Preface

Thank you for choosing ASHM. **NG٨٠P Series High Performance Heavy-duty AC Motor Drives for Asynchronous Motor**. This user manual presents a detailed description of NG٨٠P 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: (+٨٦) ١٣٥٣٠٤٢٥٤٠٢

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۰۲۱۳۳۳۹۱٤۱۸-۱۹
۰۹۱۹۷۷٤٥۱٥۹-۰۹۲۰۷۷٤٥۱٥۹
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Chapter ١ 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. ASHM. bears no responsibility for any injury and loss as a result of any violation operation.

١,١ Safety Considerations

١,١,١ 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.

١,١,٢ 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 ٢,٤. 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.

١,١,٣ 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 ٣,٥mA, 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/T١, V/T٢ and W/T٣. Failure to comply may result in equipment damage.

- Install braking resistors at terminals ⏀/ B١, and B٢ 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 ٢٢٠V 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 ASHM. 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 ١٠٠m, 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.

١,١,٤ Run

⚠ WARNING

- Drives which have been stored for more than ٢ 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 ٣,٥ 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 ASHM..
- 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.

١,١,٥ 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 ١٠ minutes after the power has been turned off and make sure the residual voltage of the bus capacitors has discharged to ٠V 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.

١,٢ Other Considerations

١,٢,١ 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 ASHM. technical personnel before use.

١,٢,٢ 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.

١,٢,٣ 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.

١,٢,٤ 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 ١٠٠m, 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.

١,٢,٥ 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.

١,٢,٦ 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 ٥٠٠V 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 ٥MΩ.

١,٢,٧ 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 ١٠٠٠ meters. It is recommended to derate ١٪ for every ١٠٠m when the altitude is above ١٠٠٠ meters.

١,٢,٨ Mechanical Vibration

This drive provides an output frequency ranging from ٠Hz to ٦٠٠٠Hz. If more than ٥٠Hz 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.

١,٢,٩ 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 ٢ Product Information

٢,١ 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.

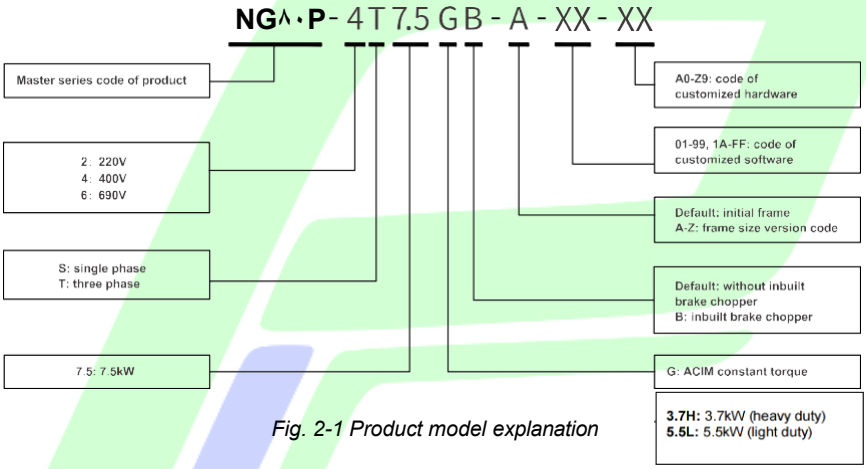


Fig. 2-1 Product model explanation

ATTENTION:

When the sub-series of NG٨٠P model is default, the load type is divided into G and L. When there is a product sub-series, the load type is default.

٢,٢ Nameplate Information

Fig. 2-2 Nameplate information

٢,٣ Information of Product Model

Table ٢-١ Product model and technical data

■ NG٨٠P-٤T□□□G(B), three-phase ٤٠٠V level (heavy-duty)

Model	Power Rating (kW)	Rated Output Current (A)	Rated Input current (A)	Applicable motor (kW)	Brake chopper	DC reactor	Frame No.
NG٨٠P-٤T٠,٧٥GB	٠,٧٥	٢,٥	٣,٥	٠,٧٥	Inbuilt	/	S٠١
NG٨٠P-٤T١,٥GB	١,٥	٣,٨	٥	١,٥			
NG٨٠P-٤T٢,٢GB	٢,٢	٥,٥	٦	٢,٢			
NG٨٠P-٤T٣,٧GB	٣,٧	٩	١٠,٥	٣,٧			
NG٨٠P-٤T٥,٥GB	٥,٥	١٣	١٤,٦	٥,٥			S٠٢
NG٨٠P-٤TV,٥GB	٧,٥	١٨	٢٠,٥	٧,٥			
NG٨٠P-٤T١١GB	١١	٢٤	٢٩	١١			
NG٨٠P-٤T١٥GB	١٥	٣٢	٣٥	١٥			S٠٣
NG٨٠P-٤T١٨,٥GB	١٨,٥	٣٧	٤٤	١٨,٥			
NG٨٠P-٤T٢٢GB	٢٢	٤٥	٥٠	٢٢			
NG٨٠P-٤T٣٠GB	٣٠	٦٠	٦٥	٣٠	Inbuilt optional		S٠٤
NG٨٠P-٤T٣VGB	٣٧	٧٥	٨٠	٣٧			
NG٨٠P-٤T٤٥GB	٤٥	٩١	٨٣	٤٥		Inbuilt	S٠٥
NG٨٠P-٤T٥٥GB	٥٥	١١٢	١٠٣	٥٥			
NG٨٠P-٤TV٥GB	V٥	١٥٠	١٤٣	V٥			S٠٦
NG٨٠P-٤T٩٠G	٩٠	١٧٦	١٦٠	٩٠	Externally mounted		
NG٨٠P-٤T١١٠G	١١٠	٢١٠	١٩٣	١١٠			
NG٨٠P-٤T١٣٢G	١٣٢	٢٥٣	٢٣٢	١٣٢			S٠٧
NG٨٠P-٤T١٦٠G	١٦٠	٣٠٤	٢٨٥	١٦٠			
NG٨٠P-٤T١٨٥G	١٨٥	٣٥٠	٣٢٦	١٨٥			S٠٨
NG٨٠P-٤T٢٠٠G	٢٠٠	٣٨٠	٣٥٤	٢٠٠			
NG٨٠P-٤T٢٥٠G	٢٥٠	٤٧٠	٤٤١	٢٥٠			S٠٩
NG٨٠P-٤T٢٨٠G	٢٨٠	٥٢٠	٤٨٩	٢٨٠			
NG٨٠P-٤T٣١٥G	٣١٥	٥٩٠	٥٧١	٣١٥			S١٠
NG٨٠P-٤T٣٥٥G	٣٥٥	٦٥٠	٦٢٤	٣٥٥			
NG٨٠P-٤T٤٠٠G	٤٠٠	٧٢٥	٦٩٩	٤٠٠			
NG٨٠P-٤T٤٥٠G	٤٥٠	٨٠٠	٧٧٠	٤٥٠			

* means brake chopper is optionally inbuilt for these models. Take ٣٠kW as an example, the model without brake chopper is NG٨٠P-٤T٣٠G, while with brake chopper is NG٨٠P-٤T٣٠GB. Braking resistor needs to be mounted externally with reference to ٣,٥,٣.

٢,٤ Technical Features of NG٨٠P

Table ٢-٢ Technical features of NG٨٠P

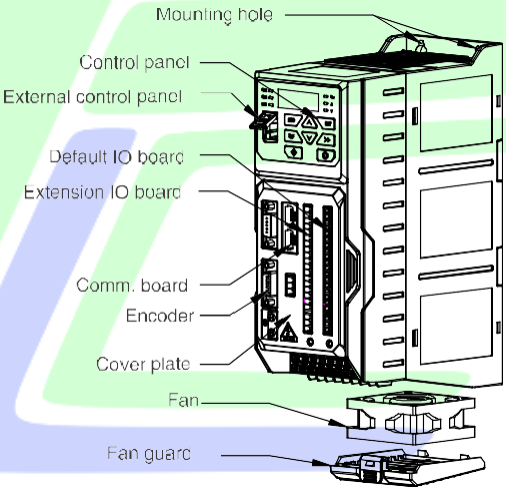
Power input	Rated input voltage	٤٠٠V level: three phase ٣٨٠V~٤٨٠V
	Frequency	٥٠Hz/٦٠Hz, tolerance ±٥٪
	Voltage range	Continuous voltage fluctuation ±١٠٪, short fluctuation -١٥٪~+١٠٪, i.e. ٤٠٠V: ٣٣٣V~٥٢٨V;
		Voltage out-of-balance rate <٣٪, distortion rate as per the requirements of IEC٦١٨٠٠-٢
	Allowable frequency fluctuation	±٥٪
	Rated input current	See Section ٢,٣
Power output	Applicable motor (kW)	See Section ٢,٣
	Rated current (A)	See Section ٢,٣
	Output voltage (V)	٣-phase: ٠~ rated input voltage, error < ±٣٪
	Output frequency (Hz)	٠,٠٠~ ٦٠٠٠,٠٠Hz; unit: ٠,٠١Hz
	Overload capacity	١٥٠٪ - ١min ١٨٠٪ - ١٠s ٢٠٠٪ - ٠,٥s
Control characteristics	V/f patterns	V/f control Sensor-less vector control ١ Sensor-less vector control ٢ Closed-loop vector control (including position control)
	Range of speed regulation	١:١٠٠ (V/f control, sensor-less vector control ١) ١:٢٠٠ (sensor-less vector control ٢) ١:١٠٠٠ (closed-loop vector control)
	Speed accuracy	±٠,٥٪ (V/f control) ±٠,٣٪ (sensor-less vector control ١ & ٢) ±٠,٠٣٪ (closed-loop vector control)
	Speed fluctuation	±٠,٣٪ (sensor-less vector control ١ & ٢) ±٠,١٪ (closed-loop vector control)
	Torque response	< ١٠ms (sensor-less vector control ١ & ٢) < ٥ms (closed-loop vector control)
	Torque control accuracy	±٧,٥٪ (sensor-less vector control ٢) ±٥٪ (closed-loop vector control)

	Starting torque	٠,٥Hz:١٨٠٪ (V/f control, sensor-less vector control ١) ٠,٢٥Hz: ١٨٠٪ (sensor-less vector control ٢) ٠Hz: ٢٠٠٪ (closed-loop vector control)
	Positioning accuracy	±١ line pulse
Basic functions	Start frequency	٠,٠٠~ ٦٠٠٠,٠٠Hz
	Accel/Decel time	٠,٠٠~٦٠٠٠s
	Switching frequency	٠,٨kHz~١٦kHz
	Frequency setting	Digital setting + control panel ∧/∨ Digital setting + terminal UP/DOWN Communication Analog setting (AI١/AI٢/AI٣/AI٤) 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 NG٨٠P-٤TV٥ and below are inbuilt or can be inbuilt. See table ٢-١ Brake chopper working voltage: ٢٠٠V class: ٣٢٥~٣٧٥V; ٤٠٠V class: ٦٥٠V~٧٥٠V Service time: ٠,٠~١٠٠,٠s
	DC brake capacity	DC injection braking start frequency: ٠,٠٠~٦٠٠٠,٠Hz DC injection braking current: ٠,٠~١٠٠,٠٪ DC injection braking time: ٠,٠٠~٣٠,٠٠s
	Input terminals	٥ digital inputs, one of which can be used for high-speed pulse input. Compatible with active open collectors NPN, PNP and dry contact input. ٢ analog inputs, voltage/current programmable.
	Output terminals	٢ digital outputs, one of which can be used for high-speed pulse output terminal, ٠~٥٠kHz square signal; can output set frequency, output frequency and so forth One relay output terminal

		١ 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, ١٦-step speed control programmable (٢-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 ٦- 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	٠~٢٠٠٠m. De-rate ١٪ for every ١٠٠m when the altitude is above ١٠٠٠ meters
	Ambient temperature	-١٠ ℃~٤٠ ℃. The rated output current should be derated ١,٥٪ for every ١ ℃ when the ambient temperature is ٤٠℃~٥٠℃
	Relative humidity	٥٪~٩٥٪, no condensation

	Vibration	Less than ٥,٩m/s٢ (٠,٦g)
	Storage temperature	-٤٠°C~+٧٠°C
Others	Efficiency at rated Amps	٧,٥kW and below: ≥٩٣٪ ١١~ ٤٥kW: ≥ ٩٥٪ ٥٥kW and above: ≥٩٨٪
	Installation	٥٦٠kW and ٦٣٠kW are cabinet type, the others are wall-mounted
	Installation	Book-type wall-mounted
	IP grade	IP٢٠/IP٠٠
	Cooling method	Forced air cooling

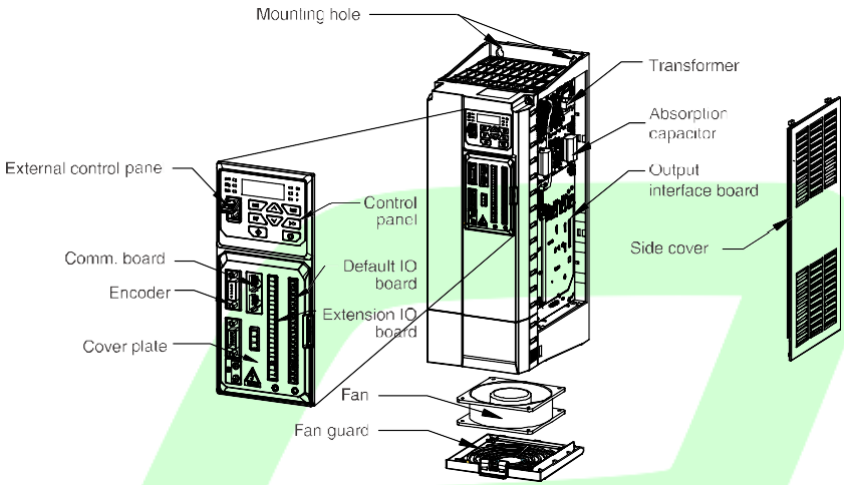
٢,٥ Parts Drawing



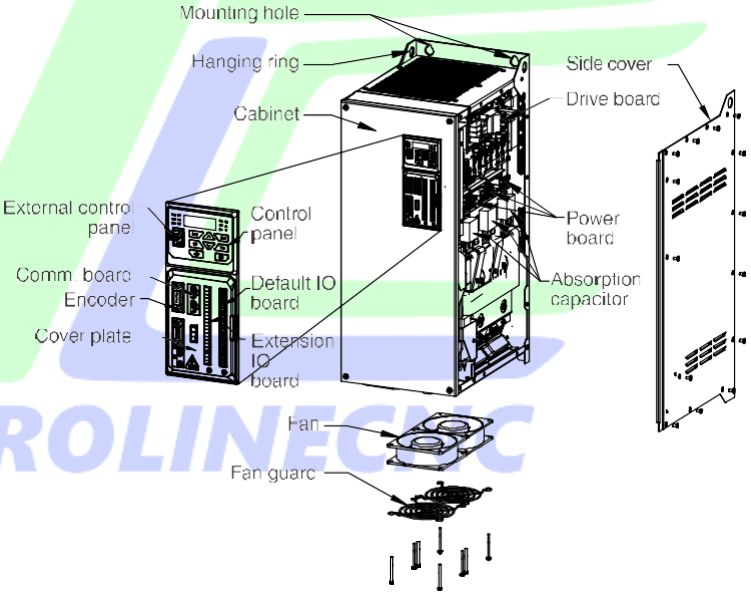
a) NGΛ٠P-٤T١١GB and below

ATTENTION:

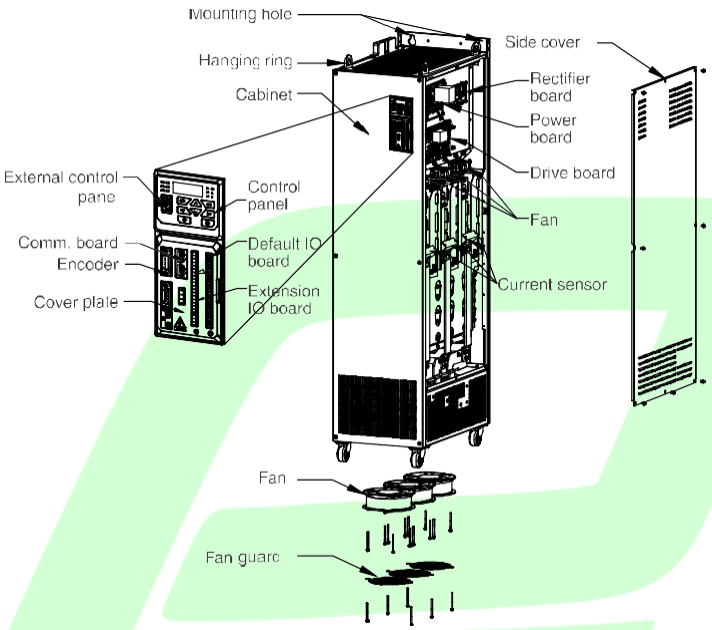
When the NGΛ٠P series drive is connected to the external control panel, open the flip cover of the network interface, and then connect the external control panel to the network interface with dual-port network cable.



b) NG٨٠P-٤T١٥GB~ NG٨٠P-٤T٢VG(B)



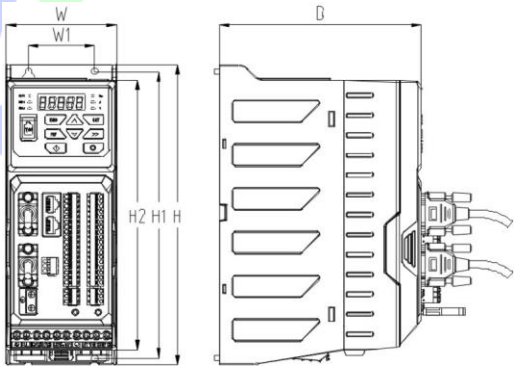
c) NG٨٠P-٤T٤٥G(B) ~ NG٨٠P-٤T٢٢٠G



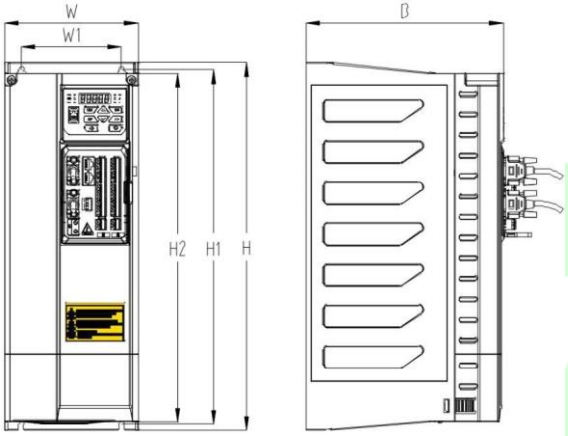
d) NGA٠P-٤T٢٥٠G and above

Fig.2-3 Parts drawing

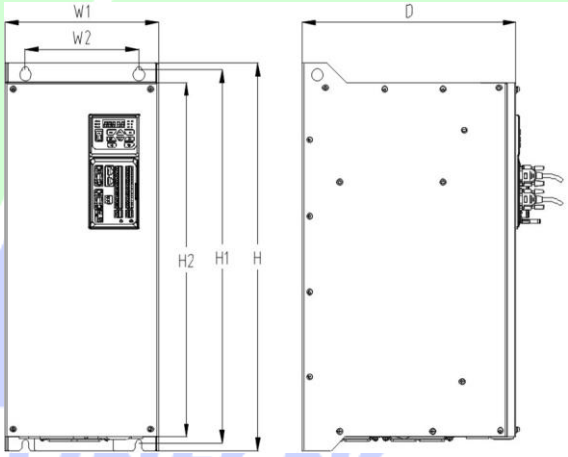
٢,٦ Appearance, Mounting Dimensions and Weight



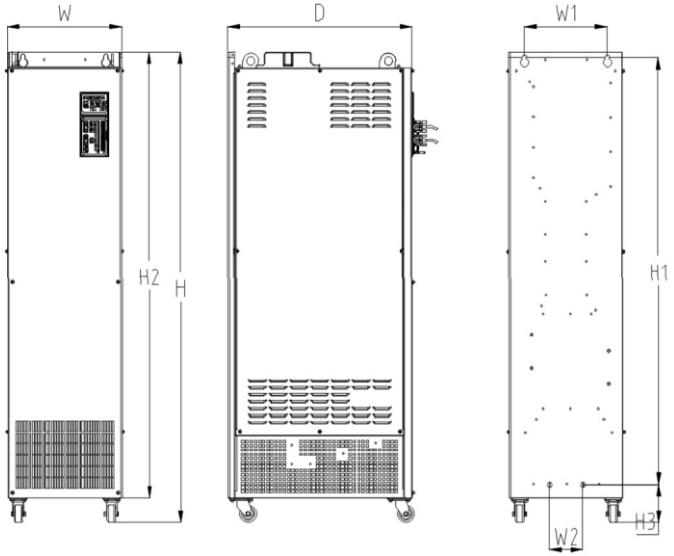
a) NGA٠P-٤T١١GB and below



b) NG۸۰P-٤T١٥GB~NG۸۰P-٤T٣٧G(B)



c) NG۸۰P-٤T٤٥G(B) ~NG۸۰P-٤T٢٢٠G



d) NGA٠P-ET٢o٠G and above

Fig.2-4 External dimensions

Table ٢-٣ Appearance, mounting dimensions and weight

Model	Frame No.	External and installation dimensions (mm)									Weight (kg)
		W	H	D	W١	W٢	H١	H٢	H٣	d	
NGA٠P-ET٠,VoGB	S٠١	٨٤	٢٣٦	١٥٣	٥٠	/	٢١٦	٢٠٤	/	٤,٥	١,٦
NGA٠P-ET١,oGB											١,٦
NGA٠P-ET٢,٢GB											١,٦
NGA٠P-ET٣,VGB											١,٦
NGA٠P-ET٥,oGB	S٠٢	٩٣	٢٨٥	١٨٣	٥٥	/	٢٧٢	/	/	٥,٥	٢,٩
NGA٠P-ET٧,oGB											٢,٩
NGA٠P-ET١١GB											٢,٩
NGA٠P-ET١oGB	S٠٣	١٢٥	٣٦٥	٢١٧	١١١	/	٣٥٠	/	/	٥,٥	٨,٠
NGA٠P-ET١٨,oGB											٨,٠
NGA٠P-ET٢٢GB											٨,٠
NGA٠P-ET٣٠G(B)	S٠٤	١٥٨	٤٣٠	٢٣٢	١١٨	/	٤١٥	/	/	٦,٥	١١,١
NGA٠P-ET٣VG(B)											١١,١

NGA٠P-ET٤٥G(B)	S٠٥	٣٣٠	٥٤٥	٣٠٠	١٧٥	/	٥٢٥	٤٩٠	/	١٠	٣١,٠
NGA٠P-ET٥٥G(B)											٣١,٠
NGA٠P-ETV٥G(B)	S٠٦	٢٥٠	٦٣٥	٣٥٠	١٨٥	/	٦١٢	٥٨٠	/	١١	٤٥,٠
NGA٠P-ET٩٠G											٤٥,٠
NGA٠P-ET١١٠G											٤٥,٠
NGA٠P-ET١٣٢G	S٠٧	٣٠٠	٧٣٨	٣٩٩	٢٣٠	/	٧١٥	٦٨٢	/	١١	٦٧,٠
NGA٠P-ET١٦٠G											٦٧,٠
NGA٠P-ET١٨٥G	S٠٨	٣٠٠	٨٩٥	٤٦٠	٢٣٠	/	٨٧٣	٨٤٠	/	١٣	١٠٣,٥
NGA٠P-ET٢٠٠G											١٠٣,٥
NGA٠P-ET٢٢٠G											١٠٣,٥
NGA٠P-ET٢٥٠G	S٠٩	٣٣٠	١٢٤٥	٥٣٣	٢٤٠	٩٦	١١٢٢	١١٧٥	١٠٩	١٣	١٤٢,٠
NGA٠P-ET٢٨٠G											١٤٢,٠
NGA٠P-ET٣١٥G	S١٠	٣٣٠	١٣٦٥	٥٣٣	٢٤٠	٩٦	١٢٤٢	١٢٩٥	١٠٩	١٣	١٨١,٠
NGA٠P-ET٣٥٥G											١٨١,٠
NGA٠P-ET٤٠٠G											١٨١,٠
NGA٠P-ET٤٥٠G											١٨١,٠

٢,٧ External Dimensions of Control Panel

The LED control panel model of NG٨٠P series is KBU-BX١ whose appearance and external dimensions are shown in Fig. ٢-٥.

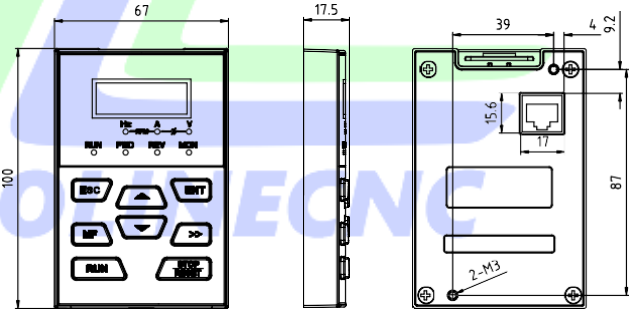
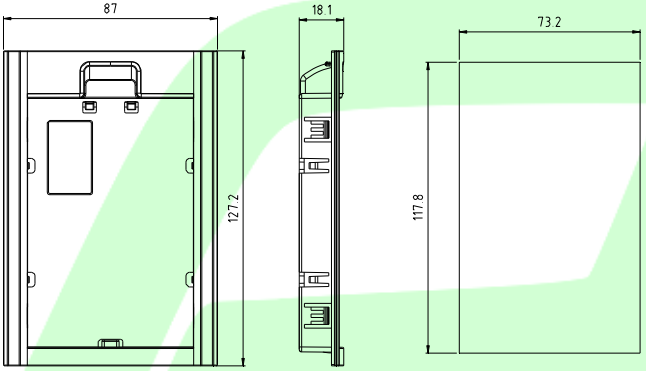


Fig. 2-5 External dimensions of KBU-BX1

٢,٨ 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-BX١ needs to be remotely used. Bracket model is KBU-DZ١ whose external dimensions are shown in Fig. ٢-٦ a). Fig. ٢-٦ b) shows applicable hole dimensions in the cabinet.



a) External dimensions of KBU-DZ١ b) Hole dimensions in the cabinet

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

Chapter ٣ Installation and Wiring

٣,١ Installation Environment

١) Ambient temperature is in the range of -١٠°C to ٥٠°C.
٢) Drive should be installed on surface of flame retardant object, with adequate surrounding space for heat dissipation.
٣) Installation should be performed where vibration is less than ٥,٩m/s^٢ (٠,٦g).
٤) Avoid installation in places exposed to direct sunlight, moisture, condensation, or water droplets.
٥) Avoid installation in areas with oil contamination, heavy metal dust, excessive dust, or high salt content.
٦) Do not expose to an atmosphere with flammable gases, corrosive gases, explosive gases or other harmful gases.
٧) Prevent drilling residues, wire ends and screws falling into drive.
٨) 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).

٣,٢ Minimum Mounting Clearances

٣,٢,١ Single drive mounting

When mounting the NG٨٠P 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.

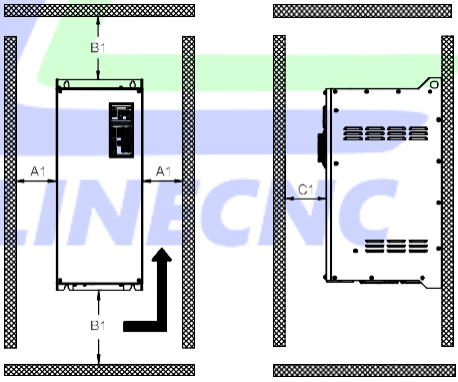


Fig. 3-1 Single drive mounting clearances (NG80P-4T0.75GB to NG80P-4T220G)

ATTENTION:

When a NGΛ٠P-ΣT٢٢٠G 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 ٣,٢,٢.

Table ٣-١ Single drive mounting clearances

(NG٨٠P-٤T٠,٧٥GB~NG٨٠P-٤T٢٢٠G)

Power rating	Mounting clearances (mm)		
	A١	B١	C١
NGΛ٠P-ΣT٠,V٥GB~NGΛ٠P-ΣT٣,VGB	≥٢	≥١٠٠	≥٥٠
NGΛ٠P-ΣT٥,٥GB~NGΛ٠P-ΣT١١GB	≥٢٠	≥١٠٠	≥٥٠
NGΛ٠P-ΣT١٥GB~NGΛ٠P-ΣT٢٢GB	≥٢٠	≥١٥٠	≥٥٠
NGΛ٠P-ΣT٣٠GB~NGΛ٠P-ΣT٣VGB	≥٥٠	≥٢٥٠	≥٥٠
NGΛ٠P-ΣTΣ٥G(B)~NGΛ٠P-ΣT٢٢٠G	≥٨٠	≥Σ٠٠	≥٥٠

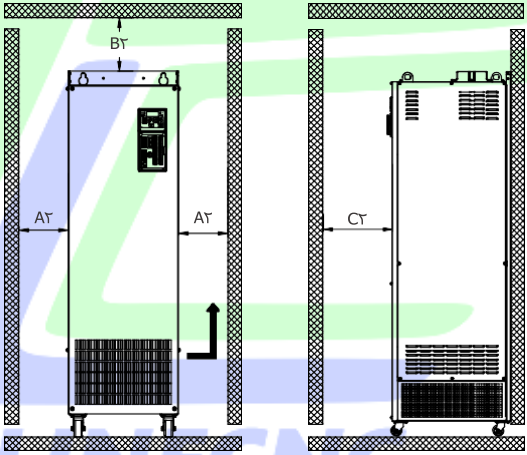


Fig. 3-2 Mounting clearances for NG80P-4T250G to NG80P-4T450G

Table ٣-٢ Single drive mounting clearances
(NG٨٠P-٤T٢٥٠GB~ NG٨٠P-٤T٤٥٠G)

AC drive power rating	Mounting clearances (mm)		
	A٢	B٢	C٢
NG٨٠P-٤T٢٥٠G~NG٨٠P-٤T٤٥٠G	≥٢٠	≥٣٠٠	≥٥٠

٣,٢,٢ Mounting multiple drives

The heat of NG٨٠P 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 ٣-٣.

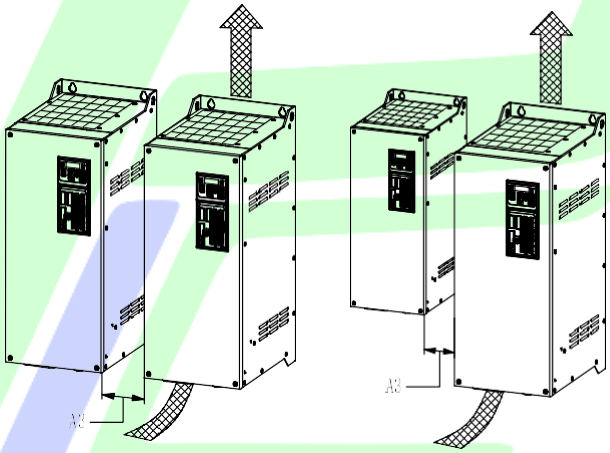


Fig. 3-3 Minimum mounting clearances of NG80P-4T0.75GB~NG80P-4T450G

Table ٣-٣ Minimum mounting clearances of multiple drives in parallel
(NG٨٠P-٤T٠,٧٥GB~NG٨٠P-٤T٤٥٠G)

Power ratings	*Mounting clearances* A٣ (mm)
NG٨٠P-٤T٠,٧٥GB~NG٨٠P-٤T٣,٧GB	≥٢
NG٨٠P-٤T٥,٥GB~NG٨٠P-٤T٢٢GB	≥٢٠
NG٨٠P-٤T٣٠GB~NG٨٠P-٤T٣٧GB	≥٥٠
NG٨٠P-٤T٤٥G(B)~NG٨٠P-٤T٤٥٠G	≥٥٠

٣,٢,٣ Vertical mounting

When the drives are mounted vertically as shown in Fig. ٣-٤, 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.

