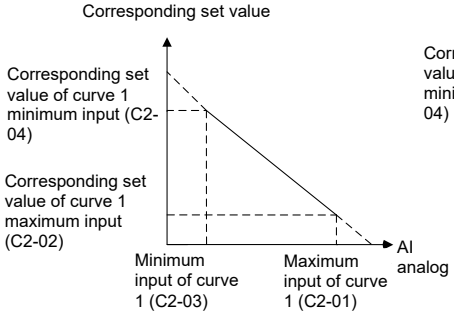


Fig. 6-3

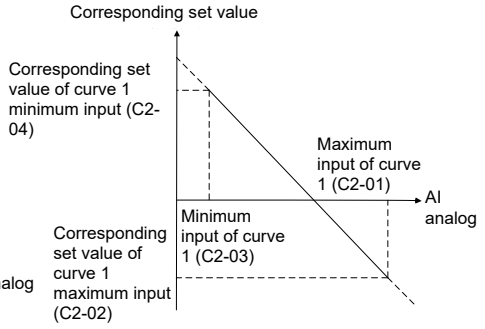


Fig. 6-4

C2-05	Curve 2 maximum input	Range: input of curve 2 inflection point A~110.0%	Factory default: 100.0%
C2-06	Corresponding set value of curve 2 maximum input	Range: -100.0%~100.0%	Factory default: 100.0%
C2-07	Input of curve 2 inflection point A	Input of curve 2 inflection point B ~ curve 2 maximum input	Factory default: 0.0%
C2-08	Set value corresponding to input of curve 2 inflection point A	Range: -100.0%~100.0%	Factory default: 0.0%
C2-09	Input of curve 2 inflection point B	Range: curve 2 minimum input ~ input of curve 2 inflection point A	Factory default: 0.0%
C2-10	Set value corresponding to input of curve 2 inflection point B	Range: -100.0%~100.0%	Factory default: 0.0%
C2-11	Curve 2 minimum input	Range: -110.0%~ input of curve 2 inflection point B	Factory default: 0.0%
C2-12	Set value corresponding to curve 2 minimum input	Range: -100.0%~100.0%	Factory default: 0.0%

Description of input value of curve 2: Voltage input:

1) With regard to AI1 and the AI3, 0% corresponds to 0V or 0mA, while 100% corresponds to 10V or 20mA.
2) Regarding to AI4, -100% corresponds to -10V, while 100% corresponds to 10V.

Curve 2 is defined by C2-05~C2-12. The input of curve 2 and the definition of corresponding set value is the same as AI1. The difference is that curve 1 is a straight line while curve 2 is a broken line with two inflection points. Diagram of curve 2 is shown as below:

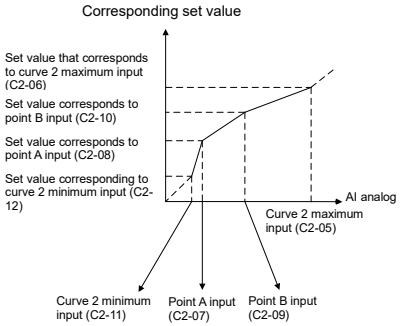


Fig. 6-5

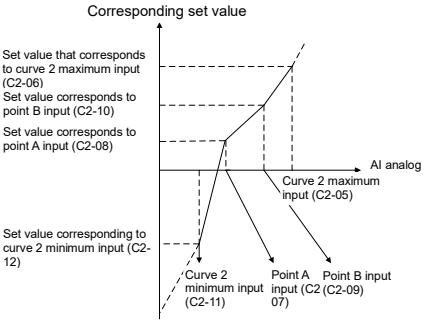


Fig. 6-6

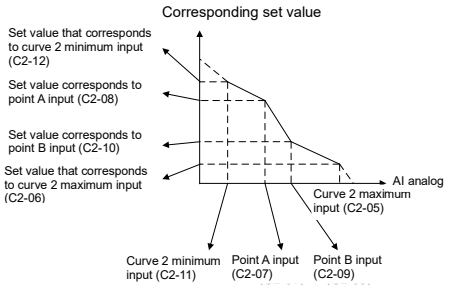


Fig. 6-7

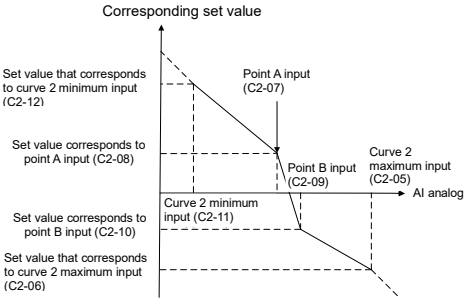


Fig. 6-8

C2-13	Curve 3 maximum input	Range: input of curve 3 inflection point A~110.0%	Factory default: 100.0%
C2-14	Set value corresponding to curve 3 maximum input	Range: -100.0%~100.0%	Factory default: 100.0%
C2-15	Input of curve 3 inflection point A	Range: input of curve 3 inflection point B~ curve 3 maximum input	Factory default: 0.0%
C2-16	Set value corresponding to input of curve 3 inflection point A	Range: -100.0%~100.0%	Factory default: 0.0%
C2-17	Input of curve 3 inflection point B	Range: curve 3 minimum input~ input of curve 3 inflection point A	Factory default: 0.0%
C2-18	Set value corresponding to input of curve 3 inflection point B	Range: -100.0%~100.0%	Factory default: 0.0%
C2-19	Curve 3 minimum input	Range: -110.0%~ input of curve 3 inflection point B	Factory default: 0.0%
C2-20	Set value corresponding to curve 3 minimum input	Range: -100.0%~100.0%	Factory default: 0.0%

Curve 3 is defined by C2-13~C2-20. The usage of curve 3 is the same as that of curve 2.

C2-21	AI1 terminal filtering time	Range: 0.000s~10.000s	Factory default: 0.100s
C2-22	AI2 terminal filtering time	Range: 0.000s~10.000s	Factory default: 0.100s
C2-23	AI3 terminal filtering time	Range: 0.000s~10.000s	Factory default: 0.100s
C2-24	AI4 terminal filtering time	Range: 0.000s～10.000s	Factory default: 0.100s

C2-21~C2-24 define the filtering time of analog input terminals AI1, AI2, AI3 and AI4. Long filtering time results in strong immunity from interference but slow response, while short filtering time brings rapid response but weak immunity from interference.

C2-25	X5 maximum input	Range: X5 maximum input~50.0kHz	Factory default: 50kHz
C2-26	Set value corresponding to	Range: -100.0%～100.0%	Factory default: 100%
C2-27	X5 minimum input	0.0 kHz～X5 maximum input	Factory default: 0.0kHz
C2-28	Set value corresponding to X5 minimum input	Range: -100.0%~100.0%	Factory default: 0.0%

When digital input terminal X5 receives pulse signal as frequency reference, the relation between input pulse signal and set frequency is defined by curves set by C2-25~C2-28.
C2-25 and C2-27 represent the range of X5 input pulse frequency, 50kHz at maximum.
C2-26 and C2-28 are the set values of frequency that corresponds to X5 input pulse frequency: 100% corresponds to positive maximum frequency while -100% corresponds to negative maximum frequency.

ATTENTION:

When pulse input is selected as the frequency reference, X5 terminal shall be set to “pulse input” function (C0-07 is set to 24).

C2-29	DI filtering time	Range: 0.000s~1.000s	Factory default: 0.100s

Defines the filtering time of terminal X5. Longer the filtering time is set, stronger the anti-noise capability is, but slower response time. Shorter the filtering time is set, quicker the response time will be, but weaker anti-noise capability.

C2-30	Analog switchover gain	Range: 0.0Hz～100.0%	Factory default: 100%

Used in conjunction with the “73: Analog signal gain switchover” terminal function. Refer to the description of analog signal gain switchover function.

Group C3 Analog and Pulse Output

C3-00	AO1 output function	Range: 0~99	Factory default: 2
C3-01	AO2 output function	Range: 0~99	Factory default: 1
C3-02	HDO output function (when used as DO)	Range: 0~99	Factory default: 0

AO1 and AO2 are analog output terminals. When used as high-speed pulse output DO, HDO terminal’s functions are set in C3-02.
Voltage output or current output of AO1 and AO2 can be selected through jumper switch S2 on

the default IO board or jumper switch S1 on the extension IO board.

Output range of DO pulse frequency is 0.0Hz ~C3-09 (maximum output pulse frequency). The ranges of corresponding digital output of AO1, AO2 and HDO are as shown in the table 6-18.

Table 6-18

Parameter value	Function	Range
0	No output	No output
1	Set frequency	0~maximum frequency
2	Output frequency	0~maximum frequency
3	Output current	0~2 times the rated current of drive
4	Output torque	0~2 times the rated torque
5	Output voltage	0~2 times the rated voltage of motor
6	Output power	0~ 2 times the rated power
7	Bus voltage	0~1000V
8	Torque command	0~2 times the rated torque
9	Torque current	0~2 times the rated current of motor
10	Magnetic flux current	0~2 times the rated current of motor
11	AI1	0~10V / 0~20mA
12	AI2	0~10V / 0~20mA
13	AI3	-10V~10V
14	AI4	-10V~10V/0~20mA
15	X5	0~50kHz
16	Communication input percentage	0~65535
17	Output frequency before compensation	0~maximum frequency
18	Output current (relative to motor rated current)	0~2 times rated output current of the motor
19	Output torque (direction hinted)	-2 times rated torque ~ 2 times rated torque
20	Set torque (direction hinted)	-2 times rated torque ~ 2 times rated torque

C3-03	AO1 offset	Range: -100.0%~100.0%	Factory default: 0.0%
C3-04	AO1 gain	Range: -2.000~2.000	Factory default: 1.000

When users need to change AO1 measuring range or correct the meter error, it can be realized by setting of C3-03 and C3-04. When using factory default set: 0~10V (or 0~20mA) of AO1 corresponds to “0~maximun”. See table 6-16 for details. By expressing standard output of AO1 as x, the adjusted AO1 output as HDO, the gain as k, and the offset as b (100% of offset corresponds to 10V or 20mA), there is the equation: HDO=kx+b

Example:

Set C3-00 to 2: output frequency. Standard AO1 output: AO1 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:

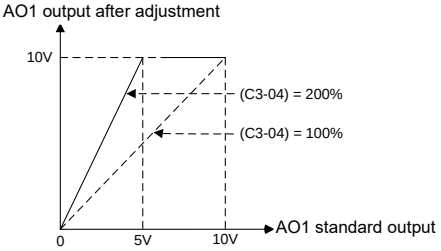


Fig. 6-9 Influence of AO1 gain against output

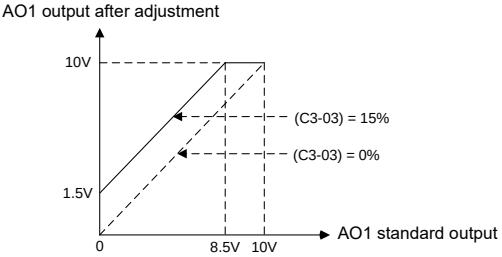


Fig. 6-10 Influence of AO1 offset against output

C3-05	AO1 filtering time	Range: 0.0s~10.0s	Factory default: 0.0s

Defines output filtering time of AO1 terminal.

