Qma

ATIRO
(AUTOMATION & DRIVE)

Q1200 Close loop Elevator Specialized AC Drive

Manual Book

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Preface

Thank you for purchasing the Q1200 series AC drive for elevator applications.The Q1200 is a new-generation high-performance vector control AC drive for elevator applications independently developed and manufacturered by Janson Controls Technologies(Shenzhen)Co.,Limited. It adopts advanced algorithms such as motor vetor control and smooth curve calculation based on Janson Controls's many years' experience in the elevator application industry.

This manual describes the correct use of the Q1200 including product features.safety information and precautions, installation, parameter setting, commissioning,and maintenance & inspection. Read and understand the manual before using the product,and keep it carefully for reference to future maintenance.The personnel who involve in system installation, commissioning, and maintenance mustreceive necessary safety and use training, understand this manual thoroughly, and haverelated experience before performing operations.

Notes
The drawings in the manual are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first.and then perform operations in accordance with the instructions. The drawings in the manual are shown for description only and may not matchthe product you purchased. The instructions aresubject to change, without notice, due to product upgrades pecification modification as well as efforts to increase the accuracy and convenience of the manual. Contact our agents or customer service center if you need a new user manualor have problems during the use.

Introduction

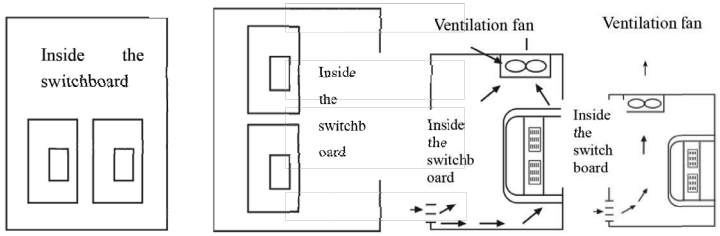
1. Product features

The Q1200 has the following features:

- Drive both the asynchronous motor and permanent magnetic synchronous motor(PMSM), and provide multiple encoder interfaces.
- Support motor auto-tuning (static auto-tuning and complete auto-tuning).
- Support multiple speed sources, multi-speed and analog setting.Guarantee good elevator riding comfort with flexible startup curves, multi-segment S-curve setting, and four groups of acceleration/deceleration time.
- Support emergency evacuation at power failure with the 48V battery power supply.
- Provide various elevator-related functions, including enable detection, brake contactor control, output contactor control, slow-down judgment, over speed protection, speed deviation detection, door preopen, contact stuck detection, motor overheat detection, and startup pre-torque compensation.

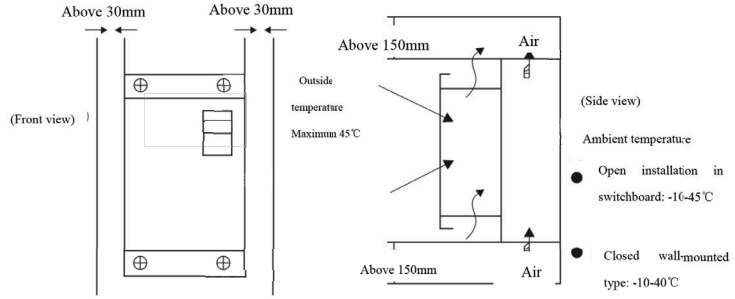
  Support connection to the external operation panel through the RJ45.
- Interface.making the operation and commissioning simpler and easier.
- Provide the built-in DC reactor and braking unit, which improves the output powerfactor and reduces costs of peripheral devices.
- Separate air duct with conformal coating process, professional manufacturingplatform, and advanced process make good product quality.
- Have the lightning protection design and the strong ant-interface capability,compliant with the EMC standard.

2. Connection to peripheral devices



(Correct configuration) (Incorrect configuration) (Correct configuration) (Incorrect configuration)

- Installing the inverter with its front surface forward and top part upward for heat radiation.
- Installation space must be in accordance with following regulations: When the inverter is installed inside the switchboard or if conditions permit, remove upper dustproof cover of the inverter for cooling and heat radiation.



Do not install the capacitor or surge suppressor on the output side of the AC drive Otherwise, it may cause faults to the AC drive or damage to the capacitor and surge suppressor.

Inputs/Outputs (main circuit)of the AC drive contain harmonics, which may interferewith the communication device connected to the AC drive. Therefore. install ananti-interference filter to minimize the interference.

For more details on peripheral devices, refer to related selection guidelines.

Product Checking

Upon unpacking,check:

Whether the nameplate model and AC drive ratings are consistent with your order.The box contains the AC drive, certificate of conformity, user manual and warranty card.

Whether the AC drive is damaged during trans portation. If you find any omission ordamage, contact your supplier or us immediately.

First-time Use

For users who use this product for the first time, read the manual carefully. If you have any problem concerning the functions or performance, contact the technical support personnelof Janson Controls to ensure correct use.

As the installation environment has direct influence on the performance and service life of the inverter, following conditions must be met.

- Ambient environment: Open installation in switchboard (-10-45℃/+14-113° F)
  Closed wall-mounted type (-10-40℃/+14-104° F)
- Avoid rain or humid environment. Avoid direct sunlight.
- Prevent erosion of oil mist and salt. • Avoid corrosive liquid and gas.
- Prevent dust, batting and metal powder from entering the inverter.
- Away from radioactive substance and combustible material.
- Prevent electromagnetic interference (welding machine, power machine).
- Prevent vibration (punch press). If it is unavcidable, please install a shockproof gasket to reduce vibration.
- When multiple inverters are installed in a control cabinet, install them at proper positions for heat dissipation. In addition, please install a heat radiation fan to make the ambient temperature around the inverter lower than 450℃.

Chapter 1 Safty precautions

1.1 General precautions

1. Requirement on the residual current device (RCD)

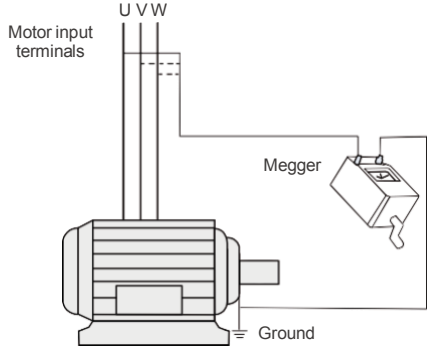
The AC drive generates high leakage current during running, which flows through the protective earthing conductor. Thus install a type-B RCD at primary side of the power supply. When selecting the RCD, you should consider the transient and steady-state leakage current to ground that may be generated at startup and during running of the AC drive. You can select a specialized RCD with the function of suppressing high harmonics or a general-purpose RCD with relatively large residual current.

2. High leakage current warning

The AC drive generates high leakage current during running, which flows through the protective earthing conductor. Earth connection must be done before connection of power supply. Earthing shall comply with local regulations and related IEC standards.

3. Motor insulation test

Perform the insulation test when the motor is used for the first time, or when it is reusedafter being stored for a long time, or in a regular check-up, in order to prevent the poorinsulation of motor windings from damaging the AC drive. The motor must bedisconnected from the AC drive during the insulation test. A 500-V mega Ohm meter is recommended for the test, Ensure that the insulation resistance is not less than 5 MΩ.