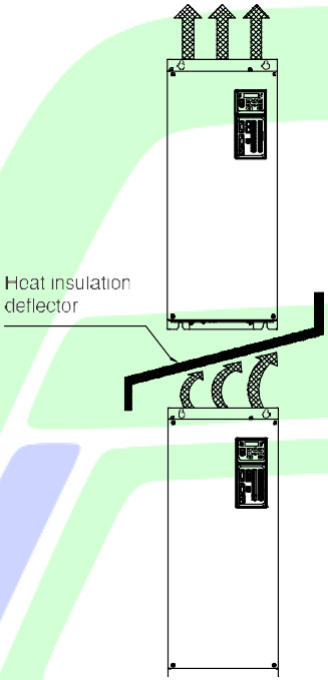


Fig. 3-4 Requirements of mounting drives vertically

ATTENTION:

Models from NGΛ٠P-ΣT٢٥٠G to NGΛ٠P-ΣT٤٥٠G can be mounted in a single cabinet or in parallel side-by-side, but cannot be mounted vertically.

٣,٢,٤ Attentions for mounting inside the cabinet

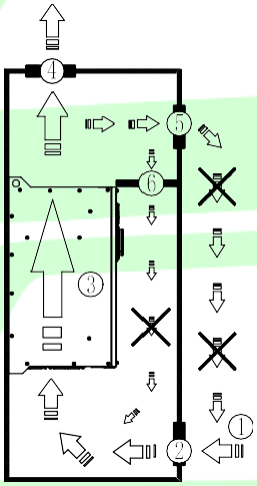
When the NGΛ٠P drive is mounted inside the cabinet, the heat is emitted from the bottom to the top. In order to avoid the circulation of hot air inside the cabinet, the following measures can be taken:

١. The grill can be used to guide the air flow at the air inlet and outlet;

٢. 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.

٣. 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:

$V = (P_{LOSS}/T_{RISE}) \times ١,٨٣$

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 ٣-٤;

T_{RISE} -- allowable temperature rise of the drive inside the cabinet. For example, inside the cabinet are a ٤٥kW and a ٩٠kW drive separately. The ambient temperature is ٣٥°C, and the maximum allowable operating temperature of the drive is ٥٠°C, that is, T_{RISE}=١٥°C. According to Table ٣-٤, the corresponding drive loss P_{LOSS} is ١٣٦٣+٢٠٥٦=٣٤١٩W. The drive cabinet needs to be equipped with a fan with air volume V=٣٤١٩ X ١,٨٢/١٥=٤١٥CFM.

ATTENTION:

The designed power consumption of single NG٨٠P drive and corresponding minimum required air volume (unit: CFM) is shown in Table ٣-٤, which customers can refer to according to needs.

Table ٣-٤ 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)
NG٨٠P-٤T٠,V٥GB	٢٣	٢١	NG٨٠P-٤TV٥G (B)	٢٠٥٠	٢٢٥
NG٨٠P-٤T١,٥GB	٤٩	٢١	NG٨٠P-٤T٩٠G	٢٠٥٦	٢٢٥
NG٨٠P-٤T٢,٢GB	V٢	٢١	NG٨٠P-٤T١١٠	٢٨٣٨	٢٢٥
NG٨٠P-٤T٣,VGB	١١٦	٢١	NG٨٠P-٤T١٣٢	٣٣٥٩	٥٩٥
NG٨٠P-٤T٥,٥GB	١٧٠	٤٢	NG٨٠P-٤T١٦٠G	٣٧٨٧	٥٩٥
NG٨٠P-٤TV,٥GB	٢٦١	٥٨	NG٨٠P-٤T١٨٥G	٤١٢٤	٦٩٢
NG٨٠P-٤T١١GB	٣٣V	V٨	NG٨٠P-٤T٢٠٠G	٤V٠١	٦٩٢
NG٨٠P-٤T١٥GB	٤١V	١٠٥	NG٨٠P-٤T٢٢٠G	٥١٣٣	٦٩٢
NG٨٠P-٤T١٨,٥GB	٥٠٠	١٠٥	NG٨٠P-٤T٢٥٠G	٥٦٢٥	٩V٥
NG٨٠P-٤T٢٢GB	٦٣٢	١٠٥	NG٨٠P-٤T٢٨٠G	٦٥٩٨	٩V٥
NG٨٠P-٤T٣٠G (B)	V٣V	١٨٥	NG٨٠P-٤T٣١٥G	V٢١٥	٩٤٦
NG٨٠P-٤T٣VG (B)	٩V٩	١٨٥	NG٨٠P-٤T٣٥٥G	٨٣٨٤	٩٤٦
NG٨٠P-٤T٤٥G (B)	١٣٦٣	٢٢٤	NG٨٠P-٤T٤٠٠G	٨٤V٣	٩٤٦
NG٨٠P-٤T٥٥G (B)	١V٨٩	٢٢٤	NG٨٠P-٤T٤٥٠G	٨٨V٦	٩٤٦

٣,٣ Remove & Mount Covers

Power ranges from ٠,V٥ kW to ٣,V kW of NG٨٠P Series Heavy-duty AC Motor Drives do not equip with terminal cover plates.

٣,٣,١ Remove & mount covers of NG٨٠P-٤T٣٧G(B) and below

- Open the cover

Removing method ١: 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 ٣-٦ 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 ٢: 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.

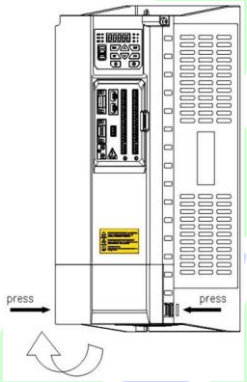


Fig. 3-6 Open the cover

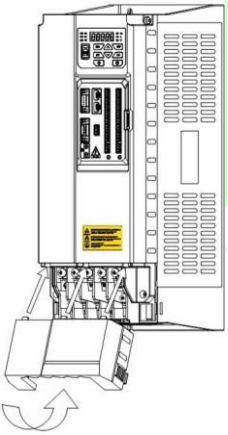


Fig. 3-7 Mount the cover

- 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 ٣-٧. 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.

٣,٣,٣ Open & Mount the Covers of NG٨٠P-٤T٤٥G(B)~NG٨٠P-٤T٢٢٠G

- 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 ٣-٨. Once the screws are removed, carefully set

them aside, and then take out the cover upwards to remove it.

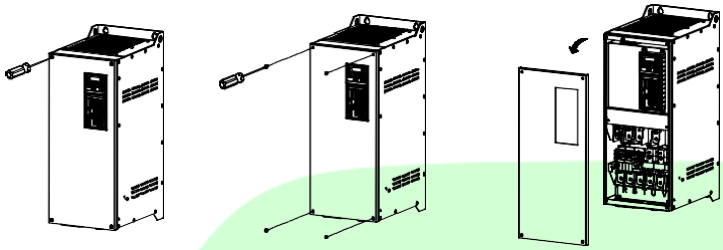


Fig. 3-8 Remove the cover

- 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 ٣-٩. After the cover fits the housing, the cover is installed.

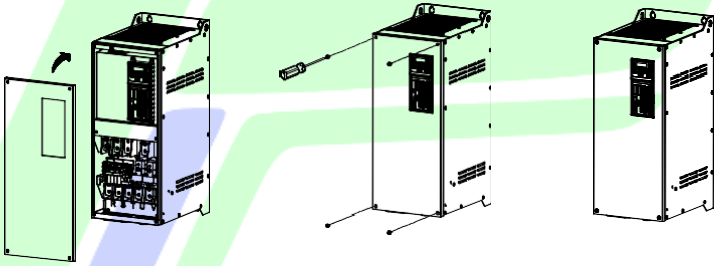


Fig. 3-9 Mount the cover

٣,٣,٤ Open & Mount the Covers of NG٨٠P-٤T٢٥٠G and above

- Open the cover

Use a cross screwdriver to remove the screws on the cover, as shown in Figure ٣-٨. 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 ٣-١١. After the cover fits the housing, the cover is installed.

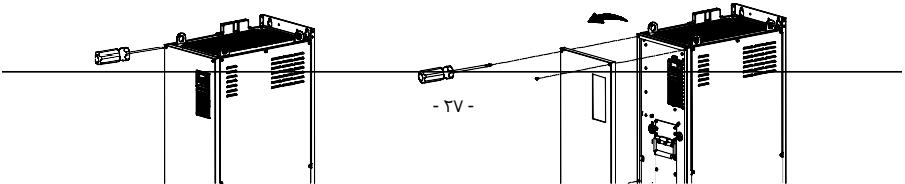


Fig. 3-10 Open the cover

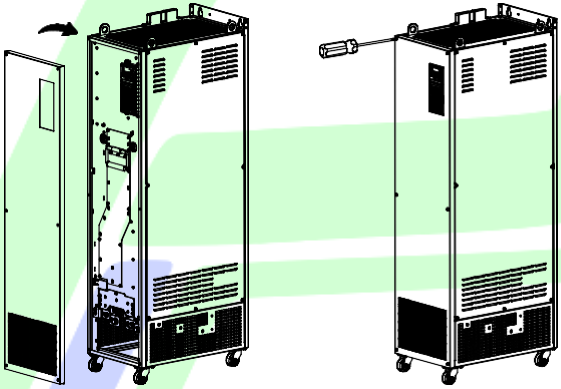


Fig. 3-11 Mount the cover

٣,٤ Remove and mount option boards

٣,٤,١ 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.

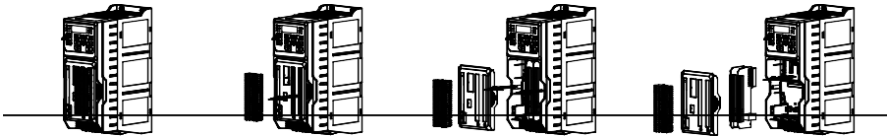


Fig. 3-12 Remove and mount the default IO board and extension IO board

ATTENTION:

Before removing all extension boards on the NGΛ٠P 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.)

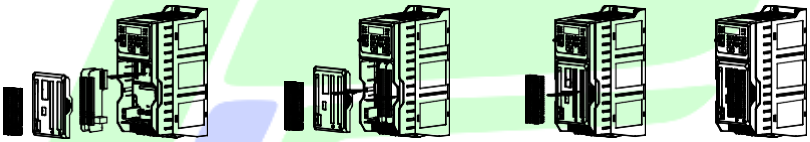


Fig. 3-13 Mount the default IO board and extension IO board

ATTENTION:

The final step for mounting all extension boards of the NGΛ٠P 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.

٣,٤,٢ 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.

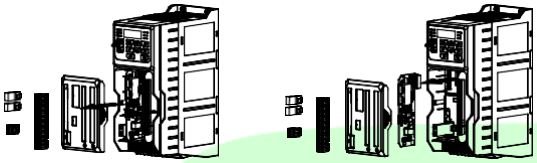


Fig. 3-14 Remove the communication board

- 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.)

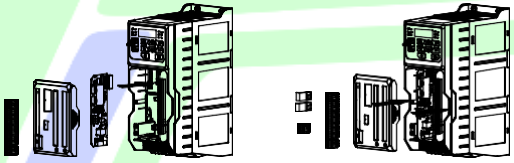


Fig. 3-15 Mount the communication board

٣,٤,٣ Mount and remove the encoder board

The NGΛ٠P series drives support two types of encoder extension boards: the ١Λ PIN pluggable terminal (referred to as "١Λ PIN") and the DB١٥ metal connector (referred to as "DB١٥"). 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:

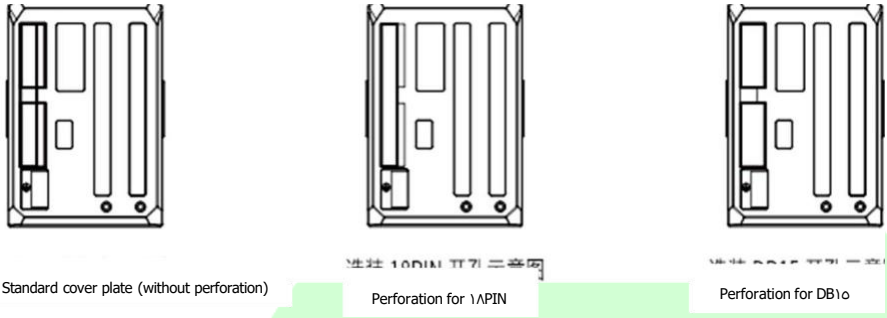


Fig. 3-16 Corresponding partition configuration of encoder extension board

٣,٤,٣,١ Remove and mount the encoder board-١٨PIN

- 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.

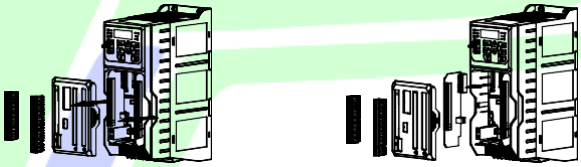


Fig. 3-17 Remove the encoder board -18PIN

- 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. ٣-١٦.)

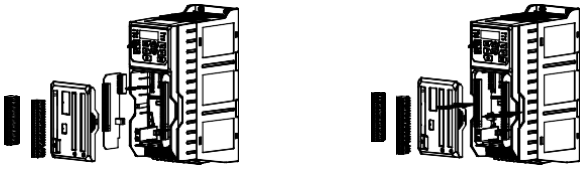


Fig. 3-18 Mount the encoder board-18PIN

٣,٤,٣,٢ Remove and mount the encoder board-DB١٥

- 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.

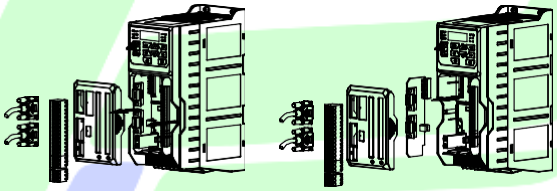


Fig. 3-19 Remove the encoder board -DB15

- 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. ٣-١٦.)

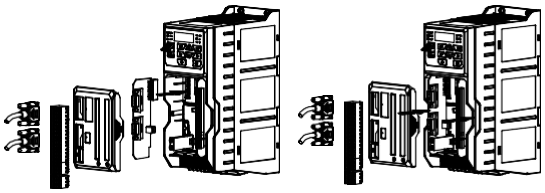


Fig. 3-20 Mount the encoder board-DB15

٣,٥ Configuration of Peripheral Devices

٣,٥,١ Standard Configuration of Peripheral Devices

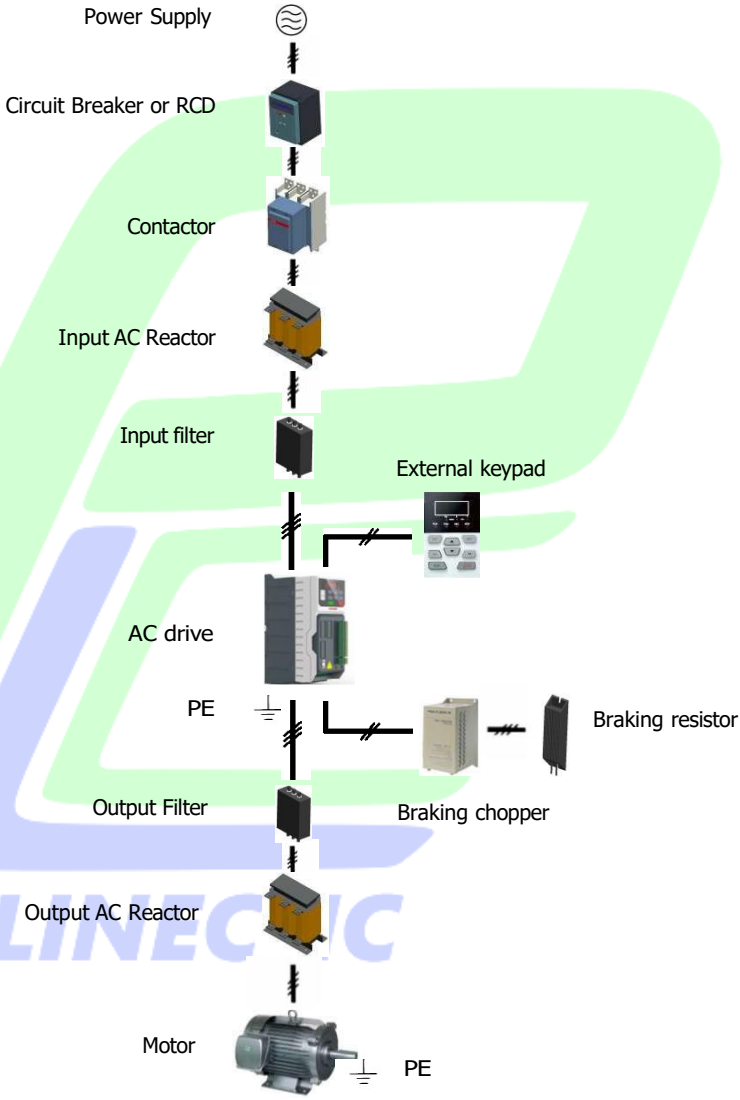


Fig. 3-21 Standard configuration of peripheral devices

٣,٥,٢ Instructions of Peripheral Devices

Table ٣-٥ 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 ١,٥~٢ 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 ASHM. technical personnel for type selection of brake chopper. Refer to type selection of braking resistor in Table ٣,٥,٣ 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 ١٠٠m, it is recommended to install an output AC reactor.
Motor	Should match the drive
External keypads	Support external LED and LCD keypads

٣,٥,٣ Selection of Peripheral Devices

Table ٣-٦ Selection of peripheral devices

Drive model	Circuit breaker (A)	Contactor (A)	Braking resistor/Brake chopper *	
			Resistor configuration	Min. Resistance
NGΛ٠P-	٦	٩	١٥٠W ٦٠٠Ω	٩٦
NGΛ٠P-٤T١,٥GB	١٠	٩	٣٠٠W ٣٠٠Ω	٩٦
NGΛ٠P-٤T٢,٢GB	١٣	١٢	٤٤٠W ٢٠٠Ω	٦٤
NGΛ٠P-٤T٣,VGB	٢٥	٢٦	٧٤٠W ١٢٠Ω	٤٠
NGΛ٠P-٤T٥,٥GB	٣٢	٢٦	١١٠٠W ٨٠Ω	٤٠
NGΛ٠P-٤TV,٥GB	٥٠	٣٨	١٥٠٠W ٦٠Ω	٤٠
NGΛ٠P-٤T١١GB	٦٣	٥٠	٢٢٠٠W ٤٠Ω	٢٥
NGΛ٠P-٤T١٥GB	٦٣	٥٠	٣٠٠٠W ٣٠Ω	٢٠
NGΛ٠P-	٨٠	٦٥	٤٠٠٠W ٢٤Ω	٢٠
NGΛ٠P-٤T٢٢GB	٨٠	٨٠	٤٥٠٠W ٢٠Ω	٢٠
NGΛ٠P-٤T٣٠G(B)	١٠٠	٨٠	٦٠٠٠W ١٥Ω	١٣,٢
NGΛ٠P-٤T٣VG(B)	١٦٠	٩٥	V٥٠٠W ١٥Ω**	١٣,٢
NGΛ٠P-٤T٤٥G(B)	١٦٠	١١٥	٩٠٠٠W ١٠Ω	١٠
NGΛ٠P-٤T٥٥G(B)	٢٥٠	١٥٠	١١٠٠٠W ١٠Ω	١٠
NGΛ٠P-٤TV٥G(B)	٢٥٠	١٧٠	١٥٠٠٠W ٦Ω	٦
NGΛ٠P-٤T٩٠G	٢٥٠	٢٠٥	Brake chopper is optional	
NGΛ٠P-٤T١١٠G	٤٠٠	٢٤٥		
NGΛ٠P-٤T١٣٢G	٤٠٠	٣٠٠		
NGΛ٠P-٤T١٦٠G	٥٠٠	٤١٠		
NGΛ٠P-٤T١٨٥G	٥٠٠	٤١٠		
NGΛ٠P-٤T٢٠٠G	٥٠٠	٤١٠		
NGΛ٠P-٤T٢٢٠G	٦٣٠	٤١٠		
NGΛ٠P-٤T٢٥٠G	٦٣٠	٤٧٥		
NGΛ٠P-٤T٢٨٠G	٨٠٠	٦٣٠		
NGΛ٠P-٤T٣١٥G	٨٠٠	٦٣٠		
NGΛ٠P-٤T٣٥٥G	٨٠٠	٦٣٠		
NGΛ٠P-٤T٤٠٠G	١٠٠٠	٨٠٠		
NGΛ٠P-٤T٤٥٠G	١٠٠٠	٨٠٠		

* 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 ١٠٠٪ to ١٢٥٪, braking frequency ١٠٪). 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 ١٠٠٪ and the braking frequency is ١٠٪ for this configuration. (For other power ratings, it is recommended to configure a braking torque of ١٢٥٪ and a braking frequency of ١٠٪.)

٣,٦ Terminal Configuration

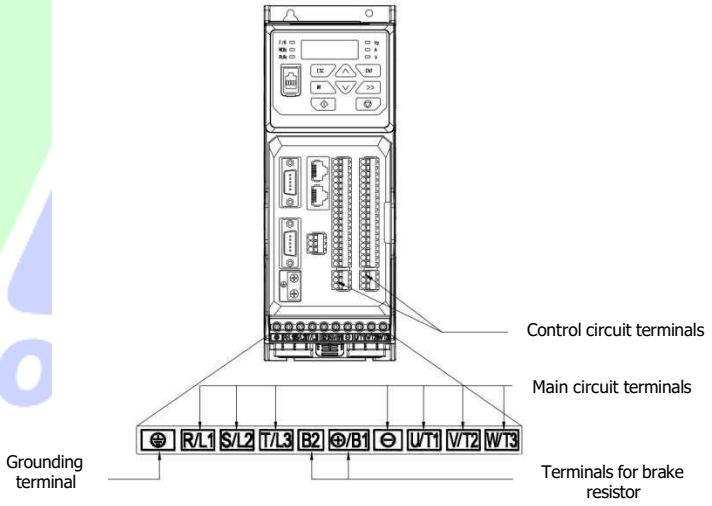


Fig. 3-22 Terminal configuration

٣,٧ 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 ٣,٥mA, 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/T١, V/T٢ and W/T٣. Failure to comply will result in equipment damage.
- Only mount braking resistors at terminals /B⊕, and B٢ 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

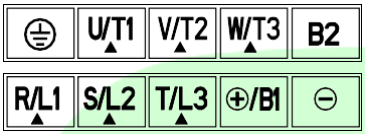
- Signal wires should be away from main power lines to the best of possibility. In the event that this cannot be ensured, vertical cross arrangement should be adopted, reducing EMI interference to the signal wires as much as possible.
- In case the motor cable exceeds ١٠٠m, an appropriate output reactor should be mounted.

٣,٧,١ Main Circuit Terminals of NGA٠P-٤T٠,V٥GB ~ NGA٠P-٤T٣,VGB

Terminal marks	Designation and function of terminals
R/L١, S/L٢, T/L٣	Three-phase AC input terminals
⊕/B١, B٢	Braking resistor connection terminals when brake unit is inbuilt*
⊕ / B١, ⊖	DC power supply input terminals**

U/T١, V/T٢, W/T٣	Three-phase AC output terminals
⏚	Ground terminal PE

٣,V,٣ Main Circuit Terminals of NGA٠P-٤To,oGB~NGA٠P-٤T٣VG(B)

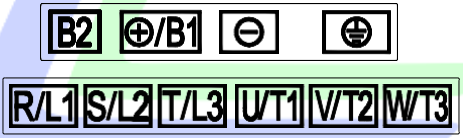


Terminal marks	Designation and function of terminals
R/L١, S/L٢, T/L٣	Three-phase AC input terminals
⊕/B١, B٢	Braking resistor connection terminals when brake unit is inbuilt*
⊕/B١,⊖	DC power supply input terminals
U/T١, V/T٢, W/T٣	Three-phase AC output terminals
⏚	Ground terminal PE

For NGA٠P-٤T٣٠G~NGA٠P-٤T٣VG drives without "B" in the model, there is no built-in brake unit as factory default, brake resistor connected between B١ and B٢ terminals is invalid.

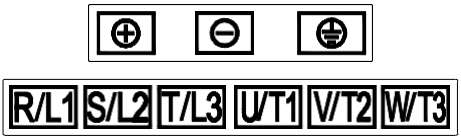
٣,V,٣ Main Circuit Terminals of NGA٠P-٤T٤oG(B) ~NGA٠P-٤T٢٢٠G

- NGA٠P-٤T٤oGB~NGA٠P-٤TVoGB



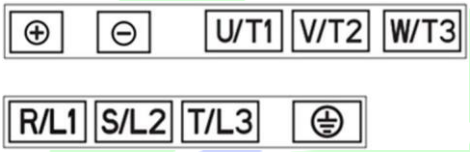
Terminal marks	Designation and function of terminals
R/L١, S/L٢, T/L٣	Three-phase AC input terminals
⊕/B١, B٢	Braking resistor connection terminals when brake unit is inbuilt*
⊕/B١, ⊖	DC power supply input terminals
U/T١, V/T٢, W/T٣	Three-phase AC output terminals
⏚	Ground terminal PE

- NGA٠P-٤T٤٥G~NGA٠P-٤T١١٠G



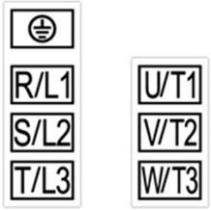
Terminal marks	Designation and function of terminals
R/L١, S/L٢, T/L٣	Three-phase AC input terminals
⊕, ⊖	DC power supply input terminals
U/T١, V/T٢, W/T٣	Three-phase AC output terminals
⏚	Ground terminal PE

➢ **NG٨٠P-٤T١٣٢G~NG٨٠P-٤T٢٢٠G**



Terminal marks	Designation and function of terminals
R/L١, S/L٢, T/L٣	Three-phase AC input terminals
⊕ , ⊖	DC power supply input terminals
U/T١, V/T٢, W/T٣	Three-phase AC output terminals
⏚	Ground terminal PE

٣,٧,٤ Main Circuit Terminals of NG٨٠P-٤T٢٥٠G ~NG٨٠P-٤T٤٥٠G



Terminal marks	Designation and function of terminals
R/L١, S/L٢, T/L٣	Three-phase AC input terminals
U/T١, V/T٢, W/T٣	Three-phase AC output terminals
⏚	Ground terminal PE

٣,٧,٥ Terminal Screw and Wiring Requirement

Table ٣-٧ Terminal screw and wiring requirement

Drive model	Power terminal			Ground terminal		
	Cable (mm٢)	Screw	Torque (kgf.cm)	Cable (mm٢)	Screw	Torque (kgf.cm)
NGA٠P-٤T٠,V٥GB	٠,٧٥	M٣,٥	١٠±٠,٥	٠,٧٥	M٣,٥	١٠±٠,٥
NGA٠P-٤T١,٥GB	٠,٧٥	M٣,٥	١٠±٠,٥	٠,٧٥	M٣,٥	١٠±٠,٥
NGA٠P-٤T٢,٢GB	٠,٧٥	M٣,٥	١٠±٠,٥	٠,٧٥	M٣,٥	١٠±٠,٥
NGA٠P-٤T٣,VGB	١	M٣,٥	١٠±٠,٥	١	M٣,٥	١٠±٠,٥
NGA٠P-٤T٥,٥GB	١,٥	M٤	١٤±٠,٥	١,٥	M٤	١٤±٠,٥
NGA٠P-٤TV,٥GB	٢,٥	M٤	١٤±٠,٥	٢,٥	M٤	١٤±٠,٥
NGA٠P-٤T١١GB	٤	M٤	١٤±٠,٥	٤	M٤	١٤±٠,٥
NGA٠P-٤T١٥GB	٦	M٥	٢٨±٠,٥	٦	M٥	٢٨±٠,٥
NGA٠P-٤T١٨,٥GB	١٠	M٥	٢٨±٠,٥	١٠	M٥	٢٨±٠,٥
NGA٠P-٤T٢٢GB	١٦	M٥	٢٨±٠,٥	١٦	M٥	٢٨±٠,٥
NGA٠P-٤T٣٠G(B)	١٦	M٦	٤٨±٠,٥	١٦	M٦	٤٨±٠,٥
NGA٠P-٤T٣VG(B)	١٦	M٦	٤٨±٠,٥	١٦	M٦	٤٨±٠,٥
NGA٠P-٤T٤٥G(B)	٢٥	M٨	١٢٠±٠,٥	٢٥	M٨	١٢٠±٠,٥
NGA٠P-٤T٥٥G(B)	٥٠	M٨	١٢٠±٠,٥	٢٥	M٨	١٢٠±٠,٥
NGA٠P-٤TV٥G(B)	V٠	M٨	١٢٠±٠,٥	٣٥	M٨	١٢٠±٠,٥
NGA٠P-٤T٩٠G	٩٥	M٨	١٢٠±٠,٥	٥٠	M٨	١٢٠±٠,٥
NGA٠P-٤T١١٠G	١٢٠	M٨	١٢٠±٠,٥	V٠	M٨	١٢٠±٠,٥
NGA٠P-٤T١٣٢G	١٥٠	M١٠	٢٥٠±٠,٥	٩٥	M١٠	٢٥٠±٠,٥
NGA٠P-٤T١٦٠G	١٨٥	M١٠	٢٥٠±٠,٥	٩٥	M١٠	٢٥٠±٠,٥
NGA٠P-٤T١٨٥G	١٨٥	M١٠	٢٥٠±٠,٥	٩٥	M١٠	٢٥٠±٠,٥

Drive model	Power terminal			Ground terminal		
	Cable (mm٢)	Screw	Torque (kgf.cm)	Cable (mm٢)	Screw	Torque (kgf.cm)
NGA٠P-٤T٢٠٠G	٩٥×٢	M١٠	٢٥٠±٠,٥	٩٥	M١٠	٢٥٠±٠,٥
NGA٠P-٤T٢٢٠G	١٢٠×٢	M١٠	٢٥٠±٠,٥	١٢٠	M١٠	٢٥٠±٠,٥
NGA٠P-٤T٢٥٠G	١٢٠×٢	M١٢	٤٤٠±٠,٥	١٢٠	M١٠	٢٥٠±٠,٥
NGA٠P-٤T٢٨٠G	١٥٠×٢	M١٢	٤٤٠±٠,٥	١٥٠	M١٠	٢٥٠±٠,٥
NGA٠P-٤T٣١٥G	١٨٥×٢	M١٢	٤٤٠±٠,٥	١٨٥	M١٠	٢٥٠±٠,٥
NGA٠P-٤T٣٥٥G	١٨٥×٢	M١٢	٤٤٠±٠,٥	١٨٥	M١٠	٢٥٠±٠,٥
NGA٠P-٤T٤٠٠G	٢٤٠×٢	M١٢	٤٤٠±٠,٥	٢٤٠	M١٠	٢٥٠±٠,٥
NGA٠P-٤T٤٥٠G	٢٤٠×٢	M١٢	٤٤٠±٠,٥	٢٤٠	M١٠	٢٥٠±٠,٥

٣,٨ 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 ٢٢٠V 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.