C3-06	AO2 offset	Range: -100.0%~100.0%	Factory default: 0.0%
C3-07	AO2 gain	Range: -2.000~2.000	Factory default: 1.000
C3-08	AO2 filtering time	Range: 0.0s~10.0s	Factory default: 0.0s

Adjustment method of AO2 output curve is the same as AO1.

C3-09	HDO maximum output pulse frequency	Range: 0.1kHz~50.0kHz	Factory default: 50.0kHz

This parameter sets the maximum output frequency when HDO terminal is selected as high-speed pulse output.

C3-10	HDO output center point	Range: 0~2	Factory default: 0

There are three different center point modes when HDO terminal is selected as high-speed pulse output.

0: No center point.

HDO pulse frequency output range 0~(C3-09) corresponds to “0~maximum”, as shown in Fig. 6-31:

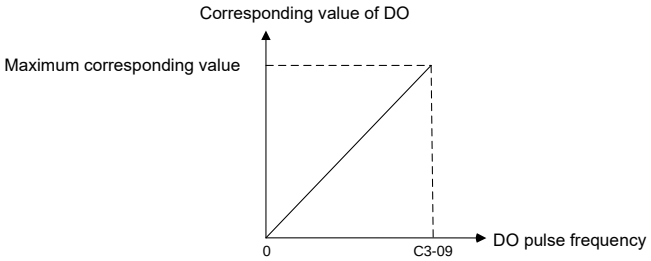


Fig. 6-11

1: Center point is (C3-09)/2, and the corresponding parameter value is positive when frequency is higher than center point. The value that corresponds to HDO pulse frequency at center point is 0. HDO pulse frequency C3-09 corresponds to the positive maximum value, while HDO pulse frequency 0Hz corresponds to the negative maximum value. See Fig. 6-12:

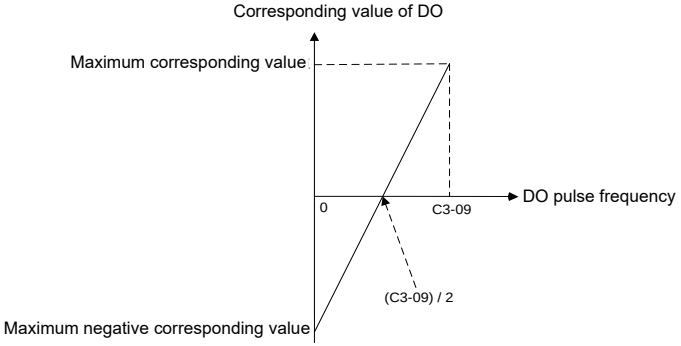


Fig. 6-12

2: Center point is (C3-09)/2, and the corresponding parameter value is positive when frequency is lower than center point. The value that corresponds to HDO pulse frequency at center point is 0. When set to 0, HDO pulse corresponds to the positive maximum value, while when set to C3-09, HDO pulse frequency corresponds to the negative maximum value. See Fig. 6-13:

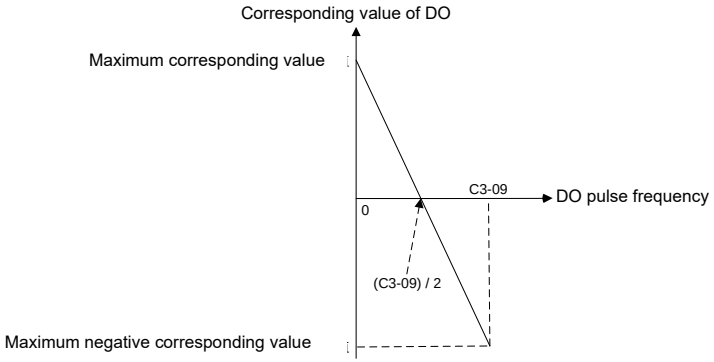


Fig. 6-13

C3-11	HDO output filtering time	Range: 0.00s~10.00s	Factory default: 0.00s

Sets the filtering time of HDO high-speed pulse output. Filtering can change the change rate of output pulse frequency. The longer the filtering time is, the lower the change rate of output pulse frequency would be.

Group C4 Automatic Correction of Analog Input

Parameter Group C4 is used to perform automatic correction of analog input channels, obtaining

the gain and offset of corresponding channel automatically. They can automatically modify the measuring range of corresponding channel or correct meter error.

C4-00	Analog correction	Range: 0~4	Factory default: 0

0: No correction
No correction to any analog input.
1: Correct AI1
Automatically correct analog AI1.
2: Correct AI2
Automatically correct analog AI2.
3: Correct AI3
Automatically correct analog AI3.
4: Correct AI4
Automatically correct analog AI4.

C4-01	Sampling value of AI1 calibration point 1	Range: 0.00V~10.00V	Factory default: 1.00V
C4-02	Input value of AI1 calibration point 1	Range: 0.00V~10.00V	Factory default: 1.00V
C4-03	Sampling value of AI1 calibration point 2	Range: 0.00V~10.00V	Factory default: 9.00V
C4-04	Input value of AI1 calibration point 2	Range: 0.00V~10.00V	Factory default: 9.00V
C4-05	Sampling value of AI2 calibration point 1	Range: 0.00V~10.00V	Factory default: 1.00V
C4-06	Input value of AI2 calibration point 1	Range: 0.00V~10.00V	Factory default: 1.00V
C4-07	Sampling value of AI2 calibration point 2	Range: 0.00V~10.00V	Factory default: 9.00V
C4-08	Input value of AI2 calibration point 2	Range: 0.00V~10.00V	Factory default: 9.00V
C4-09	Sampling value of AI3 calibration point 1	Range: -10.00V~10.00V	Factory default: 1.00V
C4-10	Input value of AI3 calibration point 1	Range: -10.00V~10.00V	Factory default: 1.00V
C4-11	Sampling value of AI3 calibration point 2	Range: -10.00V~10.00V	Factory default: 9.00V
C4-12	Input value of AI3 calibration point 2	Range: -10.00V~10.00V	Factory default: 9.00V

C4-13	Sampling value of AI4 calibration point 1	Range: -10.00V~10.00V	Factory default: 1.00V
C4-14	Input value of AI4 calibration point 1	Range: -10.00V~10.00V	Factory default: 1.00V
C4-15	Sampling value of AI4 calibration point 2	Range: -10.00V~10.00V	Factory default: 9.00V
C4-16	Input value of AI4 calibration point 2	Range: -10.00V~10.00V	Factory default: 9.00V

Take AI2 for example, automatic correction is as follows

1) Set C4-00 to 2 in stop status and press ENT key to confirm. In this way, AI2 is selected as correction channel.
2) Input a relatively low analog voltage (e.g. about 1V) via AI2 terminal, 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 9V) via AI2 terminal, 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, C4-00 parameter 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 are for reference only. Do not write the value of C4-05 directly into C4-06, or write the value of C4-07 directly into C4-08.

Group d Motor and Control Parameters

Group d0 Parameters of Motor 1

When motor 1 is selected as current load motor, please set motor parameters in Group d0.

d0-00	Type of motor 1	Range: 0~1	Factory default: 1

0: Ordinary motor

1: Variable frequency motor

The major difference between ordinary motor and variable frequency motor lies in the handling of motor overload protection. Under low speed run, ordinary motor has poor heat dissipation, so motor overload protection shall be derated at low speed. Since fan-based heat dissipation of variable frequency motor is not affected by motor speed, low-speed overload protection is not necessarily derated. Therefore, please set d0-00 to 0 when driving ordinary asynchronous motor so as to protect the motor reliably.

d0-01	Power rating of motor 1	Range: 0.4kW~6553.5kW	Factory default: model dependent
d0-02	Rated voltage of motor 1	Range: 0V~480V	Factory default: 380V
d0-03	Rated current of motor 1	Range: 0.0A~6553.5A	Factory default: model dependent
d0-04	Rated frequency of motor 1	Range:0.00Hz~600.00Hz	Factory default: 50.00Hz
d0-05	Pole number of motor 1	Range: 1~400	Factory default: 4
d0-06	Rated speed of motor 1	Range: 0~65535 r/min	Factory default: model dependent

The above-noted motor parameters must be set correctly according to motor nameplate. Please select the motor that suits the power rating of the drive, or the control performance of the drive will drop obviously.

d0-07	Stator resistance R1 of asynchronous motor 1	Range: 0.001Ω~65.535Ω	Factory default: model dependent
d0-08	Leakage inductance L1 of asynchronous motor 1	Range: 0.1mH~6553.5mH	Factory default: model dependent
d0-09	Rotor resistance R2 of asynchronous motor 1	Range: 0.001Ω~65.535Ω	Factory default: model dependent
d0-10	Mutual inductance L2 of asynchronous motor 1	Range: 0.1mH~6553.5mH	Factory default: model dependent
d0-11	No-load current of asynchronous motor 1	Range: 0.0A~6553.5A	Factory default: model dependent
d0-12	Power factor of asynchronous motor 1	Range: 0.0000~1.0000	Factory default: model dependent

The drive needs above-noted parameters to control its matching motor. If the parameters of motor 1 is known, just input the actual value into d0-07~d0-12 correspondingly.

After the autotune of motor 1, above-noted parameters are automatically updated and saved. Parameters d0-07~d0-11 are obtained through auto-tuning. If above-noted parameters are unknown and it is not allowed to perform motor tuning, please input the parameters manually by referring to parameters of kindred motors.

If motor power rating d0-01 is changed, d0-02~d0-12 will be automatically restored to default setting of the standard motor.

d0-22	Tune of motor 1	Range: 0~2	Factory default: 0

Parameters for controlling the motor performance are automatically obtained through motor tuning, and the result will be automatically saved upon the completion of motor tuning.

Be sure to correctly enter motor 1 parameters d0-01~d0-06 before motor tuning.

0: No motor tuning

1: Static tune

Static tune applies to the cases where rotary tune cannot be favorably performed due to the fact that it is impossible to disengage the motor from its load. After d0-22 is set to 1 and confirmed, press the key RUN to start static tune. D0-22 will be restored to 0 upon the successful completion of tune. In this way, parameters d0-07~d0-11 are obtained.