4. Thermal protection of motor

If the rated capacity of the motor selected does not match that of the AC drive, especially when the rated power of the AC drive is greater than that of the motor, adjust the motor protection parameters on the operation panel of the AC drive or install a thermal relay before the motor for protection.

5. Running above mains frequency

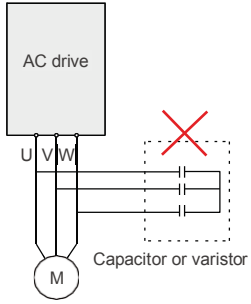
Do not use the AC drive above the mains frequency (default: 50 Hz). If such use is required, consider the strength and lifetime of all mechanical mechanism.

6. Motor heat and noise

The output of the AC drive is pulse width modulation (PWM) wave with certain harmonicwave, and therefore, the motor temperature rise, noise, and vibration are slightly greaterthan those at running with the mains frequency.

7. Voltage-sensitive device or capacitor on the output side of the AC drive

The AC drive outputs PWM waves, and therefore, do not install the capacitor for improvingpower factor or lightning protection voltage-sensitive resistor on the output side of the AC drive. Otherwise, the AC drive may suffer transient overcurrent or even be damaged.



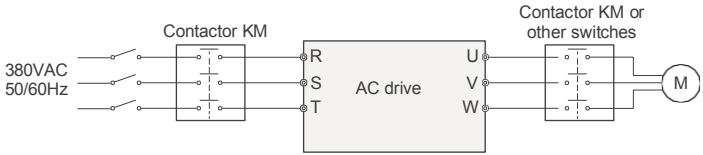
8. Contactor on the input and output sides of the AC drive

When a contactor is installed between the input side of the AC drive and the power supply,the AC drive must not be started or stopped by turning on or off the contactor.

If the AC drive has to be operated by the contactor, ensure that the time interval between switching is at least one hour because frequent charge and

discharge will shorten the service life of the capacitor inside the AC drive.

When a contactor is installed between the output side of the AC drive and the motor, do not close he contactor when the AC drive is active. Otherwise, modules inside the AC drive may be damaged.



9. Use outside the rated voltage

The AC drive must not be used outside the allowable voltage range specified in this manual. Otherwise, components inside the AC drive may be damaged. If required, use a corresponding voltage step-up or step-down device.

10. Prohibition of changing three-phase input into two-phase input

Do not change the three phase input of the AC drive into two-phase input. Otherwise, a fault will result or the servo drive will be damaged.

11. Surge suppressor

The AC drive has a built-in voltage dependent resistor (VDR) for suppressing the surge voltage generated when the inductive loads (Electromagnetic contactor, electromagnetic relay, solenoid valve, electromagnetic coil and electromagnetic brake) around the AC drive are switched on or off. If the inductive loads generate very high surge voltage, use a surge suppressor for the inductive load or use a surge suppressor togetherwith a diode.

Note:

Do not connect the surge suppressor onthe output side of the AC drive.

12. Altitude and de-rating

In places where the altitude is above 1000m and the cooling effect reduces due to thin air,it is necessary to de-rate the AC drive. Contact Janson Controls for technical support.

13. Special usage

If wiring that is not described in this manual such as common DC bus is applied, contact Janson Controls for technical support.

14. Disposal

The electrolytic capacitors on the main circuits and PCB may explode when they are burnt.Poisonous gas is generated when the plastic parts are burnt. Treat them as ordinary industrial waste.

15. Adaptable motor

The standard adaptable motor is four-pole squirrel-cage asynchronous inductionmotor. For other types of motors, select a proper AC drive according to the ratedmotor current.

The cooling fan and rotor shaft of a non-variable-frequency motor are coaxial and the cooling effect of the fan degrades when the motor speed reduces.Therefore add a more powerful fan or replace the motor with a variable-frequency motor in scenarios where the motor overheats easily.

The standard parameters of the adaptable motor have been configured inside the AC drive. It is still necessary to perform motor auto tuning or modify the default values based on actual conditions. Otherwise, the running effect and protection performance will be affected.

The AC drive may alarm or even be damaged when short-circuit exists on cables or inside the motor. Therefore, perform the insulation short-circuit test when the motor and cables are newly installed or during routine maintenance. During the test, make sure that the AC drive is completely disconnected from the tested parts.

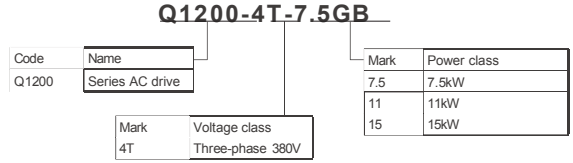
1.2 Protective functions

Adopting different protective functions for different levels of faults, the Q1200 provides the escalator running system with full abnormality protection. For detailed solutions to the faults, see chapter 8 "Troubleshooting".

These drive control abnormalities include overcurrent, overvoltage/ undervoltage,input/output phase loss, overload and control storage abnormality. Once a fault occurs,the AC drive performs protection immediately, cuts off the output, block the brake and prohibits running.

Chapter 2 Product information

2.1 Designation rule and nameplate



Nameplate

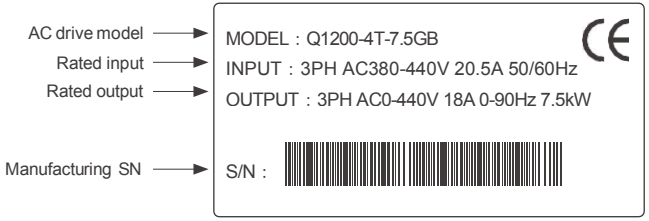


Figure 2-1 Designation rule and nameplate of the Q1200

2.2 Models

Table 2-1 Q1200 models

Q1200 Model	Input Voltage	Power Capacity (kVA)	Input Current (A)	Output Current (A)	Motor Power (kw)
Q1200-4T-7.5GB	Three-phase: 380V Range: 380-440V	11	20.5	18	7.5
Q1200-4T-11GB		17	29.0	27.0	11.0
Q1200-4T-15GB		21.0	36.0	33.0	15.0

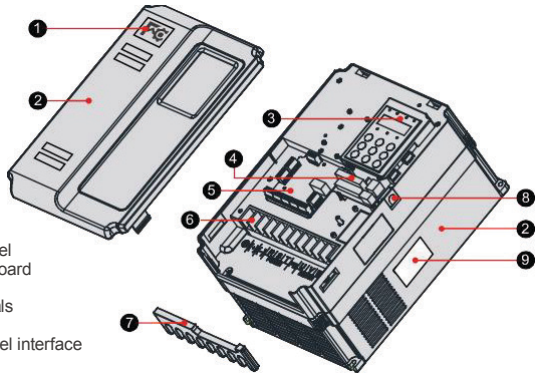
2.3 General technical specifications

Table 2-2 Q1200 technical specifications

Item		Specifications
Basic specifications	Carrier frequency	2-16kHz,adjusted automatically based on theload features
	Input frequency resolution	Digital setting: 0.01 Hz Analog setting: maximum frequency x 0.1%
	Input frequency accuracy	Digital setting: maximum frequency x ±0.01% Analog setting:maximum frequency x ±0.01%
	Control mode	Sensorless vector control (SVC) Closed-loop vector control(CLVC) V/F control
	Startup torque	0.5 Hz: 180%(SVC) 0 Hz: 200%(CLVC)
	Speed adjustment range	1:100(SVC) 1:1000(CLVC) 1:50(V/F)
	Speed stability accuracy	+0.5%(SVC) +0.05%(CLVC)
	Overload capacity	60s for 150% of the rated current, 1s for 180% ofthe rated current