٣,٨,١ Control Board Diagram

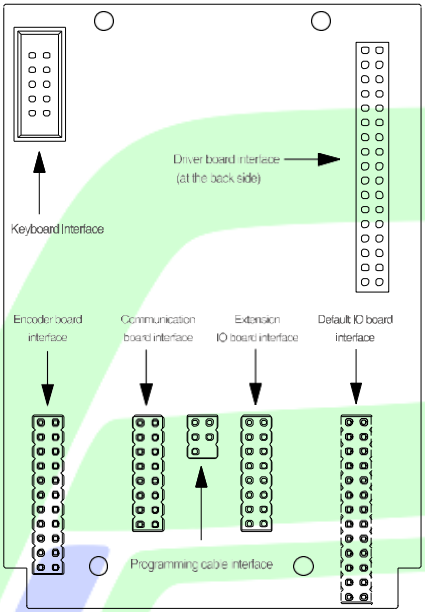


Fig. 3-23 Control Board Diagram

٣,٨,٢ NG٨٠P Wiring Diagram

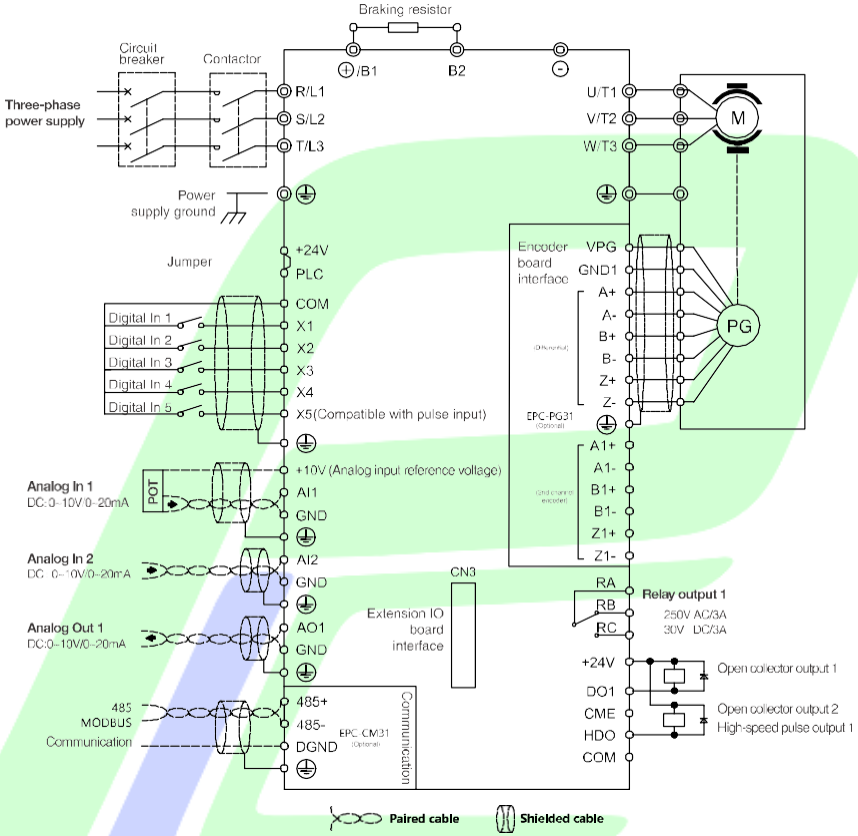


Fig. 3-24 Wiring Diagram

٣,٩ Control Terminal Specification

Table ٣-٨ Default IO board terminal specification (EPC-TM٣١)

Category	Terminal	Terminal designation	Specification
Analog input	+١٠V	Analog input reference voltage	١٠,٣V ±٣٪
			Maximum output current ١٠mA The resistance of external potentiometer should be larger than ١kΩ
	GND	Analog ground	Isolated from COM interiorly
	AI١	Analog input ١	٠~٢٠mA: input impedance - ٥٠٠Ω, maximum input current - ٢٥mA
			٠~١٠V: input impedance - ٢٢kΩ, maximum input voltage - ١٢,٥V
			Switch S١ on control board for jumping between ٠~٢٠mA and ٠~١٠V, factory default: ٠~١٠V
	AI٢	Analog input ٢	٠~٢٠mA: input impedance: ٥٠٠Ω, maximum input current: ٢٥mA
			٠~١٠V: input impedance: ٢٢kΩ, maximum input voltage: ١٢,٥V;
			Switch S٢ on control board for jumping between ٠~٢٠mA and ٠~١٠V, factory default: ٠~١٠V
Analog output	AO١	Analog output ١	٠~٢٠mA: impedance: ٢٠٠Ω~٥٠٠Ω
			٠~١٠V: impedance ≥ ١٠kΩ
			Switch S٣ on control board for jumping between ٠~٢٠mA and ٠~١٠V, factory default: ٠~١٠V
	GND	Analog ground	Isolated from COM interiorly
Digital input	X١~X٤	Digital input Terminals ١~٤	Input: ٢٤VDC, ١٠mA
			Range of frequency: ٠~٢٠٠Hz
			Voltage range: ١٠V~٣٠V
	X٥	Digital input/pulse input	Input: ٢٤VDC, ١٠mA
			Pulse input: ٠Hz～٥٠kHz
	COM	+٢٤V ground	Isolated from GND interiorly

Category	Terminal	Terminal designation	Specification
Digital Output	DO١	Open collector output	Range of voltage: ٠~٢٤V
			Range of current: ٠~٥٠mA
	HDO	Open collector output / pulse output	Open collector output: same as DO١
			Pulse output: ٠~٥٠kHz;
	CME	DO١ reference ground	Reference ground of DO١
	COM	HDO reference ground	Reference ground of HDO
COM Terminal	COM	+٢٤V ground	isolated from GND interiorly
	PLC	COM of digital input terminal	For switching high & low levels, short-circuited with +٢٤V via jumper S٤ as default, i.e. low value of digital input activated
			When power is supplied externally, jumper S٤ must be removed.
	+٢٤V	+٢٤V	٢٤V±١٠٪, isolated from GND interiorly, maximum load ٢٠٠mA
Relay ١ output	RA/RB/RC	Relay output	RA-RB: NC
			RA-RC: NO
			Contact capacity: ٢٥٠VAC/٣A, ٣٠VDC/٣A

Table ٣-٩ Extension IO board terminal specification (EPC-TM٣٢)

Category	Terminal	Terminal designation	Specification
Analog input	AI٣	Analog input ٣	٠~٢٠mA: input impedance - ٥٠٠Ω, maximum input current - ٢٥mA
			٠~١٠V: input impedance - ٢٢kΩ, maximum input voltage - ١٢,٥V
			Switch S٢ on control board for jumping between ٠~٢٠mA and ٠~١٠V, factory default: ٠~١٠V
			Compatible with motor temperature sampling through jumper switch S٤
	AI٤	Analog input ٤	٠-٢٠mA: Input impedance ٥٠٠ Ω, maximum input current ٢٥mA
			٠-١٠V: Input impedance: ٢٢kΩ, maximum input voltage ١٢,٥V

			Switch S٣ on control board for jumping between ٠~٢٠mA and ٠~١٠V, factory default: ٠~١٠V
	LCT	Current leakage detection	Rated current of transformer: ٨٠٠A (≤٢٥٥kW) or ١٥٠٠A (≥٤٠٠kW)
			Transformer turn ratio: ٨٠٠:٥ (≤٢٥٥kW) or ١٥٠٠ : ٥(≥٤٠٠kW)
Analog output	AO٢	Analog output ٢	٠~٢٠mA: impedance: ٢٠٠Ω-٥٠٠Ω
			٠～١٠V: impedance: ≥١٠kΩ
			Switch S١ on control board for jumping between ٠~٢٠mA and ٠~١٠V, factory default: ٠~١٠V
	GND	Analog ground	Internal and COM isolation
Digital input	X٦～X١٠	Digital input ٦-١٠	Input: ٢٤VDC, ١٠mA
			Frequency range: ٠-٢٠٠Hz
			Voltage range: ١٠V~٣٠V
	COM	+٢٤V ground	isolated from GND interiorly
Digital Output	DO٢~DO٤	Open collector output	Voltage range: ٠-٢٤V
			Current range: ٠-٥٠mA
	CME	Reference GND of DO	Reference ground for DO٢~DO٤
STO input	+٢٤	+٢٤V	٢٤V±١٠٪, isolated from GND interiorly, Maximum load: ٢٠٠mA
	STO١	STO signal input ١	STO function is on as default. If the STO function is not used, short-circuit STO١ and+٢٤V externally, as well as short-circuit STO٢ and+٢٤V externally, input : ٢٤VDC, ١٠mA
	STO٢	STO signal input ٢	
Relay ٢ output	TA/TB/TC	Relay output	TA–TB: NC
			TA–TC: NO
			Contact capacity: ٢٥٠VAC/٣A, ٣٠VDC/٣A

Table ٣-١٠ ٤٨٥/CAN communication board terminal specification (EPC-CM٣١/٣٢)

Category	Terminal	Terminal designation	Specification
EPC-CM٣١ (Dual RJ٤٥ interface)	٢ pin	٤٨٥+	Rate: ٤٨٠٠/٩٦٠٠/١٩٢٠٠/٣٨٤٠٠/٥٧٦٠٠/١١٥٢٠٠bps The maximum distance is ٥٠٠ meters (using standard network cable).
	٤ pin	٤٨٥-	
	٨ pin	DGND	Communication signal reference ground, isolated from GND interiorly
EPC-CM٣١A	٣ pin	٤٨٥+	

(Dual RJ٤٥ interface)	٤ pin	٤٨٥-	Rate: ٤٨٠٠/٩٦٠٠/١٩٢٠٠/٣٨٤٠٠/٥٧٦٠٠/١١٥٢٠٠bps The maximum distance is ٥٠٠ meters (using standard network cable).
	٢ pin	DGND	Communication signal reference ground, isolated from GND interiorly
EPC-CM٣١B (Terminal block)	٣ pin	٤٨٥+	Rate: ٤٨٠٠/٩٦٠٠/١٩٢٠٠/٣٨٤٠٠/٥٧٦٠٠/١١٥٢٠٠bps
	٢ pin	٤٨٥-	
	١ pin	DGND	Communication signal reference ground, isolated from GND interiorly
EPC-CM٣٢ (Dual RJ٤٥ interface)	٧ pin	CAN+	Rate: ٤٨٠٠/٩٦٠٠/١٩٢٠٠/٣٨٤٠٠/٥٧٦٠٠/١١٥٢٠٠bps The maximum distance is ٥٠٠ meters (using standard network cable).
	٥ pin	CAN-	
	٢ pin	DGND	Communication signal reference ground, isolated from GND interiorly
EPC-CM٣٢A (Terminal block)	٣ pin	CAN+	Rate: Maximum ١M bps
	٢ pin	CAN-	
	١ pin	DGND	Communication signal reference ground, isolated from GND interiorly

ATTENTION:

When ٤٨٥ communication interface is used, DGND terminal must be well connected to ٤٨٥ communication power supply ground of host computer. Failure to comply may result in damage of system ٤٨٥ 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.

٣,١٠ Control Terminal Usage

٣,١٠,١ Lay-out of Control Terminals

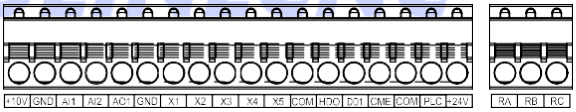


Fig. 3-25 Lay-out of control terminals (Default IO board EPC-TM31)

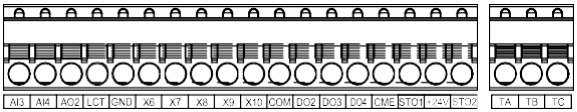


Fig. 3-26 Lay-out of control terminals (Extension IO board EPC-TM32)

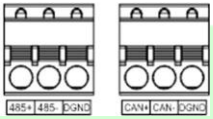


Fig. 3-27 Lay-out of control terminals (485 communication board EPC-CM31B & CAN communication board EPC-CM32A)

ATTENTION:

The above figure shows the corresponding wiring terminals. If the communication board adopts a dual RJ٤٥ network port wiring method, please refer to the pin definitions in Table ٣-١٠.

٣,١٠,٢ Control Terminal Wiring Requirement

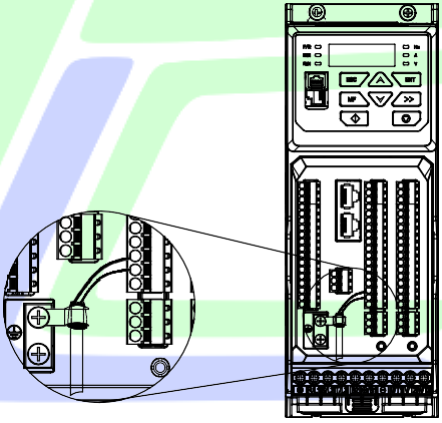


Fig. 3-28 Shielded Cable Grounded

ATTENTION:

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

Table ٣-١١ Control Terminal Wiring Specification

Cable type	Cable requirement ($mm^٢$)
Shielded cable	١,٠

٣,١٠,٣ 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 ٢٠m.

Control cables shall be kept no less than ٢٠cm 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.

٣,١٠,٤ 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 ٢٠m. 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 ٢٠cm 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**

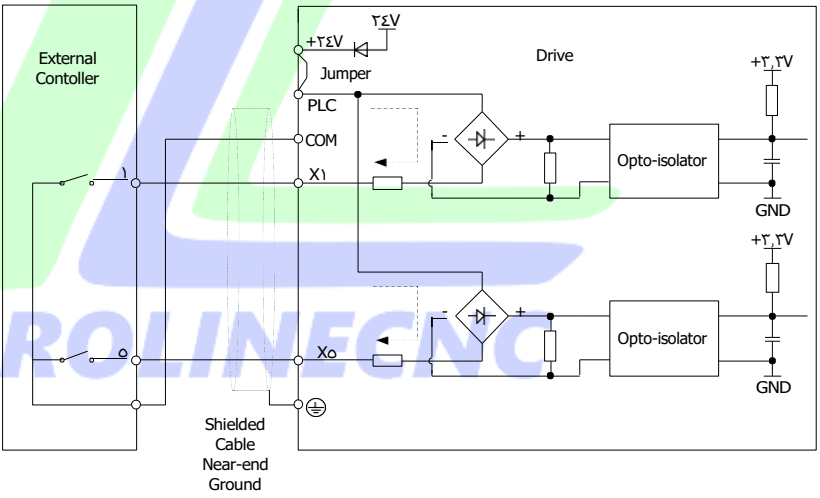


Fig. 3-29 Internal power supply dry contact

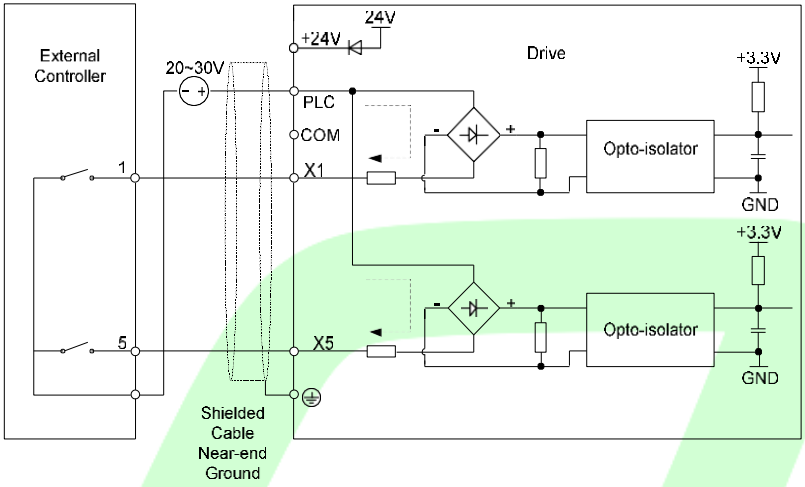


Fig. 3-30 External power supply dry contact

ATTENTION:

When Xo terminal is set to pulse input, it can accept a pulse signal from ٠ to ٥٠kHz.

When external power supply is used, the jumper S٤ between +٢٤V 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 S٤ between +٢٤V 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 DC٢٠~٣٠V. Otherwise, normal operation could not be assured and/or result in equipment damage.

◆ **Open collector NPN connection**

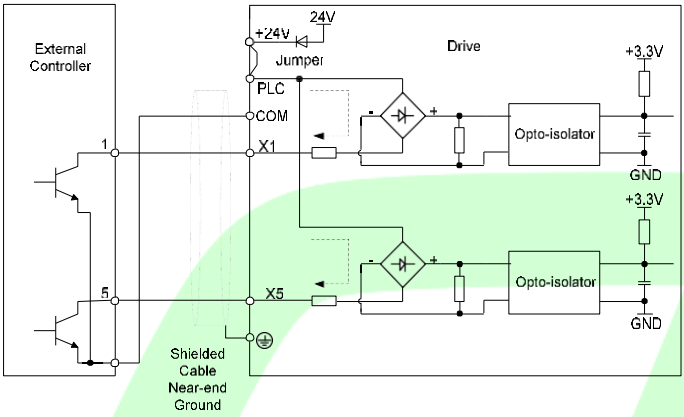


Fig. 3-31 Internal power supply open collector NPN connection

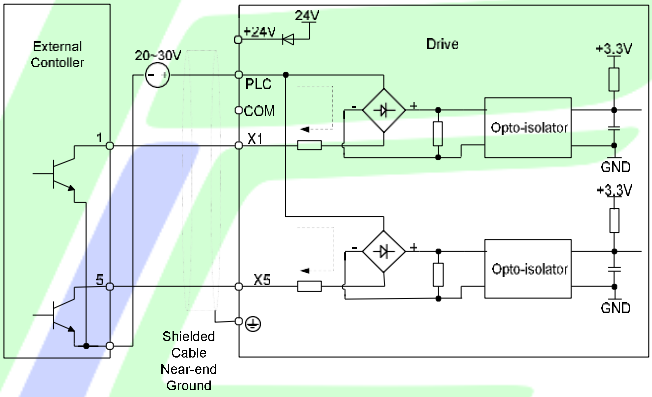


Fig. 3-32 External power supply open collector NPN connection

ATTENTION:

When Xo terminal is set to pulse input, it can accept a pulse signal from ٠ to ٥٠kHz.

When external power supply is used, the jumper S٤ between +٢٤V 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 S٤ between +٢٤V and PLC must be removed. Besides, the voltage range of external power supply should be within the range of DC٢٠~٣٠V. Otherwise normal operation could not be assured and/or hazard of equipment damage exists.

◆ **Open collector PNP connection**

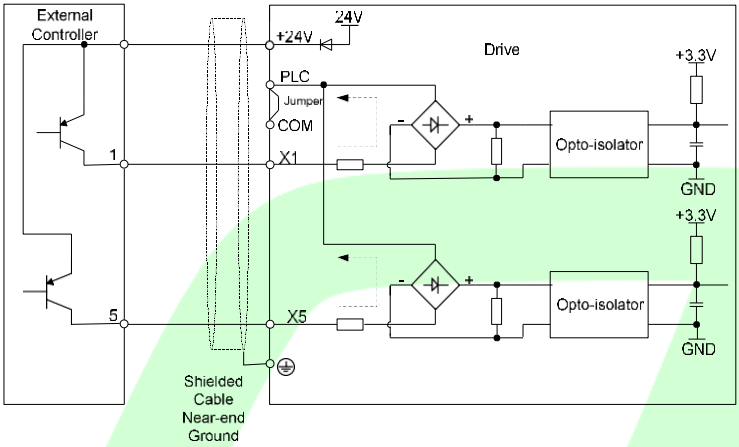


Fig. 3-33 Internal power supply open collector PNP connection

ATTENTION:

When PNP wiring is selected, the jumper S٤ between +٢٤V 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.

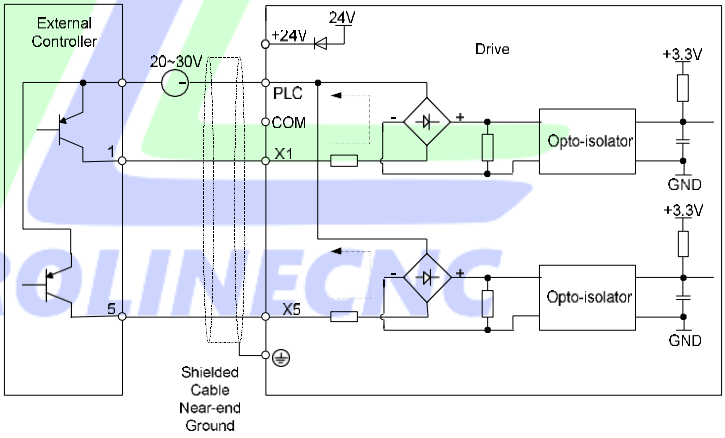


Fig. 3-34 External power supply open collector PNP connection

ATTENTION:

When Xo terminal is set to pulse input, it can accept a pulse signal from ٠ to ٥٠kHz.

When external power supply is used, the jumper S٤ between +٢٤V and PLC must be removed. Otherwise, it may result in equipment damage.

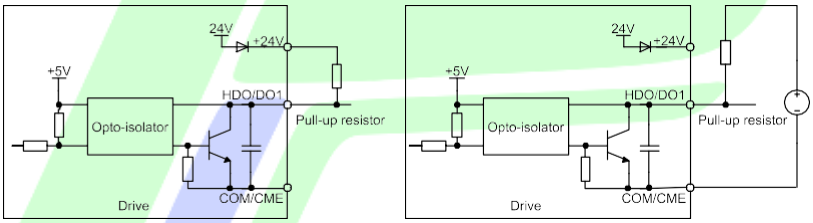
The PNP wiring for the extension IO board is the same as the method of default IO board.

The voltage range of external power supply should be DC٢٠~٣٠V. 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 S٤ between +٢٤V and PLC must be removed. Besides, the voltage range of external power supply should be within the range of DC٢٠~٣٠V. 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**



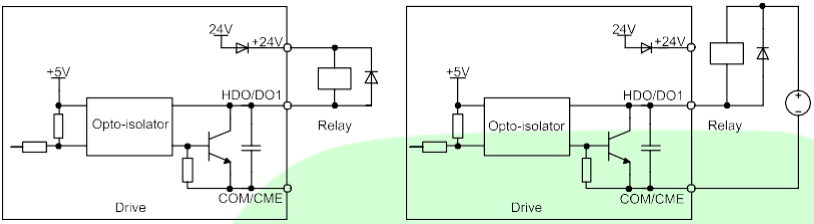
a) Internal power supply b) External power supply

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

ATTENTION:

When set to pulse output, HDO terminal shall output ٠~٥٠kHz pulse signal.

CME and COM are not connected together as default. When DO١ 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 ٢٤V, 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 ٥٠mA.

CME and COM are not connected together as default. When DO١ terminal uses the internal power supply, short-circuit COM and CME.

◆ **Wiring instruction of relay output terminal**

Control boards of NG٨٠P 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 C١-٠٢ in Chapter ٤.

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 C١-٠٣ in Chapter ٤.

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.

٣,١٠,٥ Instruction of IO board jumper signal switch

Table ٣-١٢ Instructions of Jumpers of default IO board (EPC-TM٣١)

Designation	Function	Default setting
S١	Selection of AI١ AI١_I: ٠～٢٠mA AI١_V: ٠～١٠V	٠～١٠V
S٢	Selection of AO١ AO١_I: ٠～٢٠mA AO١_V: ٠～١٠V	٠～١٠V
S٣	Selection of AI٢ AI٢_I: ٠～٢٠mA AI٢_V: ٠～١٠V	٠～١٠V
S٤	Selection between high and low levels of digital input COM P٢٤: PLC and +٢٤V short-circuited COM١: PLC and COM short-circuited (For external power supply, jumper S٤ shall be removed.)	Short-circuited with +٢٤V

Table ٣-١٣ Instructions of Jumpers of Extension IO board (EPC-TM٣٢)

Designation	Function	Default setting
S١	Selection of AO٢ AO٢_I: ٠～٢٠mA AO٢_V: ٠～١٠V	٠～١٠V
S٢	Selection of AI٣ AI٣_I: ٠～٢٠mA AI٣_V: ٠～١٠V	٠～١٠V
S٣	Selection of AI٤ AI٤_I: ٠～٢٠mA AI٤_V: ٠～١٠V	٠～١٠V
S٤	Selection of temperature sensor (corresponding to AI٣, share the same jumper with S٢) **PT100:** KTY٨٤-١٣٠ motor temperature sensor /PT١٠٠ motor temperature sensor PT١٠٠٠:	None

	PT١٠٠٠ motor temperature sensor/ NTC motor temperature sensor	

٣,١١ 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.

٣,١١,١ 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:
  ١) Mount input noise filter at input terminal of the drive;
  ٢) Mount power supply filter at power input terminal of affected equipment;
  ٣) 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 ٢٠cm, 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 ٢mm-thick pipelines or buried cement groove, also, power lines can be put into metallic conduit and grounded well with shielded cables.
- Use ٤-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.

٣,١١,٢ Grounding

Recommended ground electrode is shown in the figure below:

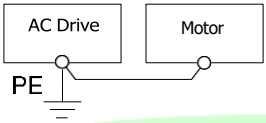


Fig. 3-37 Grounding

- 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 ٤-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.

٣,١١,٣ 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.

٣,١١,٤ 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 ٤ Operation and Run Instructions

٤,١ 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

٤,١,١ Key Functions on Control Panel

On control panel there are ٨ keys whose functions are as shown in Table ٤-١.

Table ٤-١ Key functions on control panel

Indicator	Designation	Meaning
ENT	Enter key	١) Parameter edition enter ٢) Confirmation of parameter settings ٣) Confirmation of MF key function
ESC	Escape key	١) Return function ٢) Invalid parameter edit value
∧	Increase key	١) Increase of selected bit of function code ٢) Increase of selected bit of parameter ٣) Increase of set frequency
∨	Decrease key	١) Decrease of selected bit of function code ٢) Decrease of selected bit of parameter value ٣) Decrease of set frequency
>>	Shift key	١) Selection of parameter serial bit ٢) Selection of parameter serial bit ٣) Selection of stop/run status display parameter value ٤) Fault status switches to parameter display status
RUN	Run key	Run

STOP RESET	Stop/reset key	١) Stop ٢) Fault reset
MF	Multi-function key	See Table ٤-٢ " MF key function definition"

Table ٤-٢ MF key function definition

L٠-٠٠ set value	Function of MF key	Meaning
٠	Disabled	MF key disabled
١	Forward JOG	Forward JOG function
٢	Reverse JOG	Reverse JOG function
٣	Forward/Reverse switch	Run direction forward and reverse switching
٤	Emergency STOP ١	Press MF to STOP, with decel time b٢-٠٩
٥	Emergency STOP ٢	Coast to stop, the drive cuts off output
٦	Run command setting mode switch	Control panel control -> Terminal control -> Communication control -> Control panel control, press ENT to confirm within ٥ seconds

٤,١,٢ Control Panel Indicators

Control panel is furnished with ٧ indicators whose descriptions are as below

Table ٤-٣ 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.

٤,١,٣ 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.

٤,١,٣,١ 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 L١-٠٢ parameters and the » key. For example, when users need to check set frequency as well as the values of bus voltage and AI١ value in stop status, make L١-٠٢=٠٠١٣ (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.

٤,١,٣,٢ 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 L١-٠٠ and L١-٠١ and press » to shift. For example, in run status, when users need to check bus voltage, motor speed, and input terminals status, please set L١-٠٠= ٠٠٨٤ and L١-٠١= ٠٠٠٤, 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.

٤,١,٣,٣ 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 mand 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 .

٤,١,٣,٤ 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

٤,١,٣,٥ 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)

٤,١,٣,٦ 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 A٠-٠٠ 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.

٤,١,٣,٧ 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

٤,١,٣,٨ 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 A٠-٠١ to ٠.

Fig. 4-8 Prompt message status

Prompt message characters and their meanings are shown as specified in Table ٤-٤.

Table ٤-٤ Prompt characters

Prompt symbol	Meaning	Prompt symbol	Meaning
bASIC	When A٠--١ is set to ٠	Cpyb١	Backup parameter value
dISP١	When A٠--١ is set to ١	LoAd	Parameter upload to control panel
USEr	When A٠--١ is set to ٢	dnLd١	Parameter download from control panel (motor parameter excluded)
ndFLt	When A٠--١ is set to ٣	dnLd٢	Parameter download from control panel (motor parameter included)
LoC-١	Control panel locked ١ (full locked)	P-SEt	Password has been set
LoC-٢	Control panel locked ٢ (all locked except RUN, STOP/RESET)	P-CLr	Password cleared
LoC-٣	Control panel locked ٣ (all locked except STOP/RESET)	TUNE	Motor tune in process
LoC-٤	Control panel locked ٤ (all locked except shift >>)	LoU	Drive undervoltage
PrtCt	Control panel protection	CLr-F	Clear fault record
UnLoC	Control panel lock cleared	dEFt١	Restore to factory default parameters (motor parameter excluded)

rECy١	Read the backup parameter value to parameter	dEFt٢	Restore to factory default parameters (motor parameter included)

Table ٤-٥ shows meanings of the characters displayed on control panel.

Table ٤-٥ Meanings of displayed characters

Displayed character	Character Meaning	Displayed character	Character Meaning	Displayed character	Character Meaning	Displayed character	Character Meaning
	٠		A		I		T
	١		b		J		t
	٢		C		L		U
	٣		c		N		v
	٤		d		n		y
	٥		E		o		-
	٦		F		P		٨.
	٧		G		q		.
	٨		H		r		
	٩		h		S		

٤,١,٤ Setting Method of Parameters

٤,١,٤,١ Parameter System

NGA٠P series drive parameter group: A٠~A١, b٠~b٢, C٠~C٤, D٠~Do, E٠~E٢, F٠~F٤, H٠, L٠~L١, U٠~U٢-

Each parameter group contains a number of parameters. Parameters are identified by the combination "parameter group character + parameter subgroup number + parameter number". For instance, "F٣-٠٧" indicates the seventh function code at subgroup ٣, group F.

٤,١,٤,٢ 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. ٤-٩:

Fig. 4-9 First-tier display of parameter

Second-tier display shown in Fig. ٤-١٠:

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

٤,١,٤,٣ 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 (٠~F). Parameter value is composed of the ones, tens, hundreds and thousands place. Shift Key is used to select the bit to be changed, and are used to increase or decrease numerical value.

- Example of parameter password setting
  - Setting of password (A٠٠٠٠ is set to ١٠٠٦)

١) In non-parameter edit status, it displays current parameter A٠-٠٠ when pressiing ENT .
٢) Press ENT to display parameter value ٠٠٠٠ that belongs to A٠-٠٠;
٣) Press ▲ for six times to change the rightmost digit "٠" to "٦";
٤) Press » to move the flashing digit to the leftmost bit;
٥) Press ▲ once to change "٠" in leftmost bit to "١";
٦) Press ENT to save the value of A٠-٠٠, then Control panel will switch to display the next parameter A٠-٠١;
٧) Press ▼ to change A٠-٠١ to A٠-٠٠;
٨) Repeat steps ٢) till ٦). A٠-٠١ will be displayed after control panel displaying **P-Set**;
٩) 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 ٥ minutes, ③ restart the drive.

Flow chart of user password setting:

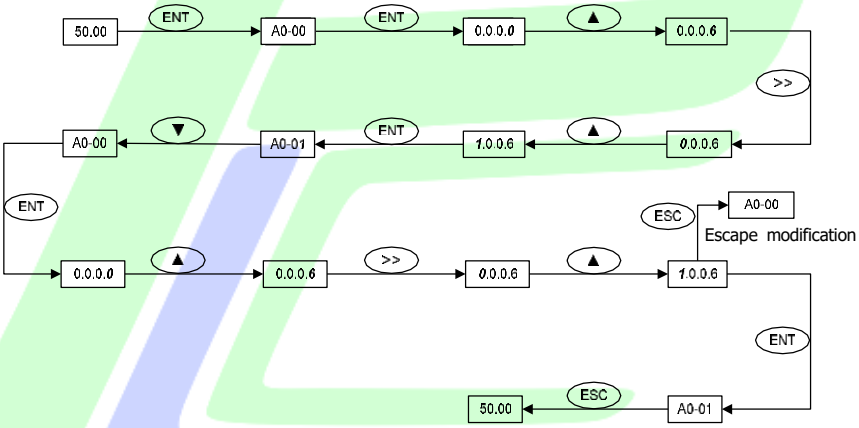


Fig. 4-11 Flow chart of user password setting

ATTENTION:

User's password is successfully set when step ٨ finished, but will not take effect until the completion of step ٩.

◆ **Password authentication**

In non-parameter edit status, press ENT to enter first-tier display A٠-٠٠, then press ENT to enter second-tier display ٠,٠,٠,٠. 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 A٠-٠٠. Password can be cleared by writing value ٠٠٠٠ into A٠-٠٠ for twice.

- **Example of parameter setting**

◆ **Example ١**: modify upper limit frequency from ٦٠٠Hz to ٥٠Hz (change b٠-٠٩ from ٦٠٠,٠٠ to ٥٠,٠٠)

١) In non-parameter edit status, press ENT to display current parameter A٠-٠٠;
٢) Press » to move flashing digit to modification bit (A flashes);
٣) Press ∧ once to change "A" to "b";
٤) Press » to move flashing to modification bit (٠ in ones place flashing);
٥) Press ∧ nine times to change "٠" to "٩";
٦) Press ENT to view the parameter value (٦٠٠,٠٠) of b٠-٠٩;
٧) Press » to move flashing digit to modification digit (٦ flashing);
٨) Press ∨ six times to change "٦" to "٠";
٩) Press » once to move flashing digit rightwards by one bit;
١٠) Press ∧ for five times to change "٠" to "٥";
١١) Press ENT to save the value (٥٠,٠٠) of b٠-٠٩. Then the control panel will automatically switch to display the next function code (b٠-١٠);
١٢) Press ESC to exit parameter edit status.