2: Rotary autotune

To perform rotary tune, it is essential to disengage the motor from its load. Motor tuning is prohibited when motor is loaded. After d0-22 is set to 2 and confirmed, press RUN to perform static tune, upon the completion of which, rotary autotune is performed. In this way, parameters d0-07~d0-11 have been obtained after the successful completion of rotary tune. The encoder direction d0-29 can be obtained by the closed-loop vector control.

3: PMSM encoder installation angle identification

Applicable to PG vector control. After identification, the initial angle d0.20 can be obtained.

🕮 ATTENTION:

- Before identification, please make sure the motor is in a stationary state, otherwise the parameter identification cannot be performed normally.
- During the identification process, the operation panel displays "TUNE" and the run indicator light is on. After the parameter identification is completed, the run indicator light goes out.
- If the parameter identification is unsuccessful, a "tUN" fault is reported.
- The closed-loop control of the synchronous motor must obtain d0.20 to operate normally, and 2 or 3 identifications are required.

.

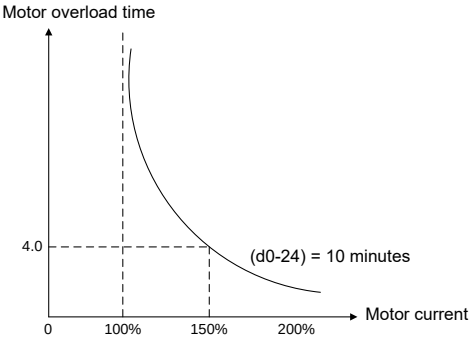


Fig. 6-14 Overload protection curve for ordinary motor running at 10Hz

d0-25	Temperature transducer signal input of motor 1	Range: 00～32	Factory default: 00

Onesplace: sensor channel

0: No sampling

1: Analog input TEMP (on extension PG board)

2: Analog input AI3 (on extension IO board)

Tens place: sensor type:

0: PT100

1: PT1000

2: KTY84

3: NTC

It is of great importance to select the correct sensor type and sampling channel according to the on-site application requirement, as an incorrect setup can lead to temperature sampling abnormalities. Please refer to Chapter 3 for the requirements regarding temperature sampling channel input terminals and DIP switches.

d0-30	Numerator of motor 1 mechanical gear ratio	Range: Range: 1～65535	Factory default: 1000
d0-31	Denominator of motor 1 mechanical gear ratio	Range: Range: 1～65535	Factory default: 1000

When encoder is not mounted on motor, vector control with PG can also be performed over motor by properly setting speed ratio. This parameter is defined as the ratio of motor rotation speed to encoder rotation speed.

I.e., d0-30**:** d3-31**= motor rotation speed: encoder rotation speed**

For example: when the speed reducing ratio between motor and motor spindle on machine is 3:1, which means that the motor spindle will turn a circle as the motor rotates by three circles. Encoder and motor spindle is connected at a transmission ratio of 1:1. Therefore, set d0-30 to 3000, and set d3-31 to 1000 in this case.

If encoder is directly mounted on motor, just need to set d0-30 equal to d3-31, like the default. Please set based on actual transmission ratio, or the drive won't work correctly.

Group F Machine Tool Application

Group F1 Multi-step Frequency

F1-00	Frequency set source of multi-step 0	Range: 0~9	Factory default: 0

0: Digital setting F1-02
1: Digital setting b0-02 + control panel ∧/∨ adjustment
2: Digital setting b0-02 + terminal UP/DOWN adjustment
3: AI1
4: AI2
5: AI3
6: AI4
7: X5 pulse input
8: Process PID output
9: Communication
At most 16-step of frequency can be set through the combination of "multi-step frequency terminals 1~4" of digital input. Multi-step frequency 2~15 are only digital setting while a number of setting sources can be selected for multi-step frequency 0~1. Parameter value of F1-00 determines command source of step 0.

F1-01	Frequency set source of multi-step 1	Range: 0~9	Factory default: 0

0: Digital setting F1-03
1: Digital setting b0-04 + control panel ∧/∨ adjustment
2: Digital setting b0-04 + terminal UP/DOWN adjustment
3: AI1
4: AI2
5: AI3
6: AI4

7: X5 pulse input
8: Process PID output
9: Communication
At most 16-step of frequency can be set through the combination of "multi-step frequency terminals 1~4" of digital input. Multi-step frequency 2~15 are only digital setting while a number of setting sources can be selected for multi-step frequency 0~1. Parameter value of F1-01 determines command source of step 1.

F1-02	Multi-step frequency 0	Range: -100.0%~100.0%	Factory default: 0.0%
F1-03	Multi-step frequency 1	Range: -100.0%~100.0%	Factory default: 0.0%
F1-04	Multi-step frequency 2	Range: -100.0%~100.0%	Factory default: 0.0%
F1-05	Multi-step frequency 3	Range: -100.0%~100.0%	Factory default: 0.0%
F1-06	Multi-step frequency 4	Range: -100.0%~100.0%	Factory default: 0.0%
F1-07	Multi-step frequency 5	Range: -100.0%~100.0%	Factory default: 0.0%
F1-08	Multi-step frequency 6	Range: -100.0%~100.0%	Factory default: 0.0%
F1-09	Multi-step frequency 7	Range: -100.0%~100.0%	Factory default: 0.0%
F1-10	Multi-step frequency 8	Range: -100.0%~100.0%	Factory default: 0.0%
F1-11	Multi-step frequency 9	Range: -100.0%~100.0%	Factory default: 0.0%
F1-12	Multi-step frequency 10	Range: -100.0%~100.0%	Factory default: 0.0%
F1-13	Multi-step frequency 11	Range: -100.0%~100.0%	Factory default: 0.0%
F1-14	Multi-step frequency 12	Range: -100.0%~100.0%	Factory default: 0.0%
F1-15	Multi-step frequency 13	Range: -100.0%~100.0%	Factory default: 0.0%
F1-16	Multi-step frequency 14	Range: -100.0%~100.0%	Factory default: 0.0%
F1-17	Multi-step frequency 15	Range: -100.0%~100.0%	Factory default: 0.0%

🕮 ATTENTION:
F1-02~F1-17 is relevant to upper limit b0-09

At most 16 steps of multi-step frequency can be set by different status combinations of "multi-step frequency terminals 1~4" of digital input, as shown in Table 6-20.

Group F4 Position Control

Position control is only valid when there is PG vector control and d2-00 selects speed control. Position control includes five modes: zero-speed clamping, spindle orientation, simple feed control, pulse train position control, and return to origin. The current positioning control mode can be checked in "U0-68".

F4-00	Position control mode	Range: 00~11	Factory default: 00

Ones place: Signal type selection

0: AB orthogonal reference

1: Direction+pulse (B: direction+A:pulse) reference

Tens place: position command

0: Not reverse

1: Reverse

F4-01	Position feedback channel	Range: 0000～1111	Factory default: 0000

Ones place: PG board type selection

0: Single encoder feedback

1: Dual encoder feedback

Tens place: Orientation encoder feedback selection

0: Motor encoder

1: Second encoder

Hundreds place: Pulse-tracking encoder feedback selection

0: Motor encoder

1: Second encoder

Thousands place: Reserved

Our PG31 is a dual-encoder card that supports simultaneous input of two ABZ encoder signals. In this case, the unit digit can be set to 1, while the tens and hundreds digits should be selected based on application requirements, designating either the motor encoder or the secondary encoder as the position feedback encoder. Other encoder cards only support single-channel encoder signal input, and in such cases, "0000" should be selected.

F4-02	Numerator of gear ratio of command and feedback pulses	Range: 1～10000	Factory default: 1
F4-03	Denominator of gear ratio of command and feedback pulses	Range: 1～10000	Factory default: 1

The ratio of variation of command(set) pulse to feedback pulse can be changed through electronic gear.

Numerator: denominator = variation of feedback pulse per unit time: variation of pulse reference per unit time.

For example: every time when command changes by 8 pulses, the motor is required to rotate

by 5 pulses, thus set F4-02=5 and F4-03=8.

F4-04	Gear ratio numerator 1 of motor and spindle	Range: 1～10000	Factory default: 1
F4-05	Gear ratio denominator 1 of motor and spindle	Range: 1～10000	Factory default: 1
F4-06	Gear ratio numerator 2 of motor and spindle	Range: 1～10000	Factory default: 1
F4-07	Gear ratio denominator 2 of motor and spindle	Range: 1～10000	Factory default: 1

The mechanical gear ratio between the speed feedback encoder and the position feedback encoder is as follows: the speed feedback encoder is set as the encoder for Group D, while the position feedback encoder is determined by F4-01. When selecting the motor encoder, the gear ratio is set to 1. For the second encoder, the mechanical gear ratio of the two encoders on their respective axes should be filled in according to the actual situation.

For example, when the gear ratio is 2 and the input pulse tracking-up is 10 Hz, the motor speed will be 20 Hz, while the speed of the axis where the position feedback encoder is located will be 10 Hz.

F4-08	Spindle encoder resolution	Range: 1～16000	Factory default: 2500

The spindle encoder resolution refers to the number of pulses per revolution of the encoder. It must be set correctly when using PG card in vector control.

F4-09	Spindle encoder direction	Range: 0～1	Factory default: 0

0: Forward

During forward rotation of motor, phase A is the lead phase (in case of reversal rotation, phase B is leading)

1: Reverse

During forward rotation of motor, phase B is the lead phase (in case of reversal rotation, phase A is leading)

F4-10	Spindle encoder disconnection detection	Range: 0.0s～8.0s	Factory default: 0.0s

This parameter takes effect under closed-loop vector control. When the motor is running at none-zero speed, if the drive fails to detect input signals of phases A and B of the encoder in the span of time set by d3-32 the drive will treat abnormality happened to the PG. The drive reports fault "CLL" and coast to stop. When this parameter is set to 0.0s, the detection is

disabled.

F4-11	Frequency division output selection	Range: 00～11	Factory default: 00

Ones place: Frequency division output encoder selection

0: motor encoder

1: spindle encoder

Tens place: Frequency division output direction selection

0: Forward

1: Reverse

F4-12	Frequency division coefficient	Range: 0～65535	Factory default: 0
F4-13	Resolution after frequency multiplication	Range: 1～16000	Factory default: 2500

The same applies to the encoder resolution explanation in F4-08.

F4-14	Position mode completion range	Range: 0～9999	Factory default: 20
F4-15	Position mode completion time	Range: 0.001s～5.000s	Factory default: 0.100s

Under the mode of position control, when the difference between the detected position by encoder and command position is less than F4-14, also the lasting time attains value of F4-15, this terminal outputs ON as finish of positioning.