2.4 Exploded view and mounting dimensions

2.4.1 Exploded view



1. Logo
2. Housing
3. Operation panel
4. Main control board
5. I/O board
6. Power terminals
7. Cable Barrier
8. Operation panel interface
9. Nameplate

Figure 2-2 Exploded view of the Q1200 (7.5-15kW,plastic housing)

2.4.2 Mounting dimensions

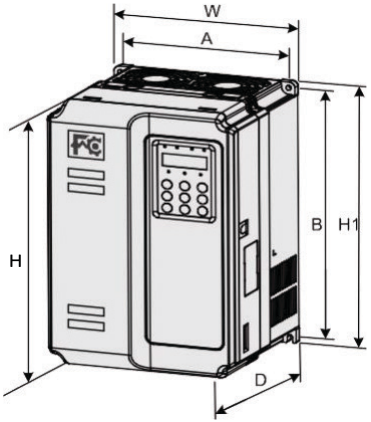


Figure 2-4 Mounting dimension diagram of the Q1200 (7.5-15kW,plastic housing)

AC drive model	Mounting hole (mm)		Physical dimensions (mm)				Hole diameter (+,mm)	Gross weight (kg)
	A	B	H	H1	W	D		
Q1200-4T-7.5GB	190	305	322	/	208	192	6	6.5
Q1200-4T-11GB								
Q1200-4T-15GB								

2.5 Optional part

If any optional part in the following table is required, specify it in your order.

Table 2-4 Optional parts of the Q1200

Name	Model	Function	Remarks
PG card	MD32PG5	Provide 5V power supply; 1313 absolute value seriesCoder; Differential output of frequency-divided signals; minute Frequency is fixed by 1;	-
	MCTC-PG-A4	Provides 15V power supply, adapted to the push-pull and open-collector incremental encoders,several frequency-division options	-
	MCTC-PG-B	Provides 5V power supply, adapted to the line driver output incrementa and U,V,W encoders,always 1-frequency-division	-
	MCTC-PG-C	Provides 5V power supply, adapted to the SIN/COS encoder,open-collector always output,1-frequency-division	-
	MCTC-PG-C2		-
	MCTC-PG-C3	Provides 5V power supply, adapted to the SIN/COS encoder, differential output,always 1-frequency-division	-

2.6 Selection of braking components

The Q1200 models of 15kW and below have a built-in braking unit, and you only need to connect an external regen resistor between PB and + terminals.

Select the regen Resistor based on the configuration listed in the following table.

Table 2-6 Braking component selection for the Q1200 models.

Table 2-6 Braking component selection for the Q1200 models

AC drive model	Power of adaptable motor (kW)	Max. resistor (Ω)	Min. resistance (Ω)	Power of regen. resistor (W)	Braking unit
Q1200-4T-7.5GB	7.5	85	65	2500	Built-in
Q1200-4T-11GB	11	55	43	3500	
Q1200-4T-15GB	15	43	35	4500	

Chapter 3 Electrical installation

3.1 Electrical installation

3.1.1 Peripheral electrical devices

Table 3-1 Selection of peripheral electrical devices

AC drive model	MCCB (A)	Contactor (Ω)	Main circuit cable on input side (mm²)	Main circuit cable on output side (mm²)	Contro circuit cable (mm²)	Grounding cable (mm²)
Q1200-4T-7.5GB	40	32	6	6	1	4
Q1200-4T-11GB	63	40	6	6	1	6
Q1200-4T-15GB	63	40	6	6	1	6

Table 3-2 Description of peripheral electrical devices

Periphera device	Mounting location	Function description
MCCB	Power input side	Cut off the power supply of the AC drive and provide short-circuit protection. It is mandatory.
Safety contactor	Between MCCB and the AC drive input side	Apply/Cut off the power supply of the AC drive.Do not start and stop the AC drive frequently by switching the contactor on and off (Less than twiceper minute) nor use it to directly start the AC drive.
AC input reactor	AC drive input side	Improve the power factor of the input side. Eliminate the higher harmonics on the input side to provide effective protection on the rectifier bridge. Eliminate the input current unbalance due tounbalance between the power phases. It is installed when the DC reactor cannot meetthe requirements.

DC input reactor	AC drive DC side	Improve the power factor of the power input side. Eliminate the higher harmonics of the inputside effectively and prevent other devices from being damaged due to distortion of the voltage waveform. Eliminate the input current unbalance due to power supply inter-phase unbalance. It features small size and does not cause voltage dip,and is the standard configuration.
AC output reactor	Between the AC drive output side and the motor, close to the AC drive	The output side of the AC drive has much high harmonics,as when the motor is far from the AC drive, there is much distributed capacitance in the circuit. Certain harmonics may cause resonance in the circuit, causing two impacts: Degrade the motor insulation performance anddamage the motor in the long run. Generate large leakage current and causefrequent AC drive protection trips. If the distance between the AC drive and the motoris greater than 100m, install an AC output reactor.

3.1.3 Description and wiring of main circuit terminals

⚠ Danger

Ensure that the power supply is cut off before wiring. Failure to comply may result in electric shock.

Wiring must be performed only by qualified personnel under instructions described in this manual. Failure to comply may result in unexpected accidents.

Never connect the regen. Resistor to the DC bus terminals (+),(-).

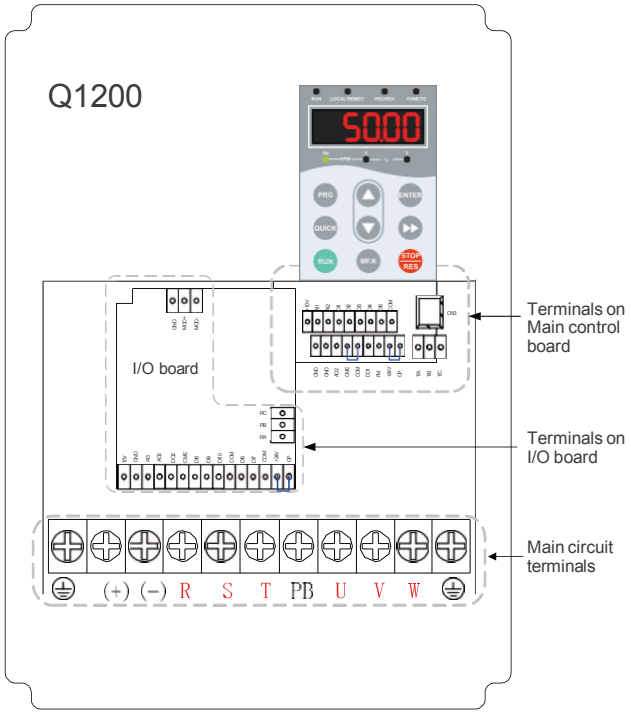
⚠ Warning

The power supply must meet the input power requirements of the AC drive.Otherwise, the AC drive will be damaged.