Flow chart is shown below:

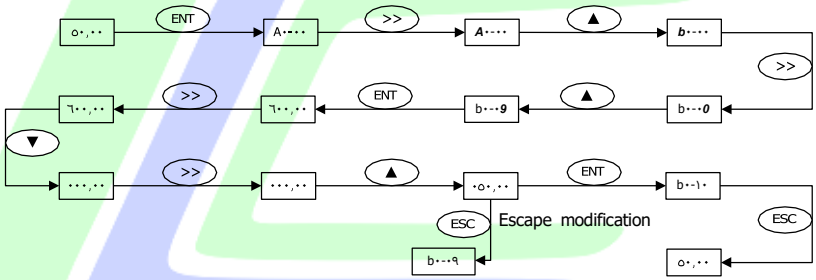


Fig. 4-12 Flow chart of upper limit frequency modification

◆ **Example ٢: user parameter initialization**

١) In non-parameter edit status, press ENT to display current parameter A٠-٠٠;
٢) Press ∧ three times to change "٠" in the rightmost bit of A٠-٠٠ to "٣";
٣) Press ENT to display parameter value ٠ of A٠-٠٣;
٤) Press ∧ once to change "٠" to "٢" or "٣" ("٢" motor parameter excluded, "٣" means motor parameter included);
٥) Press ENT to save the value of A٠-٠٣.Then control panel will automatically display parameter A٠-٠٠;
٦) Press ESC to escape parameter edit status.

Flow chart is shown below:

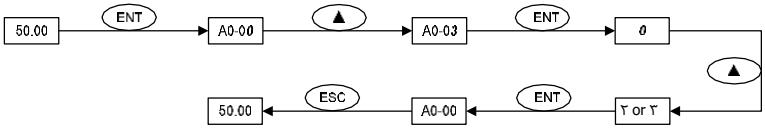


Fig. 4-13 Flow chart of user parameter initialization

◆ **Example ٣**: setting method of hexadecimal parameter

Take L١-٠٢ (LED STOP display parameter) for example, if LED control panel is required to display: setting frequency, bus voltage, AI١, 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 ٤-٦, the corresponding relation between binary numbers and a hexadecimal number.

Table ٤-٦ Corresponding relation between binary and hexadecimal

Binary numbers				Hexadecimal (LED bit display value)
BIT٣	BIT٢	BIT١	BIT٠	
٠	٠	٠	٠	٠
٠	٠	٠	١	١
٠	٠	١	٠	٢
٠	٠	١	١	٣
٠	١	٠	٠	٤
٠	١	٠	١	٥
٠	١	١	٠	٦
٠	١	١	١	٧
١	٠	٠	٠	٨
١	٠	٠	١	٩
١	٠	١	٠	A
١	٠	١	١	B
١	١	٠	٠	C
١	١	٠	١	D
١	١	١	٠	E
١	١	١	١	F

Set the value in the ones place:

As shown in Fig. ٤-١٤, "setting frequency" and "bus voltage" are respectively determined by BIT٠ and BIT١ in ones place of L١-٠٢. If BIT٠=١, setting frequency will be displayed. The bits

that correspond to the parameters which are not required to display shall be set to ٠. Therefore, the value in ones place should be ٠٠١١, corresponding to ٣ in a hexadecimal number. Set the ones place to ٣.

Set the value in tens place:

As shown in Fig. ٤-١٤, since it is required to display "AI١", the binary set value of tens place is ٠٠٠١, corresponding to ١ in a hexadecimal number. Thus, bit of tens place shall be set to ١.

Set the value in hundreds place:

As shown in Fig. ٤-١٤, 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. ٤-١٤, since required to display "running linear speed" and "setting linear speed", the binary set value of thousand place shall be ٠٠١١ that corresponds to ٣ in a hexadecimal number.

To sum up, L١-٠٢ should be set to ٣٠١٣.

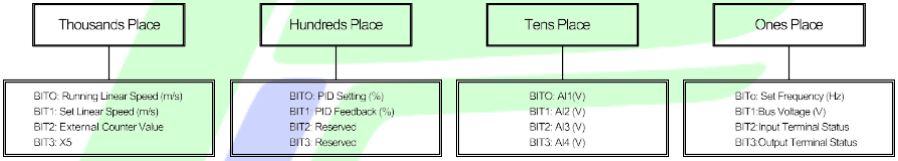


Fig. 4-14 Setting of hexadecimal parameter L1-02

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

١) The parameter cannot be modified, such as actual detection parameters, running recording parameters, etc;

٢) This parameter cannot be modified in run status but could be changed when motor stopped;

٣) Parameter under protection. When parameter A٠-٠٢ is set to ١, parameters cannot be modified as the parameter protection against misoperation enabled. To edit parameter in such a circumstance, it is necessary to set A٠-٠٢ to ٠ as first step.

٤,١,٤,٤ 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 L٠-٠١ for further information.

  Method ١: set the parameter value of L٠-٠١ to non-zero, then press

  ESC + ENT + ∧ simultaneously.

Method ٢: do not operate CONTROL PANEL within five minutes after L٠-٠١ is set to non-zero.

Method ٣: cut the power off and then applying power on after L٠-٠١ parameter is set to non-zero.

Refer to flow chart ٤-١٥ for locking CONTROL PANEL.

- **Unlock control panel**

  To unlock control panel, press ESC + » + ▼ simultaneously. Unlocking won't change the value of parameter L٠-٠١. In other words, control panel will be locked again if the condition of locking control panel is fulfilled. To unlock control panel completely, L٠-٠١ value must be modified to ٠ after unlocking.

Refer to flow chart ٤- ١٦ of unlocking control panel

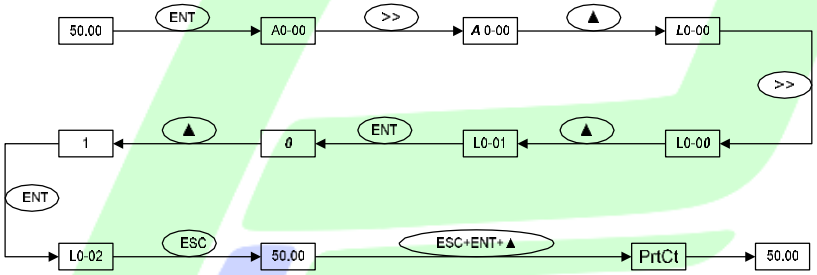


Fig. 4-15 Flow chart of locking control panel

Fig. 4-16 Flow chart of unlocking control panel

٤,٢ First-time Power up

Perform wiring in strict accordance with technical requirements as set forth in Chapter ٣ – mount and Wiring.

٤,٢,١ Flow chart of first-time power up of asynchronous motor

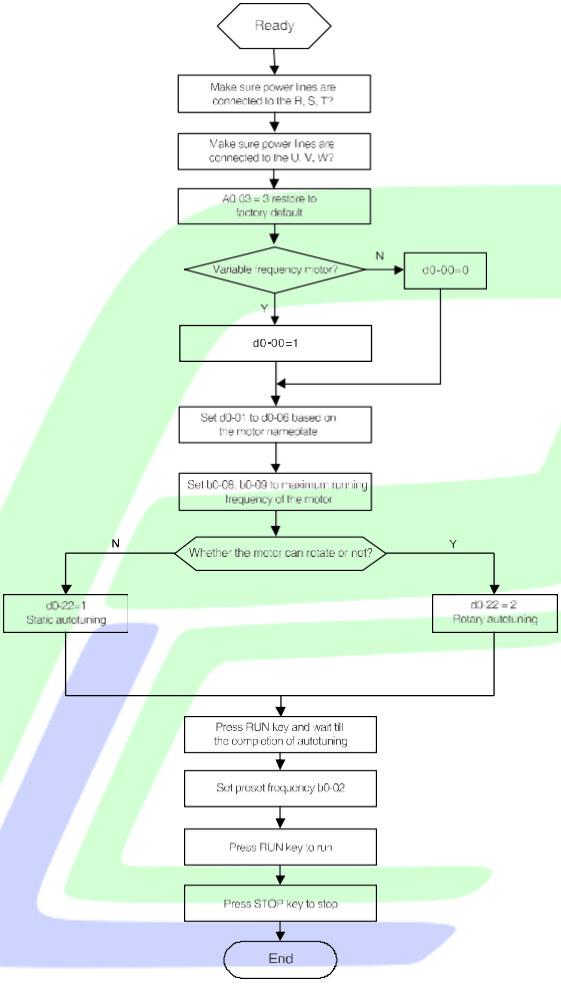


Fig. 4-17 Flow chart of first-time power up for asynchronous motor

Chapter ٥ List of Parameters

NG٨٠P parameter groups are listed below:

Category	Parameter Group	Reference Page
Group A: System Parameters and Parameter Management	A٠: System Parameters	P٧٦-٧٧
	A١: User-defined Display Parameters	P٧٧-٧٨
Group b: Run Parameter Setting	b٠: Frequency Reference	P٧٨-٨١
	b١: Start/Stop Control	P٨١-٨٤
	b٢: Accel/Decel Parameters	P٨٤-٨٥
Group C: Input & Output Terminals	C٠: Digital Input	P٨٦-٩١
	C١: Digital Output	P٩٢-٩٥
	C٢: Analog and Pulse Input	P٩٥-٩٧
	C٣: Analog and Pulse Output	P٩٧-٩٨
	C٤: Automatic Correction of Analog Input	P٩٩-١٠٠
Group d: Motor and Control Parameters	d٠: Parameters of Motor ١	P١٠٠-١٠٢
	d١: V/f Control Parameters of Motor ١	P١٠٢-١٠٣
	d٢: Vector Control Parameters of Motor ١	P١٠٤-١٠٨
	d٣: Parameters of Motor ٢	P١٠٩-١١١
	d٤: V/f Control Parameters of Motor ٢	P١١١-١١٣
	do: Vector Control Parameters of Motor ٢	P١١٣-١١٧
Group E: Enhanced Function and Protection Parameters	E٠: Enhanced Function	P١١٧-١١٨
	E١: Protection Parameters	P١١٨-١٢٣
	E٢: Enhanced Functions of Motor Control	P١٢٣-١٢٤
Group F: Application Parameters	F٠: Process PID	P١٢٥-١٢٧
	F١: Multi-step Frequency	P١٢٧-١٢٨
	F٢: Simple PLC	P١٢٨-١٣٤
	F٤: Position Control	P١٣٤-١٤١
Group H: Communication Parameters	H٠: Communication Parameters	P١٤١
	L٠: Keys of Control Panel	P١٤٢-١٤٤

Category	Parameter Group	Reference Page
Group L: Keys and Display of Control panel Parameters	L١: Control Panel Display Setting	P١٤٥-١٤٧
Group U: Monitoring	U٠: Status Monitoring	P١٤٨-١٥٣
	U١: History fault	P١٥٣-١٥٧
	U٢: Drive Version Information	P١٥٧-١٥٨

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 A٠: System Parameters				
A٠-٠٠	Setting of user password	٠٠٠٠～FFFF	٠٠٠٠	△
A٠-٠١	Parameter display	٠: Display all parameters ١: Only display A٠-٠٠ and A٠-٠١ （Valid for A١-٢٠～A١-٢١ parameter group display/hide） ٢: Only display A٠-٠٠, A٠-٠١ and user-defined parameters A١-٠٠~A١-١٩ ٣: Only display A٠-٠٠, A٠-٠١, and the parameters different from factory default	٠	△

Param.	Designation	Scope	Factory Default	Attr
A٠-٠٢	Parameter protection	٠: All parameter programmable ١: Only A٠-٠٠ and this parameter programmable	٠	△
A٠-٠٣	Parameter restoration	٠: No operation ١: Clear fault record ٢: Restore all parameters to factory default (prior to U٠ group, excluding motor parameters) ٣: Restore all parameters to factory default (prior to U٠ group, including motor parameters) ٤: Restore all parameters to backup parameters (prior to U٠ group)	٠	×
A٠-٠٤	Parameter backup	٠: No operation ١: Backup all parameters (prior to U٠ group)	٠	×
A٠-٠٥	Parameter copy	٠: No operation ١: Upload parameter ٢: Download parameter (excluding motor parameters) ٣: Download parameter (including motor parameters)	٠	×
A٠-٠٨	Motor ١ / motor ٢ selection	٠: Motor ١ ١: Motor ٢	٠	×
A٠-٠٩	Motor control technique	Ones place: motor ١ control technique Tens place: motor ٢ control technique ٠: V/f control ١: Sensor-less vector control ١	٠٠	×

Param.	Designation	Scope	Factory Default	Attr
		٢: Sensor-less vector control ٢ ٣. Closed-loop vector control Note: Torque control is not available if set to ٠ or ١)		
Group A١: User-defined Display Parameters				
A١-٠٠- A١-١٩	User-defined display parameter ١-٢٠	Setting range of thousands place: A, b, C, d, E, F, H, L, U Setting range of hundreds place: ٠~٩ Setting range of tens place: ٠~٩ Setting range of ones place: ٠~٩	٠	×
A١-٢٠	Parameter group display/hide setting ١	٠～FFFF	FFFF	×
A١-٢١	Parameter group display/hide setting ٢	٠～FFFF	FFFF	×
Group b Run Parameter Setting				
Group b٠ Frequency Reference				
b٠-٠٠	FREQ set mode	٠: Master frequency reference ١: Master & auxiliary computation result ٢: Switch between master and auxiliary frequency reference ٣: Switch between master frequency reference, and master & auxiliary computation result ٤: Switch between auxiliary frequency reference, and master & auxiliary computation result	٠	×

Param.	Designation	Scope	Factory Default	Attr
b٠-٠١	Master FREQ set	٠: Digital setting (b٠-٠٢) + control panel ∧/∨ adjustment ١: Digital setting (b٠-٠٢) + terminal UP/DOWN adjustment ٢: AI١(on default IO board) ٣: AI٢ (on default IO board) ٤: AI٣ (on extension IO board) ٥: A٤ (on extension IO board) ٦: X٥ pulse input ٧: Process PID output ٨: PLC ٩: Multi-step speed ١٠: Communication input ١١: PA/PB input ١٢. Rotating knob keypad input	٠٠	×
b٠-٠٢	Master FREQ digital setting	b٠-١٠～b٠-٠٩	٥٠,٠٠Hz	△
b٠-٠٣	Auxiliary FREQ set	٠: No command ١: Digital setting (b٠-٠٢) + Control panel ∧/∨ adjustment ٢: Digital setting (b٠-٠٤) + terminal UP/DOWN adjustment ٣: AI١(on default IO board) ٤: AI٢(on default IO board) ٥: AI٣ (on extension IO board) ٦: AI٤ (on extension IO board) ٧: X٥ pulse input ٨: Process PID output	٠٠	×

Param.	Designation	Scope	Factory Default	Attr
		٩: PLC ١٠: Multi-step speed ١١: Communication ١٢: Rotating knob keypad input		
b٠-٠٤	Auxiliary FREQ digital setting	Lower limit frequency ~ upper limit frequency	٠,٠٠Hz	△
b٠-٠٥	Auxiliary FREQ range	٠: Relative to maximum frequency ١: Relative to master frequency	٠	×
b٠-٠٦	Auxiliary FREQ coeff	٠,٠٪~١٠٠,٠٪	١٠٠,٠٪	△
b٠-٠٧	Computation of master and auxiliary FREQ	٠: Master + auxiliary ١: Master - auxiliary ٢: Max {master, auxiliary} ٣: Min {master, auxiliary}	٠	×
b٠-٠٨	Maximum FREQ	Upper limit frequency ~٦٠٠,٠٠Hz	٥٠,٠٠Hz	×
b٠-٠٩	Upper limit FREQ	Lower limit frequency ~ maximum frequency	٥٠,٠٠Hz	×
b٠-١٠	Lower limit FREQ	٠,٠٠Hz~upper limit frequency	٠,٠٠Hz	×
b٠-١١	Operation when set FREQ lower than lower limit FREQ	٠: Run at lower limit frequency ١: Run at ٠ Hz ٢: Stop	٠	×
b٠-١٢	Time-delay of stop when set FREQ lower than lower limit FREQ	٠,٠s ~ ٦٥٥٣,٥s	٠,٠s	×
b٠-١٣	Lower limit of skip FREQ band ١	٠,٠٠Hz~upper limit frequency	٠,٠٠Hz	×
b٠-١٤	Upper limit of skip FREQ band ١	٠,٠٠Hz~upper limit frequency	٠,٠٠Hz	×
b٠-١٥	Lower limit of skip FREQ band ٢	٠,٠٠Hz~upper limit frequency	٠,٠٠Hz	×

Param.	Designation	Scope	Factory Default	Attr
b٠-١٦	Upper limit of skip FREQ band ٢	٠,٠٠Hz~upper limit frequency	٠,٠٠Hz	×
b٠-١٧	Lower limit of skip FREQ band ٣	٠,٠٠Hz~upper limit frequency	٠,٠٠Hz	×
b٠-١٨	Upper limit of skip FREQ band ٣	٠,٠٠Hz~upper limit frequency	٠,٠٠Hz	×
b٠-١٩	Jog FREQ	٠,٠٠Hz~upper limit frequency	٥,٠٠Hz	△
Group b١: Start/Stop Control				
b١-٠٠	Run command	٠: Control panel control ١: Terminal control ٢: Communication control	٠	×
b١-٠١	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: ٠: No binding ١: Digital setting (b٠-٠٢) + control panel ∧ / ∨ adjustment ٢: Digital setting (b٠-٠٢) + terminal UP/DOWN adjustment ٣: Analog input AI١ ٤: Analog input AI٢ ٥: Analog input AI٣ (on extension IO board) ٦: Analog input AI٤ (on extension IO	٠٠٠	×

Param.	Designation	Scope	Factory Default	Attr
		board) ٧. Xo pulse input ٨: Process PID output ٩: PLC A: Multi-step frequency B: Communication input C. PA/PB input D. Rotating knob keypad input		
b١-٠٢	Run direction	٠: Forward ١: Reverse	٠	△
b١-٠٣	Reverse disabled	٠: Reverse enabled ١: Reverse disabled	٠	×
b١-٠٤	Dead time between forward and reverse	٠,٠s～٣٦٠٠,٠s	٠,٠s	△
b١-٠٥	Start method	٠: From start frequency (b١-٠٦) ١: DC injection braking start ٢: Flying start	٠	×
b١-٠٦	Start FREQ	٠,٠٠Hz~upper limit frequency	٠,٠٠Hz	×
b١-٠٧	Holding time of start FREQ	٠,٠s～٣٦٠٠,٠s	٠,٠s	△
b١-٠٨	DC braking current at start	٠,٠٪～١٠٠,٠٪	٠,٠٪	△
b١-٠٩	DC braking time at start	٠,٠٠s～٣٠,٠٠s	٠,٠٠s	△
b١-١٠	Flying start current	٠,٠٪～٢٠٠,٠٪	١٠٠,٠٪	△
b١-١١	Flying start Decel time	٠,١s～٢٠,٠s	٢,٠s	△
b١-١٢	Flying start V/F coeff	٠,٠٪～١٠٠,٠٪	١,٠٪	△
b١-١٣	Stop method	٠: Ramp to stop ١: Coast to stop ٢: Ramp to stop + DC injection brake	٠	×

Param.	Designation	Scope	Factory Default	Attr
b١-١٤	Start FREQ of DC brake stop	٠,٠٠Hz~upper limit frequency	٠,٠٠Hz	△
b١-١٥	DC brake current	٠,٠٪～١٠٠,٠٪	٠,٠٪	△
b١-١٦	DC brake time	٠,٠٠s～٣٠,٠٠s	٠,٠٠s	△
b١-١٧	Overexcitation brake	٠: Disabled ١: Enabled based on DC bus voltage ٢: Enabled on ١٢٠٪ rated voltage ٣: Enabled on ١٢٥٪ rated voltage ٤: Enabled on ١٣٠٪ rated voltage ٥: Enabled on ١٣٥٪ rated voltage ٦: Enabled on ١٤٠٪ rated voltage ٧:Enabled on ١٤٥٪ rated voltage ٨: Enabled on ١٥٠٪ rated voltage	١	×
b١-١٨	Dynamic brake	٠: disabled ١: enabled	٠	×
b١-١٩	Dynamic brake threshold voltage	٦٥٠V～٧٥٠V	٧٢٠V	×
b١-٢٠	Auto restart when power up again after power loss	٠: disabled ١: enabled	٠	×
b١-٢١	Time delay of auto restart when power up again	٠,٠s～١٠,٠s	٠,٠s	△
b١-٢٢	Flying start mode	Ones place: first -time power up search frequency ٠: Search from zero frequency ١: Search from the set frequency ٢: Search from the maximum frequency Tens place: Search from the opposite	٠٠	×

Param.	Designation	Scope	Factory Default	Attr
		direction enabled ٠: search from one direction ١: Search from two directions		
Group b٢: Accel/Decel Parameters				
b٢-٠٠	Accel/Decel time resolution	٠: ٠,٠١s ١: ٠,١s ٢: ١s	١	×
b٢-٠١	Accel time ١	٠s～٦٠٠,٠٠s/٦٠٠٠,٠s/٦٠٠٠٠s (٦,٠s for ١٥kW and below, ٢٠,٠s for ١٨,٥kW and above)	Model dependent	△
b٢-٠٢	Decel time ١			△
b٢-٠٣	Accel time ٢	٠,٠～٦٠٠,٠٠ s/ ٦٠٠٠,٠ s/٦٠٠٠ s	٦,٠s	△
b٢-٠٤	Decel time ٢	٠,٠～٦٠٠,٠٠ s/ ٦٠٠٠,٠ s/٦٠٠٠ s	٦,٠s	△
b٢-٠٥	Accel time ٣	٠,٠～٦٠٠,٠٠ s/ ٦٠٠٠,٠ s/٦٠٠٠ s	٦,٠s	△
b٢-٠٦	Decel time ٣	٠,٠～٦٠٠,٠٠ s/ ٦٠٠٠,٠ s/٦٠٠٠ s	٦,٠s	△
b٢-٠٧	Accel time ٤	٠,٠～٦٠٠,٠٠ s/ ٦٠٠٠,٠ s/٦٠٠٠ s	٦,٠s	△
b٢-٠٨	Decel time ٤	٠,٠～٦٠٠,٠٠ s/ ٦٠٠٠,٠ s/٦٠٠٠ s	٦,٠s	△
b٢-٠٩	Decel time for emergency stop	٠,٠～٦٠٠,٠٠ s/ ٦٠٠٠,٠ s/٦٠٠٠ s	٦,٠s	△
b٢-١٠	Jog Accel time	٠,٠～٦٠٠,٠٠ s/ ٦٠٠٠,٠ s/٦٠٠٠ s	٦,٠s	△
b٢-١١	Jog Decel time	٠,٠～٦٠٠,٠٠ s/ ٦٠٠٠,٠ s/٦٠٠٠ s	٦,٠s	△
b٢-١٢	Accel/Decel curve	٠: Linear Accel/Decel ١: Broken-line Accel/Decel ٢: S-curve Accel/Decel A ٣: S-curve Accel/Decel B	٠	×
b٢-١٣	Accel time switching FREQ of broken-line Accel/Decel	٠,٠٠Hz ~ Maximum	٠,٠٠Hz	△

Param.	Designation	Scope	Factory Default	Attr
b٢-١٤	Decel time switching FREQ of broken-line Accel/Decel	٠,٠٠Hz ~ maximum frequency	٠,٠٠Hz	△
b٢-١٥	Time of Accel S-curve first segment	٠,٠٠s～٦٠,٠٠s (S-curve A)	٠,٢٠s	△
b٢-١٦	Time of Accel S-curve last segment	٠,٠٠s～٦٠,٠٠s (S-curve A)	٠,٢٠s	△
b٢-١٧	Time of Decel S-curve first segment	٠,٠٠s～٦٠,٠٠s (S-curve A)	٠,٢٠s	△
b٢-١٨	Time of Decel S-curve last segment	٠,٠٠s～٦٠,٠٠s (S-curve A)	٠,٢٠s	△
b٢-١٩	Proportion of Accel S-curve first segment	٠,٠٪～١٠٠,٠٪ (S-curve B)	٢٠,٠٪	△
b٢-٢٠	Proportion of Accel S-curve last segment	٠,٠٪～١٠٠,٠٪ (S-curve B)	٢٠,٠٪	△
b٢-٢١	Proportion of Decel S-curve first segment	٠,٠٪～١٠٠,٠٪ (S-curve B)	٢٠,٠٪	△
b٢-٢٢	Proportion of Decel S-curve last segment	٠,٠٪～١٠٠,٠٪ (S-curve B)	٢٠,٠٪	△
Group C: Input & Output Terminals				
Group C٠: Digital Input				

Param.	Designation	Scope	Factory Default	Attr
C٠-٠٠	Enabled condition of run command terminals when power up	This function is only for digital terminals with parameter value ١~٤ (forward/reverse jog, and forward/reverse run), and also is only for initial run after power up ٠: 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. ١: 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.	٠	×
C٠-٠١	Function of terminal X١	٠: No function ١: JOG forward ٢: JOG reverse ٣: Running forward (FWD) ٤: Running reverse (REV) ٥: Three-wire control ٦: Running suspended ٧: External stop ٨: Emergency stop ٩: DC injection brake stop ١ ١٠: DC injection braking stop ٢ ١١: Coast to stop	٣	×
C٠-٠٢	Function of terminal X٢		٤	×
C٠-٠٣	Function of terminal X٣		١	×
C٠-٠٤	Function of terminal X٤		٢٣	×
C٠-٠٥	Function of terminal X٥		٠	×
C٠-٠٦	Function of terminal X٦ (on extension IO board)		٠	×
C٠-٠٧	Function of terminal X٧ (on extension IO board)		٠	×

Param.	Designation	Scope	Factory Default	Attr
C٠-٠٨	Function of terminal X٨ (on extension IO board)	١٢: Terminal UP ١٣: Terminal DOWN ١٤: UP/DOWN (including ∧/∨ key) adjustment clear ١٥: Multi-step frequency terminal ١ ١٦: Multi-step frequency terminal ٢ ١٧: Multi-step frequency terminal ٣ ١٨: Multi-step frequency terminal ٤ ١٩: Accel/Decel time determinant ١ ٢٠: Accel/Decel time determinant ٢ ٢١: Accel/Decel disabled ٢٢: External fault input ٢٣: Fault reset (RESET) ٢٤: Pulse input (valid only for X٥) ٢٥: Motor ١/٢ switchover ٢٦: Speed/Torque control switch ٢٧: Run command switched to control panel control ٢٨: Run command switched to terminal control ٢٩: Run command switched to communication control ٣٠: FREQ reference mode shift ٣١: Master FREQ reference switched to digital setting b٠٠٠٢ ٣٢: Auxiliary FREQ reference switched to digital setting b٠٠٠٤ ٣٣: PID adjustment direction ٣٤: PID paused	٠	×
C٠-٠٩	Function of terminal X٩ (on extension IO board)		٠	×
C٠-١٠	Function of terminal X١٠ (on extension IO board)		٠	×
C٠-١١	Function of terminal AI١ (Digital enabled)		٠	×
C٠-١٢	Function of terminal AI٢ (Digital enabled)		٠	×
C٠-١٣	Function of terminal AI٣ (Digital enabled)		٠	×
C٠-١٤	Function of terminal AI٤ (Digital enabled)		٠	×

Param.	Designation	Scope	Factory Default	Attr
		٣٥: PID integration paused ٣٦: PID parameter switch ٣٧: Count input ٣٨: Count clear ٣٩: Reserved ٤٠: Reserved ٤١: Zero-speed clamping enabled ٤٢: Spindle orientation enabled ٤٣: Stop position terminal selection ١ for spindle orientation ٤٤: Stop position terminal selection ٢ for spindle orientation ٤٥: Origin signal input ٤٦: Forward carry ٤٧: Reverse carry ٤٨: Carry terminal selection ١ ٤٩: Carry terminal selection ٢ ٥٠: Carry terminal selection ٣ ٥١: Pulse position control pulse input ٥٢: Position reference direction input ٥٣: Clear positioning pulse ٥٤-٥٦: Reserved ٥٧: Spindle gear ratio terminal selection ٥٨: Find the origin ٥٩: Spindle orientation enabled and run ٦٠: Pulse tracking enabled and run ٦١: Zero speed clamping enabled and		

Param.	Designation	Scope	Factory Default	Attr
		run ٦٢: Reserved ٦٣: PLC paused ٦٤: PLC disabled ٦٥: PLC stop memory clear ٦٦-٦٧: Reserved ٦٨: Running prohibited ٦٩: DC injection brake when running ٧٠: Analog input curve switchover ٧١: Pulse tracking enabled ٧٢: Reserved ٧٣: Analog signal gain switch ٧٤-٧٥: Reserved ٧٦: Stop position terminal selection ٣ for spindle orientation ٧٧~٩٩: Reserved		
C٠-١٥	Filtering time of digital input terminal	٠,٠٠٠～١,٠٠٠s	٠,٠١٠s	△
C٠-١٦	Delay time of terminal X١	٠,٠s～٣٦٠٠,٠s	٠,٠s	△
C٠-١٧	Delay time of terminal X٢	٠,٠s～٣٦٠٠,٠s	٠,٠s	△
C٠-١٨	Digital input terminal enabled status setting ١	Ones place: X١ ٠: Positive logic ١: Negative logic Tens place: X٢ (same as ones place) Hundreds place: X٣ (same as ones place) Thousands place: X٤ (same as ones place)	٠٠٠٠	△

Param.	Designation	Scope	Factory Default	Attr
C٠-١٩	Digital input terminal enabled status setting ٢	Ones place: X٥ ٠: Positive logic ١: Negative logic Tens place: X٦ (same as ones place) Hundreds place: XV (same as ones place) Thousands place: XΛ (same as ones place)	٠٠٠٠	△
C٠-٢٠	Digital input terminal enabled status setting ٣	Ones place: X٩ ((on extension IO board) ٠: Positive logic ١: Negative logic Tens place: X١٠ ((on extension IO board) Hundreds place: AI١ Thousands place: AI٢	٠٠٠٠	△
C٠-٢١	Digital input terminal enabled status setting ٤	Ones place: AI٣ ((on extension IO board) ٠: Positive logic ١: Negative logic Tens place: AI٤ (on extension IO board) ٠: Positive logic ١: Negative logic Hundreds place: Reserved Thousands place: Reserved	٠٠	△
C٠-٢٢	Terminal UP/DOWN frequency adjustment control	Ones place: action when stop ٠: Clear ١: Holding	٠٠٠٠	△

Param.	Designation	Scope	Factory Default	Attr
		Tens place: action on power loss ٠: Clear ١: Holding Hundreds place: integral function ٠: No integral function ١: Integral function enabled Thousands place: run direction ٠: Unable to change the direction ١: Enable to change the direction		
C٠-٢٣	Terminal UP/DOWN frequency change step size	٠,٠٠Hz/s～١٠٠,٠٠Hz/s	٠,٠٣Hz/s	△
C٠-٢٤	FWD/REV terminal control mode	٠: Two-wire mode ١ ١: Two-wire mode ٢ ٢: Three-wire mode ١ ٣: Three-wire mode ٢	٠	×
C٠-٢٥	Option of virtual input terminal	٠٠٠～٣FFF ٠: Actual terminal in effect ١: Virtual terminal in effect Ones place: BIT٠～BIT٣: X١～X٤ Tens place: BIT٤～BIT٦: X٥～X٨, Hundreds place: BIT٠～BIT٣: X٩～X١٠,AI١,AI٢ Thousands place: BIT٠～BIT١: AI٣, AI٤ (Note: X٦-X١٠, AI٣-AI٤ are on the extension IO board)	٠٠٠٠	×
C٠-٢٦	Enabled condition of run command terminal after fault reset	٠: Trigger edge detected + ON detected ١: ON detected	٠	△