F4-16	Max.output frequency of pulse tracking	Range: 0.00Hz～b0-09	Factory default: 50.00Hz

Limit the output frequency under pulse tracking control

F4-17	ASR High-speed proportional gain of pulse tracking	Range: 0.0～20.0	Factory default: 0.5
F4-18	ASR High-speed integral time of pulse tracking	Range: 0.000s～8.000s	Factory default: 0.200s
F4-19	ASR Low-speed proportional gain of pulse tracking	Range: 0.0～20.0	Factory default: 0.5
F4-20	ASR Low-speed integral time of pulse tracking	Range: 0.000s～8.000s	Factory default: 0.200s

Under pulse tracking control, the high and low-speed speed loop parameters can be adjusted to modify the system's dynamic response and stability. Generally, no adjustments are necessary;

if adjustments are required, please fine-tune around the factory values.

F4-21	Feed-forward gain of pulse tracking	Range: 0.00～2.00	Factory default: 1.00

When the frequency of command pulse changes, if lagging of the tracking of feedback pulse occurs, please increase the value of feed-forward gain gradually. In the contrary case, please decrease the value of feed-forward gain gradually. It is not necessary to adjust it under normal circumstances. If necessary, please perform fine adjustment around factory default value.

F4-22	High-speed proportional gain of pulse tracking	Range: 0.00～100.00	Factory default: 1.00
F4-23	Low-speed proportional gain of pulse tracking	Range: 0.00～100.00	Factory default: 1.00
F4-24	Proportional gain low-speed switching frequency	Range: 0.00Hz～F4-25	Factory default: 5.00Hz
F4-25	Proportional gain high-speed switching frequency	Range: F4-24～b0-09	Factory default: 10.00Hz

When the running frequency is below the set frequency in F4-24, set the gain in F4-23. When the operating frequency is above the set frequency in F4-25, set the gain in F4-22.

F4-26	Feed-forward filter time	Range: 0～255	Factory default: 0
F4-27	Filter time of command inertia	Range: 0～255	Factory default: 0
F4-28	Filter time of command average value	Range: 0～1.023S	Factory default: 0.010s

Filters the command pulse signal. Longer filtering time contributes to better interference immunity but may result in lagging of position tracking.

F4-29	Position-loop output amplitude limit	Range: 0.00Hz～50.00Hz	Factory default: 10.00Hz

Limit the output of the position loop in the orientation control mode.

F4-30	ASR low-speed proportional gain of orientation	Range: 0.0～20.0	Factory default: 1.0
F4-31	ASR low-speed integral time of orientation	Range: 0.000～8.000	Factory default: 0.200

PI parameters related to the orientation control mode. Generally, no adjustments are necessary; if adjustments are required, please fine-tune around the factory values.

F4-32	Selection of switching to position	Range: 00～11	Factory default: 00

Ones place: Selection of switching to position

0: Direct switch

1: Positioning first and then switch

Tens place: Anti -reverse of position enabled

0: Disable

1: Enable

F4-33	Direction selection of spindle orientation	Range: 0～3	Factory default: 0

0: Forward

1: Reverse

2: Current direction

3: Nearest direction

F4-34	Orientation frequency	Range: 0.01Hz～b0-09	Factory default: 5.00Hz

When orientation is enabled, the motor searches for the Z signal at this frequency. Once the Z signal is detected, positioning will be completed based on the response time set in F4-35. The final stop position is determined by the orientation position.

F4-35	Orientation response time	Range: 0.1s～1000.0s	Factory default: 3.0s

The time for the motor to decelerate from the orientation frequency to the orientation position should be adjusted based on actual situation. (OK)

F4-36	High-speed proportional gain of orientation	Range: 0.00～100.00	Factory default: 1.50
F4-37	Low-speed proportional gain of orientation	Range: 0.00～100.00	Factory default: 1.00
F4-38	Low-speed switching frequency of orientation	Range: 0.00Hz～F4-39	Factory default: 0.50Hz
F4-39	High-speed switching frequency of orientation	Range: F4-38～F4-34	Factory default: 1.00Hz

In the orientation control, switch the proportional gain set in F4-36 and F4-37 based on the operating frequency and the settings in F4-38 and F4-39.

F4-40 ～ F4-47	Orientation position 1 to 8	Range: 0 ~ pulses per rotation	Factory default: 0

The spindle orientation stop position can be selected by the combination of terminals 3/2/1. For example, when the combination is 011, orientation position 3 becomes active. During orientation enable operation, the motor shaft will run to the position specified by the orientation position

setting.

F4-48	Orientation S-curve selection	Range: 0～1	Factory default: 0

0: No S curve

1: S curve

F4-49	Proportion of initial segment of orientation Decel S-curve	Range: 0.0%～100.0%	Factory default: 20.0%
F4-50	Proportion of ending segment of orientation Decel S-curve	Range: 0.0%～100.0%	Factory default: 20.0%

When F4-48 is set to 1, it is effective in adjusting the deceleration process of orientation control, making the motor's operation during the orientation process smoother.

F4-51	Accel time for orientation/returning to origin	Range: 0.1s～1000.0s	Factory default: 2.0s
F4-52	Decel time for orientation/returning to origin	Range: 0.1s～1000.0s	Factory default: 2.0s

Acceleration and deceleration time for orientation/return to origin.

F4-53	Rigidness adjustment for position mode	Range: 0～1024	Factory default: 0

Adjust the rigidity during position control to accommodate different types of loads. Increasing the value in F4-53 can enhance the holding force when locking the shaft, but setting this value too high may cause oscillation.

F4-54	Return to origin selection	Range: 00～12	Factory default: 00

Ones place:

0: Return to origin triggered by terminal

1: Return to origin at each startup

2: Return to origin at the end of each carry

Tens place: Origin signal selection

0: External terminal input (Dual direction)

1: Encoder Z signal

2: External terminal input (Single direction)

F4-55	Return to origin direction	Range: 0～1	Factory default: 0

0: Forward when returning to origin

1: Reverse when returning to origin

F4-56	Return to origin frequency 1	Range: F4-57～b0-09	Factory default: 10.00Hz
F4-57	Return to origin frequency 2	Range: 0～F4-56	Factory default: 1.00Hz

When in operation mode and enabling return to origin, the motor first accelerates or decelerates to the frequency set in F4-56 according to the direction selected in F4-55. Once the frequency reaches the value in F4-56, if a rising edge of the origin signal is detected, the current position at the rising edge is latched, and deceleration begins. After decelerating to zero, the motor runs in reverse (opposite to the direction in F4-55) at the frequency set in F4-57, and the target position is the previously latched position of the rising edge of the origin signal. Once the position is reached, the return to origin is successful.

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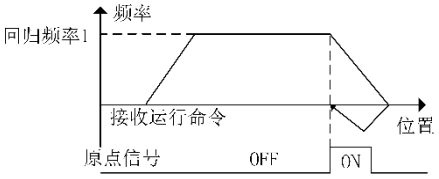


图 6-51

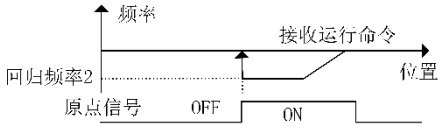


图 6-52

F4-58	Zero speed clamping selection	Range: 0～2	Factory default: 0

0: Disabled

1: Enabled

2: Enabled when terminal is valid

F4-59	Zero speed clamping start frequency	Range: 0～b0-09	Factory default: 0.30Hz

When the zero speed clamping is enabled and the drive's reference frequency is below the value set in F4.59, it enters the locking state of zero speed clamping. At this point, regardless of any changes in motor load, the motor will remain in this position. When the reference

frequency exceeds this value or the zero speed clamping is disabled, the drive will exit the zero speed clamping state and operate at the set speed.

F4-60	Zero speed clamping gain	Range: 0~30.00	Factory default: 1.00

In zero speed clamping mode, if the motor's feedback position changes, the response parameters for returning to the target position can be adjusted. Setting them too high may cause oscillation. Generally, no adjustment is needed; if adjustments are necessary, please fine-tune them close to the factory default values.

F4-61	Zero speed clamping error tolerance	Range: 0~10000	Factory default: 2

The deviation between the motor's feedback position and the zero speed clamping target position is considered as the completion of zero speed clamping if it is within the error tolerance. At this time, the motor output frequency is 0. Generally, no adjustment is needed; if adjustments are necessary, please fine-tune them close to the factory default values.

F4-62	Simple carry function selection	Range: 0～1	Factory default: 0

0: Disable

1: Enable

F4-63	Carry acceleration and deceleration time	Range: 0.1s～1000.0s	Factory default: 2.0s

The acceleration and deceleration times for simple carry are both determined by the value set in F4-63. The carry amount can be selected using the combination of terminals 3, 2, and 1. For example, when the terminal combination is 011, carry amount 3 is selected. The carry amount is calculated in terms of pulse counts, where the high position increments by 10,000 per step, and the low position represents the rem ainder less than 10,000.

F4-64	Carry quantity 0 high bits	Range: 0～9999	Factory default: 0
F4-65	Carry quantity 0 low bits	Range: 0～9999	Factory default: 0
F4-66	Carry quantity 1 high bits	Range: 0～9999	Factory default: 0
F4-67	Carry quantity 1 low bits	Range: 0～9999	Factory default: 0
F4-68	Carry quantity 2 high bits	Range: 0～9999	Factory default: 0
F4-69	Carry quantity 2 low bits	Range: 0～9999	Factory default: 0
F4-70	Carry quantity 3 high bits	Range: 0～9999	Factory default: 0
F4-71	Carry quantity 3 low bits	Range: 0～9999	Factory default: 0
F4-72	Carry quantity 4 high bits	Range: 0～9999	Factory default: 0
F4-73	Carry quantity 4 low bits	Range: 0～9999	Factory default: 0
F4-74	Carry quantity 5 high bits	Range: 0～9999	Factory default: 0
F4-75	Carry quantity 5 low bits	Range: 0～9999	Factory default: 0
F4-76	Carry quantity 6 high bits	Range: 0～9999	Factory default: 0
F4-77	Carry quantity 6 low bits	Range: 0～9999	Factory default: 0
F4-78	Carry quantity 7 high bits	Range: 0～9999	Factory default: 0
F4-79	Carry quantity 7 low bits	Range: 0～9999	Factory default: 0
F4-80	Acceleration filtering	Range: 0.0～500.0	Factory default: 20.0
F4-81	Inertia compensation coefficient	Range: 0～65535	Factory default: 0.000

In simple carry control, different carry quantities are selected based on the function combinations of the input terminals. The carry quantity calculation formula is:

Carry quantity= High bit * 10000 + low bit.