The motor to be connected must adapt to the AC drive. Otherwise, it may cause damage to the motor or cause AC drive protection.

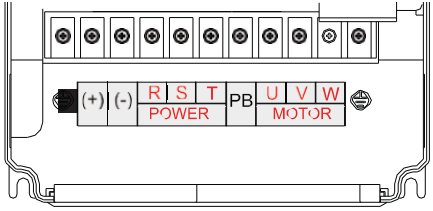
Never connect the power cables to the output terminals (U, V W) of the AC drive. Failure to comply will result in damage to the AC drive.

Figure 3-13 Terminal arrangement of the Q1200



1. Terminal arrangement

Figure 3-14 Main circuit terminal arrangement (7.5-15kW)



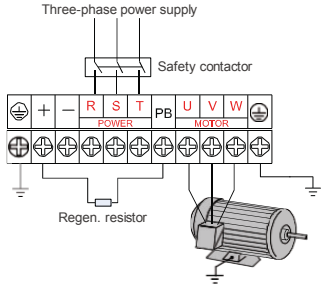
2. Descriptions

Table 3-1 Description of main circuit terminals

Mark	Terminal name	Function description
R,S,T	Three-phase power input terminals	Provide three-phase 380V power supply.
(+).(-)	Positive and negative terminals of DC bus	Connect the external braking unit for models of 15kW and above.
(+), PB	Terminals for regen.connecting resistor	Connect the regen.resistor for models of 7.5 to 15kW.
U,V W	AC drive output terminals	Connect the three-phase motor.
⏚	Grounding terminal	Must be grounded.

3. Wiring

Figure 3-15 Main circuit connection diagram



For models of 7.5 to 15kW

The wiring precautions are as follows:

DC bus terminals (+), (-)

Terminals (+) and (-) of DC bus have residual voltage after the AC drive is switched off. Before touching the terminals, wait until the CHARGE indicator becomes OFF and ensure that the voltage measured with a multimeter is smaller than 36V.

When connecting external braking components for the AC drive of 15 kW and above,connect the braking unit to terminals (+) and (-) andthe regen. resistor toterminals P and PB of the brak ing unit. Never reverse (+) and (-). Failure to comply may result in damage to the AC drive and even cause a fire.

The cable length between the braking unit and terminals (+) and (-) must not exceed 5m. The cable length between the braking unit and the regen. resistor must not exceed 10m. Use twisted pair wire or tight pair wires for parallel connection.

Do not connect the regen. resisto r directly tothe DC bus. Otherwise, it may damage the AC drive and even cause fire.

Terminals (+), PB for connecting regen. resistor

For the AC drive of below 15kW with buit-in braking unit, terminals (+), PB areeffective.

Connect a regen. resistor of the recommended model in Chapter 2

Ensure that the cable length of the regen. resistor is shorter than 5m.

The temperature of the regen. resistor increases due to energy release. Protection and heat dissipation measures are required.

AC drive output terminals U,V,W

The terminals are used to connect the three phase motor, When the motor rotating direction is reverse to the required direction, exchange any two of the U,V,W cables.

Do not connect a capacitor or surge absorber to the output side of the AC drive.Otherwise, it may cause frequent AC drive faults or even damage the AC drive.

The output must not be short-circuited or grounded

Put the U,V,W cables through the grounded metal pipes and separate these cables from the signal cables or lay them vertical to the signal cables.

If the motor cable is too long, electrical resonance will be generated due to the impactof distributed capacitance. This will damage the motor insulation or generate higher leakage current, causing the AC drive to trip in overcurrent protection. If the motor cable is greater than 100m long, an AC output reactor must be installed close to the AC drive.

Grounding terminal

This terminal must be reliably grounded with thick and short main protective earthing(PE) conductor.

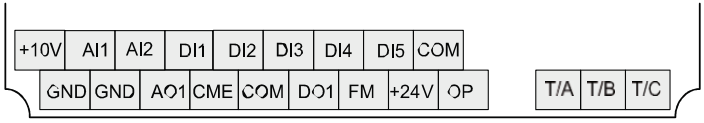
The yellow-green multi-strain copper PE conductor above 4mm2 is recommended.

Ensure that the grounding resistance must not be larger than 5fi.

The neutral wire must not be the PE conductor.

3.1.4 Description and wiring of main control board terminals

1. Terminal arrangement



2. Descriptions

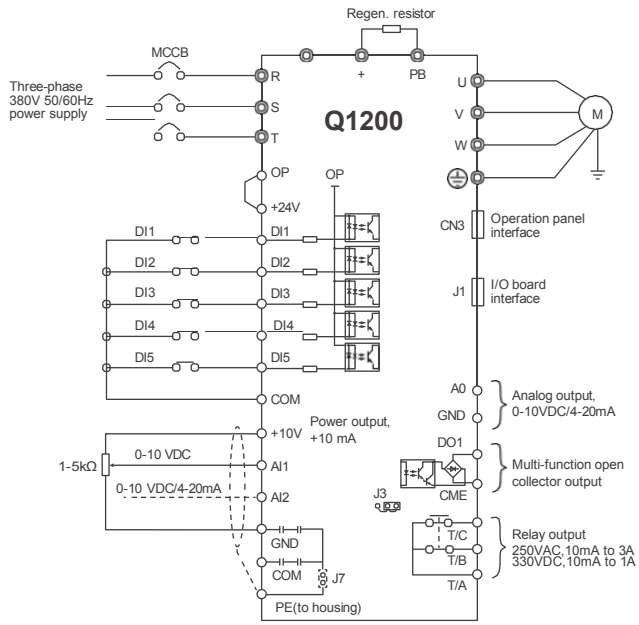
Table 3-4 Description of main control board terminals

Type	Mark	Terminal name	Function description
Power supply	+10-GND	External +10VDC power supply	Provide +10V power supply externally. Generally, it provides power supply to the external potentiometer with resistance range of 1-5 kfi Maximum output current: 10 mA
	+24V-COM	External +24 V power supply	Provide +24 V power supply externally. Generally, it provides power supply to DI/DO terminals and external sensor Maximum output current: 200 mA
	OP	External power supply	It is shorted with +24V by a jumper by default. When DI1 to DI5 need to be driven by external signal, OP needs to be connected to external power supply and be disconnected from +24 V.
Analog input	AI1-GND	AI1	Input voltage range: 0-10 VDCInput impedance: 100 kfi
	AI2-GND	AI2	1. Input range: 0-10 VDC or 4-20 mA, determinedby jumper J3 on the Main Control Board. 2. Input impedance: 100kΩ for voltage input, 500Ω for current input
Digital input	DI1-COM	DI1	1. Optical coupling isolation, compatible with duapolarity input 2. Input impedance: 3.3 kfi 3. Voltage range at level input: 9-30 V
	DI2-COM	DI2	
	DI3-COM	DI3	
	DI4-COM	DI4	
	DI5-COM	DI5(high-speed pulse)	Besides features of DI1-DI4,it can be used for high-speed pulse input