Param.	Designation	Scope	Factory Default	Attr
Group C١: Digital Output				
C١-٠٠	HDO output function	٠: No output ١: Drive undervoltage ٢: Drive run preparation completed ٣: Drive is running ٤: Drive in ٠Hz running (no output at stop) ٥: Drive in ٠Hz running (output at stop) ٦: Run direction ٧: Frequency attained ٨: Upper limit frequency attained ٩: Lower limit frequency attained ١٠: Frequency higher than FDT ١ ١١: Frequency higher than FDT ٢ ١٢: Speed being restricted (torque control mode) ١٣: Torque being restricted (speed control mode) ١٤: Fault output ١٥: Alarm output ١٦: Drive (motor) overloaded alarm ١٧: Drive thermal alarm ١٨: Zero current detection ١٩: X١ ٢٠: X٢ ٢١: Motor ١/ ٢ indication ٢٢-٢٤: Reserved ٢٥: Consecutive run time attained ٢٦: Accumulative run time attained	٠	△
C١-٠١	DO١ output function		٠	△
C١-٠٢	DO٢ output function (on extension IO board)		٠	△
C١-٠٣	DO٣ output function (on extension IO board)		٠	△
C١-٠٤	DO٤ output function (on extension IO board)		٠	△
C١-٠٥	Relay output function selection on default IO board		١٤	△
C١-٠٦	Relay output function selection on extension IO board		١٥	△

Param.	Designation	Scope	Factory Default	Attr
		٢٧: Reserved ٢٨: Position completed ٢٩: Position approaching ٣٠: PLC step completed ٣١: PLC cycle completed ٣٢: Reserved ٣٣: The upper/lower limit of set frequency obtained ٣٤: Positioning completed ٣٥: Carry completed ٣٦-٩٩: Reserved		
C١-٠٧	HOD output delay time	٠,٠～٣٦٠٠,٠s	٠,٠s	△
C١-٠٨	DO١ output delay time	٠,٠～٣٦٠٠,٠s	٠,٠s	△
C١-٠٩	DO٢ output delay time (on extension IO board)	٠,٠～٣٦٠٠,٠s	٠,٠s	△
C١-١٠	DO٣ output delay time (on extension IO board)	٠,٠～٣٦٠٠,٠s	٠,٠s	△
C١-١١	DO٤ output delay time (on extension IO board)	٠,٠～٣٦٠٠,٠s	٠,٠s	△
C١-١٢	Relay output delay time of default IO board	٠,٠～٣٦٠٠,٠s	٠,٠s	△
C١-١٣	Relay output delay time of extension board	٠,٠～٣٦٠٠,٠s	٠,٠s	△
C١-١٤	Digital output terminal enabled status setting ١	Ones place: HDO ٠: Positive logic ١: Negative logic Tens place: Relay output R١ on default IO board (Same as ones place) Hundreds place: Relay output R٢	٠٠٠٠	×

Param.	Designation	Scope	Factory Default	Attr
		(Same as ones place) Thousands place: Reserved		
C١-١٥	Digital output terminal enabled status setting ٢	Ones place: DO١ ٠: Positive logic ١: Negative logic Tens place: DO٢ (Same as ones place) Hundreds place: DO٣ (Same as ones place) Thousands place: DO٤ (Same as ones place)	٠٠٠٠	×
C١-١٦	Detective object of frequency doubling technology (FDT)	Ones place: FDT١ detective object ٠: Set value of speed (frequency after Accel/Decel) ١: Detected speed value Tens place: FDT٢ detective object ٠: Set value of speed (frequency after Accel/Decel) ١: Detected speed value	٠٠	△
C١-١٧	FDT١ upper value	٠,٠٠Hz～b٠-٠٨	٥٠,٠٠Hz	△
C١-١٨	FDT١ lower value	٠,٠٠Hz～b٠-٠٨	٤٩,٠٠Hz	△
C١-١٩	FDT٢ upper value	٠,٠٠Hz～b٠-٠٨	٢٥,٠٠Hz	△
C١-٢٠	FDT٢ lower value	٠,٠٠Hz～b٠-٠٨	٢٤,٠٠Hz	△
C١-٢١	Detection width of frequency attained	٠,٠٠Hz～b٠-٠٨	٢,٥٠Hz	△

Param.	Designation	Scope	Factory Default	Attr
C١-٢٢	Zero current detection level	٠,٠٪～٥٠,٠٪	٥,٠٪	△
C١-٢٣	Zero current detection time	٠,٠١s～٥٠,٠٠s	٠,٥٠s	△
Group C٢: Analog and Pulse Input				
C٢-٠٠	Analog input curve	Ones place: AI١ input curve ٠: Curve ١ (٢ points) ١: Curve ٢ (٤ points) ٢: Curve ٣ (٤ points) ٣: AI Curve X terminal switchover Tens place: AI٢ input curve (same as ones place) Hundreds place: AI٣ input curve (same as ones place, IO option board) Thousands place: AI٤ input curve (same as ones place, IO option board)	٢٢١٠	×
C٢-٠١	Curve ١ maximum input	Curve ١ minimum input ~ ١١٠,٠٪	١٠٠,٠٪	△
C٢-٠٢	Corresponding set value of curve ١ maximum input	-١٠٠,٠٪～١٠٠,٠٪	١٠٠,٠٪	△
C٢-٠٣	Curve ١ minimum input	-١١٠,٠٪～ Curve ١ maximum input	٠,٠٪	△
C٢-٠٤	Corresponding set value of curve ١ minimum input	-١٠٠,٠٪～١٠٠,٠٪	٠,٠٪	△
C٢-٠٥	Curve ٢ maximum input	Range: input of curve ٢ inflection point A~١١٠,٠٪	١٠٠,٠٪	△
C٢-٠٦	Corresponding set value of curve ٢ maximum input	-١٠٠,٠٪～١٠٠,٠٪	١٠٠,٠٪	△

Param.	Designation	Scope	Factory Default	Attr
C٢-٠٧	Input of curve ٢ inflection point A	input of curve ٢ inflection point B ~ maximum input of curve ٢	٠,٠٪	△
C٢-٠٨	Set value corresponding to input of curve ٢ inflection point A	-١٠٠,٠٪～١٠٠,٠٪	٠,٠٪	△
C٢-٠٩	Input of curve ٢ inflection point B	minimum input of curve ٢~input of curve ٢ inflection point A	٠,٠٪	△
C٢-١٠	Set value corresponding to input of curve ٢ inflection point B	-١٠٠,٠٪～١٠٠,٠٪	٠,٠٪	△
C٢-١١	Curve ٢ minimum input	-١١٠,٠٪～input of curve ٢ inflection point B	-١٠٠,٠٪	△
C٢-١٢	Set value corresponding to curve ٢ minimum input	-١٠٠,٠٪～١٠٠,٠٪	-١٠٠,٠٪	△
C٢-١٣	Curve ٢ maximum input	input of curve ٢ inflection point A～ ١١٠,٠٪	١٠٠,٠٪	△
C٢-١٤	Set value corresponding to curve ٢ maximum input	-١٠٠,٠٪～١٠٠,٠٪	١٠٠,٠٪	△
C٢-١٥	Input of curve ٣ inflection point A	input of curve ٣ inflection point B～ maximum input of curve ٣	٠,٠٪	△
C٢-١٦	Set value corresponding to input of curve ٣ inflection point A	-١٠٠,٠٪～١٠٠,٠٪	٠,٠٪	△
C٢-١٧	Input of curve ٣ inflection point B	minimum input of curve ٣~input of curve ٣ inflection point A	٠,٠٪	△
C٢-١٨	Set value corresponding to input of curve ٣ inflection point B	-١٠٠,٠٪～١٠٠,٠٪	٠,٠٪	△

Param.	Designation	Scope	Factory Default	Attr
C٣-١٩	Curve ٣ minimum input	-١١٠,٠٪～input of curve ٣ inflection point B	٠,٠٪	△
C٣-٢٠	Set value corresponding to curve ٣ minimum input	-١٠٠,٠٪～١٠٠,٠٪	٠,٠٪	△
C٣-٢١	AI١ terminal filtering time	٠,٠٠٠s～١٠,٠٠٠s	٠,١٠٠s	△
C٣-٢٢	AI٢ terminal filtering time	٠,٠٠٠s～١٠,٠٠٠s	٠,١٠٠s	△
C٣-٢٣	AI٣ terminal filtering time (on extension IO board)	٠,٠٠٠s～١٠,٠٠٠s	٠,١٠٠s	△
C٣-٢٤	AI٤ terminal filtering time (on extension IO board)	٠,٠٠٠s～١٠,٠٠٠s	٠,١٠٠s	△
C٣-٢٥	Xo maximum input	Xo minimum input～٥٠,٠kHz	٥٠,٠kHz	△
C٣-٢٦	Set value corresponding to Xo maximum input	-١٠٠,٠٪～١٠٠,٠٪	١٠٠,٠٪	△
C٣-٢٧	Xo minimum input	٠,٠ kHz～Xo maximum input	٠,٠kHz	△
C٣-٢٨	Set value corresponding to Xo minimum input	-١٠٠,٠٪～١٠٠,٠٪	٠,٠٪	△
C٣-٢٩	Xo filtering time	٠,٠٠٠s～١,٠٠٠s	٠,٠٠١s	△
C٣-٣٠	Analog gain switchover value	٠,٠٪～١٠٠,٠٪	١٠٠,٠٪	△
Group C٣: Analog and Pulse Output				
C٣-٠٠	AO١ output function	٠: No output ١: FREQ reference ٢: Output frequency ٣: Output current (relative to freq. rated value) ٤: Output torque (absolute value) ٥: Output voltage ٦: Output power ٧: Bus voltage ٨: Torque command ٩: Torque current ١٠: Magnetic flux current ١١: AI١	٢	△
C٣-٠١	AO٢ output function		١	△
C٣-٠٢	HDO output function		٠	△

Param.	Designation	Scope	Factory Default	Attr
		١٢: AI٢ ١٣: AI٣ ١٤: AI٤ ١٥: Xo ١٦: Communication input percentage ١٧: Output frequency before compensation ١٨: Output current (relative to motor rated current) ١٩: Output torque (direction hinted) ٢٠: Set torque (direction hinted) ٢١~٩٩: Reserved		
C٣-٠٣	AO١ offset	-١٠٠,٠٪～١٠٠,٠٪	٠,٠٪	△
C٣-٠٤	AO١ gain	-٣,٠٠٠～٣,٠٠٠	١,٠٠٠	△
C٣-٠٥	AO١ filtering time	٠,٠s～١٠,٠s	٠,٠s	△
C٣-٠٦	AO٢ offset (on extension IO board)	-١٠٠,٠٪～١٠٠,٠٪	٠,٠٪	△
C٣-٠٧	AO٢ gain (on extension IO board)	-٣,٠٠٠～٣,٠٠٠	١,٠٠٠	△
C٣-٠٨	AO٢ filtering time (on extension IO board)	٠,٠s～١٠,٠s	٠,٠s	△
C٣-٠٩	HDO maximum output pulse frequency	٠,١KHz～٥٠,٠KHz	٥٠,٠kHz	△
C٣-١٠	HDO output center point	٠: No center point ١: Center point is (C٣-٠٩)/٢, and the corresponding parameter value is positive when frequency is higher than center point. ٢: Center point is (C٣-٠٩)/٢, and the corresponding parameter value is positive when frequency is lower than center point	٠	×
C٣-١١	HDO output filtering time	٠,٠٠s～١٠,٠٠s	٠,٠٠s	△

Param.	Designation	Scope	Factory Default	Attr
Group C٤: Automatic Correction of Analog Input				
C٤-٠٠	Analog corrected channel	٠: No correction ١: Correct AI١ ٢: Correct AI٢ ٣: Correct AI٣ ٤: Correct AI٤	٠	×
C٤-٠١	Sampling value of AI١ calibration point ١	٠,٠٠V～١٠,٠٠V	١,٠٠V	◎
C٤-٠٢	Input value of AI١ calibration point ١	٠,٠٠V～١٠,٠٠V	١,٠٠V	×
C٤-٠٣	Sampling value of AI١ calibration point ٢	٠,٠٠V～١٠,٠٠V	٩,٠٠V	◎
C٤-٠٤	Input value of AI١ calibration point ٢	٠,٠٠V～١٠,٠٠V	٩,٠٠V	×
C٤-٠٥	Sampling value of AI٢ calibration point ١	٠,٠٠V～١٠,٠٠V	١,٠٠V	◎
C٤-٠٦	Input value of AI٢ calibration point ١	٠,٠٠V～١٠,٠٠V	١,٠٠V	×
C٤-٠٧	Sampling value of AI٢ calibration point ٢	٠,٠٠V～١٠,٠٠V	٩,٠٠V	◎
C٤-٠٨	Input value of AI٢ calibration point ٢	٠,٠٠V～١٠,٠٠V	٩,٠٠V	×
C٤-٠٩	Sampling value of AI٣ calibration point ١	٠,٠٠V～١٠,٠٠V	١,٠٠V	◎
C٤-١٠	Input value of AI٣ calibration point ١	٠,٠٠V～١٠,٠٠V	١,٠٠V	×
C٤-١١	Sampling value of AI٣ calibration point ٢	٠,٠٠V～١٠,٠٠V	٩,٠٠V	◎

Param.	Designation	Scope	Factory Default	Attr
C٤-١٢	Input value of AI٢ calibration point ٢	٠,٠٠V～١٠,٠٠V	٩,٠٠V	×
C٤-١٣	Sampling value of AI٤ calibration point ١	-١٠,٠٠V～١٠,٠٠V	١,٠٠V	◎
C٤-١٤	Input value of AI٤ calibration point ١	-١٠,٠٠V～١٠,٠٠V	١,٠٠V	×
C٤-١٥	Sampling value of AI٤ calibration point ٢	-١٠,٠٠V～١٠,٠٠V	٩,٠٠V	◎
C٤-١٦	Input value of AI٤ calibration point ٢	-١٠,٠٠V～١٠,٠٠V	٩,٠٠V	×
Group d Motor and Control Parameters				
Group d٠: Parameters of Motor ١				
d٠-٠٠	Type of motor ١	٠: Ordinary ACIM ١: Variable frequency ACIM	١	×
d٠-٠١	Power rating of motor ١	٠,٤KW～٦٥٥٣,٥KW	Model dependent	×
d٠-٠٢	Rated voltage of motor ١	٠V～٤٨٠V(for drives ٣٨٠V level)	٣٨٠V	×
d٠-٠٣	Rated current of motor ١	٠,٠A～٦٥٥٣,٥A	Model dependent	×
d٠-٠٤	Rated frequency of motor ١	٠,٠٠Hz～٦٠٠٠,٠٠Hz	٥٠,٠٠Hz	×
d٠-٠٥	Pole number of motor ١	١～٤٠٠	٤	×
d٠-٠٦	Rated speed of motor ١	٠r/min～٦٥٥٣٥r/min	Model dependent	×
d٠-٠٧	Stator resistance R١ of async motor ١	٠,٠٠١Ω～٦٥,٥٣٥Ω	Model dependent	×
d٠-٠٨	Leakage inductance L١ of async motor ١	٠,١mH～٦٥٥٣,٥mH	Model dependent	×
d٠-٠٩	Rotor resistance R٢ of async motor ١	٠,٠٠١Ω～٦٥,٥٣٥Ω	Model dependent	×

Param.	Designation	Scope	Factory Default	Attr
d٠-١٠	Mutual inductance L٢ of async motor ١	٠,١mH～٦٥٥٣,٥mH	Model dependent	×
d٠-١١	No-load current of async motor ١	٠,٠A～٦٥٥٣,٥A	Model dependent	×
d٠-١٢	Flux weakening coeff ١ of async motor ١	٠,٠٠١～١,٠٠٠	٠,٨٨٠	×
d٠-٢٢	Autotune of motor ١	٠: No autotune ١: Static autotune ٢: Rotary autotune	٠	×
d٠-٢٣	Overload protection mode of motor ١	٠: No protection ١: Judged by motor current ٢: Judged by temperature transducer	١	×
d٠-٢٤	Overload protection detection time of motor ١	٠,١～١٥,٠min	٥,٠min	×
d٠-٢٥	Temperature transducer signal input of motor ١	Ones place: sensor channel ٠: No sampling ١: Analog input TEMP (on extension PG board) ٢: Analog input EAI (on extension IO board) Tens place: sensor type: ٠: PT١٠٠ ١: PT١٠٠٠ ٢: KTY٨٤ ٣: NTC	٠٠	×
d٠-٢٦	Thermal protection threshold of motor ١ temperature transducer	٠~٢٠٠,٠°C	١٢٠,٠°C	×

Param.	Designation	Scope	Factory Default	Attr
d٠-٢٧	Motor ١ encoder type	Ones place: Encoder Type: ٠: ABZ incremental encoder ١: UVW incremental encoder ٢: Rotary transformer ٣: With CD signal SINCOS ٤: Without CD SINCOS Tens Place: Rotary change ratio: ٠: None ١: ٠,٢٣ ٢: ٠,٢٨ ٣: ٠,٥ Hundreds Place: ٠: Manually set encoder type ١: Automatically set encoder type Thousands place: reserved	٠٠٢٠	×
d٠-٢٨	Encoder resolution of motor ١	١～١٦٠٠٠	١٠٢٤	×
d٠-٢٩	Encoder direction of motor ١	٠: forward ١: reverse	٠	×
d٠-٣٠	Numerator of motor ١ mechanical gear ratio	١～٦٥٥٣٥	١٠٠٠	×
d٠-٣١	Denominator of motor ١ mechanical gear ratio	١～٦٥٥٣٥	١٠٠٠	×
d٠-٣٢	Disconnection detection of motor ١ encoder	٠,٠s～٨,٠s (٠,٠s means this function is invalid)	٠,٠s	△
d٠-٣٣	Motor ١ Sin bias	٠～٤٠٩٥	٠	△
d٠-٣٤	Motor ١ Cos bias	٠～٤٠٩٥	٠	△
d٠-٣٥	Motor ١ Sin gain	٠～٤٠٩٥	٠	△
d٠-٣٦	Motor ١ Cos gain	٠～٤٠٩٥	٠	△

Param.	Designation	Scope	Factory Default	Attr
d٠-٣٧	Sin, Cos and Z phase difference of motor ١	٠,٠～٣٦٠,٠	٠,٠	△
d٠-٣٨	Motor temperature coefficient	٠,٠٠٠～٢,٠٠٠	١,٠٠٠	△
Group d١: V/f Control Parameters of Motor ١				
d١-٠٠	V/f curve setting	٠: Linear V/f ١: Multi-step V/f (d١-٠١～d١-٠٨) ٢: ١,٢nd power ٣: ١,٤th power ٤: ١,٦th power ٥: ١,٨th power ٦: ٢,٠nd power ٧: V/F separation method ١ ٨: V/F separation method ٢	٠	×
d١-٠١	V/f frequency value f٣	٠,٠٠Hz~rated frequency of motor	٥٠,٠٠Hz	×
d١-٠٢	V/f voltage value V٣	٠,٠٪~١٠٠,٠٪;	١٠٠,٠٪	×
d١-٠٣	V/f frequency value f٢	d١-٠٥～d١-٠١	٠,٠٠Hz	×
d١-٠٤	V/f voltage value V٢	٠,٠٪～١٠٠,٠٪	٠,٠٪	×
d١-٠٥	V/f frequency value f١	d١-٠٧～d١-٠٣	٠,٠٠Hz	×
d١-٠٦	V/f voltage value V١	٠,٠٪～١٠٠,٠٪	٠,٠٪	×
d١-٠٧	V/f frequency value f٠	٠,٠٠Hz～d١-٠٥	٠,٠٠Hz	×
d١-٠٨	V/f voltage value V٠	٠,٠٪～١٠٠,٠٪	٠,٠٪	×
d١-٠٩	Torque boost	٠,٠٪~٣٠,٠٪; ٠,٠٪ is automatic torque boost	٠,٠٪	△
d١-١٠	Slip compensation gain	٠,٠٪～٤٠٠,٠٪	١٠٠,٠٪	△
d١-١١	Droop control	٠,٠٠Hz～maximum frequency	٠,٠٠Hz	△

Param.	Designation	Scope	Factory Default	Attr
d١-١٢	Current limitation mode	٠: Disabled ١: Set by d١-١٣ ٢: Set by AI١ ٣: Set by AI٢ ٤: Set by AI٣ ٥. Set by AI٤ ٦: Set by Xo	١	×
d١-١٣	Digital setting of current limit value	٢٠,٠٪～٢٠٠,٠٪	١٦٠,٠٪	△
d١-١٤	Current limit coeff on flux weakening	٠,٠٠١～١,٠٠٠	٠,٥٠٠	△
d١-١٥	Energy saving percentage	٠٪～٤٠,٠٪	٠,٠٪	△
d١-١٦	V/f oscillation suppression gain ١	٠～٣٠٠٠	٣٨	△
d١-١٧	V/f oscillation suppression gain ٢	٠～٣٠٠٠	٠	△
d١-١٨	Voltage setting on V/f separated pattern	٠: by D١-١٩ digital setting ١: by AI١ ٢: by AI٢ ٣: by AI٣ ٤: by AI٤ ٥: by process PID output ٦: by AI١+ process PID output	٠	×
d١-١٩	Digital set voltage on V/f separated pattern	٠,٠٪～ ١٠٠,٠٪	٠,٠٪	△
d١-٢٠	Voltage variation time on V/f separated pattern	٠,٠٠S ～ ٦٠٠,٠٠s	٠,٠١s	△
Group d٢: Vector Control Parameters of Motor ١				

Param.	Designation	Scope	Factory Default	Attr
d٢-٠٠	Speed/torque control	٠: speed control ١: torque control	٠	×
d٢-٠١	ASR high-speed proportional gain Kp١	٠,٠～٢٠,٠	١,٠	△
d٢-٠٢	ASR high-speed integration time Ti١	٠,٠٠٠s～٨,٠٠٠s	٠,٢٠٠s	△
d٢-٠٣	ASR low-speed proportional gain Kp٢	٠,٠～٢٠,٠	١,٠	△
d٢-٠٤	ASR low-speed integration time Ti٢	٠,٠٠٠s～٨,٠٠٠s	٠,٢٠٠s	△
d٢-٠٥	ASR switching frequency ١	٠,٠٠Hz～d٢-٠٦	٥,٠٠Hz	△
d٢-٠٦	ASR switching frequency ٢	d٢-٠٥~upper limit frequency	١٠,٠٠Hz	△
d٢-٠٧	ASR input filtering time	٠,٠ms～٥٠٠,٠ms	٠,٣ms	△
d٢-٠٨	ASR output filtering time	٠,٠ms～٥٠٠,٠ms	٠,٠ms	△
d٢-٠٩	D-axis ACR proportion coefficient Kp	٠,٠٠٠～٨,٠٠٠	١,٠٠٠	△
d٢-١٠	D-axis ACR integration coefficient Ki	٠,٠٠٠～٨,٠٠٠	١,٠٠٠	△
d٢-١١	Pre-excitation time	٠,٠٠٠s～٥,٠٠٠s	٠,٢٠٠s	△
d٢-١٢	Driven torque restriction source	٠: d٢-١٤ digital setting ١: AI١ ٢: AI٢ ٣: AI٣ ٤: AI٤ ٥: X٥ pulse input ٦. Communication	٠	×

Param.	Designation	Scope	Factory Default	Attr
d٢-١٣	Braking torque restriction source	٠: d٢-١٥ digital setting ١: AI١ ٢: AI٢ ٣: AI٣ ٤: AI٤ ٥: X٥ pulse input ٦: Communication	٠	×
d٢-١٤	Digital setting of driven torque limit value	٠,٠٪～٢٠٠,٠٪	١٥٠,٠٪	△
d٢-١٥	Digital setting of braking torque limit value	٠,٠٪～٢٠٠,٠٪	١٥٠,٠٪	△
d٢-١٦	Torque limit coefficient in flux weakening	٠,٠٪～١٠٠,٠٪	٥٠,٠٪	△
d٢-١٧	Driven slip compensation gain	١٠,٠٪~٣٠٠,٠٪	١٠٠,٠٪	△
d٢-١٨	Brake slip compensation gain	١٠,٠٪~٣٠٠,٠٪	١٠٠,٠٪	△
d٢-١٩	Torque reference source	٠: Set by d٢-٢٠ ١: AI١ ٢: AI٢ ٣: AI٣ ٤: AI٤ ٥: X٥ pulse input ٦: Communication	٠	×
d٢-٢٠	Digital setting of torque	-٢٠٠,٠٪～٢٠٠,٠٪	٠,٠٪	△

Param.	Designation	Scope	Factory Default	Attr
d٢-٢١	Forward speed limitation source under torque control	٠: Set by d٢-٢٣ ١: AI١ ٢: AI٢ ٣: AI٣ ٤: AI٤ ٥: Xo pulse input ٦: Communication	٠	×
d٢-٢٢	Reverse speed limitation source under torque control	٠: Set by d٢-٢٤ ١: AI١ ٢: AI٢ ٣: AI٣ ٤: AI٤ ٥: Xo pulse input ٦: Communication	٠	×
d٢-٢٣	Forward speed limited value under torque control	٠,٠٠Hz ~b٠-٠٨	٥٠,٠٠Hz	△
d٢-٢٤	Reverse speed limited value under torque control	٠,٠٠Hz～b٠-٠٨	٥٠,٠٠Hz	△
d٢-٢٥	Set torque accel/decel time	٠,٠٠s～١٢٠,٠٠s	٠,١٠s	△
d٢-٢٦	Energy saving percentage for ACIM	٠٪～١٠٠,٠٪	١٠٠,٠٪	△
d٢-٢٧	Starting point of energy-saving torque	٠~٤٠٩٦	٠	△
d٢-٢٨	Ending point of energy-saving torque	٠~٤٠٩٦	١١٠٠	△

Param.	Designation	Scope	Factory Default	Attr
d٢-٢٩	Q-axis ACR proportion coefficient Kp	٠,٠٠٠～٨,٠٠٠	١,٠٠٠	△
d٢-٣٠	Q-axis ACR integration coefficient Ki	٠,٠٠٠～٨,٠٠٠	١,٠٠٠	△
d٢-٣١	D axis decoupling coefficient	٠～٦٥,٥٣٥	١,٠٠٠	△
d٢-٣٢	Q axis decoupling coefficient	٠～٦٥,٥٣٥	١,٠٠٠	△
d٢-٣٣	Maximum voltage utilization rate	٠～١١٠,٠٪	١٠٠,٠٪	△
d٢-٣٦	Weak magnetic loop coefficient	٠～٦٥٥٣٥	٢٠٠	△
d٢-٤٠	MTPV mode	٠: Disable ١: Enable	٠	△
d٢,٤٢	MTPV proportion coefficient	٠～٦٥٥٣٥	١٠٠	△
d٢,٤٣	MTPV integration coefficient	٠～٦٥٥٣٥	١٠	△
d٢-٤٤	Closed -loop adjustment variable	Ones place: Asynchronous motor feedback enabled Tens place: Reserved Hundreds place: Integral separation of speed loop enabled	١٠١	△
d٢-٤٥	Waveform delay compensation coefficient	٠～٨,٠٠٠	٠,٥٠٠	△
d٢-٤٧	Speed loop desaturation coefficient	٠～٦٥٥٣٥	١٠	△

Param.	Designation	Scope	Factory Default	Attr
Group d٣: Parameters of Motor ٢				
d٣-٠٠	Type of motor ٢	٠: Ordinary ACIM ١: Variable frequency ACIM	١	×
d٣-٠١	Power rating of motor ٢	٠,٤KW～٦٥٥٣,٥KW	Model dependent	×
d٣-٠٢	Rated voltage of motor ٢	٠V～٤٨٠V (for ٣٨٠V model)	٣٨٠V	×
d٣-٠٣	Rated current of motor ٢	٠,٠A～٦٥٥٣,٥A	Model dependent	×
d٣-٠٤	Rated frequency of motor ٢	٠,٠٠Hz～٦٠٠٠,٠٠Hz	٥٠,٠٠Hz	×
d٣-٠٥	Pole number of motor ٢	١～٤٠٠	٤	×
d٣-٠٦	Rated speed of motor ٢	٠rpm～٦٥٥٣٥rpm	Model dependent	×
d٣-٠٧	Stator resistance R١ of async motor ٢	٠,٠٠١ohms～٦٥,٥٣٥٥hms	Model dependent	×
d٣-٠٨	Leakage inductance L١ of async motor ٢	٠,١mH～٦٥٥٣,٥mH	Model dependent	×
d٣-٠٩	Rotor resistance R٢ of async motor ٢	٠,٠٠١ohms～٦٥,٥٣٥٥hms	Model dependent	×
d٣-١٠	Mutual inductance L٢ of asynchronous motor ٢	٠,١mH～٦٥٥٣,٥mH	Model dependent	×
d٣-١١	No-load current of async motor ٢	٠,٠A～٦٥٥٣,٥A	Model dependent	×
d٣-١٢	Power factor of async motor ٢	٠,٠٠١～١,٠٠٠	٠,٨٨٠	×
d٣-٢٢	Autotune of motor ٢	٠: No autotune ١: Static autotune ٢: Rotary autotune	٠	×
d٣-٢٣	Overload protection mode of motor ٢	٠: No protection ١: Judged by motor current ٢: Judged by temperature transducer	١	×

Param.	Designation	Scope	Factory Default	Attr
d٣-٢٤	Overload protection detection time of motor ٢	٠,١～١٥,٠min	٥,٠min	×
d٣-٢٥	Temperature transducer signal input of motor ٢	Ones place: ٠: No. (no sampling) ١: AI TEMP (on PG extension board) ٢: EAI (on extension IO board) Tens place: Sensor type: ٠: PT١٠٠ ١: PT١٠٠٠ ٢: KTY٨٤ ٣: NTC	٠٠	×
d٣-٢٦	Thermal protection threshold of motor ٢ temperature transducer	٠~٢٠٠,٠°C	١٢٠,٠°C	×
d٣-٢٧	Motor ٢ encoder type	Ones place: Encoder Type: ٠: ABZ incremental encoder ١: UVW incremental encoder ٢: Rotary transformer ٣: With CD signal SINCOS ٤:Without CD signal SINCOS Tens Place: Rotary change ratio: ٠: None ١: ٠,٢٣ ٢: ٠,٢٨ ٣: ٠,٥ Hundreds Place: ٠: Manually set encoder type ١: Automatically set encoder type Thousands place: reserved	٠٠٢٠	×

Param.	Designation	Scope	Factory Default	Attr
d٣-٢٨	Motor ٢ encoder resolution	١～١٦٠٠٠	١٠٢٤	×
d٣-٢٩	Motor ٢ encoder direction	٠: Forward ١: Reverse	٠	×
d٣-٣٠	Numerator of motor ٢ mechanical gear ratio	١～٦٥٥٣٥	١٠٠٠	×
d٣-٣١	Denominator of motor ٢ mechanical gear ratio	١～٦٥٥٣٥	١٠٠٠	△
d٣-٣٢	Motor ٢ encoder disconnection detection	٠,٠s～٨,٠s (٠,٠s means this function is invalid)	٠,٠s	△
d٣-٣٣	Motor ٢ sin bias	٠～٤٠٩٥	٠	△
d٣-٣٤	Motor ٢ Cos bias	٠～٤٠٩٥	٠	△
d٣-٣٥	Motor ٢ Sin gain	٠～٤٠٩٥	٠	△
d٣-٣٦	Motor ٢ Cos gain	٠～٤٠٩٥	٠	△
d٣-٣٧	Motor ٢ Sin Cos and Z phase difference	٠,٠～٣٦٠,٠	٠,٠	△
d٣-٣٨	Motor temperature coefficient	٠,٠٠٠～٢,٠٠٠	١,٠٠٠	×
Group d٤: V/f Control Parameters of Motor ٢				
d٤-٠٠	V/f curve setting	٠: Linear V/f ١: Multi-step V/f (d١-٠١～d١-٠٨) ٢: ١,٢nd power ٣: ١,٤th power ٤: ١,٦th power ٥: ١,٨th power ٦: ٢,٠nd power ٧: V/F separation method ١ ٨: V/F separation method ٢	٠	×
d٤-٠١	V/f frequency value f٣	٠,٠٠Hz～rated frequency of motor	٥٠,٠٠Hz	×