The simple carry control process is illustrated in Figure 6-15

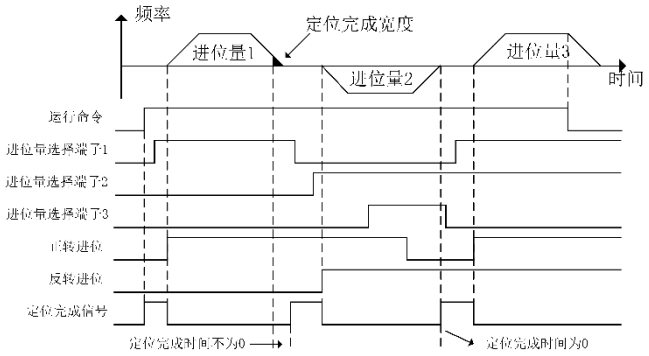


Fig 6-15

Group H Communication Parameters

Group H0 MODBUS Communication Parameters

Support universal Modbus protocol. Please refer to appendix for detailed description of communication protocol.

H0-00	SCI port selection	Range: 0~5	Factory default: 0

0: No communication

1: Local 485 port (CM31)

2: PNET-C03 / MTP-C03 / DEV

3: ECT / PN(CM35) / MTP (CM39)

4: CAN (CM32)

5: M3(CM33) / CANOPEN(CM36) / Profibus DP (CM37)

🕮 Attention:

After changing the communication method, the drive should be restarted)

H0-01	SCI port communication configuration	Range: 0000~1135	Factory default: 0001

- ◆ Ones place: baud rate

0: 4800bps
1: 9600bps
2: 19200bps
3: 38400bps
4: 57600bps
5: 115200bps

- ◆ 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
3：1-8-1-N 格式，RTU

- ◆ Hundreds place: connection type

0: Direct cable connection (232/485)
1: MODEM (232)

- ◆ Thousands place: communication data handling at power loss

0: Not saved at power loss

1: Saved at power loss

H0-02	Local address of SCI port communication	Range: 0~247	Factory default: 1

Sets this drive address. 0 is broadcast address, while available addresses are 1~247.

H0-03	Time out detection of SCI port communication	Range: 0.0s~100.0s	Factory default: 5.00s

This parameter sets communication error detection time. When it's set to 0, no communication error will be reported.

H0-04	485 端口通讯时本机应答延时 Time delay of SCI port communication	Range: 0ms~1000ms	Factory default: 0ms

Sets response time delay of this drive to the master.

H0-05	Master/Slave option	Range: 0~2	Factory default: 0

0: PC controls the drive

PC as master controls the drive. This supports all communication protocols.

1: As master

According to the selection of H0-06, the drive sends current b0-02 (digital setting of master frequency reference) or F0-01 (PID digital setting) through communication. As master, this drive can only send the data and cannot receive the data.

2: As slave

Put the received data into b0-02 (digital setting of master frequency reference) or F0-01 (PID digital setting) through communication. b0-02/F0-01 is selected by parameter H0-06. Other communication data addresses are not supported. As slave, this drive can only receive the data.

H0-06	Parameter store address when this drive working as master	Range: 0~1	Factory default: 0

0: b0-02

1: F0-01

This parameter takes effect when H0-05 is set to 1. This parameter sets the slave drive frequency setting address when this drive is working as the master drive.

H0-07	Proportional factor of received frequency	Range: 0.0~1000.0	Factory default: 100.0

This parameter takes effect when H0-05 is set to 2. Data sent by master is multiplied by H0-07 and then put the result into b0-02 or F0-01 (set by H0-06 of master).

This parameter setting is very useful when a master drive controls a number of slave drives and needs to allocate the frequency.

H0-08	485 Automatic reset enable	Range: 0～1	Factory default: 0

0: disable

1: enable

H0-09	Byte transmission type between the communication card and the host computer (M3)	Range: 0～1	Factory default: 0

M3 communication is active and is used to set the number of bytes transmitted between the communication card and the host computer:

0: 48 bytes (with sub-command)

1: 32 bytes

H0-10	SPI Fault Detection Time	Range: 0.00s～100.00s	Factory default: 5.00s

If the SPI communication fault on the communication card persists for a duration exceeding the time set in H0-10, a TrC communication abnormality fault will be reported. Setting H0-10 to 0 disables this fault reporting.

H0-11	Restore the communication card's factory default IP address (MTP).	Range: 0～1	Factory default: 0

0：Disabled

1： Reset to factory IP address after repower

H0-13	Bus speed unit selection (EC)	Range: 0～1	Factory default: 0

0: rpm
1: pulse/s

This setting is used to match the unit of speed provided by the bus, either revolutions per minute (rpm) or pulses per second (pulse/s).

H0-14	Address mapping selection （M3）	Range: 0～1	Factory default: 0

0: None
1: Yaskawa

Group H1 Communication Data

H1-00	EtherCAT synchronous delay data update	Range: 0.0%～100.0%	Factory default: 0.0%

After receiving the EtherCAT synchronization signal, data is sent after a delay set by H1-00. The delay time is expressed as a percentage of the communication cycle.

Chapter 7 Troubleshooting

7.1. 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 records of fault 1, fault 2 and fault 3. Faults are recorded with numeric codes (1~46), 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
			Start frequency is too high	Drop start frequency
			Accel time is too short	Prolong the Accel time
			Motor parameters are improperly set	Set the parameters correctly according to motor nameplate
			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 flying start
			Output short circuit (phase-to-phase short circuit or output ground short circuit)	Check motor connection and output ground impedance
2	oC2	Const-speed overcurrent	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
			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
3	oC3	Decel overcurrent	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
			Output short circuit (phase-to-phase short circuit or output ground short circuit)	Check motor connection and output ground impedance
4	ou1	Accel overvoltage	Load inertia is too big	Use dynamic brake
			Abnormal input volt	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	ou2	Const-speed overvoltage	Improper parameter setting of regulator under SVC control	Properly set regulator parameters
			Abnormal input voltage	Check power grid voltage
			Load variation is too big	Check the load
			Output short circuit (phase-to-phase short circuit or output ground short circuit)	Check motor connection and output ground impedance
6	ou3	Decel overvoltage	Load inertia is too big	Use dynamic braking
			Decel time is too short	Prolong the Decel time
			Abnormal input voltage	Check power grid voltage
			Improper parameter setting of regulator under SVC control	Properly set regulator parameters
			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
7	FAL	Module protection	Overvoltage or overcurrent	Refer to the solutions of overvoltage or overcurrent
			Output short circuit (phase-to-phase short circuit or output ground short circuit)	Check motor connection and output ground impedance
			Loose connection of control board	Pull out and reinsert the cables of control board
			Direct connection of inverter module	Seek services
			Control board abnormal	Seek services
			Switching mode power supply (SMPS) failed	Seek services
8	tUN	Autotune failed	Bad motor connection	Check motor connection
			Autotune during rotation of the motor	Autotune in stationary status of the motor
			Big error between real motor parameters and the setting	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
			Start FREQ is too high	Drop start 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
			Load is too heavy	Reduce the load
			Inappropriate V/f curve under V/f control	Set V/f curve correctly
			Restart the rotary motor	Reduce current limited value or flying start
			Output short circuit (phase-to-phase short circuit and output ground short circuit)	Check motor connection and output ground impedance

Fault code	Fault display	Fault description	Causes	Solutions
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 according to motor nameplate
			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-time running of ordinary motor at low speed with heavy load	Select variable frequency motor
11	CtC	Current detection circuit failed	Abnormal connection between control board and drive board	Check and re-connection
			Abnormal current detection circuit of control board	Seek services
			Abnormal current detection circuit of drive board	Seek services
			Current sensor failed	Seek services
			SMPS failed	Seek services
12	GdP	Output ground short-circuit protection	Output connection ground short circuit	Check motor connection and output ground impedance
			Motor insulation abnormal	Check the motor
			Inverter module abnormal	Seek services
			Output ground leakage current is too big	Seek services

Fault code	Fault display	Fault description	Causes	Solutions
13	ISF	Input power supply fault	Severe voltage imbalance among power supply phases	Check power grid voltage
			Abnormal input wiring of power supply	Check power supply input wiring
			Abnormal bus capacitance	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
15	oL3	Inverter module overload protection	Overcurrent	Handle it with the methods for overcurrent
			Input power supply abnormal	Check input power grid voltage
			Motor output abnormal	Check the motor or motor connection
			Inverter module abnormal	Seek services
16	oH1	Module (IGBT) thermal protection	Ambient temperature is too high	Drop ambient temperature
			Fan failed	Replace the fan
			Air duct blocked	Clear air duct
			Temperature sensor abnormal	Seek services
			Inverter module mounting abnormal	Seek services
17	oH2	Motor (PTC) thermal protection	Ambient temperature is too high	Drop ambient temperature
			Improper setting of motor thermal protection point	Correctly set motor thermal protection point
			Thermal detection circuit failed	Seek services

Fault code	Fault display	Fault description	Causes	Solutions
18	oH3	PIM temperature measurement circuit fault	Temperature sensor not well connected with socket	Pull out and re-insert
			Ambient temperature is too low	Raise ambient temperature
			Module detection circuit failed	Seek services
			Thermistor failed	Seek services
19	CLL	Encoder disconnected	No signal or lack of signal	Check if encoder is damaged, and/or there is some abnormity with the encoder power supply
			Lines disconnected	Reconnect encoder lines
			Wrong disconnection	Reconnect encoder lines
20	ST1	STO 1 circuit abnormal	Extension board of safety torque circuit damaged	Seek services
			Switch of STO 1 circuit abnormal	Check STO switch
21	ST2	STO 2 circuit abnormal	Extension board of STO circuit damaged	Seek services
			Switch of STO 2 circuit abnormal	Check STO switch
22	STO	Safety Torque Off	Improper connection to the switch of STO	Connect to STO switch after ensuring safety
23	I0E	Extension IO board connection abnormal	Extension IO board damaged	Seek services
			Extension IO board not inserted into the groove properly	Insert the extension IO board again
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
25	to1	Consecutive run time set by the agent reached	“Consecutive run time set by the agent reached” enabled	Seek services
26	to2	Consecutive run time	“Consecutive run time attained" enabled	See specification of Group E0

Fault code	Fault display	Fault description	Causes	Solutions
		attained		
27	to3	Cumulative run time attained	“Cumulative run time attained" enabled	See specification of Group E0
28	SUE	Abnormal power supply at run	DC bus voltage fluctuation is too big or the power is lost	Check input power grid voltage and load
29	EPr	EEPROM read/write fault	Parameter read/write abnormal at control board	Seek services
30	CCL	Current detection circuit failed	Power supply voltage abnormal	Check grid power supply voltage
			Abnormal contactor feedback circuit at drive board	Seek services
			Contactor failed	Seek services
			Buffer resistance failed	Seek services
			Abnormal SMPS	Seek services
31	TrC	Communication board abnormal	Improper setting of baud rate	Set properly
			Communication port disconnected	Reconnected
			Upper computer/device does not work	Make upper computer/device work
			Drive communication parameter error	Set properly
32	PdC	Control panel communication abnormal	Control panel disconnected	Reconnected
			Severe EMI	Check peripheral equipment or seek services
33	CPy	Parameter copy failure	Parameter uploading or downloading abnormal	Seek services
			No parameters stored at control panel	Seek services