Analog output	AO1-GND	AO1	Voltage or current output, determined by jumper J4 on main control board. Output voltage range: 0-10V Output current range: 0-20mA
Digital output	DO1-CME	DO	Optical coupling isolation, dual polarity open collector output. Output voltage range: 0-24V Output current range: 0-50mA Note that CME and COM are internally insulated,but they are shorted externally when delivery. In this case, DO1 is driven by +24V by default. If you want to apply external power to DO1, remove the jumper between CME and COM.
	FM-COM	Reserved	
Relay output	T/A-T/B	Normally closed (NC) terminal	Contact driving capacity: 250VAC,3A, COSφ = 0.4; 30 VDC,1A
	T/A-T/C	Normally open (NO) terminal	
Auxiliry interface	J1	I/O interface	Connect to the external operation panel.
	CN3	Operation panel interface	

3. Wiring

Figure 3-16 Wiring of Main Control Board terminals

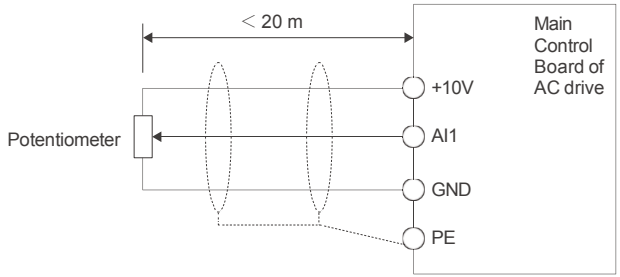


Note: Indicates the main circuit terminal, and indicates terminal on the main control board.

1) Wiring of AI terminals

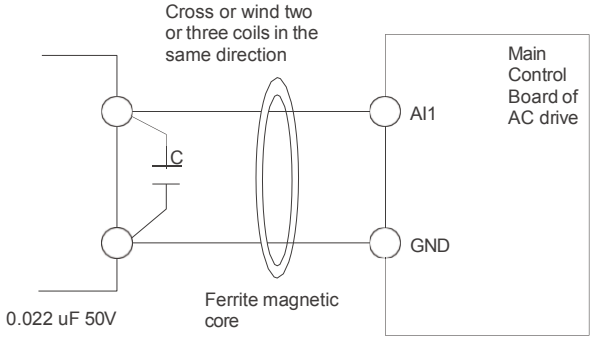
Weak analog voltage signals are easy to suffer external interference, and therefore theshielded cable must be used and the cable length must be less than 20 m, as shown infollowing figure.

Figure 3-17 Wiring ofAI terminals



In applications where the analog signal suffers severe interference, install filter capacitoror ferrite magnetic core at the analog signal source, as shown in the following fiqure.

Figure 3-18 Install filter capacitor or ferrite magnetic core

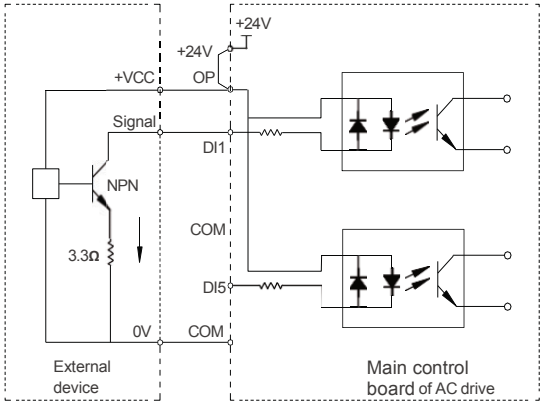


2) Wiring of DI terminals

Generally, use the shielded cable not longer than 20m. When active driving is adopted,necessary filtering measures shall be taken to prevent the interference to the power supply. The contact control mode is recommended.

SINK wiring

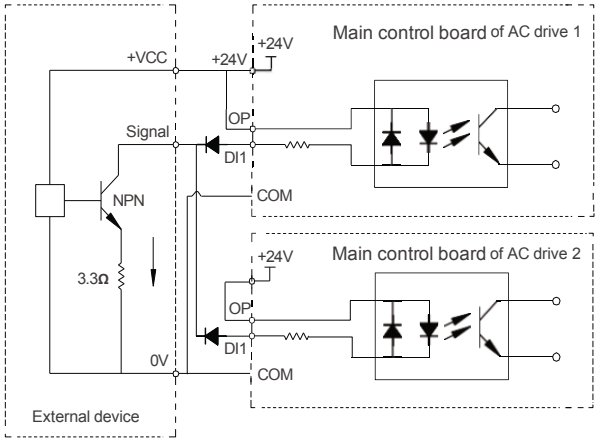
Figure 3-19 Wiring in SINK mode



This is the most commonly used wiring mode. To apply external power supply, remove the jumper between terminals +24V and OP, and connect the positive pole of external power supply to OP, and 0V of external power supply to the corresponding DI through the controlcontact on the AC drive.

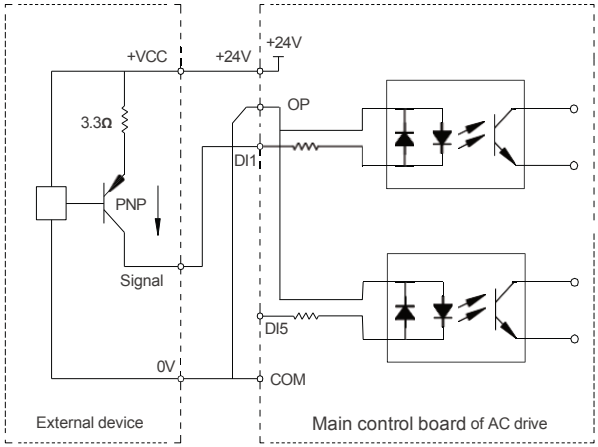
In such wiring mode, the DI terminals of different AC drives must not be connected inparallel. Otherwise, DI mal-function may result. If parallel connection (Different AC drives)is required, connect a diode in series at the DI and the diode needs to satisfy the requirement: IF > 10mA UF <1V

Figure 3-20 DI terminals connected in parallel in SINK mode



SOURCE wiring

Figure 3-21 Wiring in SOURCE mode



In such wiring mode, remove the jumper between +24V and OP, and connect +24V to the common terminal of the external controller and meanwhile connect OP to COM.

To apply external power supply, remove the jumper between terminals +24V and OP, and connect OP to 0V of external power supply, can connect 24V to the corresponding DI through the control contact on the AC drive.

3) Wiring of DO terminal

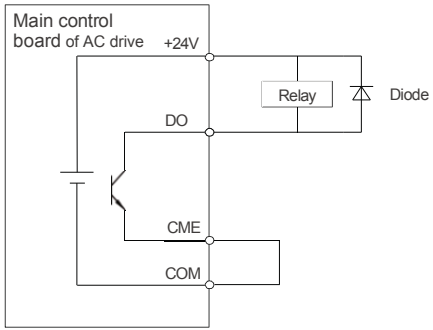
When the DO terminal needs to drive the relay, an absorption diode shall be installed on both sides of the relay coil. The driving capacity is not more than 50mA. Otherwise, it may cause damage to the 24VDC power supply.