Param.	Designation	Scope	Factory Default	Attr
d٤-٠٢	V/f voltage value V٣	٠,٠٪~١٠٠,٠٪	١٠٠,٠٪	×
d٤-٠٣	V/f frequency value f٣	d٤-٠٥~d٤-٠١	٠,٠٠Hz	×
d٤-٠٤	V/f voltage value V٢	٠,٠٪~١٠٠,٠٪	٠,٠٪	×
d٤-٠٥	V/f frequency value f١	d٤-٠٧~d٤-٠٣	٠,٠٠Hz	×
d٤-٠٦	V/f voltage value V١	٠,٠٪~١٠٠,٠٪	٠,٠٪	×
d٤-٠٧	V/f frequency value f٠	٠,٠٠Hz~d٤-٠٥	٠,٠٠Hz	×
d٤-٠٨	V/f voltage value V٠	٠,٠٪~١٠٠,٠٪	٠,٠٪	×
d٤-٠٩	Torque boost	٠,٠٪~٣٠,٠٪; ٠,٠٪ means auto torque boost	٠,٠٪	△
d٤-١٠	Slip compensation gain	٠,٠٪~٤٠٠,٠٪	١٠٠,٠٪	△
d٤-١١	Droop control	٠,٠٠Hz~١٠,٠٠Hz	٠,٠٠Hz	△
d٤-١٢	Current limitation mode	٠: Disabled ١: Set by d٤-١٣ ٢: Set by AI١ ٣: Set by AI٢ ٤: Set by AI٣ ٥: Set by AI٤ ٦: X٥	١	×
d٤-١٣	Digital set current limit value	٢٠,٠٪~٢٠٠,٠٪	١٦٠,٠٪	△
d٤-١٤	Current limit coeff on flux weakening	٠,٠٠١~١,٠٠٠	٠,٥٠٠	△
d٤-١٥	Energy saving percentage	٠٪~٤٠,٠٪	٠,٠٪	△
d٤-١٦	V/f oscillation suppression gain ١	٠~٣٠٠٠	٣٨	△
d٤-١٧	V/f oscillation suppression gain ٢	٠~٣٠٠٠	٠	△

Param.	Designation	Scope	Factory Default	Attr
d٤-١٨	Voltage setting on V/f separated pattern	٠: by D١-١٩ digital setting ١: by AI١ ٢: by AI٢ ٣: by AI٣ ٤: by AI٤ ٥: by process PID output ٦: by AI١+ process PID output	٠	×
d٤-١٩	Digital set voltage on V/f separated pattern	٠,٠٪～ ١٠٠,٠٪	٠,٠٪	△
d٤-٢٠	Voltage variation time on V/f separated pattern	٠,٠٠S ～ ٦٠٠,٠٠s	٠,٠١s	△
Group d٥: Vector Control Parameters of Motor ٢				
d٥-٠٠	Speed/torque control	٠: speed control ١: torque control	٠	×
d٥-٠١	ASR high-speed proportional gain Kp١	٠,٠～٢٠,٠	١,٠	△
d٥-٠٢	ASR high-speed integration time Ti١	٠,٠٠٠s～٨,٠٠٠s	٠,٢٠٠	△
d٥-٠٣	ASR low-speed proportional gain Kp٢	٠,٠～٢٠,٠	١,٠	△
d٥-٠٤	ASR low-speed integration time Ti٢	٠,٠٠٠s～٨,٠٠٠s	٠,٢٠٠	△
d٥-٠٥	ASR switching frequency ١	٠,٠٠Hz～d٥-٠٦	٥,٠٠Hz	△
d٥-٠٦	ASR switching frequency ٢	d٥-٠٥～upper limit	١٠,٠٠Hz	△
d٥-٠٧	ASR input filtering time	٠,٠ms～٥٠٠,٠ms	٠,٣ms	△
d٥-٠٨	ASR output filtering time	٠,٠ms～٥٠٠,٠ms	٠,٠ms	△

Param.	Designation	Scope	Factory Default	Attr
do-٠٩	ACR proportion coeff Kp	٠,٠٠٠～٨,٠٠٠	١,٠٠٠	△
do-١٠	ACR integration coeff Ki	٠,٠٠٠～٨,٠٠٠	١,٠٠٠	△
do-١١	Pre-excitation time	٠,٠٠٠s～٥,٠٠٠s	٠,٢٠٠s	△
do-١٢	Driven torque restriction source	٠: do-١٤ digital setting ١: AI١ ٢: AI٢ ٣: AI٣ ٤: AI٤ ٥: Xo pulse input ٦: Communication	٠	×
do-١٣	Braking torque restriction source	٠: do-١٥ digital setting ١: AI١ ٢: AI٢ ٣: AI٣ ٤: AI٤ ٥: Xo pulse input ٦: Communication	٠	×
do-١٤	Digital setting of driven torque limit value	٠,٠٪～٢٠٠,٠٪	١٥٠,٠٪	△
do-١٥	Digital setting of braking torque limit value	٠,٠٪～٢٠٠,٠٪	١٥٠,٠٪	△
do-١٦	Torque limit coefficient in flux weakening	٠,٠٪～١٠٠,٠٪	٥٠,٠٪	△
do-١٧	Driven slip compensation gain	١٠,٠٪～٣٠٠,٠٪	١٠٠,٠٪	△
do-١٨	Brake slip compensation gain	١٠,٠٪～٣٠٠,٠٪	١٠٠,٠٪	△

Param.	Designation	Scope	Factory Default	Attr
do-١٩	Torque reference source	٠: Set by do-٢٠ ١: AI١ ٢: AI٢ ٣: AI٣ ٤: AI٤ ٥: Xo pulse input ٦: Communication	٠	×
do-٢٠	Digital setting of torque	-٢٠٠,٠٪～٢٠٠,٠٪	٠,٠٪	△
do-٢١	Forward speed limitation source	٠: Set by do-٢٣ ١: AI١ ٢: AI٢ ٣: AI٣ ٤: AI٤ ٥: Xo pulse input ٦: Communication	٠	×
do-٢٢	Reverse speed limitation source	٠: Set by do-٢٤ ١: AI١ ٢: AI٢ ٣: AI٣ ٤: AI٤ ٥: Xo pulse input ٦: Communication	٠	×
do-٢٣	Forward speed limited value	٠,٠٠Hz～b٠-٠٨	٥٠,٠٠Hz	△
do-٢٤	Reverse speed limited value	٠,٠٠Hz～b٠-٠٨	٥٠,٠٠Hz	△
do-٢٥	Set torque accel/decel time	٠,٠٠s～١٢٠,٠٠s	٠,١٠s	△

Param.	Designation	Scope	Factory Default	Attr
do-٣٦	Energy saving percentage for ACIM	٠٪～١٠٠,٠٪	١٠٠,٠٪	△
do-٣٧	Starting point of energy-saving torque	٠～٤٠٩٦	٠	△
do-٣٨	Ending point of energy-saving torque	٠～٤٠٩٦	١١٠٠	△
do-٣٩	Q-axis ACR proportion coefficient Kp	٠,٠٠٠～٨,٠٠٠	١,٠٠٠	△
do-٣٠	Q-axis ACR integration coefficient Ki	٠,٠٠٠～٨,٠٠٠	١,٠٠٠	△
do-٣١	D axis decoupling coefficient	٠～٦٥,٥٣٥	١,٠٠٠	△
do-٣٢	Q axis decoupling coefficient	٠～٦٥,٥٣٥	١,٠٠٠	△
do-٣٣	Maximum voltage utilization rate	٠～١١٠,٠٪	١٠٠,٠٪	△
do-٣٦	Weak magnetic loop coefficient	٠～٦٥٥٣٥	٣٠٠	△
do-٤٠	MTPV mode	٠: Disable ١: Enable	٠	△
do-٤٢	MTPV ratio coefficient	٠～٦٥٥٣٥	١٠٠	△
do-٤٣	MTPV integral coefficient	٠～٦٥٥٣٥	١٠	△
do-٤٤	Closed -loop adjustment variable	Ones place: Asynchronous motor feedback enabled Tens place: Reserved Hundreds Place: Integral separation of speed loop enabled	١٠١	△

Param.	Designation	Scope	Factory Default	Attr
do-٤٥	Waveform delay compensation coefficient	٠~٨,٠٠٠	٠,٥٠٠	△
do-٤٧	Speed loop desaturation coefficient	٠~٦٥٥٣٥	١٠	△
Group E: Enhanced Function and Protection Parameters				
Group E٠: Enhanced function				
E٠-٠٠	Switching FREQ	Range: ٠,٨KHz～١٦,٠KHz ≤٣٠kW: factory default: ٦,٠KHz ٣٧KW～٤٥KW: factory default: ٥,٠ kHz ٥٥kW~٧٥kW: factory default: ٤,٠ kHz ≥٩٠kW: factory default: ٣,٠KHz	Model dependent	△
E٠-٠١	PWM optimization	Ones place: switching FREQ adjusted with temperature ٠: Self-adaption ١: No adjustment Tens place: PWM modulation mode ٠: Five-segment and seven-segment automatic switchover ١: Five-segment mode ٢: Seven-segment mode Hundreds place: over-modulation adjustment ٠: Disabled ١: Enabled	٠١١٠	×

Param.	Designation	Scope	Factory Default	Attr
		٢: Deep over-modulation Thousands place: PWM switching frequency relation with output frequency ٠: Self-adaption ١: No adaption		
E٠-٠٢	Action when run time attained	Ones place: action when consecutive run time attained: ٠: Run continued ١: Stop and fault reported Tens place: action when accumulative run time attained: ٠: Run continued ١: Stop and fault reported Hundreds place: unit of run time ٠: Second ١: Hour	٠٠٠	×
E٠-٠٣	Consecutive run time setting	٠,٠～٦٠٠٠,٠s (h)	٠,٠s(h)	△
E٠-٠٤	Accumulative run time setting	٠,٠～٦٠٠٠,٠s (h)	٠,٠s(h)	△
E٠-١٢	Random switch frequency adjustment coefficient	٠～١٠٠	٠	△
Group E١: Protection Parameters				
E١-٠٠	Overvoltage stall	O: Prohibited ١: Allowed ٢: Only valid for decel	٠	×

Param.	Designation	Scope	Factory Default	Attr
E١-٠١	Overvoltage stall protection voltage	١٢٠٪~١٥٠٪	١٣٠٪	△
E١-٠٢	Undervoltage stall	٠: Disabled ١: Enabled	٠	×
E١-٠٣	Overload alarm	Ones place: detection option: ٠: Always detect ١: Detect at constant speed only Tens place: compared with ٠: Motor rated current ١: Drive rated current Hundreds place: drive action ٠: Alarm but run continued ١: Alarm and coast to stop	٠٠٠	×
E١-٠٤	Overload alarm threshold	٢٠,٠٪~٢٠٠,٠٪	١٨٠,٠٪	△
E١-٠٥	Overload alarm detecting time	٠,١s~٦٠,٠s	٥,٠s	△
E١-٠٦	Protection action ١	Ones place:encoder disconnected(CLL)/PG board abnormal ٠: Alarm and coast to stop ١: CLL alarms but run continued ٢: PGE alarms but run continued ٣: CLL and PGE alarm but run continued Tens place: PIM temperature measurement circuit fault (oH٢) ٠: Alarm and coast to stop ١: Alarm but run continued	٠٠٠٠	×

Param.	Designation	Scope	Factory Default	Attr
		Hundreds place: abnormal EEPROM (Epr) ٠: Alarm and coast to stop ١: Alarm but run continued Thousands place: abnormal terminal communication (TrC) ٠: Alarm and coast to stop ١: Alarm but run continued		
E١-٠٧	Protection action ٢	Ones place: abnormal power supply when running (SUE) ٠: Alarm and coast to stop ١: Shield the fault Tens place: current detection circuit failed (CtC) ٠: Alarm and coast to stop ١: Alarm but run continued Hundreds place: abnormal contactor (CCL): ٠: Alarm and coast to stop ١: Alarm but run continued Thousands place: input/output phase loss (ISF, oPL): ٠: Protection for neither input supply fault nor output phase loss ١: No protection for input phase loss, protection enabled for output phase loss ٢: Protection enabled for input phase loss, no protection for output	٣٠٠١	×

Param.	Designation	Scope	Factory Default	Attr
		phase loss ٣: Protection enabled for both input phase loss and output phase loss		
E١-٠٨	Fault memory after power loss	٠: Not memorized after power loss ١: Memorized after power loss	٠	×
E١-٠٩	Fault auto-reset times	٠～٢٠	٠	×
E١-١٠	Auto-reset interval	٢,٠s～٢٠,٠s	٢,٠s	×
E١-١١	Relay action on drive fault	Ones place: when undervoltage fault occurs ٠: No action ١: Action enabled Tens place: when fault locked ٠: No action ١: Action enabled Hundreds place: auto-reset interval ٠: No action ١: Action enabled	٠١٠	×
E١-١٢	Cooling fan control	٠: Auto run (Based on inverter bridge temperature) ١: Always run after power up	٠	△
E١-١٣	Drive overheat alarm threshold	٠,٠℃～١٠٠,٠℃	٨٠,٠℃	△
E١-١٤	Protection action ٣	٠ ~ FFFF The first F from the right: Bit٠: Not shield GDP fault ٠ , shield ١ Bit١ ~ ٣: Reserved The second F from the right: Bit٠: Not shield AIP fault ٠, shield ١ Bit١: Not shield OL٣ fault ٠, shield ١	٠٠٠٠	×

Param.	Designation	Scope	Factory Default	Attr
		Bit٢ ~ ٣: Reserved The third F from the right: Bit٠: Not shield fault ٠ of extension IO board, shield ١ Bit١ ~ ٣: Reserved The fourth F from the right: Bit٠: fault ٠ of brake tube is not shielded, shield ١ Bit١ ~ ٣: Reserved		
E١-١٥	Single -phase current overload point	٠,٠٪~٤٠٠,٠٪	١٥٠,٠٪	△
E١-١٦	Single -phase current overload time	٠,٠٠٠s~٥٠,٠٠٠s	١,٠٠٠s	△
E١-١٧	Over speed/excessive speed difference	Ones place: Over speed (OS) action selection ٠: Coast to stop and report the fault ١: Continue to run Tens place: Excessive speed deviation (DEV) action selection ٠: Coast to stop and report the fault ١: Continue to run	٠٠	×
E١-١٨	Over speed (OS) detection value	٠,٠٪~١٠٨,٠٪	١٠٥,٠٪	△
E١-١٩	Over speed (OS) detection time	٠,٠S~٢٠,٠٠S	١,٠٠s	△
E١-٢٠	Detection value of excessive speed difference	٠,٠٪~٥٠,٠٪	٢٠,٠٪	△

Param.	Designation	Scope	Factory Default	Attr
E١-٢١	Detection time of excessive speed difference	٠,٠S～٢٠,٠٠S	٥,٠٠s	△
E١-٢٣	Sampling delay settings	٠～٥٠٠	١٠٠	×
E١-٢٤	Five -stage frequency threshold	٠～٦٥٥٣٥	٨,٠٠Hz	△
E١-٢٥	Overvoltage stall coefficient	٠～٢٠٠	٣٠	△
Group E٢: Enhanced Functions of Motor Control				
E٢-٠٠	Observer Kp for ACIM in SVC٢	٠～٦٥٥٣٥	٢٠٠	△
E٢-٠١	Observer Ki for ACIM in SVC٢	٠～٦٥٥٣٥	٢٠٠٠	△
E٢-٠٢	Observer Ki٢ for ACIM in SVC٢	٠～٦٥٥٣٥	٢٠٠٠	△
E٢-٠٣	Observer model compensation ١ for ACIM in SVC٢ (change after auto-tuning)	-٩٩٩٩～٩٩٩٩	٠	×
E٢-٠٤	Observer model compensation ٢ for ACIM in SVC٢ (change after auto-tuning)	-٩٩٩٩～٩٩٩٩	٨	△
E٢-٠٥	Observer coefficient K١ for ACIM in SVC٢	-٩٩٩٩～٩٩٩٩	٠	△
E٢-٠٦	Observer coefficient K٢ for ACIM in SVC٢	-٩٩٩٩～٩٩٩٩	-١	△
E٢-٠٧	Observer coefficient K٣ for ACIM in SVC٢	٠～٦٥٥٣٥	٠	△

Param.	Designation	Scope	Factory Default	Attr
E٢-٠٨	Observer coefficient KE for ACIM in SVC٢	٠~٦٥٥٣٥	٠	△
E٢-٠٩	Observer feedback mode ٢ for ACIM in SVC٢	٠~٦٥٥٣٥	٣٠٠٠	△
E٢-١٠	Observer feedback mode for ACIM in SVC٢	٠~١	٠	△
E٢-١١	Observer amplitude limit for ACIM in SVC٢	٠~٦٥٥٣٥	١٠٠	△
E٢-١٢	Observer compensation Kp for ACIM in SVC٢	٠~٦٥٥٣٥	١٠٠٠	△
E٢-١٣	Observer compensation Ki for ACIM in SVC٢	٠~٦٥٥٣٥	٢٠	△
E٢-١٤	Observer compensation coefficient for ACIM in SVC٢	٠,٠٠٠~٦٥,٥٣٥	٠,٥٠٠	△
E٢-١٥	Sync speed threshold for ACIM in SVC٢	٠,٠٠Hz~٦٠٠٠,٠٠Hz	٠,٣٠Hz	△
E٢-١٦	Motor feedback frequency filtering	٠,٠ms~٥٠٠,٠ms	٠,٣ms	△
E٢-١٧	Torque closed-loop selection	٠: Disable ١: Enable	١	△
E٢-١٨	Torque loop Kp	٠~٦٥٥٣٥	١٠٠٠	△
E٢-١٩	Torque loop Ki	٠~٦٥٥٣٥	٥٠	△
E٢-٢٠	Active damping proportion coefficient	٠~٦٥٥٣٥	٠	△
E٢-٢١	Active damping amplitude limit adjustment	٠~٦٥٥٣٥	٥١٢	△

Param.	Designation	Scope	Factory Default	Attr
Group F Application Parameters				
Group F٠: Process PID				
F٠-٠٠	PID reference	٠: F٠-٠١ digital setting ١: AI١ ٢: AI٢ ٣: AI٣ ٤: AI٤ ٥: X٥ pulse input ٦: Communication	٠	×
F٠-٠١	PID digital setting	٠,٠٪~١٠٠,٠٪	٥٠,٠٪	△
F٠-٠٢	PID feedback	٠: AI١ ١: AI٢ ٢: AI٣ (on extension IO board) ٣: AI٤ (on extension IO board) ٤: AI١+AI٢ ٥: AI١-AI٢ ٦: Max {AI١, AI٢} ٧: Min {AI١, AI٢} ٨: X٥ pulse input ٩: Communication	٠	×
F٠-٠٣	PID adjustment	Ones place: output frequency ٠: Must be the same direction as the set run direction ١: Opposite direction allowed Tens place: integration selection ٠: Integral continued when FREQ attains upper/lower limit	١٠	×

Param.	Designation	Scope	Factory Default	Attr
		١: Integral stopped when FREQ attains upper/lower limit		
F٠-٠٤	PID positive and negative adjustment	٠: Positive adjustment ١: Negative adjustment	٠	×
F٠-٠٥	Filtering time of PID reference	٠,٠s～٦٠,٠٠s	٠,٠٠s	△
F٠-٠٦	Filtering time of PID feedback	٠,٠s～٦٠,٠٠s	٠,٠٠s	△
F٠-٠٧	Filtering time of PID output	٠,٠s～٦٠,٠٠s	٠,٠٠s	△
F٠-٠٨	Proportional gain Kp١	٠,٠～٢٠٠,٠	٥٠,٠	△
F٠-٠٩	Integration time Ti١	٠,٠٠٠s～٥٠,٠٠٠s	٠,٥٠٠s	△
F٠-١٠	Derivative time Td١	٠,٠s～١٠٠,٠s	٠,٠٠٠s	△
F٠-١١	Proportional gain Kp٢	٠,٠～٢٠٠,٠	٥٠,٠	△
F٠-١٢	Integration time Ti٢	٠,٠٠٠s～٥٠,٠٠٠s	٠,٥٠٠s	△
F٠-١٣	Derivative time Td٢	٠,٠s～٥٠,٠٠٠s	٠,٠٠٠s	△
F٠-١٤	PID parameter switch	٠: No switch, determined by parameters Kp١, Ti١ and Td١ ١: Auto-switched on the basis of input offset (F٠-١٥) ٢: Switched by input terminal	٠	×
F٠-١٥	Input offset under PID auto switch	٠,٠٪～١٠٠,٠٪	٢٠,٠٪	△
F٠-١٦	Sampling period T	٠,٠٠١s～٥٠,٠٠٠s	٠,٠٠٢s	△

Param.	Designation	Scope	Factory Default	Attr
F٠-١٧	PID offset limit	٠,٠٪～١٠٠,٠٪	٠,٠٪	△
F٠-١٨	PID derivative limit	٠,٠٪～١٠٠,٠٪	٠,٥٪	△
F٠-١٩	PID initial value	٠,٠٪～١٠٠,٠٪	٠,٠٪	×
F٠-٢٠	PID initial value holding time	٠,٠s～٣٦٠٠,٠s	٠,٠s	△
F٠-٢١	PID feedback loss detection value	٠,٠٪~١٠٠,٠٪ (no detection when set to ٠٪)	٠,٠٪	△
F٠-٢٢	PID feedback loss detection time	٠,٠s～٣٠,٠s	١,٠s	△
F٠-٢٣	Cutoff FREQ when opposite to rotary set direction	٠,٠٠Hz~b٠-٠٨	٥٠,٠٠Hz	△
F٠-٢٤	PID computation option	٠: No computation in stop status ١: Computation continued in stop status	٠	△
Group F١: Multi-step Frequency				
F١-٠٠	FREQ set source of multi-step ٠	٠: Digital setting F١-٠٢ ١: Digital setting b٠-٠٢ + control panel ∧/∨ adjustment ٢: Digital setting b٠-٠٢ + terminal UP/DOWN adjustment ٣: AI١ ٤: AI٢ ٥: AI٣ (on extension IO board) ٦: AI٤ (on extension IO board) ٧: X٥ pulse input ٨: Process PID output ٩: Communication	٠	×

Param.	Designation	Scope	Factory Default	Attr
F١-٠١	FREQ set source of multi-step ١	٠: Digital setting F١-٠٣ ١: Digital setting b٠-٠٤ + control panel ∧/∨ adjustment ٢: Digital setting b٠-٠٤ + terminal UP/DOWN ٣: AI١ ٤: AI٢ ٥: AI٣ (on extension IO board) ٦: AI٤ (on extension IO board) ٧: X٥ pulse input ٨: Process PID output ٩: Communication	٠	×
F١-٠٢ ~ F١-١٧	Multi-step FREQ ٠-١٥	Lower limit~upper limit (-١٠٠,٠٪~ ١٠٠,٠٪) Percentage relative to the upper limit frequency in b٠-٠٩	٠,٠٪	△
Group F٢: Simple PLC				
F٢-٠٠	Simple PLC run mode	Ones place: PLC run mode ٠: Stop after a single cycle ١: Continue to run with the last FREQ after a single cycle ٢: Cycle repeated Tens place: power loss memory ٠: No memory on power loss ١: Memorized on power loss Hundreds place: start mode ٠: Run from the first step "multi-step frequency ٠" ١: Continue to run from the step of stop	٠٠٠٠	×

Param.	Designation	Scope	Factory Default	Attr
		(or fault) ٢: Continue to run from the step and FREQ at which the running stopped (or fault occurred) Thousands place: unit of simple PLC run time ٠: Second (s) ١: Minute (min)		
F٢-٠١	Setting of multi-step ٠	Ones place: FREQ reference ٠: Multi-step FREQ ٠ (F١-٠٢) ١: AI١ ٢: AI٢ ٣: AI٣ (on extension IO board) ٤: AI٤ (on extension IO board) ٥: X٥ pulse input ٦: Process PID output ٧: Multi-step FREQ ٨: Communication Tens place: run direction ٠: Forward ١: Reverse ٢: Determined by run command Hundreds place: Accel/Decel time ٠: Accel/Decel time ١ ١: Accel/Decel time ٢ ٢: Accel/Decel time ٣ ٣: Accel/Decel time ٤	٠٠٠	×
F٢-٠٢	Run time of step ٠	٠,٠～٦٠٠٠,٠ s (min)	٠,٠s	△

Param.	Designation	Scope	Factory Default	Attr
F٢-٠٣	Setting of step ١	Ones place: FREQ reference ٠: Multi-step FREQ ١ (F١-٠٣) ١~٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: Accel/Decel time option (same as F٢-٠١)	٠٠٠	×
F٢-٠٤	Run time of step ١	٠,٠~٦٠٠٠,٠ s (min)	٠,٠s	△
F٢-٠٥	Setting of step ٢	Ones place: FREQ reference ٠: Multi-step FREQ ٢ (F١-٠٤) ١~٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: Accel/Decel time option (same as F٢-٠١)	٠٠٠	×
F٢-٠٦	Run time of step ٢	٠,٠~٦٠٠٠,٠ s (min)	٠,٠s	△
F٢-٠٧	Setting of step ٣	Ones place: FREQ reference ٠: Multi-step FREQ ٣ (F١-٠٥) ١~٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: Accel/Decel time option (same as F٢-٠١)	٠٠٠	×
F٢-٠٨	Run time of step ٣	٠,٠~٦٠٠٠,٠ s (min)	٠,٠s	△
F٢-٠٩	Setting of step ٤	Ones place: FREQ reference ٠: Multi-step FREQ ٤ (F١-٠٦) ١~٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١)	٠٠٠	×

Param.	Designation	Scope	Factory Default	Attr
		Hundreds place: Accel/Decel time option (same as F٢-٠١)		
F٢-١٠	Run time of step ٤	٠,٠～٦٠٠٠,٠ s (min)	٠,٠s	△
F٢-١١	Setting of step ٥	Ones place: FREQ reference ٠: Multi-step FREQ ٥ (F١-٠٧) ١～٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: Accel/Decel time option (same as F٢-٠١)	٠٠٠	×
F٢-١٢	Run time of step ٥	٠,٠～٦٠٠٠,٠ s (min)	٠,٠s	△
F٢-١٣	Setting of step ٦	Ones place: FREQ reference ٠: Multi-step FREQ ٦ (F١-٠٨) ١～٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: Accel/Decel time option (same as F٢-٠١)	٠٠٠	×
F٢-١٤	Run time of step ٦	٠,٠～٦٠٠٠,٠ s (min)	٠,٠s	△
F٢-١٥	Setting of step ٧	Ones place: FREQ reference ٠: Multi-step FREQ ٧ (F١-٠٩) ١～٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: Accel/Decel time option (same as F٢-٠١)	٠٠٠	×
F٢-١٦	Run time of step ٧	٠,٠～٦٠٠٠,٠ s (min)	٠,٠s	△
F٢-١٧	Setting of step ٨	Ones place: FREQ reference ٠: Multi-step FREQ ٨ (F١-١٠)	٠٠٠	×

Param.	Designation	Scope	Factory Default	Attr
		١~٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: Accel/Decel time option (same as F٢-٠١)		
F٢-١٨	Run time of step ٨	٠,٠~٦٠٠٠,٠ s (min)	٠,٠s	△
F٢-١٩	Setting of step ٩	Ones place: FREQ reference ٠: Multi-step FREQ ٩ (F١-١١) ١~٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: ACC/DEC time option (same as F٢-٠١)	٠٠٠	×
F٢-٢٠	Run time of step ٩	٠,٠~٦٠٠٠,٠ s (min)	٠,٠s	△
F٢-٢١	Setting of step ١٠	Ones place: FREQ reference ٠: multi-step FREQ ١٠ (F١-١٢) ١~٧: same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: Accel/Decel time option (same as F٢-٠١)	٠٠٠	×
F٢-٢٢	Run time of step ١٠	٠,٠~٦٠٠٠,٠ s (min)	٠,٠s	△
F٢-٢٣	Setting of step ١١	Ones place: FREQ reference ٠: Multi-step FREQ ١١ (F١-١٣) ١~٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: Accel/Decel time option (same as F٢-٠١)	٠٠٠	×

Param.	Designation	Scope	Factory Default	Attr
F٢-٢٤	Run time of step ١١	٠,٠～٦٠٠٠,٠ s (min)	٠,٠s	△
F٢-٢٥	Setting of step ١٢	Ones place: FREQ reference ٠: Multi-step FREQ ١٢ (F١-١٤) ١～٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: Accel/Decel time option (same as F٢-٠١)	٠٠٠	×
F٢-٢٦	Run time of step ١٢	٠,٠～٦٠٠٠,٠ s (min)	٠,٠s	△
F٢-٢٧	Setting of step ١٣	Ones place: FREQ reference ٠: Multi-step FREQ ١٣ (F١-١٥) ١～٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: Accel/Decel time option (same as F٢-٠١)	٠٠٠	×
F٢-٢٨	Run time of step ١٣	٠,٠～٦٠٠٠,٠ s (min)	٠,٠s	△
F٢-٢٩	Setting of step ١٤	Ones place: FREQ reference ٠: Multi-step FREQ ١٤ (F١-١٦) ١～٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: Accel/Decel time option (same as F٢-٠١)	٠٠٠	×
F٢-٣٠	Run time of step ١٤	٠,٠～٦٠٠٠,٠ s (min)	٠,٠s	△

Param.	Designation	Scope	Factory Default	Attr
F٢-٣١	Setting of step ١٥	Ones place: FREQ reference ٠: Multi-step FREQ ١٥ (F١-١٧) ١~٧: Same as F٢-٠١ Tens place: run direction (same as F٢-٠١) Hundreds place: Accel/Decel time option (same as F٢-٠١)	٠٠٠	×
F٢-٣٢	Run time of step ١٥	٠,٠~٦٠٠٠,٠ s (min)	٠,٠s	△
Group FΣ: Position Control				
FΣ-٠٠	Position command selection	Ones place: Signal type selection ٠: AB orthogonal reference ١: Direction+pulse (B: direction+A:pulse) reference Tens place: position command ٠: Not reverse ١: Reverse	٠٠	×
FΣ-٠١	Position feedback channel	Ones place: PG board type selection ٠: Single encoder feedback ١: Dual encoder feedback Tens place: Orientation encoder feedback selection ٠: Motor encoder ١: Second encoder Hundreds place: Pulse-tracking encoder feedback selection ٠: Motor encoder ١: Second encoder Thousands place: Reserved	٠٠٠١	×

Param.	Designation	Scope	Factory Default	Attr
F٤-٠٢	Numerator of gear ratio of command and feedback pulses	١～١٠٠٠٠	١	△
F٤-٠٣	Denominator of gear ratio of command and feedback pulses	١～١٠٠٠٠	١	△
F٤-٠٤	Gear ratio numerator ١ of motor and spindle	١～١٠٠٠٠	١	△
F٤-٠٥	Gear ratio denominator ١ of motor and spindle	١～١٠٠٠٠	١	△
F٤-٠٦	Gear ratio numerator ٢ of motor and spindle	١～١٠٠٠٠	١	△
F٤-٠٧	Gear ratio denominator ٢ of motor and spindle	١～١٠٠٠٠	١	△
F٤-٠٨	Spindle encoder resolution	١～١٠٠٠٠	١٠٢٤	△
F٤-٠٩	Spindle encoder direction	٠: Positive ١: Reverse	٠	×
F٤-١٠	Spindle encoder disconnection detection	٠,٠s ~ ٨,٠s (٠,٠s means this function is invalid)	٠,٠s	△
F٤-١١	Frequency division output selection	Ones place: Frequency division output encoder selection ٠: motor encoder ١: spindle encoder Tens place: Frequency division output direction selection ٠: Forward ١: Reverse	٠٠	△

Param.	Designation	Scope	Factory Default	Attr
F٤-١٢	Frequency division coefficient	٠: No ١: ٢ frequency division ٢: ٤ frequency division ٣: ٦ frequency division ٤: ٨ frequency division ... ... ٦٤: ١٢٨ frequency division	٠	△
F٤-١٣	Resolution after frequency multiplication	١～١٦٠٠٠	١٠٢٤	△
F٤-١٤	Position mode completion range	٠～٩٩٩٩	٢٠	×
F٤-١٥	Position mode completion time	٠,٠٠١～٥,٠٠٠S	٠,١٠٠s	×
F٤-١٦	Max.output frequency of pulse tracking	٠～B٠-٠٩	٥٠,٠٠Hz	×
F٤-١٧	ASR High-speed proportional gain of pulse tracking	٠,٠～٢٠,٠	٠,٥	△
F٤-١٨	ASR High-speed integral time of pulse tracking	٠,٠٠٠s～٨,٠٠٠s	٠,٢٠٠s	△
F٤-١٩	ASR Low-speed proportional gain of pulse tracking	٠,٠～٢٠,٠	٠,٥	△
F٤-٢٠	ASR Low-speed integral time of pulse tracking	٠,٠٠٠s～٨,٠٠٠s	٠,٢٠٠s	△
F٤-٢١	Feed-forward gain of pulse tracking	٠～٢,٠٠	١,٠٠	△
F٤-٢٢	High-speed proportional gain of pulse tracking	٠～١٠٠,٠٠	١,٠٠	△