Fault code	Fault display	Fault description	Causes	Solutions
35	SFt	Software version compatibility failure	Version of control panel is not consistent with that of control board	Seek services
36	oC4	Hardware overcurrent fault	The hardware overcurrent threshold is triggered, the cause is the same as fault 1~3	Solve this issue according to solutions of fault codes 1 to 3
37	ou4	Hardware overvoltage fault	The hardware overvoltage threshold is triggered, the cause is the same as fault 4~6	Solve this issue according to solutions of fault codes 4 to 6
38	PGE	PG board connection fault	PG board damaged	Seek services
			PG board not inserted to the groove properly	Insert the PG board again
			PG board not connected to the closed loop control	Set the control mode properly
39	bEF	Back EMF identification abnormality	Motor stall due to excessive load	Disconnect the heavy load
			Voltage too low	Correctly set rated voltage and motor type
40	AIP	AI input out-of-limit	Control board failed	Seek services
			AI input is too high or low	Set AI input within correct range
41	LoU	Undervoltage protection	DC bus voltage is too low	Check input voltage if it is too low or the drive is the process of power loss
42	oSP	Over-speed	Set value of over-speed is too small	Set over-speed value correctly
			Big fluctuation of load	Stabilize the load
			Unreasonable vector control parameter setting	Set correctly
43	SPL	Speed bias is large	Speed bias setting value is too small	Set speed bias reasonably

Fault code	Fault display	Fault description	Causes	Solutions
			Big fluctuation of load	Stabilize the load
			Unreasonable vector control parameter setting	Set correctly
44	bCF	Brake pipe short-circuit fault	DC brake pipe damaged	Seek services
45	Plo	PID feedback lost	Abnormal PID feedback channel abnormal	Check the feedback channel
			Inappropriate setting of PID parameters	Set properly
46	CbE	Communication abnormal	Abnormal communication wire	Reconnect the wire
			Too much interference on site	Check peripheral equipment or seek services
47	PGu	PG board abnormal	PG board software version not match	Seek services
48	Cbu	Control board matching abnormal	Control board version mismatch	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 8 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.

8.1. 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℃~40℃
	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℃

8.2. 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

Inspection items	Measures
Check if copper bar screws are loose	Tighten
Check if drive mounting screws are loose	Tighten
Check if there are defect on power cables and control cables	Replace the cables
Check if there is dust on circuit board	Clear it up
Check if air duct is blocked	Clear it up
Check if the fan works normally	**Replace the fan**
Check if the contactor is abnormal	**Whether contactor is activated enough and there is abnormal noise, if so, replace the contactor**
Check if drive insulation is failed	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 failed	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 failure.
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.

8.3. 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
Electrolytic capacitor	40,000~50,000h	Excessively high ambient temperature and excessively low air pressure result in electrolyte volatilization; aging of electrolyte capacitor	Check if there is liquid leakage Check if safety valve projects Check if capacitance value is out of allowable range Check if insulation resistance is abnormal
Relay/contactor	50,000~100,000 times	Corrosion and dust impairs the contacting effect of contact; excessively frequent contact action	Open/close failure False alarm of CCL fault

8.4. 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 desiccant
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 desiccant

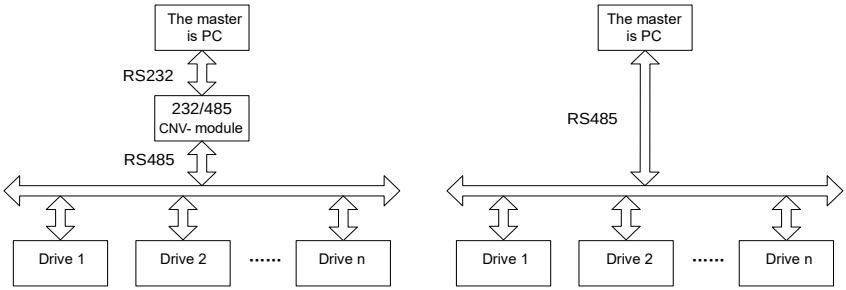
ATTENTION:

Since long-term storage may lead to the deterioration of electrolytic capacitor, the drive must be powered up once in case storage period exceeds half a year. After applying the power, input voltage must be boosted to rated value gradually using a voltage regulator, and be sure to have the inverter operated at no load for more than 5 hours.

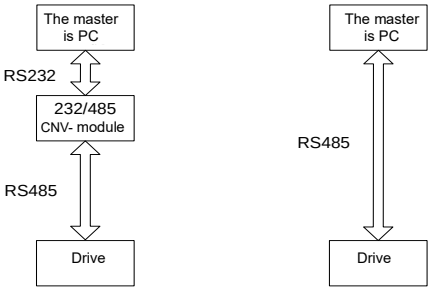
Appendix 1 Communication Protocol

Networking Model

The drives have two networking modes, single master/multiple slaves networking and single master/single slave networking.



Single master/multiple slaves networking diagram



Single master/single slave networking diagram

Interface Mode

RS485 or RS232 interface: asynchronous, half-duplex. Default data format: 8-N-2 (8 data bits, no check, two stop bits), 9600 bps. See parameters of Group H0 for parameter setting.

Communication Mode

1) Drive is used as a slave for master-slave station-to-station communication. When master sends commands using broadcast address, the slave does not respond;
2) Native address, baud rate and data format of inverter are set through slave operating panel

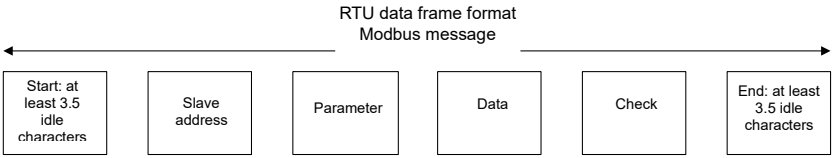
or serial communication;

3) Slave reports the current fault information in the latest response frame for master polling;
4) Please refer to Chapter 3 about the explanation of communication extension board for the communication interface.

Protocol Format

Modbus protocol supports RTU.

RTU data frame format is shown as the figure below:



RTU:

In RTU mode, idle time between frames can be set through function code or comply with Modbus internal convention, for which the minimum inter-frame idle is as follows:

1) Frame header and end define the frame by making bus idle time equal to or longer than 3.5-byte time;
2) After the start of frame, the clearance between characters must be less than 1.5-character communication time, or the newly received characters will be treated as the header of the new frame;
3) Data check employs CRC-16 and the whole information participates in the check; the high and low bytes of check sum shall be sent after exchange. Please refer to examples at the end of protocol for details of CRC check;
4) The bus idle time of at least 3.5 characters (or set minimum bus idle time) shall be maintained between frames and needs not to accumulate the starting and ending idle time.

The data frame of which the request frame is "reading parameter value of b0-02 from slave 0x01" is as below:

Appendix Table 1

Address	Function code	Register address	Read words	Check sum
01	03	02 02	00 01	24 72

Response frame of slave 0x01 is as below:

Appendix Table 2

Address	Function code	Register address	Read words	Check sum
01	03	02	13 88	B5 12

Protocol Function

The uppermost function of Modbus is to read and write parameters, and different parameters determine different operation requests. Parameters operations supported by inverter Modbus protocol are as shown in the table below:

Appendix Table 3 Parameters

Parameter	Meaning of parameter
0x03	Read drive functional parameters and run status parameters
0x06	Over-write individual drive functional parameters or control parameters, which are not saved on power loss
0x08	Line diagnosis
0x10	Over-write multiple drive functional parameters or control parameters, which are not saved on power loss
0x41	Write individual drive functional parameters or control parameters, and save them to non-volatile storage unit
0x42	Parameter management

Functional parameters, control parameters and status parameters of the drive are all mapped to read-write register of Modbus. Read-write characteristics and range of parameters comply with the instructions of user manual of the drive. Group numbers of drive parameters are mapped as high byte of register address, while in-group indexes are mapped as low byte of register address. Drive control parameters and status parameters are all virtualized as drive parameter groups. The corresponding relations between parameter group numbers and their high bytes of register address are as shown in table below:

Appendix Table 4 High-byte register addresses mapped from parameter group numbers

Parameter group	Mapping register address, high byte	Parameter group	Mapping register address, high byte
A0	0x00	E2	0x12
A1	0x01	F0	0x13
b0	0x02	F1	0x14

Parameter group	Mapping register address, high byte	Parameter group	Mapping register address, high byte
b1	0x03	F2	0x15
b2	0x04	F3	0x16
C0	0x05	F4	0x17
C1	0x06	F5	0x18
C2	0x07	F6	0x19
C3	0x08	H0	0x1A
C4	0x09	H1	0x1B
d0	0x0A	H2	0x1C
d1	0x0B	L0	0x1D
d2	0x0C	L1	0x1E
d3	0x0D	U0	0x1F
d4	0x0E	U1	0x20
d5	0x0F	U2	0x21
E0	0x10	Drive control parameter group	0x62
E1	0x11	Drive status parameter group	0x63

For example, the register address of drive parameter b0-02 is 0x0202 while that of E0-07 is 0x1107.

In the following paragraphs, we present the formats and meanings of Modbus protocol parameters and data portion hereafter, i.e. to introduce the "parameter" and "data" related contents in above-noted data frame format. These two parts constitute the application layer protocol data unit of Modbus. The application layer protocol data unit mentioned below refers to these two parts. We take RTU mode for example to describe frame format below.

Application layer protocol data units of various parameters are as follows:
Parameter 0x03: read register content
Request format is shown in appendix table 5.

Appendix Table 5

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	1	0x03
Register address	2	0x0000~0xFFFF
Number of registers	12	0x0001~0x000C

Check	LRC or CRC	

Response format is shown in appendix table 6.

Appendix Table 6

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	1	0x03
Number of read bytes	1	2* number of registers
Register content	2* number of registers	
Check	LRC or CRC	

Parameter 0x06(0x41): write register content (0x41 saved at power loss)
Request format is shown in appendix table 7.

Appendix Table 7

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	1	0x06
Register address	2	0x0000~0xFFFF
Register content	2	0x0000~0xFFFF
Check	LRC or CRC	

Response format is shown in appendix table 8.

Appendix Table 8

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	1	0x06
Register address	2	0x0000~0xFFFF
Register content	2	0x0000~0xFFFF
Check	LRC or CRC	

Some parameters of the drive are reserved and cannot be modified by communication setting.

The list of these parameters is shown in appendix table 9.

Appendix Table 9

	Parameters	Remarks
(Autotune)	d0-22 d3-22	Communication not operable
(Parameter passing)	A0-05	Communication not operable
(User password)	A0-00	User password can not be set by communication, but the user password set by control panel can be unlocked by writing the same password from upper computer/device communication. Upper computer/device can view and modify parameters.