Note:

Do not reverse the polarity of the absorption diode during installation, as shown in Figure3-22 Otherwise, the 24VDC power supply will be damaged immediately once there isdigital output.

CME and COM are internally isolated, but they are shorted by jumper externally at delivery.In this case, DO1 is driven by +24V by defaulfo apply external power to DO1, removethe jumper between CME and COM.

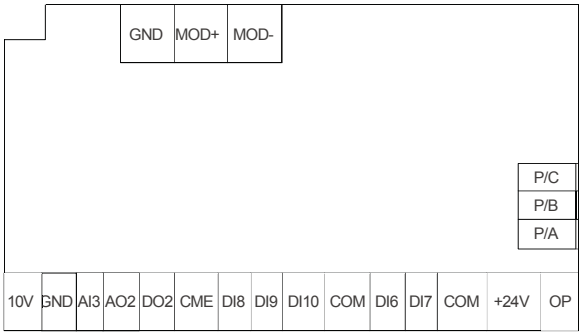
Figure 3-22 DO terminal wiring diagram



3.1.5 Description and wiring of I/O extension board terminals

1. Terminal arrangement

Figure 3-23 Terminal arrangement of I/O extension board



2. Descriptions

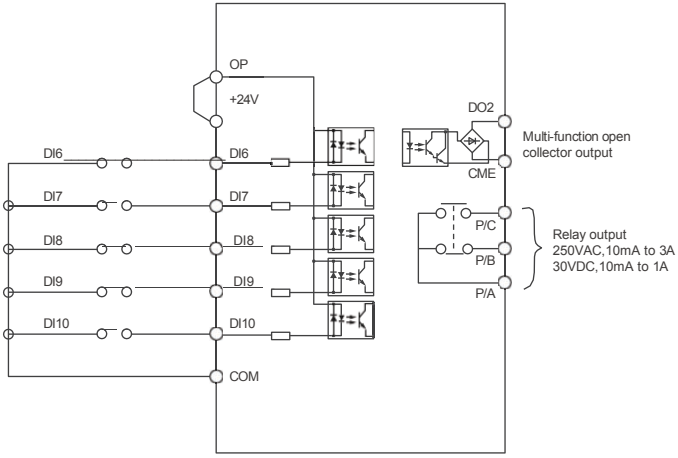
Table 3-5 Description of terminals on I/O extension board

Type	Mark	Terminal name	Function description
Power supply	+10-GND	External +10VDC power supply	Provide +10V power supply externally. Generally, it provides power supply to the external potentiometer with resistance range of 1-10kfi Maximum output current: 10 mA
	+24V-COM	External +24 V power supply	Provide +24V power supply externally. Generally, it provides power supply to DI/DO terminals and external sensor. Maximum output current: 200 mA
	OP	Externalpower supply	It is shorted with +24V by a jumper by default. When DI6 to DI10 need to be driven by external signal, OP needs to be connected to external power supply and be disconnected from +24V.
Digital input	DI6-COM	DI6	1. Optical coupling isolation, compatible with dual polarity input 2. Input impedance: 3.3kfi 3. Voltage range at level input: 9-30V
	DI7-COM	DI7	
	DI8-COM	DI8	
	DI9-COM	DI9	
	DI10-COM	DI10	
Digital output	DO2-CME	DO2	Optical coupling isolation, dual polarity open collector output. Output voltage range: 0-24V Output current range: 0-50mA Note that CME and COM are internally insulated,but they are shorted externally when delivery. In this case, DO1 is driven by +24V by default. If you want to apply external power to DO1, remove the jumper between CME and COM.
Relay output	P/A-P/B	Normally closed (NC) terminal	Contact driving capacity: 250VAC,3A, COSφ = 0.4; 30VDC,1A
	P/A-P/C	Normally open (NO) terminal	
Analog input	AI3-GND	AI3	Reserve
Analog output	AO2-GND	AO2	
Comm-unicati-on	MOD+	Communication terminal	Reserve
	MOD-		

3. Wiring

The frequency-division output signal of the PG needs to be input to terminals A-IN and B-IN on the I/O extension board only when the direct travel ride function is used. The main control board obtains this PG signal from terminals A-OUT and B-OUT (Open collector output) or A+A- and B+B- (Differential output).

Figure 3-24 Wiring of terminals on I/O extension board



Chapter 4 Operation and trial running

4.1 Description of running modes and states

4.1.1 Command Source

The command source is the channel of RUN commands and speed references. Two command sources are supported:

- Operation panel control
  The RUN commands are given by pressing keys RUN and STOP RESET on the operation panel.
- Terminal control
  RUN commands and speed references are given by multi-function input terminals.
- Select one from the two command sources.

4.1.2 Control Mode

Three control modes are supported:

- Sensorless vector control (SVC)
- Closed-loop vector control(CLVC)
- Voltage/Frequency (V/F) control

4.1.3 Running Mode

- Motor auto-tuning mode
  The Q1200 supports two motor auto-tuning modes: with-load and no-load. Fordetails,see the description of P1-11.
- Common mode
  It refers to the running in operation panel control or analog setting.
- Multi-speed mode
  The speed references are given by state combinations of multi-speed terminals.
  The AC drive can run in only one mode in a period.

4.1.4 System State

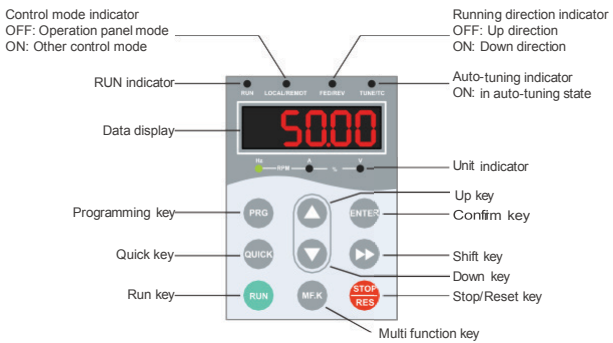
The Q1200 has four states, stop, programming, running, and fault and alarm states.

- Stop state
  After power-off and execution of RUN commands, the AC drive is in the stop stateThe RUN indicator is OFF, and the operation panel display blinks; the parameters can be viewed circularly by pressing ⏩ .The AC drive exits this state after receiving the RUN command again.
- Programming state
  The AC drive is in the programming state when you view and set parameters on theoperation panel.
- Running state
  The AC drive is in running state (elevator running). The RUN indicator is ON. The operation panel display is not blinking.
- Fault and alarm state
  The AC drive becomes faulty and displays the fault code.

4.2 Use of the LED operation panel

You can modify the parameters, monitor the working status and start or stop the AC drive by operating the operation panel. The following figure shows the LED operation panel.

Figure 4-1 Diagram of the LED operation panel



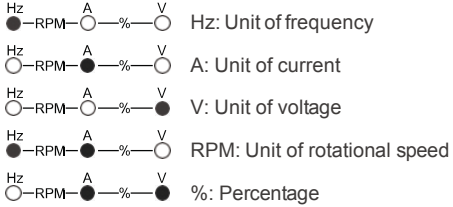
1. Function indicators

RUN: ON indicates that the AC drive is in the running state, and OFF indicates that the ACdrive is in the stop state.
LOCALI/REMOT: OFF indicates that the AC drive is in the operation panel running mode, and ONindicates that the AC drive is in terminal control mode.
FWD/REV: ON indicates down direction of the elevator, and OFF indicates up direction of theescalator.
TUNEI/TC: ON indicates the auto-tuning state.