Param.	Designation	Scope	Factory Default	Attr
F٤-٢٣	Low-speed proportional gain of pulse tracking	٠～١٠٠,٠٠	١,٠٠	△
F٤-٢٤	Proportional gain low-speed switching frequency	٠～F٤-٢٥	٥,٠٠Hz	×
F٤-٢٥	Proportional gain high-speed switching frequency	F٤-٢٤~b٠-٠٩	١٠,٠٠Hz	×
F٤-٢٦	Feed-forward filter time	٠～٢٥٥	٠	△
F٤-٢٧	Filter time of command inertia	٠～٢٥٥	٠	×
F٤-٢٨	Filter time of command average value	٠～١,٠٢٣S	٠,٠١٠s	×
F٤-٢٩	Position-loop output amplitude limit	٠～٥٠,٠٠HZ	١٠,٠٠Hz	△
F٤-٣٠	ASR low-speed proportional gain of orientation	٠,٠～٢٠,٠	١,٠	△
F٤-٣١	ASR low-speed integral time of orientation	٠,٠٠٠s～٨,٠٠٠s	٠,٢٠٠s	△
F٤-٣٢	Selection of switching to position	Ones place: Selection of switching to position ٠: Direct switch ١: Positioning first and then switch Tens place: Anti -reverse of position enabled ٠: Disable ١: Enable	٠٠	△

Param.	Designation	Scope	Factory Default	Attr
F٤-٣٣	Direction selection of spindle orientation	٠: Forward ١: Reverse ٢: Current direction ٣: Nearest direction	٠	×
F٤-٣٤	Orientation frequency	٠,٠١～b٠-٠٩	٥,٠٠Hz	×
F٤-٣٥	Orientation response time	٠,١～١٠٠٠,٠S	٠,٥s	△
F٤-٣٦	High-speed proportional gain of orientation	٠～١٠٠,٠٠	١,٥٠	△
F٤-٣٧	Low-speed proportional gain of orientation	٠～١٠٠,٠٠	١,٠٠	△
F٤-٣٨	Low-speed switching frequency of orientation	٠～F٤-٣٩	٠,٥٠Hz	×
F٤-٣٩	High-speed switching frequency of orientation	F٤-٣٨～F٤-٣٤	١,٠٠Hz	×
F٤-٤٠	Orientation position ١	٠ ~ Pulses per rotation	٠	△
F٤-٤١	Orientation position ٢	٠ ~ Pulses per rotation	٠	△
F٤-٤٢	Orientation position ٣	٠ ~ Pulses per rotation	٠	△
F٤-٤٣	Orientation position ٤	٠ ~ Pulses per rotation	٠	△
F٤-٤٤	Orientation position ٥	٠ ~ Pulses per rotation	٠	△
F٤-٤٥	Orientation position ٦	٠ ~ Pulses per rotation	٠	△
F٤-٤٦	Orientation position ٧	٠ ~ Pulses per rotation	٠	△
F٤-٤٧	Orientation position ٨	٠ ~ Pulses per rotation	٠	△
F٤-٤٨	Orientation S-curve selection	٠: No S curve ١: S curve	٠	△
F٤-٤٩	Proportion of initial segment of orientation Decel S-curve	٠,٠٪～١٠٠,٠٪ (F٤-٤٩+F٤-٥٠≤١٠٠٪)	٢٠,٠٪	△

Param.	Designation	Scope	Factory Default	Attr
F٤-٥٠	Proportion of ending segment of orientation Decel S-curve	٠,٠٪～١٠٠,٠٪	٢٠,٠٪	△
F٤-٥١	Accel time for orientation/returning to origin	٠,١～١٠٠٠,٠S	٢,٠s	×
F٤-٥٢	Decel time for orientation/returning to origin	٠,١～١٠٠٠,٠S	٢,٠s	×
F٤-٥٣	Rigidness adjustment for position mode	٠～١٠٢٤	٠	△
F٤-٥٤	Return to origin selection	Ones place:: ٠: Return to origin triggered by terminal ١: Return to origin at each startup ٢: Return to origin at the end of each carry Tens place: Origin signal selection ٠: External terminal input ١: Encoder Z signal	٠٠	×
F٤-٥٥	Return to origin direction	٠: Forward when returning to origin ١: Reverse when returning to origin	٠	×
F٤-٥٦	Return to origin frequency ١	F٤-٥٧～b٠-٠٩	١٠,٠٠Hz	×
F٤-٥٧	Return to origin frequency ٢	٠,٠٠Hz～F٤-٥٦	١,٠٠Hz	×
F٤-٥٨	Zero speed clamping function selection	٠: Zero speed clamping function disabled ١: Zero speed clamping function enabled	٠	△

Param.	Designation	Scope	Factory Default	Attr
		٢: Zero speed clamping enabled when terminal is valid		
FΣ-٥٩	Zero speed clamping start frequency	٠,٠٠Hz～b٠-٠٩	٠,٣٠Hz	△
FΣ-٦٠	Zero speed clamping gain	٠~٣٠,٠٠	١,٠٠	△
FΣ-٦١	Zero speed clamping error tolerance	٠~١٠٠٠	٢	△
FΣ-٦٢	Simple carry function selection	٠: Disable ١: Enable	٠	△
FΣ-٦٣	Carry Accel/Decel time	٠,١~١٠٠٠,٠S	٢,٠s	×
FΣ-٦٤	Carry quantity ٠ high bits	٠～٩٩٩٩	٠	△
FΣ-٦٥	Carry quantity ٠ low bits	٠～٩٩٩٩	٠	△
FΣ-٦٦	Carry quantity ١ high bits	٠～٩٩٩٩	٠	△
FΣ-٦٧	Carry quantity ١ low bits	٠～٩٩٩٩	٠	△
FΣ-٦٨	Carry quantity ٢ high bits	٠～٩٩٩٩	٠	△
FΣ-٦٩	Carry quantity ٢ low bits	٠～٩٩٩٩	٠	△
FΣ-٧٠	Carry quantity ٣ high bits	٠～٩٩٩٩	٠	△
FΣ-٧١	Carry quantity ٣ low bits	٠～٩٩٩٩	٠	△
FΣ-٧٢	Carry quantity ٤ high bits	٠～٩٩٩٩	٠	△
FΣ-٧٣	Carry quantity ٤ low bits	٠～٩٩٩٩	٠	△
FΣ-٧٤	Carry quantity ٥ high bits	٠～٩٩٩٩	٠	△
FΣ-٧٥	Carry quantity ٥ low bits	٠～٩٩٩٩	٠	△
FΣ-٧٦	Carry quantity ٦ high bits	٠～٩٩٩٩	٠	△
FΣ-٧٧	Carry quantity ٦ low bits	٠～٩٩٩٩	٠	△
FΣ-٧٨	Carry quantity ٧ high bits	٠～٩٩٩٩	٠	△
FΣ-٧٩	Carry quantity ٧ low bits	٠～٩٩٩٩	٠	△

Param.	Designation	Scope	Factory Default	Attr
F٤-٨٠	Acceleration filtering	٠,٠～٥٠٠٠,٠	٢٠,٠	△
F٤-٨١	Inertia compensation coefficient	٠～٦٥٥٣٥	٠,٠٠٠	△
Group H: Communication Parameters				
Group H٠: MODBUS Communication Parameters				
H٠-٠٠	SCI port selection	٠: No communication ١: Local ٤٨٥ port ٢: PN/MTP/DEV ٣: ECT ٤: CAN ٥: M٣ (After changing communication method, the AC drive should be restarted)	٠	×
H٠-٠١	SCI port communication configuration	Ones place: baud rate ٠: ٤٨٠٠bps ١: ٩٦٠٠bps ٢: ١٩٢٠٠bps ٣: ٣٨٤٠٠bps ٤: ٥٧٦٠٠bps ٥: ١١٥٢٠٠bps Tens place: data format ٠: ١-٨-٢-N format, RTU ١: ١-٨-١-E format, RTU ٢: ١-٨-١-O Format, RTU Hundreds place: connection type ٠: Direct cable connection (٢٣٢/٤٨٥) ١: MODEM (٢٣٢) Thousands place: saving method	٠٠٠١	×

Param.	Designation	Scope	Factory Default	Attr
		٠: Not saved at power loss ١: Saved at power loss		
H٠-٠٢	Local address of ٤٨٥ port communication	٠~٢٤٧, ٠ is broadcast address	١	×
H٠-٠٣	Time out detection of ٤٨٥ port communication	٠,٠s～١٠٠٠,٠s	٠,٠s	×
H٠-٠٤	Time delay of ٤٨٥ port communication	٠ms～١٠٠٠ms	٠ms	×
H٠-٠٥	Master/Slave option	٠: PC controls this drive ١: As master ٢: As slave	٠	×
H٠-٠٦	Parameter store address when this drive working as master	٠: b٠-٠٢ ١: F٠-٠١	٠	×
H٠-٠٧	Proportional factor of received FREQ	٠～١٠٠٠,٠	١٠٠,٠	△
H٠-٠٨	٤٨٥ Automatic reset enable	٠: disable ١: enable	٠	×

Param.	Designation	Scope	Factory Default	Attr
Group L Keys and Display of Control panel				
Group L٠: Keys of Control panel				
L٠-٠٠	MF key setting	٠: No function ١: Forward jog ٢: Reverse jog ٣: Forward/reverse switchover ٤: Emergency stop ١ (set Decel time by b٢-٠٩) ٥: Emergency stop ٢ (coast to stop) ٦: Run command sources shifted	٠	△
L٠-٠١	Keys locked option	٠: Not locked ١: All locked ٢: Keys locked except RUN, STOP/RESET ٣: Keys locked except STOP/RESET ٤: Keys locked except >>	٠	△
L٠-٠٢	Function of STOP key	٠: STOP key activated only at control panel control ١: STOP key activated under any run command source	٠	△

Param.	Designation	Scope	Factory Default	Attr
L٠-٠٣	FREQ adjustment through keys ∧/∨	Ones place Bit٠: option on ramp to stop ٠: zeroing the adjustment value ١: holding the adjustment value Ones place Bit١: option at master & auxiliary frequency reference ٠: zeroing the adjustment value ١: holding the adjustment value Tens Place: option on power loss ٠: zeroing the adjustment value ١: holding the adjustment value Hundreds Place: integrating option ٠: Integrating disabled ١: Integrating enabled Thousands place: run direction ٠: Direction changing prohibited ١: Direction changing permitted	٠١٠٠	△
L٠-٠٤	Step size of FREQ adjustment through keys ∧/∨	٠,٠٠Hz/s～١٠,٠٠Hz/s	٠,١٠Hz/s	△
Group L١ Control Panel Display Setting				

Param.	Designation	Scope	Factory Default	Attr
L١-٠٠	Display parameter setting ١ on run status	Binary system setting: ٠: No Display ١: Display Ones place: BIT٠: Run FREQ (Hz) BIT١: FREQ reference (Hz) BIT٢: Bus voltage (V) BIT٣: Output current (A) Tens place: BIT٠: Output torque (%) BIT١: Output power (kW) BIT٢: Output voltage (V) BIT٣: Motor speed (r/min) Hundreds place: BIT٠: AI١ (V) BIT١: AI٢ (V) BIT٢: AI٣ (V) BIT٣: AI٤ (V) Thousands place: BIT٠: running FREQ ٢ (Hz) BIT١: Xo BIT٢: External count value BIT٣: Reserved Note: when this parameter is set to ٠٠٠٠, run FREQ (Hz) would be displayed as default	١٠٨F	△

Param.	Designation	Scope	Factory Default	Attr
L١-٠١	Display parameter setting ٢ on run status	Binary system setting: ٠: No Display ١: Display Ones place: BIT٠: Run linear speed (m/s) BIT١: Set linear speed (m/s) BIT٢: Input terminal status BIT٣: Output terminal status Tens place: BIT٠: PID reference (%) BIT١: PID feedback (%) BIT٢: Reserved BIT٣: Reserved Hundreds place: BIT٠: Torque reference (%) BIT١: Reserved BIT٢: Reserved BIT٣: Reserved Thousands place: reserved BIT١: Reserved BIT٢: Reserved BIT٣: Reserved	٠٠٠٠	△

Param.	Designation	Scope	Factory Default	Attr
L١-٠٣	Display parameter setting on stop status	Binary system setting: ٠: No Display ١: Display Ones place: BIT٠: FREQ reference (Hz) BIT١: Bus voltage (V) BIT٢: Input terminal status BIT٣: Output terminal status Tens place: BIT٠: AI١ (V) BIT١: AI٢ (V) BIT٢: AI٣ (V) BIT٣: AI٤ (V) Hundreds place: BIT٠: PID reference (%) BIT١: PID feedback (%) BIT٢: Reserved BIT٣: Reserved Thousands place: BIT٠: Run linear speed (m/s) BIT١: Set linear speed (m/s) BIT٢: External count value BIT٣: Xo Note: when this function code is set to ٠٠٠٠, the FREQ reference would be displayed as default (Hz)	٠٠٠٣	△
L١-٠٣	Linear speed coeff	٠,١~٩٩٩,٩٪	١٠٠,٠٪	△

Param.	Designation	Scope	Factory Default	Attr
Group U Monitoring				
Group U٠ Status Monitoring				
U٠-٠٠	Run frequency	٠,٠٠Hz～٦٠٠٠,٠٠Hz	٠,٠٠Hz	◎
U٠-٠١	Set frequency	٠,٠٠Hz～٦٠٠٠,٠٠Hz	٠,٠٠Hz	◎
U٠-٠٢	Bus voltage	٠V～٦٥٥٣٥V	٠V	◎
U٠-٠٣	Output voltage	٠V～٦٥٥٣٥V	٠V	◎
U٠-٠٤	Output current	٠,٠A～٦٥٥٣,٥A	٠,٠A	◎
U٠-٠٥	Output torque	-٣٠٠,٠٪～٣٠٠,٠٪	٠,٠٪	◎
U٠-٠٦	Output power	٠,٠٪～٣٠٠,٠٪	٠,٠٪	◎
U٠-٠٧	Master FREQ reference source	٠: Digital setting + adjustment through ∧/∨ on control panel ١: Digital setting + terminal UP/DOWN adjustment ٢: Analog input AI١ ٣: Analog input AI٢ ٤: Analog input AI٣ (on extension IO board) ٥. Analog input AI٤ (on extension IO board) ٦: X٥ pulse input ٧: Process PID output ٨: PLC ٩: Multi-step FREQ ١٠: Communication ١١: PA/PB input	٠٠	◎

Param.	Designation	Scope	Factory Default	Attr
U٠-٠٨	Auxiliary FREQ reference source	٠: No set ١: Digital setting + adjustment through ∧/∨ on control panel ٢: Digital setting + terminal UP/DOWN adjustment ٣: Analog input AI١ ٤: Analog input AI٢ ٥: Analog input AI٣ (on extension IO board) ٦: Analog input AI٤ (on extension IO board) ٧: X٥ pulse input ٨: Process PID output ٩: PLC ١٠: Multi-step FREQ ١١: Communication	٠٠	◎
U٠-٠٩	Master FREQ reference	٠,٠٠Hz～٦٠٠,٠٠Hz	٠,٠٠Hz	◎
U٠-١٠	Auxiliary FREQ reference	٠,٠٠Hz～٦٠٠,٠٠Hz	٠,٠٠Hz	◎
U٠-١١	Drive status	Ones place: run status ٠: Accelerating ١: Decelerating ٢: Constant speed running Tens place: drive status ٠: Stop ١: Running ٢: Autotune	٠٠	◎
U٠-١٢	AI١ input voltage	٠,٠٠V～١٠,٠٠V	٠,٠٠V	◎
U٠-١٣	AI٢ input voltage	٠,٠٠V～١٠,٠٠V	٠,٠٠V	◎

Param.	Designation	Scope	Factory Default	Attr
U٠-١٤	AI٣ input voltage (on extension IO board)	٠,٠٠V～١٠,٠٠V	٠,٠٠V	◎
U٠-١٥	AI٤ input voltage (on extension IO board)	-١٠,٠٠V～١٠,٠٠V	٠,٠٠V	◎
U٠-١٦	AO١ output	٠,٠٪～١٠٠,٠٪	٠,٠٪	◎
U٠-١٧	AO٢ output (on extension IO board)	٠,٠٪～١٠٠,٠٪	٠,٠٪	◎
U٠-١٨	X٥ high-frequency pulse input frequency	٠,٠KHz～٥٠,٠KHz	٠,٠kHz	◎
U٠-١٩	Digital input terminal status	Range: ٠٠٠٠～٢FFF Note: ١) ٠ means invalid, ١ means valid; ٢) bit٠~bit١٣: X١,X٢,...,X١٠,AI١,AI٢,AI٣,AI٤	٠٠٠٠	◎
U٠-٢٠	Digital output terminal status	Range: ٠٠～FF Note: ١) ٠ means open, ١ means closed; ٢) BIT٠ ~ BitV: DO١,DO٢,DO٣,DO٤, HDO Reserved, R١, R٢	٠٠	◎
U٠-٢١	PID set	٠,٠٪～١٠٠,٠٪	٠,٠٪	◎
U٠-٢٢	PID feedback	٠,٠٪～١٠٠,٠٪	٠,٠٪	◎
U٠-٢٣	PID input offset	-١٠٠,٠٪～١٠٠,٠٪	٠,٠٪	◎
U٠-٢٤	PLC step	٠～١٥	٠	◎
U٠-٢٥	V/F separated target voltage	٠,٠٪～ ١٠٠,٠٪	٠,٠٪	◎
U٠-٢٦	V/F separated actual output voltage	٠,٠٪～ ١٠٠,٠٪	٠,٠٪	◎
U٠-٢٧	Frequency before speed search stop	٠～٦٠٠,٠٠Hz	٠,٠٠Hz	◎

Param.	Designation	Scope	Factory Default	Attr
U٠-٢٨	Resolution of spindle encoder	٠~٦٠٠٠	٠	◎
U٠-٢٩	Resolution of motor encoder	٠~٦٠٠٠	٠	◎
U٠-٣٠	Torque reference value	٠,٠٪~٣٠٠,٠٪	٠,٠٪	◎
U٠-٣١	Cumulative power-up time	٠~٦٥٥٣٥h	٠h	◎
U٠-٣٢	Cumulative run time	٠~٦٥٥٣٥h	٠h	◎
U٠-٣٣	Environment temperature	-٤٠,٠°C~٢٠٠,٠°C	٠,٠°C	◎
U٠-٣٤	Inverter bridge temperature	-٤٠,٠°C~٢٠٠,٠°C	٠,٠°C	◎
U٠-٣٥	Motor temperature	-٤٠,٠°C~٢٠٠,٠°C	٠,٠°C	◎
U٠-٣٦	Terminal count value	٠~٦٥٥٣٥	٠	◎
U٠-٣٧	Run command log at LoU	٠~١	٠	◎
U٠-٣٨	Fault code log at LoU	٠~١٠٠	٠	◎
U٠-٣٩	Code execution time	٠~٦٥٥٣٥	٠	◎
U٠-٤٠	CtC fault source	٠: No fault ١: V phase ٢: W phase ٣: U phase	٠	◎
U٠-٤٣	Higher-bit numbers of control panel ∧/∨ stored value	-١~١	٠	◎
U٠-٤٤	Lower-bit numbers of control panel ∧/∨ stored value	٠,٠٠~٦٥٥,٣٥	٠,٠٠Hz	◎

Param.	Designation	Scope	Factory Default	Attr
U٠-٤٥	Higher-bit numbers of terminal UP/DOWN stored value	-١～١	٠	◎
U٠-٤٦	Lower-bit numbers of terminal UP/DOWN stored value	٠,٠٠～٦٥٥,٥٥	٠,٠٠Hz	◎
U٠-٤٧	Position control pulse error	-٩٩٩٩～+٩٩٩٩	٠	◎
U٠-٤٨	Feed-forward pulse FREQ of pulse tracking	٠,٠٠Hz～٦٠٠٠,٠٠Hz	٠	◎
U٠-٤٩	Motor absolute position display	٠~٦٥٥٣٥	٠	◎
U٠-٥٠	Spindle absolute position display	٠~٦٥٥٣٥	٠	◎
U٠-٥١	Higher-bit of carry amount command	٠～٩٩٩٩	٠	◎
U٠-٥٢	Lower-bit of carry amount command	٠～٩٩٩٩	٠	◎
U٠-٥٣	Current carry amount higher-bit	٠～٩٩٩٩	٠	◎
U٠-٥٤	Current carry amount lower-bit	٠～٩٩٩٩	٠	◎
U٠-٥٥	Motor feedback FREQ	٠,٠٠Hz～٦٠٠٠,٠٠Hz	٠,٠٠Hz	◎
U٠-٥٦	Spindle feedback FREQ	٠,٠٠Hz～٦٠٠٠,٠٠Hz	٠,٠٠Hz	◎
U٠-٥٧	Reference pulse FREQ	٠,٠٠Hz～٦٠٠٠,٠٠Hz	٠,٠٠Hz	◎
U٠-٦٠	Reserved	٠～٦٥٥٣٥	٠	◎
U٠-٦١	Reserved	٠～٦٥٥٣٥	٠	◎
U٠-٦٢	Communication status of PN communication board	٠～٦٥٥٣٥	٠	◎

Param.	Designation	Scope	Factory Default	Attr
U٠-٦٤	CPU load rate	٠～١٠٠,٠٪	٠,٠٪	◎
U٠-٦٥	PG interruption error accumulated	٠~٦٥٥٣٥	٠	◎
U٠-٦٦	PG interruption cycle	٠~٦٥٥٣٥	٠	◎
U٠-٦٧	Communication error accumulated of PG board	٠~٦٥٥٣٥	٠	◎
U٠-٦٨	Current position mode	Ones place: ١: orientation ٢: pulse tracking ٣: return to origin ٤: simple carry ٥: Zero speed clamping Tens Place: Status in each mode	٠	◎
		Group U١ Fault history		
U١-٠٠	History fault ١ (latest)	٠: No fault ١: Accel overcurrent (oC١) ٢: Const-speed overcurrent (oC٢) ٣: Decel overcurrent (oC٣) ٤: Accel overvoltage (ou١) ٥: Const-speed overvoltage (ou٢) ٦: Decel overvoltage (ou٣) ٧: Module protection (FAL) ٨: Autotune failed (tUN) ٩: Drive overloaded (oL١) ١٠: Motor overloaded (oL٢) ١١: Current detection circuit failed (CtC)	٠	◎

Param.	Designation	Scope	Factory Default	Attr
		١٢: Output ground short-circuit protection (GdP) ١٣: Input power supply fault (ISF) ١٤: Output phase loss (oPL) ١٥: Inverter module overload protection (oL٣) ١٦: Module (IGBT) thermal protection (oH١) ١٧: Motor (PTC) thermal protection (oH٢) ١٨: PIM temperature measurement circuit fault (oH٣) ١٩: Encoder disconnected (CLL) ٢٠: STO ١ circuit abnormal (ST١) ٢١: STO ٢ circuit abnormal (ST٢) ٢٢: Safety Torque Off (ST٠) ٢٣: Extension IO board connection abnormal (I٠E) ٢٤: External equipment error (PEr) ٢٥: Consecutive run time set by the agent reached (to١) ٢٦: Consecutive run time attained (to٢) ٢٧: Cumulative run time attained (to٣) ٢٨: Abnormal power supply at run (SUE) ٢٩: EEPROM read/write fault (EPr) ٣٠: Abnormal contactor (CCL) ٣١: Abnormal port communication (TrC)		

Param.	Designation	Scope	Factory Default	Attr
		٣٢: Control panel communication abnormal (PdC) ٣٣: Parameter copy failure (CPHDO) ٣٤: Reserved ٣٥: Software version compatibility failure (SFt) ٣٦: Hardware overcurrent fault (oC٤) ٣٧: Hardware overvoltage fault (ou٤) ٣٨: PG board connection fault (PGE) ٣٩: Reserved ٤٠: AI input out-of-limit (AIP) ٤١: Undervoltage protection (LoU) ٤٢: Over-speed (oSP) ٤٣: Speed bias is large (SPL) ٤٤: DC inject brake short-circuit fault (bCF) ٤٥: PID feedback lost (PIo) ٤٦: Communication abnormal (CbE) ٤٧: PG board software version abnormal (PGu)		
U١-٠١	Run FREQ at fault ١	٠,٠٠Hz～٦٠٠,٠٠Hz	٠,٠٠Hz	◎
U١-٠٢	Output current at fault ١	٠,٠A～٦٥٥٣,٥A	٠,٠A	◎
U١-٠٣	Bus voltage at fault ١	٠V～١٠٠٠٠V	٠V	◎
U١-٠٤	Ambient temperature at fault ١	-٤٠,٠°C～١٠٠,٠°C	٠,٠°C	◎
U١-٠٥	Inverter bridge temperature at fault ١	-٤٠,٠°C～١٠٠,٠°C	٠,٠°C	◎

Param.	Designation	Scope	Factory Default	Attr
U١-٠٦	Input terminal status at fault ١	٠٠٠٠～FFFF	٠٠٠٠	◎
U١-٠٧	Output terminal status at fault ١	٠٠٠٠～FFFF	٠٠٠٠	◎
U١-٠٨	Cumulative run time at fault ١	٠～٦٥٥٣٥h	٠h	◎
U١-٠٩	Code of fault ٢	Same as U١-٠٠	٠	◎
U١-١٠	Run FREQ at fault ٢	٠,٠٠Hz～٦٠٠,٠٠Hz	٠,٠٠Hz	◎
U١-١١	Output current at fault ٢	٠,٠A～٦٥٥٣,٥A	٠,٠A	◎
U١-١٢	Bus voltage w at fault ٢	٠V～١٠٠٠٠V	٠V	◎
U١-١٣	Temperature ١ of heat sink at fault ٢	-٤٠,٠°C～١٠٠,٠°C	٠,٠°C	◎
U١-١٤	Temperature ٢ of heat sink at fault ٢	-٤٠,٠°C～١٠٠,٠°C	٠,٠°C	◎
U١-١٥	Input terminal status at fault ٣	٠～FFFF	٠٠٠٠	◎
U١-١٦	Output terminal status at fault ٣	٠～FFFF	٠٠٠٠	◎
U١-١٧	Cumulative run time at fault ٣	٠～٦٥٥٣٥h	٠h	◎
U١-١٨	Code of fault ٣	Same as U١-٠٠	٠	◎
U١-١٩	Run FREQ at fault ٣	٠,٠٠Hz～٦٠٠,٠٠Hz	٠,٠٠Hz	◎
U١-٢٠	Output current at fault ٣	٠,٠A～٦٥٥٣,٥A	٠,٠A	◎
U١-٢١	Bus voltage w at fault ٣	٠V～١٠٠٠٠V	٠V	◎

Param.	Designation	Scope	Factory Default	Attr
U١-٢٢	Temperature ١ of heat sink at fault ٣	-٤٠,٠°C～١٠٠,٠°C	٠,٠°C	◎
U١-٢٣	Temperature ٢ of heat sink at fault ٣	-٤٠,٠°C～١٠٠,٠°C	٠,٠°C	◎
U١-٢٤	Input terminal status at fault ٣	٠٠٠٠～FFFF	٠٠٠٠	◎
U١-٢٥	Output terminal status at fault ٣	٠٠٠٠～FFFF	٠٠٠٠	◎
U١-٢٦	Cumulative run time at fault ٣	٠～٦٥٥٣٥h	٠h	◎
Group U٢ Version Information				
U٢-٠٠	InvertListNo	٠٠٠٠～٠xFFFF	Model dependent	◎
U٢-٠١	SoftVer	٠٠٠٠～٠xFFFF	Model dependent	◎
U٢-٠٢	SoftNonStandarVer	٠٠٠٠～٠xFFFF	Model dependent	◎
U٢-٠٣	KeyPadSoftVer	٠٠٠٠～٠xFFFF	Model dependent	◎
U٢-٠٤	HardWareVer	٠٠٠٠～٠xFFFF	Model dependent	◎
U٢-٠٥	TypeCodeHigh	٠～٩٩٩٩	٠	◎
U٢-٠٦	TypeCodeLow	٠～٦٥٥٣٥	٠	◎
U٢-٠٧	FactoryYearMonth	٠～٦٥٥٣٥	٠	◎
U٢-٠٨	BatchNo	٠～٦٥٥٣٥	٠	◎
U٢-٠٩	SerialNo	٠～٦٥٥٣٥	٠	◎
U٢-١٠	Communication board hardware version	٠٠٠٠～٠xFFFF	٠	◎
U٢-١١	PG board software version number	٠٠٠٠～٠xFFFF	٠	◎

Param.	Designation	Scope	Factory Default	Attr
U٢-١٢	PG board dedicated software version number	٠٠٠٠～٠xFFFF	٠	◎
U٢-١٣	I/O board hardware version	٠٠٠٠～٠x٠٠٠F	٠	◎
U٢-١٤	I/O board software version	٠٠٠٠～٠xFFFF	٠	◎
U٢-١٥	Communication board software version number	٠٠٠٠～٠xFFFF	٠	◎
U٢-١٦	Communication board dedicated software version number	٠٠٠٠～٠xFFFF	٠	◎

Chapter ٦ Troubleshooting

٦.١ 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 U١-٠٠, U١-٠٩ and U١-١٨ are used to view the records of fault ١, fault ٢ and fault ٣. Faults are recorded with numeric codes (١~٤٦), 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
١	oC١	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
٢	oC٢	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
٣	oC٣	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
٤	ou١	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
٥	ou٢	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
٦	ou٣	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
V	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
٨	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
٩	oL١	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
١٠	oL٢	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
١١	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
١٢	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
١٣	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
١٤	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
١٥	oL٣	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
١٦	oH١	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
١٧	oH٢	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
١٨	oH٣	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
١٩	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
٢٠	ST١	STO ١ circuit abnormal	Extension board of safety torque circuit damaged	Seek services
			Switch of STO ١ circuit abnormal	Check STO switch
٢١	ST٢	STO ٢ circuit abnormal	Extension board of STO circuit damaged	Seek services
			Switch of STO ٢ circuit abnormal	Check STO switch
٢٢	STO	Safety Torque Off	Improper connection to the switch of STO	Connect to STO switch after ensuring safety
٢٣	I٠E	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
٢٤	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
٢٥	to١	Consecutive run time set by the agent reached	"Consecutive run time set by the agent reached" enabled	Seek services
٢٦	to٢	Consecutive run time	"Consecutive run time attained" enabled	See specification of Group E٠

Fault code	Fault display	Fault description	Causes	Solutions
		attained		
٢٧	to٣	Cumulative run time attained	"Cumulative run time attained" enabled	See specification of Group E٠
٢٨	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
٢٩	EPr	EEPROM read/write fault	Parameter read/write abnormal at control board	Seek services
٣٠	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
٣١	TrC	Abnormal port communication	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
٣٢	PdC	Control panel communication abnormal	Control panel disconnected	Reconnected
			Severe EMI	Check peripheral equipment or seek services
٣٣	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
٣٥	SFt	Software version compatibility failure	Version of control panel is not consistent with that of control board	Seek services
٣٦	oCE	Hardware overcurrent fault	The hardware overcurrent threshold is triggered, the cause is the same as fault ١~٣	Solve this issue according to solutions of fault codes ١ to ٣
٣٧	ouE	Hardware overvoltage fault	The hardware overvoltage threshold is triggered, the cause is the same as fault ٤~٦	Solve this issue according to solutions of fault codes ٤ to ٦
٣٨	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
٤٠	AIP	AI input out-of-limit	Control board failed	Seek services
			AI input is too high or low	Set AI input within correct range
٤١	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
٤٢	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
٤٣	SPL	Speed bias is large	Speed bias setting value is too small	Set speed bias reasonably
			Big fluctuation of load	Stabilize the load
			Unreasonable vector control parameter setting	Set correctly

Fault code	Fault display	Fault description	Causes	Solutions
٤٤	bCF	Brake pipe short-circuit fault	DC brake pipe damaged	Seek services
٤٥	Plo	PID feedback lost	Abnormal PID feedback channel abnormal	Check the feedback channel
			Inappropriate setting of PID parameters	Set properly
٤٦	CbE	Communication abnormal	Abnormal communication wire	Reconnect the wire
			Too much interference on site	Check peripheral equipment or seek services
٤٧	PGu	PG board abnormal	PG board software version not match	Seek services
٤٦	CbE	Communication abnormal	Abnormal communication wire	Reconnect the wire
			Too much interference on site	Check peripheral equipment or seek services
٤٧	PGu	PG board abnormal	PG board software version does not match	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 ٧ 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 ٠V before the maintenance.