Parameter 0x08: communication line diagnosis.

Request format is shown in appendix table 10.

Appendix Table 10

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	1	0x08
Sub-parameter	2	0x0000~0x0030
Data	2	0x0000~0xFFFF
Check	LRC or CRC	

Response format is shown in appendix table 11.

Appendix Table 11

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	1	0x08
Sub-parameter	2	0x0000~0x0030
Data	2	0x0000~0xFFFF
Check	LRC or CRC	

Sub-parameters supported by line diagnosis are as set forth in the table below.

Appendix Table 12 Line diagnosis sub-parameter

Sub-PARA	Data (request)	Data (response)	Meaning of subfunction
0x0001	0x0000	0x0000	Reinitialize communication: make no-response mode disable.
	0xFF00	0xFF00	Reinitialize communication: make no-response mode disable.
0x0003	“New frame end” 00	“New frame end” 00	Set the frame end of ASCII mode and this "new frame end" will replace the original line feed symbol.(Note: new frame end shall not be greater than 0x7F and shall not be equal to 0x3A)
0x0004	0x0000	No response	Set no-response mode. Only response to reinitialization communication request. This is mainly used for isolating faulty equipment.
0x0030	0x0000	0x0000	Make slave no-response to invalid command and error command
	0x0001	0x0001	Make slave response to invalid command and error command

Parameter 0x10: write parameters continuously

Request format is shown in appendix table 13.

Appendix Table 13

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	1	0x10
Register address	2	0x0000~0xFFFF
Number of registers	2	0x0001~0x0004
Number of bytes of register content	1	2* number of operation registers
Register content	2* number of operation registers	
Check	LRC or CRC	

Response format is shown in appendix table 14.

Appendix Table 14

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	1	0x10
Register address	2	0x0000~0xFFFF
Number of registers	2	0x0001~0x0004
Check	LRC or CRC	

Parameter 0x42: parameter management

Request format is shown in appendix table 15.

Appendix Table 15

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	1	0x42
Sub-parameter	2	0x0000~0x0007
Data	2 (high byte is parameter group number, while low byte is parameter in-group index)	
Check	LRC or CRC	

Response format is shown in appendix table 16.

Appendix Table 16

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	1	0x42
Sub-parameter	2	0x0000~0x0007
Data	2	0x0000~0xFFFF
Check	LRC or CRC	

Sub-parameters supported by parameter management are set forth in the table 17.

Appendix Table 17 Parameter management sub-parameters

Sub-PARA	Data (request)	Data (response)	Meaning of sub-function
0x0000	Parameter group number and in-group index respectively possess high and low bytes	Upper limit of parameter	Read the upper limit of parameter
0x0001	Parameter group number and in-group index respectively possess high and low bytes	Lower limit of parameter	Read the lower limit of parameter
0x0002	Parameter group number and in-group index respectively possess high and low bytes	See specification below for details of parameter characteristics	Read the characteristics of parameter
0x0003	Parameter group number possesses high byte, while the lower byte is 0.	Maximum value of in-group index	Read the maximum value of in-group index
0x0004	Parameter group number possesses high byte, while the lower byte is 0.	The next parameter group number possesses high byte, while the lower byte is 0.	Read the next parameter group number
0x0005	Parameter group number possesses high byte, while the lower byte is 0.	The previous parameter group number possesses high byte, while the lower byte is 0.	Read the previous parameter group number

Status parameter group should not be modified and does not support the reading of upper and lower limits. Parameter characteristic is 2-byte long, and the bit definition is shown in the table below:

Appendix Table 18 Parameter characteristics

Characteristic parameter (BIT)	Value	Meaning
BIT1~BIT0	00B	Changeable in run
	01B	Not changeable in run, but changeable in stop
	10B	Read only
	11B	Factory parameters
BIT4~BIT2	000B	Accuracy: 1
	001B	Accuracy: 0.1
	010B	Accuracy: 0.01
	011B	Accuracy: 0.001
	100B	Accuracy: 0.0001
	Others	Reserved
BIT7~BIT5	000B	The unit is A
	001B	The unit is Hz
	010B	The unit is Ω
	011B	The unit is r/min
	100B	The unit is S
	101B	The unit is V
	110B	The unit is %
	111B	No unit
BIT8	0: decimal; 1: hexadecimal	Display format
BIT9	0: non-quick menu; 1: quick menu	Quick menu or not
BIT10	0: not uploaded; 1: uploaded	Uploaded to control panel or not
BIT13~BIT11	001B	Data width: 1
	010B	Data width: 2
	011B	Data width: 3
	100B	Data width: 4
	101B	Data width: 5
	110B	Data width: 6
	111B	Data width: 7
BIT14	Number of symbols available/not available	0: unsigned number; 1: directed number
BIT15	Reserved	Reserved

The response format is shown as table 19 when an error occurs.

Appendix Table 19

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	1	0x80 + parameter
Error code	1	
Check	LRC or CRC	

Error codes supported by Modbus protocol are listed in the table below:

Appendix Table 20 Error codes

Error codes	Meanings of error codes
0x01	Illegal parameter
0x02	Illegal register address
0x03	Data error, i.e. data are out of upper limit or lower limit
0x04	Slave operation failed, including errors caused by invalid data although there are in the range
0x05	Command is valid and being processed, mainly used for storing data to non-volatile storage
0x06	Slave is busy, please try again later; mainly used for storing data into non-volatile storage
0x18	Message frame error: including message length error and check error
0x20	Parameter is not changeable
0x21	Parameter is not changeable during the running
0x22	Parameter is under password protection

Drive control parameters are used for start, stop and run frequency setting. By detecting drive status parameters, run status and run mode can be obtained. Drive control parameters and status parameters are shown in appendix table 21.

Appendix Table 21 Control parameters

Register address	Parameter name	Save at power loss
0x6200	Control command word	No
0x6201	Master frequency setting	Yes
0x6202	Auxiliary frequency setting	Yes
0x6203	Master frequency reference	No
0x6204	Auxiliary frequency reference	No

Register address	Parameter name	Save at power loss
0x6205	Multi-step frequency reference	No
0x6206	Simple PLC frequency reference	No
0x6207	PID digital setting percentage (0~100.0%)	No
0x6208	PID feedback percentage (0~100.0%)	No
0x6209	Driven torque limit (0~200.0%)	No
0x620A	Brake torque limit (0~200.0%)	No
0x620B	Reserved	No
0x620C	Reserved	No
0x620D	Reserved	No
0x620E	Analog AO1 source setting	No
0x620F	Analog EAO source setting	No
0x6210	Digital DO output source setting	No
0x6211	Setting of slave frequency setting proportion (0~100.0%)	No
0x6212	Virtual terminal communication reference	No
0x6213	Accel time 1	Yes
0x6214	Decel time 1	Yes

Appendix Table 22 Status parameters

Register address	Parameter name
0x6300	Run status word 1
0x6301	Current run frequency
0x6302	Output current
0x6303	Output voltage
0x6304	Output power
0x6305	Rotary speed
0x6306	Bus voltage
0x6307	Output torque
0x6308	External counter
0x6309	High-bit words of actual length

Register address	Parameter name
0x630A	Low-bit words of actual length
0x630B	Status of digital input terminal
0x630C	Status of digital output terminal
0x630D	Setting of run frequency
0x630E	PID setting
0x630F	PID feedback
0x6310	Set Accel time 1
0x6311	Set Decel time 1
0x6312	AI1 (Unit:0.01V) (Range: 0.00V-10.00V)
0x6313	AI2 (Unit:0.01V) (Range: 0.00V-10.00V)
0x6314	AI3 (Unit:0.01V) (Range: 0.00V-10.00V)
0x6315	AI4 (Unit:0.01V) (Range: -10.00V-10.00V)
0x6316	X5 (unit: kHz)
0x6317	Fault 1 (the latest)
0x6318	Fault 2
0x6319	Fault 3
0x631A	Run display parameter
0x631B	Stop display parameter
0x631C	Setting of drive control mode
0x631D	Frequency reference mode
0x631E	Master frequency reference
0x631F	Digital setting of master frequency reference
0x6320	Auxiliary frequency reference
0x6321	Digital setting of auxiliary frequency reference
0x6322	Drive status word 2
0x6323	Current drive fault

Drive control bits are defined as below table 23.

Appendix Table 23 Control bits

Control bit	Value	Meaning	Function description
BIT0	0	Run command disabled	Stop the drive
	1	Run command enabled	Start the drive
BIT1	1	Reverse	

Control bit	Value	Meaning	Function description
	0	Forward	Set the run direction when run command enabled
BIT2	1	Jog	
	0	Jog disabled	
BIT3	1	Reset command enabled	
	0	Reset command disabled	
BIT4	1	Coast to stop enabled	
	0	Coast to stop disabled	
BIT15~BIT5	000000B	Reserved	

ATTENTION:

When BIT0 and BIT2 coexist, jog takes precedence.

Drive status bits are shown in appendix table 24.

Appendix Table 24 Status word 1 bits

Status bit	Value	Meaning	Remarks
BIT0	1	Run	
	0	Stop	
BIT1	1	Reverse	
	0	Forward	
BIT3~BIT2	00B	Constant speed	
	01B	Accel	
	10B	Decel	
BIT4	0	Main setting not attained	
	1	Main setting attained	
BIT7~BIT5	Reserved		
BIT15~BIT8	0x00~0xFF	Fault code	0: drive normal. Non-0: drive at fault; Refer to relative specification of the fault codes in Chapter 7 in this user manual

Appendix Table 25 Status word 2 bits

Status bit	Value	Meaning	Remarks
BIT0	1	Jog	
	0	Non-jog	
BIT1	1	PID run	
	0	Non-PID run	
BIT2	1	PLC run	
	0	Non-PLC run	
BIT3	1	Run at multi-step frequency	
	0	Run at non-multi step frequency	
BIT4	1	Ordinary run	
	0	Non-ordinary run	
BIT5	1	Wobble frequency	
	0	Non-wobble frequency	
BIT6	1	Undervoltage	
	0	Normal voltage	
BIT7	1	Sensor-less vector control	
	0	Non-sensor-less vector control	
BIT8	1	Closed-loop vector control	
	0	Non-closed-loop vector control	
BIT9	1	Position control	
	0	Non-position control	
BIT10	1	Autotune	
	0	Non-autotune	
Others	0	Reserved	

Operation Instructions

0x03 reads multiple (including one) registers (default address is 0x01). Master enquiry:

Appendix Table 26

Address	Parameter	Register address	Number of registers	Check code
01	03	XX XX	000X	XX XX

Slave response:

Appendix Table 27

Address	Parameter	Total number of bytes	Data	Check code
01	03	2* number of registers	Bn~B0	XX XX

Register address: 0x00 00~0x63 22;

Number of registers: 0x00 01~0x00 0C;

Data: n is equal to (2 x the number of registers -1).