2. Data display

The 5-segment LED display can display the monitoring data such as frequency reference and output frequency, and fault codes.

3. Unit indicators



4. Keys

Table 4-1 Description of keys on the operation panel

Key	Name	Function
PRG	Programming	Enter or exit Level-I menu.
ENTER	Confirm	Enter the menu interfaces level by level, and confirm the parameter setting.
▲	Up	Increase data or function code
▼	Down	Decrease data or function code
▶▶	Shift	Select the displayed parameters in turn in the stop or running state, and select the digit to be modified when modifying parameters.
RUN	Run	Start the AC drive in the operation panel running mode.
STOP RES	Stop/Reset	Stop the AC drive when it is in the running state and perform the reset operation when it is in the fault state.
QUICK	Quick	Enter or exit Level-I quick menu.
MF.K	Multi-function	Display or hide the fault information in the fault state which facilitates parameter viewing.

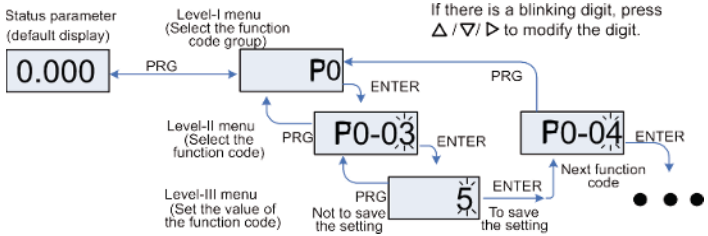
4.3 Viewing and Operation

4.3.1 Operation Procedure

The LED operation panel adopts three-level menu.

The three-level menu consists of function code group (Level I), function code (Level II).and function code setting value (level III), as shown in the following figure.

Figure 4-2 Operation procedure on the operation panel



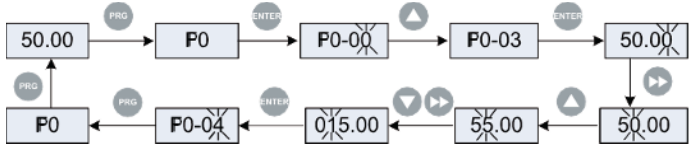
You can return to Level II menu from Level III menu by pressing PRG or ENTER .The difference between the two is as follows:

After you press ENTER ,the system saves the parameter setting first, and then goes back to Level II menu and shifts to the next function code.

After you press PRG ,the system does not save the parameter setting, but directly returns to Level II menu and remains at the current function code.

Here is an example of changing the value of PO-03 from 50.00Hz to 15.00 Hz.

Figure 4-3 Example of changing the parameter value



In Level III menu, if the parameter has no blinking digit, it means that the parameter cannot be modified.This may be because:

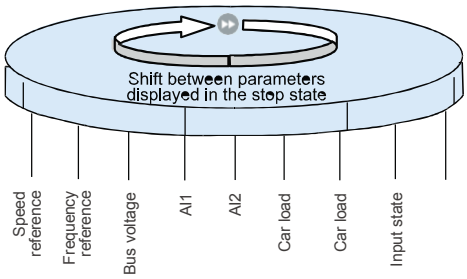
Such a parameter is only readable, such as actually detected paraneters and running record parameters.

Such a parameter cannot be modified in the running state and can only be changedat stop.

4.3.2 Viewing Status Parameters

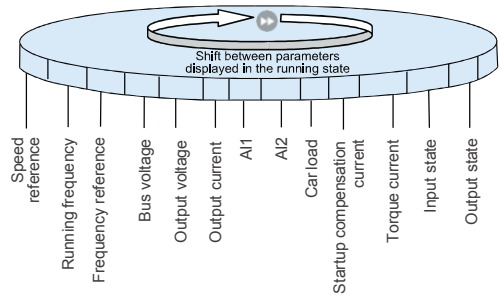
In the stop state, a total of 8 parameters can be displayed circularly by pressing .Select the parameters to be displayed by setting P8-02 (each bit of P8-02 indicates a parameter).

Figure 4-4 Shift between parameters displayed in the stop state



In the running state, a total of 13 parameters can be displayed circularly by pressing .You can select the parameters to be displayed by setting P8-01 (each bit of P8-01 indicates a parameter).

Figure 4-5 Shift between parameters displayed in the running state



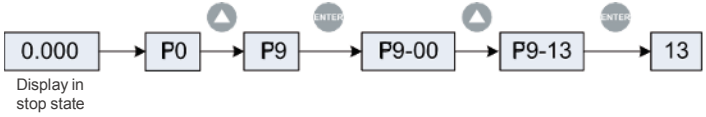
For details, see the description of corresponding parameters in Chapter 6.

4.3.3 Reading Fault Information

When a fault occurs on the AC drive, the operation panel displays the fault code. Based on the fault code, you can check the fault causes listed in chapter 8 to rectify the fault quickly.

The Q1200 records the latest 11 faults and the frequency, current, bus voltage.DI/DO terminal state of the latest three faults.

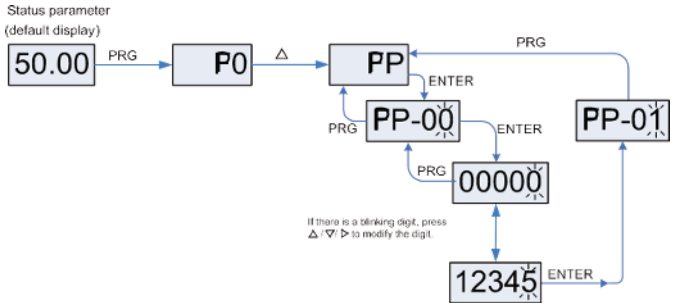
Figure 4-6 Viewing fault code



4.4 Password Setting

The Q1200 provides the user password protection function.

Figure 4-7 Password setting



When PP-00 is set to a non-zero value, the password function is enabled. The password takes effect after you exit the function code editing state. When you press PRG again,"-----" will be displayed, and you must enter the correct user password to enter the menu.To view factory parameters, you also need to enter the factory password. Do not try to modify factory parameters because incorrect setting will easily cause abnormality or damage to the AC drive.

During password setting, you can change the password and the last input is considered as the set password.

To cancel the password protection function, enter the menu with the correct password and then set PP-00 to 0.

Chapter 5 Function code table

5.1 Brief introduction

1. There are a total of 17 function code groups, each of which includes several function codes. The function codes adopt the three level menu. The function code group number is Level-I menu; the function code number is Level-II menu; the function codesetting is Level-III menu.

2. The meaning of each column in the function code table is as follows:

Item	Definition
Function code	Indicates the function code number.
Parameter name	Indicates the parameter name of the function code.
Setting range	Indicates the setting range of the parameter.
Min. unit	Indicates the minimum measurement unit of the parameter.
Default	Indicates the default setting of the parameter at factory.
Property	Indicates whether the parameter can be modified (Including the modification conditions).