٧,١ 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	-١٠℃~٤٠℃
	Humidity	Hygrometer	٥٪~٩٥٪, 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 U٠-٣٢ displayed temperature and ambient temperature does not exceed ٤٠℃

٧,٢ Regular Maintenance

Users should perform regular inspection of the drive every ٣~٦ 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 ٠V 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 ٥٠٠V 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 ٥٠٠V 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 ٥ hours.

٧,٣ 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	٣٠,٠٠٠~٤٠,٠٠٠h	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	٤٠,٠٠٠~٥٠,٠٠٠h	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	٥٠,٠٠٠~١٠٠,٠٠٠ times	Corrosion and dust impairs the contacting effect of contact; excessively frequent contact action	Open/close failure False alarm of CCL fault

٧,٤ Storage

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

Items	Requirements	Recommended storage method and environment
Storage temperature	-٤٠~+٧٠℃	In case of long-term storage, areas with an ambient temperature of less than ٢٠℃ are recommended Avoid the storage in areas where temperature shock may result in condensation and freezing
Storage humidity	٥~٩٥٪	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

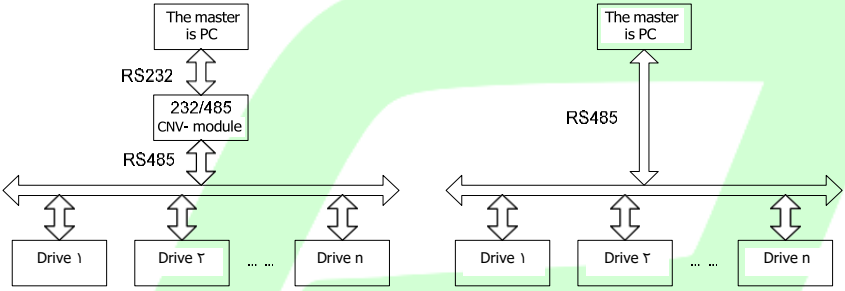
ATTENTION:

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 ٥ hours.

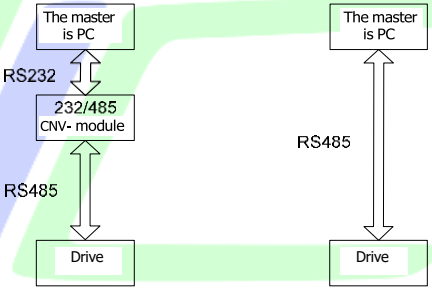
Appendix ١ Communication Protocol

١. 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

٢. Interface Mode

RS٤٨٥ or RS٢٣٢ interface: asynchronous, half-duplex. Default data format: ٨-N-٢ (٨ data bits, no check, two stop bits), ٩٦٠٠ bps. See parameters of Group H٠ for parameter setting.

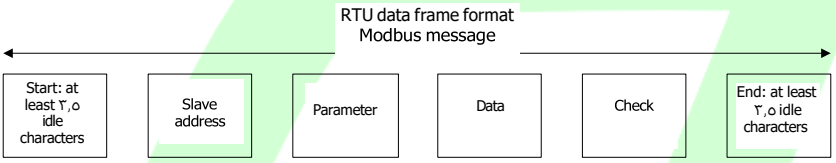
٣. Communication Mode

١) 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;

٢) Native address, baud rate and data format of inverter are set through slave operating panel or serial communication;
٣) Slave reports the current fault information in the latest response frame for master polling;
٤) Please refer to Chapter ٣ about the explanation of communication extension board for the communication interface.

٤. 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:

١) Frame header and end define the frame by making bus idle time equal to or longer than ٣,٥-byte time;
٢) After the start of frame, the clearance between characters must be less than ١,٥-character communication time, or the newly received characters will be treated as the header of the new frame;
٣) Data check employs CRC-١٦ 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;
٤) The bus idle time of at least ٣,٥ 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 b٠-٠٣ from slave ٠x٠١" is as below:

Appendix Table ١

Address	Function code	Register address	Read words	Check sum
٠١	٠٣	٠٢ ٠٣	٠٠ ٠١	٣٤ ٧٣

Response frame of slave ٠x٠١ is as below:

Appendix Table ٢

Address	Function code	Register address	Read words	Check sum
٠١	٠٣	٠٢	١٣ ٨٨	Bo ١٢

٥. 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 ٣ Parameters

Parameter	Meaning of parameter
٠x٠٣	Read drive functional parameters and run status parameters
٠x٠٦	Over-write individual drive functional parameters or control parameters, which are not saved on power loss
٠x٠٨	Line diagnosis
٠x١٠	Over-write multiple drive functional parameters or control parameters, which are not saved on power loss
٠x٤١	Write individual drive functional parameters or control parameters, and save them to non-volatile storage unit
٠x٤٢	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 ٤ High-byte register addresses mapped from parameter group numbers

Parameter group	Mapping register address, high byte	Parameter group	Mapping register address, high byte
A٠	٠x٠٠	E٢	٠x١٢
A١	٠x٠١	F٠	٠x١٣
b٠	٠x٠٢	F١	٠x١٤

Parameter group	Mapping register address, high byte	Parameter group	Mapping register address, high byte
b١	٠x٠٣	F٢	٠x١٥
b٢	٠x٠٤	F٣	٠x١٦
C٠	٠x٠٥	F٤	٠x١٧
C١	٠x٠٦	F٥	٠x١٨
C٢	٠x٠٧	F٦	٠x١٩
C٣	٠x٠٨	H٠	٠x١A
C٤	٠x٠٩	H١	٠x١B
d٠	٠x٠A	H٢	٠x١C
d١	٠x٠B	L٠	٠x١D
d٢	٠x٠C	L١	٠x١E
d٣	٠x٠D	U٠	٠x١F
d٤	٠x٠E	U١	٠x٢٠
d٥	٠x٠F	U٢	٠x٢١
E٠	٠x١٠	Drive control parameter group	٠x٦٢
E١	٠x١١	Drive status parameter group	٠x٦٣

For example, the register address of drive parameter b٠-٠٢ is ٠x٠٢٠٢ while that of E٠-٠٧ is ٠x١١٠٧.

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 ٠x٠٣: read register content
Request format is shown in appendix table ٥.

Appendix Table ٥

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	١	٠x٠٣
Register address	٢	٠x٠٠٠٠~٠xFFFF
Number of registers	١٢	٠x٠٠٠١~٠x٠٠٠C

Check	LRC or CRC	

Response format is shown in appendix table ٦.

Appendix Table ٦

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	١	٠x٠٣
Number of read bytes	١	٢* number of registers
Register content	٢* number of registers	
Check	LRC or CRC	

Parameter ٠x٠٦(٠x٤١): write register content (٠x٤١ saved at power loss)
Request format is shown in appendix table ٧.

Appendix Table ٧

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	١	٠x٠٦
Register address	٢	٠x٠٠٠٠~٠xFFFF
Register content	٢	٠x٠٠٠٠~٠xFFFF
Check	LRC or CRC	

Response format is shown in appendix table ٨.

Appendix Table ٨

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	١	٠x٠٦
Register address	٢	٠x٠٠٠٠~٠xFFFF
Register content	٢	٠x٠٠٠٠~٠xFFFF
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 ٩.

Appendix Table ٩

	Parameters	Remarks
(Autotune)	d٠-٢٢ d٣-٢٢	Communication not operable
(Parameter passing)	A٠-٠٥	Communication not operable
(User password)	A٠-٠٠	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 ٠x٠٨: communication line diagnosis.
Request format is shown in appendix table ١٠.

Appendix Table ١٠

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	١	٠x٠٨
Sub-parameter	٢	٠x٠٠٠٠~٠x٠٠٣٠
Data	٢	٠x٠٠٠٠~٠xFFFF
Check	LRC or CRC	

Response format is shown in appendix table ١١.

Appendix Table ١١

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	١	٠x٠٨
Sub-parameter	٢	٠x٠٠٠٠~٠x٠٠٣٠
Data	٢	٠x٠٠٠٠~٠xFFFF
Check	LRC or CRC	

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

Appendix Table ١٢ Line diagnosis sub-parameter

Sub-PARA	Data (request)	Data (response)	Meaning of subfunction
٠x٠٠٠١	٠x٠٠٠٠	٠x٠٠٠٠	Reinitialize communication: make no-response mode disable.
	٠xFF٠٠	٠xFF٠٠	Reinitialize communication: make no-response mode disable.
٠x٠٠٠٣	"New frame end" ٠٠	"New frame end" ٠٠	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 ٠xVF and shall not be equal to ٠x٣A)
٠x٠٠٠٤	٠x٠٠٠٠	No response	Set no-response mode. Only response to reinitialization communication request. This is mainly used for isolating faulty equipment.
٠x٠٠٣٠	٠x٠٠٠٠	٠x٠٠٠٠	Make slave no-response to invalid command and error command
	٠x٠٠٠١	٠x٠٠٠١	Make slave response to invalid command and error command

Parameter ٠x١٠: write parameters continuously
Request format is shown in appendix table ١٣.

Appendix Table ١٣

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	١	٠x١٠
Register address	٢	٠x٠٠٠٠~٠xFFFF
Number of registers	٢	٠x٠٠٠١~٠x٠٠٠٤
Number of bytes of register content	١	٢* number of operation registers
Register content	٢* number of operation registers	
Check	LRC or CRC	

Response format is shown in appendix table ١٤.

Appendix Table ١٤

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	١	٠x١٠
Register address	٢	٠x٠٠٠٠~٠xFFFF
Number of registers	٢	٠x٠٠٠١~٠x٠٠٤
Check	LRC or CRC	

Parameter ٠x٤٢: parameter management
Request format is shown in appendix table ١٥.

Appendix Table ١٥

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	١	٠x٤٢
Sub-parameter	٢	٠x٠٠٠٠~٠x٠٠٠٧
Data	٢ (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 ١٦.

Appendix Table ١٦

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	١	٠x٤٢
Sub-parameter	٢	٠x٠٠٠٠~٠x٠٠٠٧
Data	٢	٠x٠٠٠٠~٠xFFFF
Check	LRC or CRC	

Sub-parameters supported by parameter management are set forth in the table ١٧.

Appendix Table ١٧ Parameter management sub-parameters

Sub-PARA	Data (request)	Data (response)	Meaning of sub-function
٠x٠٠٠٠	Parameter group number and in-group index respectively possess high and low bytes	Upper limit of parameter	Read the upper limit of parameter
٠x٠٠٠١	Parameter group number and in-group index respectively possess high and low bytes	Lower limit of parameter	Read the lower limit of parameter
٠x٠٠٠٢	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
٠x٠٠٠٣	Parameter group number possesses high byte, while the lower byte is ٠.	Maximum value of in-group index	Read the maximum value of in-group index
٠x٠٠٠٤	Parameter group number possesses high byte, while the lower byte is ٠.	The next parameter group number possesses high byte, while the lower byte is ٠.	Read the next parameter group number
٠x٠٠٠٥	Parameter group number possesses high byte, while the lower byte is ٠.	The previous parameter group number possesses high byte, while the lower byte is ٠.	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 ٢-byte long, and the bit definition is shown in the table below:

Appendix Table ١٨ Parameter characteristics

Characteristic parameter (BIT)	Value	Meaning
BIT١~BIT٠	٠٠B	Changeable in run
	٠١B	Not changeable in run, but changeable in stop
	١٠B	Read only
	١١B	Factory parameters
BIT٤~BIT٢	٠٠٠B	Accuracy: ١
	٠٠١B	Accuracy: ٠,١
	٠١٠B	Accuracy: ٠,٠١
	٠١١B	Accuracy: ٠,٠٠١
	١٠٠B	Accuracy: ٠,٠٠٠١
	Others	Reserved
BIT٧~BIT٥	٠٠٠B	The unit is A
	٠٠١B	The unit is Hz
	٠١٠B	The unit is Ω
	٠١١B	The unit is r/min
	١٠٠B	The unit is S
	١٠١B	The unit is V
	١١٠B	The unit is %
	١١١B	No unit
BIT٨	٠: decimal; ١: hexadecimal	Display format
BIT٩	٠: non-quick menu; ١: quick menu	Quick menu or not
BIT١٠	٠: not uploaded; ١: uploaded	Uploaded to control panel or not
BIT١٣~BIT١١	٠٠١B	Data width: ١
	٠١٠B	Data width: ٢
	٠١١B	Data width: ٣
	١٠٠B	Data width: ٤
	١٠١B	Data width: ٥
	١١٠B	Data width: ٦
	١١١B	Data width: ٧
BIT١٤	Number of symbols available/not available	٠: unsigned number; ١: directed number
BIT١٥	Reserved	Reserved

The response format is shown as table ١٩ when an error occurs.

Appendix Table ١٩

Application layer protocol data unit	Data length (number of bytes)	Range
Parameter	١	٠x٨٠ + parameter
Error code	١	
Check	LRC or CRC	

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

Appendix Table ٢٠ Error codes

Error codes	Meanings of error codes
٠x٠١	Illegal parameter
٠x٠٢	Illegal register address
٠x٠٣	Data error, i.e. data are out of upper limit or lower limit
٠x٠٤	Slave operation failed, including errors caused by invalid data although there are in the range
٠x٠٥	Command is valid and being processed, mainly used for storing data to non-volatile storage
٠x٠٦	Slave is busy, please try again later; mainly used for storing data into non-volatile storage
٠x١٨	Message frame error: including message length error and check error
٠x٢٠	Parameter is not changeable
٠x٢١	Parameter is not changeable during the running
٠x٢٢	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 ٢١.

Appendix Table ٢١ Control parameters

Register address	Parameter name	Save at power loss
٠x٦٢٠٠	Control command word	No
٠x٦٢٠١	Master frequency setting	Yes
٠x٦٢٠٢	Auxiliary frequency setting	Yes
٠x٦٢٠٣	Master frequency reference	No
٠x٦٢٠٤	Auxiliary frequency reference	No

Register address	Parameter name	Save at power loss
٠x٦٢٠٥	Multi-step frequency reference	No
٠x٦٢٠٦	Simple PLC frequency reference	No
٠x٦٢٠٧	PID digital setting percentage (٠~١٠٠,٠٪)	No
٠x٦٢٠٨	PID feedback percentage (٠~١٠٠,٠٪)	No
٠x٦٢٠٩	Driven torque limit (٠~٢٠٠,٠٪)	No
٠x٦٢٠A	Brake torque limit (٠~٢٠٠,٠٪)	No
٠x٦٢٠B	Reserved	No
٠x٦٢٠C	Reserved	No
٠x٦٢٠D	Reserved	No
٠x٦٢٠E	Analog AO١ source setting	No
٠x٦٢٠F	Analog EAO source setting	No
٠x٦٢١٠	Digital DO output source setting	No
٠x٦٢١١	Setting of slave frequency setting proportion (٠~١٠٠,٠٪)	No
٠x٦٢١٢	Virtual terminal communication reference	No
٠x٦٢١٣	Accel time ١	Yes
٠x٦٢١٤	Decel time ١	Yes

Appendix Table ٢٢ Status parameters

Register address	Parameter name
٠x٦٣٠٠	Run status word ١
٠x٦٣٠١	Current run frequency
٠x٦٣٠٢	Output current
٠x٦٣٠٣	Output voltage
٠x٦٣٠٤	Output power
٠x٦٣٠٥	Rotary speed
٠x٦٣٠٦	Bus voltage
٠x٦٣٠٧	Output torque
٠x٦٣٠٨	External counter
٠x٦٣٠٩	High-bit words of actual length

Register address	Parameter name
٠x٦٣٠A	Low-bit words of actual length
٠x٦٣٠B	Status of digital input terminal
٠x٦٣٠C	Status of digital output terminal
٠x٦٣٠D	Setting of run frequency
٠x٦٣٠E	PID setting
٠x٦٣٠F	PID feedback
٠x٦٣١٠	Set Accel time ١
٠x٦٣١١	Set Decel time ١
٠x٦٣١٢	AI١ (Unit:٠,٠١V) (Range: ٠,٠٠V-١٠,٠٠V)
٠x٦٣١٣	AI٢ (Unit:٠,٠١V) (Range: ٠,٠٠V-١٠,٠٠V)
٠x٦٣١٤	AI٣ (Unit:٠,٠١V) (Range: ٠,٠٠V-١٠,٠٠V)
٠x٦٣١٥	AI٤ (Unit:٠,٠١V) (Range: -١٠,٠٠V-١٠,٠٠V)
٠x٦٣١٦	Xo (unit: kHz)
٠x٦٣١٧	Fault ١ (the latest)
٠x٦٣١٨	Fault ٢
٠x٦٣١٩	Fault ٣
٠x٦٣١A	Run display parameter
٠x٦٣١B	Stop display parameter
٠x٦٣١C	Setting of drive control mode
٠x٦٣١D	Frequency reference mode
٠x٦٣١E	Master frequency reference
٠x٦٣١F	Digital setting of master frequency reference
٠x٦٣٢٠	Auxiliary frequency reference
٠x٦٣٢١	Digital setting of auxiliary frequency reference
٠x٦٣٢٢	Drive status word ٢
٠x٦٣٢٣	Current drive fault

Drive control bits are defined as below table ٢٣.

Appendix Table ٢٣ Control bits

Control bit	Value	Meaning	Function description
BIT٠	٠	Run command disabled	Stop the drive
	١	Run command enabled	Start the drive
BIT١	١	Reverse	

Control bit	Value	Meaning	Function description
	٠	Forward	Set the run direction when run command enabled
BIT٢	١	Jog	
	٠	Jog disabled	
BIT٣	١	Reset command enabled	
	٠	Reset command disabled	
BIT٤	١	Coast to stop enabled	
	٠	Coast to stop disabled	
BIT١٥~BIT٥	٠٠٠٠٠٠B	Reserved	

ATTENTION:

When BIT٠ and BIT٢ coexist, jog takes precedence.

Drive status bits are shown in appendix table ٢٤.

Appendix Table ٢٤ Status word ١ bits

Status bit	Value	Meaning	Remarks
BIT٠	١	Run	
	٠	Stop	
BIT١	١	Reverse	
	٠	Forward	
BIT٢~BIT٣	٠٠B	Constant speed	
	٠١B	Accel	
	١٠B	Decel	
BIT٤	٠	Main setting not attained	
	١	Main setting attained	
BIT٧~BIT٥	Reserved		
BIT١٥~BIT٨	٠x٠٠~٠xFF	Fault code	٠: drive normal. Non-٠: drive at fault; Refer to relative specification of the fault codes in Chapter ٧ in this user manual

Appendix Table ٢٥ Status word ٢ bits

Status bit	Value	Meaning	Remarks
BIT٠	١	Jog	
	٠	Non-jog	
BIT١	١	PID run	
	٠	Non-PID run	
BIT٢	١	PLC run	
	٠	Non-PLC run	
BIT٣	١	Run at multi-step frequency	
	٠	Run at non-multi step frequency	
BIT٤	١	Ordinary run	
	٠	Non-ordinary run	
BIT٥	١	Wobble frequency	
	٠	Non-wobble frequency	
BIT٦	١	Undervoltage	
	٠	Normal voltage	
BIT٧	١	Sensor-less vector control	
	٠	Non-sensor-less vector control	
BIT٨	١	Closed-loop vector control	
	٠	Non-closed-loop vector control	
BIT٩	١	Position control	
	٠	Non-position control	
BIT١٠	١	Autotune	
	٠	Non-autotune	
Others	٠	Reserved	

٦. Operation Instructions

٠x٠٣ reads multiple (including one) registers (default address is ٠x٠١). Master enquiry:

Appendix Table ٢٦

Address	Parameter	Register address	Number of registers	Check code
٠١	٠٣	XX XX	٠٠٠X	XX XX

Slave response:

Appendix Table ٢٧

Address	Parameter	Total number of bytes	Data	Check code
٠١	٠٣	٢* number of registers	Bn~B٠	XX XX

Register address: ٠x٠٠ ٠٠~٠x٦٣ ٢٢;
Number of registers: ٠x٠٠ ٠١~٠x٠٠ ٠C;
Data: n is equal to (٢ x the number of registers -١).
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 ٠x٠٣ is used here to read values of ٠x٠١ slave's control parameters b٠-٠٠, b٠-٠١, b٠-٠٢ and b٠-٠٣. At this moment, b٠-٠٠ = ٠, b٠-٠١ = ٠, b٠-٠٢ = ٥٠,٠٠, b٠-٠٣ = ٠.

Appendix Table ٢٨

	Address	PARAM	Register address	Number of registers	Number of data bytes	Data	Check sum
Request	٠١	٠٣	٠٢ ٠٠	٠٠ ٠٤	None	None	٤٤ B١
Response	٠١	٠٣	None	None	٠٨	٠٠٠٠,٠٠٠٠, ١٣٨٨, ٠٠٠B	١١ V٩

Management of parameter ٤٢H
Master enquiry:

Appendix Table ٢٩

Address	Parameter	Sub-parameter	Data	Check code
٠١	٤٢	XX XX	XX XX	XX XX

Slave response:

Appendix Table ٣٠

Address	Parameter	Sub-parameter	Data	Check code
٠١	٤٢	XX XX	B١~B٠	XX XX

Register address: ٠x٠٠ ٠٠~٠x٢١ ٠٦ and ٠x٦٢ ٠٠~٠x٦٣ ٢٢.
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 ٠x٤٢ is used here to read the upper limit value of ٠x٠١ slave's control parameter b٠-٠٢ which is ٦٠٠,٠٠:

Appendix Table ٣١

	Address	Parameter	Sub-PARA	Data	Check sum
Request	٠١	٤٢	٠٠ ٠٠	٠٢ ٠٢	F٩ ٦٤
Response	٠١	٤٢	٠٠ ٠٠	EA ٦٠	٣٦ ٨D

٠x٠٦ (٠x٤١ data storage) writes that individual parameter data is not saved.
Master enquiry:

Appendix Table ٣٢

Address	Parameter	Register address	Data	Check code
٠١	٠٦	٦٢ ٠٠	B١ B٠	XX XX

Slave response:

Appendix Table ٣٣

Address	Parameter	Register address	Data	Check code
٠١	٠٦	٦٢ ٠٠	B١ B٠	XX XX

Example:
Parameter ٠x٠٦ is used here to write ٠x٠١ slave's control command (forward), i.e. to write ١ to register address ٠x٦٢٠٠:

Appendix Table ٣٤

	Address	Parameter	Register address	Number of registers	Number of data bytes	Data	Check sum
Request	٠١	٠٦	٦٢ ٠٠	None	None	٠٠ ٠١	٥V B٢
Response	٠١	٠٦	٦٢ ٠٠	None	None	٠٠ ٠١	٥V B٢

١٠H writes that the data of multiple registers are not saved.
Master enquiry:

Appendix Table ٣٥

Address	Parameter	Register address	Number of registers	Number of data bytes	Data	Check code
٠١	١٠	XX XX	٠٠٠١~٠٠٠٤	Number of ٢* registers	XX XX	XX XX

Slave response:

Appendix Table ٣٦

Address	Parameter	Register address	Number of registers	Check code
٠١	١٠	XX XX	Number of ٢* registers	XX XX

Register address: ٠x٠٠ ٠٠~٠x١E ٠٤, ٠x٦٢ ٠٠~٠x٦٢ ١٤
Number of registers: ٠x٠٠ ٠١~٠x٠٠ ٠٤
Number of data bytes: ٠x٠٢~٠x٠٨
Data: n is equal to (٢ x the number of registers -١).

Example:
Parameter ٠x١٠ is used here to write the corresponding write data ١, ٦ and ٠ in control registers ٠x٦٢٠٠, ٠x٦٢٠١ and ٠x٦٢٠٢ of slave ٠x٠١:

Appendix Table ٣٧

	Address	Parameter	Register address	Number of registers	Number of data bytes	Data	Check sum
Request	٠١	١٠	٦٢ ٠٠	٠٠ ٠٣	٠٦	٠٠٠١,٠٠٠٦,٠٠٠٠	CE FA
Response	٠١	١٠	٦٢ ٠٠	٠٠ ٠٣	None	None	٩F B٠

٠x٠٨: communication line diagnosis
Master enquiry:

Appendix Table ٣٨

Address	Parameter	Sub-parameter	Data	Check code
٠١	٠٨	XX XX	XX XX	XX XX

Slave response:

Appendix Table ٣٩

Address	Function code	Subfunction code	Data	Check code
٠١	٠٨	XX XX	Bn~B٠	XX XX

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

Example:
Parameter ٠x٠٨ is used here to set the communication no-response mode of ٠x٠١ slave:

Appendix Table ٤٠

	Address	Parameter	Sub-PARA	Data	Check sum
Request	٠١	٠٨	٠٠ ٠٤	٠٠ ٠٠	A١ CA
Response	٠١	٠٨	٠٠ ٠٤	٠٠ ٠٠	A١ 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 ٤١

Address	Parameter	Data	Check code
٠١	٠x٨٠+parameter	Error code	XX XX

Example:
Parameter ٠x١٠ is used here to write the corresponding write data ١, ١١, ٤ and ١٠٠,٠٠ in control registers ٠x٦٢٠٠, ٠x٦٢٠١, ٠x٦٢٠٢ and ٠x٦٢٠٣ of ٠x٠١ slave:

Appendix Table ٤٢

	Address	Parameter	Register address	Number of registers	Number of data bytes	Data	Check sum
Request	٠١	١٠	٦٢٠٠	٠٠ ٠٤	٠٨	٠٠٠١,٠٠٠B ٠٠٠٤ ٢٧١٠	DE ٦٤
Response	٠١	٩٠	None	None	None	٢٠	٠C ٠١

٧. LRC/CRC Generation

In consideration of the demand for speed improvement, CRC-١٦ is usually realized in form mode. C-language source codes for realization of CRC-١٦ 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 CRC١٦*/
Uint١٦ CRC١٦(const Uint١٦ *data, Uint١٦ len)
{
    Uint١٦ crcValue = ٠xffff;
    Uint١٦ i;
    while (len--)
    {
        crcValue ^= *data++;
        for (i = ٠; i <= ٧; i++)
        {
            if (crcValue & ٠x٠٠٠١)
            {
                crcValue = (crcValue >> ١) ^ ٠xa٠٠١;
            }
            else
            {
                crcValue = crcValue >> ١;
            }
        }
    }
    return (crcValue);
}
```

Appendix ٢ Option Board Information

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

Type	Name	Description
Extension IO board	EPC-TM٣٢	Supports ٥ digital inputs, ٢ analog inputs, ٢ STO inputs, ١ leakage current detection input, ٢ digital outputs, ١ analog output, and ١ relay output.
Communication extension board	EPC-CM٣١	CAN communication board-dual RJ٤٥ interface-compatible with GS١٠٠ pin definition
	EPC-CM٣١A	CAN communication board-dual RJ٤٥ interface-compatible with GK٦١٠ pin definition
	EPC-CM٣١B	٤٨٥ communication board-٣ PIN terminal block
	EPC-CM٣٢	CAN communication board-dual RJ٤٥ interface
	EPC-CM٣٢A	CAN communication board-٣ PIN terminal block
	EPC-CM٣٣	MIII communication board-dual RJ٤٥ interface
	EPC-CM٣٤	EtherCAT communication board-dual RJ٤٥ interface
	EPC-CM٣٥	Profinet communication board-dual RJ٤٥ interface
	EPC-CM٣٦	CANopen communication board-dual RJ٤٥ interface
Encoder extension board	EPC-PG٣١	Non-isolated dual closed-loop PG board, supports ٢ differential A/B/Z signal inputs, and ١ differential PA/PB pulse reference, ١ A/B/Z differential division frequency output, ١ motor temperature sampling, and can directly support UVW encoder, with a maximum input ٢MHz. Dual-port D-sub connectors are adopted.
	EPC-PG٣٢	Single-channel isolated PG board, supports ١ differential A/B/Z input, ١ differential PA/PB pulse reference, ١ A/B/Z open collector division frequency output, ١ motor temperature sampling, with a maximum input ٥٠٠kHz. Dual-port D-sub connectors are adopted.
	EPC-PG٣٢A	Single-channel isolated PG board, supports ١ ١٢V digital A/B/Z input, ١ ٢٤V digital PA/PB pulse reference, ١ A/B/Z open collector division frequency output, ١ motor temperature sampling, with a maximum input ٥٠٠kHz. Dual-port D-sub connectors are adopted.
	EPC-PG٣٢B	Single-channel isolated PG board, supports ١ differential A/B/Z input, ١ ٢٤V digital PA/PB pulse reference, ١ A/B/Z

		open collector division frequency output, ۱ motor temperature sampling, with a maximum input ٥۰۰kHz. Dual-port D-sub connectors are adopted.
Encoder extension board	EPC-PG۳۳	Rotary decoding PG board, supports ۱ rotary decoding, ۱ differential PA/PB pulse reference, ۱ A/B/Z open collector division frequency output or ۱ A/B/Z differential division frequency output, ۱ motor temperature sampling, with a maximum input ۳۰۰kHz.Dual-port D-sub connectors are adopted.
	EPC-PG۳٤	SINCOS decoding board, supports ۱ SINCOS decoding, ۱ differential PA/PB pulse reference, ۱ A/B/Z differential division frequency output, and ۱ motor temperature sampling. Dual-port D-sub connectors are adopted.
	EPC-PG۳٥	Absolute encoder board, supports protocol formats such as SSI, ENDAT, BISS and so on. Dual-port D-sub connectors are adopted.
	EPC-PG۳٦	Single-channel isolated PG board, supports ۱ differential A/B/Z signal input, ۱ differential PA/PB pulse reference, ۱ A/B/Z differential division frequency output, with a maximum input ٥۰۰kHz, ۱۸-pin terminal blocks are adopted, replacing PG۳۹ Dual-port D-sub connectors.
	EPC-PG۳۷	Single-channel isolated PG board, supports ۱ differential A/B/Z input and ۱ differential PA/PB pulse reference, ۱ A/B/Z open collector division frequency output, ۱ motor temperature sampling, with a maximum input ٥۰۰kHZ, ۱۸-pin terminal blocks are adopted, replacing PG۳۲ Dual-port D-sub connectors.
	EPC-PG۳۷A	Single-channel isolated PG board, supports ۱ ۱۲V digital A/B/Z input and ۱ ۲٤V digital PA/PB pulse reference, ۱ A/B/Z open collector division frequency output, ۱ motor temperature sampling, with a maximum input ٥۰۰kHZ, ۱۸-pin terminal blocks are adopted, replacing PG۳۲A Dual-port D-sub connectors.
	EPC-PG۳۷B	Single-channel isolated PG board, supports ۱ differential A/B/Z input, ۱ ۲٤V digital PA/PB pulse reference, ۱ A/B/Z open collector division frequency output, ۱ motor temperature sampling, with a maximum input ٥۰۰kHz, ۱۸-pin terminal blocks are adopted, replacing PG۳۲B Dual-port D-sub connectors.

	EPC-PG۳۸	Rotary decoding and SINCOS decoding board, supports ۱ rotary decoding, ۱ SINCOS decoding, ۱ A/B/Z open collector division frequency output, and ۱ motor temperature sampling. Dual-port D-sub connectors are adopted.
	EPC-PG۳۹	Single-channel isolated PG board, supports ۱ differential A/B/Z input, ۱ differential PA/PB pulse reference, ۱ A/B/Z differential frequency division output, ۱ motor temperature sampling, with a maximum input ٥۰۰kHz. Dual-port D-sub connectors are adopted, replacing PG۳۱ in single closed-loop applications.

Appendix ٣ Dedicated Model Explanation

The 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.