Application example:

Note: before using communication controlling drive, please check if hardware is properly connected; in addition, be sure to properly set the communication data format, baud rate and address.

Parameter 0x03 is used here to read values of 0x01 slave's control parameters b0-00, b0-01, b0-02 and b0-03. At this moment, b0-00 = 0, b0-01 = 0, b0-02 = 50.00, b0-03 = 0.

Appendix Table 28

	Address	PARAM	Register address	Number of registers	Number of data bytes	Data	Check sum
Request	01	03	02 00	00 04	None	None	44 B1
Response	01	03	None	None	08	0000,0000, 1388, 000B	11 79

Management of parameter 42H

Master enquiry:

Appendix Table 29

Address	Parameter	Sub-parameter	Data	Check code
01	42	XX XX	XX XX	XX XX

Slave response:

Appendix Table 30

Address	Parameter	Sub-parameter	Data	Check code
01	42	XX XX	B1~B0	XX XX

Register address: 0x00 00~0x21 06 and 0x62 00~0x63 22.
Sub-parameter: refer to the table of parameter managing sub-parameter.
Data: refer to the values of data as set forth in the table of parameter managing sub-parameter.
Example:
Parameter 0x42 is used here to read the upper limit value of 0x01 slave's control parameter b0-02 which is 600.00:

Appendix Table 31

	Address	Parameter	Sub-PARA	Data	Check sum
Request	01	42	00 00	02 02	F9 64
Response	01	42	00 00	EA 60	36 8D

0x06 (0x41 data storage) writes that individual parameter data is not saved.
Master enquiry:

Appendix Table 32

Address	Parameter	Register address	Data	Check code
01	06	62 00	B1 B0	XX XX

Slave response:

Appendix Table 33

Address	Parameter	Register address	Data	Check code
01	06	62 00	B1 B0	XX XX

Example:
Parameter 0x06 is used here to write 0x01 slave's control command (forward), i.e. to write 1 to register address 0x6200:

Appendix Table 34

	Address	Parameter	Register address	Number of registers	Number of data bytes	Data	Check sum
Request	01	06	62 00	None	None	00 01	57 B2
Response	01	06	62 00	None	None	00 01	57 B2

10H writes that the data of multiple registers are not saved.
Master enquiry:

Appendix Table 35

Address	Parameter	Register address	Number of registers	Number of data bytes	Data	Check code
01	10	XX XX	0001~0004	Number of 2* registers	XX XX	XX XX

Slave response:

Appendix Table 36

Address	Parameter	Register address	Number of registers	Check code
01	10	XX XX	Number of 2* registers	XX XX

Register address: 0x00 00~0x1E 04, 0x62 00~0x62 14
Number of registers: 0x00 01~0x00 04
Number of data bytes: 0x02~0x08
Data: n is equal to (2 x the number of registers -1).

Example:
Parameter 0x10 is used here to write the corresponding write data 1, 6 and 0 in control registers 0x6200, 0x6201 and 0x6202 of slave 0x01:

Appendix Table 37

	Address	Parameter	Register address	Number of registers	Number of data bytes	Data	Check sum
Request	01	10	62 00	00 03	06	0001,0006,0000	CE F8
Response	01	10	62 00	00 03	None	None	9F B0

0x08: communication line diagnosis
Master enquiry:

Appendix Table 38

Address	Parameter	Sub-parameter	Data	Check code
01	08	XX XX	XX XX	XX XX

Slave response:

Appendix Table 39

Address	Function code	Subfunction code	Data	Check code
01	08	XX XX	Bn~B0	XX XX

Sub-parameter: table of line diagnosis sub-parameter.

Example:
Parameter 0x08 is used here to set the communication no-response mode of 0x01 slave:

Appendix Table 40

	Address	Parameter	Sub-PARA	Data	Check sum
Request	01	08	00 04	00 00	A1 CA
Response	01	08	00 04	00 00	A1 CA

Read error or warning
In case illegal parameter, illegal register address, data errors and other anomalies are detected during communication, slave response communication anomaly will occur. In such a case, the slave response will be in the following formats:
Slave response:

Appendix Table 41

Address	Parameter	Data	Check code
01	0x80+parameter	Error code	XX XX

Example:
Parameter 0x10 is used here to write the corresponding write data 1, 11, 4 and 100.00 in control registers 0x6200, 0x6201, 0x6202 and 0x6203 of 0x01 slave:

Appendix Table 42

	Address	Parameter	Register address	Number of registers	Number of data bytes	Data	Check sum
Request	01	10	62 00	00 04	08	0001,000B 0004 2710	DE 64
Response	01	90	None	None	None	20	0C 01

LRC/CRC Generation

In consideration of the demand for speed improvement, CRC-16 is usually realized in form mode. C-language source codes for realization of CRC-16 are given below. Please note that the high and low bytes have been exchanged in final result, that is to say, the result is the CRC check sum to be sent:

```
/* The function of CRC16*/
Uint16 CRC16(const Uint16 *data, Uint16 len)
{
    Uint16 crcValue = 0xffff;
    Uint16 i;
    while (len--)
    {
        crcValue ^= *data++;
        for (i = 0; i <= 7; i++)
        {
            if (crcValue & 0x0001)
            {
                crcValue = (crcValue >> 1) ^ 0xa001;
            }
            else
            {
                crcValue = crcValue >> 1;
            }
        }
    }
    return (crcValue);
}
```

Appendix 2 Option Board Information

(Refer to user manuals of each option board for details.)

Type	Name	Description
Extension IO board	EPC-TM32	Supports 5 digital inputs, 2 analog inputs, 2 STO inputs, 1 leakage current detection input, 3 digital outputs, 1 analog output, and 1 relay output.
	EPC-TM33	1 three-phase phase voltage detection, 1 bus current detection, 1 temperature detection (supports PT100/PT1000/NTC, NTC jumper is compatible with PT1000)
	EPC-TM34	2 differential battery voltage detections, 1 bus current detection, 1 temperature detection (supports PT100/PT1000/NTC, NTC jumper is compatible with PT1000)
	EPC-TM36	4 digital input, 1 analog input, 2 STO input, 3 digital output, 1 analog output, 1 relay output, 1 CAN communication
	EPC-TM37	1 digital input, 2 STO input, 1 24V input, 1 digital output
Communication extension board	EPC-CM31	485 communication board-dual RJ45 interface-compatible with GS100 pin definition (Not recommend)
	EPC-CM31A	485 communication board-dual RJ45 interface-compatible with GK610 pin definition
	EPC-CM31B	485 communication board-3 PIN terminal block
	EPC-CM32	CAN communication board-dual RJ45 interface
	EPC-CM32A	CAN communication board-3 PIN terminal block
	EPC-CM33	MIII communication board-dual RJ45 interface
	EPC-CM34	EtherCAT communication board-dual RJ45 interface
	EPC-CM35	Profinet communication board-dual RJ45 interface
	EPC-CM36	CANopen communication board-dual RJ45 interface
	EPC-CM37	Profibus-DP communication board-DB-9 interface
	EPC-CM39	Modbus-TCP communication board-dual RJ45 interface
	EPC-CM40	EtherNet/IP communication board-dual RJ45 interface
Encoder extension board	EPC-PG31	Non-isolated dual closed-loop PG board, supports 2 differential A/B/Z signal inputs, and 1 differential PA/PB pulse reference, 1 A/B/Z differential division frequency

Encoder extension board		output, 1 motor temperature sampling, and can directly support UVW encoder, with a maximum input 2MHz. Dual-port D-sub connectors are adopted.
	EPC-PG32	Single-channel isolated PG board, supports 1 differential A/B/Z input, 1 differential PA/PB pulse reference, 1 A/B/Z open collector division frequency output, 1 motor temperature sampling, with a maximum input 500kHz. Dual-port D-sub connectors are adopted.
	EPC-PG32A	Single-channel isolated PG board, supports 1 12V digital A/B/Z input, 1 24V digital PA/PB pulse reference, 1 A/B/Z open collector division frequency output, 1 motor temperature sampling, with a maximum input 500kHz. Dual-port D-sub connectors are adopted.
	EPC-PG32B	Single-channel isolated PG board, supports 1 differential A/B/Z input, 1 24V digital PA/PB pulse reference, 1 A/B/Z open collector division frequency output, 1 motor temperature sampling, with a maximum input 500kHz. Dual-port D-sub connectors are adopted.
	EPC-PG33	Rotary decoding PG board, supports 1 rotary decoding, 1 differential PA/PB pulse reference, 1 A/B/Z open collector division frequency output or 1 A/B/Z differential division frequency output, 1 motor temperature sampling, dual-port D-sub connectors are adopted.
	EPC-PG34	SINCOS decoding board, supports 1 SINCOS decoding, 1 differential PA/PB pulse reference, 1 A/B/Z differential division frequency output, and 1 motor temperature sampling. Dual-port D-sub connectors are adopted.
	EPC-PG35	Absolute encoder card, supports 1 absolute encoder decoding, 1 Sine/Cosine decoding,1 motor temperature sensor (supports PT100/PT1000/NTC, NTC jumper is the same as PT1000), 1 frequency output O/A, O/B, O/Z, and can support SSI, ENDAT, BISS and other protocol formats. It adopts double DB head form.
	EPC-PG36	Single-channel isolated PG board, supports 1 differential A/B/Z signal input, 1 differential PA/PB pulse reference, 1 A/B/Z differential division frequency output, with a maximum input 500kHz, 18-pin terminal blocks are adopted.
	EPC-PG37A	Single-channel isolated PG board, supports 1 12V digital

		A/B/Z input and 1 24V digital PA/PB pulse reference, 1 A/B/Z open collector division frequency output, 1 motor temperature sampling, with a maximum input 500kHZ, 18-pin terminal blocks are adopted, replacing PG32A Dual-port D-sub connectors.
	EPC-PG37B	Single-channel isolated PG board, supports 1 differential A/B/Z input, 1 24V digital PA/PB pulse reference, 1 A/B/Z open collector division frequency output, 1 motor temperature sampling, with a maximum input 500kHz, 18-pin terminal blocks are adopted, replacing PG32B Dual-port D-sub connectors.
	EPC-PG38	Rotary decoding and SINCOS decoding board, supports 1 rotary decoding, 1 SINCOS decoding, 1 A/B/Z open collector division frequency output, and 1 motor temperature sampling. Dual-port D-sub connectors are adopted.
	EPC-PG39	Single-channel isolated PG board, supports 1 differential A/B/Z input, 1 differential PA/PB pulse reference, 1 A/B/Z differential frequency division output, 1 motor temperature sampling, with a maximum input 500kHz. Dual-port D-sub connectors are adopted, replacing PG31 in single closed-loop applications.