The modification property of the parameters includes three types, described as follows:

" ☆ ": The parameter can be modified when the AC drive is in either stop or running state.

" ★ ": The parameter cannot be modified when the AC drive is in the running state.

" ● ": The parameter is the actually measured value and cannot be modified. The system automatically restricts the modification property of all parameters
to prevent mal-function.

5.2 Function code groups

On the operation panel,press PRG and then ▲ or ▼,and you can view the function code groups. The function code groups are classified as follows:

P0	Basic parameters	P8	Display parameters
P1	Motor parameters	P9	Protection function parameters
P2	Vector control parameters	PA	PG Parameters
P3	V/F control parameters	PB	Communication parameters
P4	Input function parameters	PC	Special enhanced parameters
P5	Output function parameters	PU	Monitoring parameters
P6	Speed parameters	PF	Factory parameters
P7	Auxiliary function parameters	PP	User parameters

5.3 Function code table

Function code	Parameter name	Setting range	Default	Min. Unit	Property
Group P0: Basic parameters					
P0-00	Control mode	0: Sensorless vector control(SVC) 1: Closed loop vector control(CLVC) 2: Voltage/Frequency (V/F)control	1	1	★
P0-01	Command source selection	0: Operation panel control 1: Terminal control	1	1	★
P0-02	Speed reference source	0: Digital setting 1: Multi-speed 2: AI1 3: AI2 4: Reserved 5: Special multi-speed	1	1	★
P0-03	Digital setting frequency	0.00Hz to maximum frequency	0.00 Hz	0.01Hz	☆
P0-04	Running direction	0: Direction unchanged 1: Direction reversed	0	1	★
P0-05	Maximum frequency	0.00-90.00	50.00	0.01Hz	★
P0-06	Carrier frequency	0.5-16.0	Model dependent	0.1kHz	☆
P0-07	Carrier frequency adjusting mode	0: Fixed PWM 1: Random PWM	0	1	☆
Group P1: Motor parameters					
P1-00	Encoder type	0: SIN/COS encoder 1: U,V,W encoder 2: ABZ incremental encoder	0	1	★
P1-01	Rated motor power	0.4-110.0	Model dependent	0.1kW	★
P1-02	Rated motor voltage	100-500	Model dependent	1V	★
P1-03	Rated motor current	0.00-655.00	Model dependent	0.01A	★
P1-04	Rated motor frequency	0.00 to maximum frequency	50.00	0.01Hz	★
P1-05	Rated motor speed	0-3000	1460	1 RPM	★
P1-06	Reserved	-	-	-	★
P1-07	Synchronous motor power-off angle	0.0-359.9	0.0	0.1°	★
P1-08	Reserved	-	-	-	★
P1-09	Synchronous motor current filter coefficient	0.0-3.0	0.0	0.1	★

Function code	Parameter name	Setting range	Default	Min. Unit	Property
P1-10	Encoder verification selection	0-65535	0	1	★
P1-11	Motor auto-tuning mode	0: No operation 1: With-load auto-tuning 2: No-load auto-tuning	0	1	★
P1-12	Reserved	-	-	-	★
P1-13	Reserved	-	-	-	★
P1-14	Stator resistance	0.001-65.000	Model dependent	0.001 Ω	☆
P1-15	Asynchronous motor rotor inductance	0.001-65.000	Model dependent	0.001 Ω	☆
P1-16	Asynchronous motor leakage inductance	0.01-650.00	Model dependent	0.01 mH	☆
P1-17	Asynchronous motor mutual inductance	0.1-6500.00	Model dependent	0.1mH	☆
P1-18	Asynchronous motor magnetizing current	0.01-650.00	0.01	0.01A	☆
P1-19	Synchronous motor shaft D inductance	0.01-650.00	0.01	0.01 mH	★
P1-20	Synchronous motor shaft Q inductance	0.01-650.00	0.01	0.01 mH	★
P1-21	Synchronous motor back EMF	0-65535	0	1V	★
P1-25	Motor type	0: Asynchronous motor 1: Synchronous motor	1	1	★

Group P1: Motor parameters					
P2-00	Speed loop proportional gain 1	0-100	35	1	☆
P2-01	Speed loop integral time 1	0.01-10.00	0.60	0.01s	☆
P2-02	Switchover frequency 1	0.00 to P2-05	2.00	0.01Hz	☆
P2-03	Speed loop proportional gain 2	0-100	30	1	☆
P2-04	Speed loop integral time 2	0.01-10.00	0.80	0.01s	☆
P2-05	Switchover frequency 2	P2-02 to maximum frequency	5.00	0.01Hz	☆
P2-06	Current loop proportional gain	10-500	60	1	☆
P2-07	Current loop integral gain	10-500	30	1	☆
P2-08	Torque upper limit	0.0-200.0%	150%	0.1%	☆
P2-09	Torque acceleration time	1-500	1	1ms	★
P2-10	Torque deceleration time	1-500	350	1ms	★
P2-11	Speed filter coefficient	1-20	10	1	★
P2-12	Angle-free auto-tuning function selection	0-65535 Bit1: Angle-free auto tuning function Bit2: Angle-free auto tuning mode	0	1	★

Function code	Parameter name	Setting range	Default	Min. Unit	Property
Group P3: VIF control parameter					
P3-00	Startup frequency	0.00-10.00	0.00	0.01Hz	☆
P3-01	Torque output delay	0.00-10.00	0.20	0.01s	★
P3-02	Brake release delay	0.20-10.00	0.20	0.01s	★
P3-03	Zero-speed delay	0.00-10.00	0.30	0.01s	★
P3-04	Startup time	0.00-10.00	0.00	0.01s	★
P3-05	Startup frequency holding time	0.00-10.00	0.00	0.01s	★
P3-06	Brake apply delay	0.00-10.00	0.20	0.01s	★
P3-07	Stop release delay	0.00-10.00	0.30	0.01s	★
P3-08	RUN contactor open delay	0.00-10.00	0.00	0.01s	★
P3-09	Startup pre-torque selection	0: Pre-torque invalid 1: DI setting 2: AI1 setting 3: A12 setting 4: Fixed pre-torque 5: Noload-cell compensation	0	1	★
P3-10	Pre-torque offset	0.0-100.0%	48.0%	0.1%	☆
P3-11	Pre-torque gain	0.00-1.50	0.60	0.01	★
P3-12	Pre-torque initialoffset	-100.0 to 100.0%	10.0%	0.1%	☆
P3-13	DI load cell signal1	0.0-100.0%	10.0%	0.1%	★
P3-14	DI load cell signal 2	0.0-100.0%	30.0%	0.1%	★
P3-15	DI load cell signal 3	0.0-100.0%	70.0%	0.1%	★
P3-16	DI load cell signal 4	0.01-00.0%	90.0%	0.1%	★
P3-17	Filter time of load cell analog input	0.00-1.00	0.10	0.01s	☆
P3-18	Load cell analog no-load input	0.00-10.00	0.00	0.01V	☆
P3-19	Load cell analog full-load input	0.00-10.00	10.00	0.01V	☆
P3-20	Load for analog load cell auto-tuning	0-100	0	1	☆
P3-21	Analog load cell auto-tuning function	0: Disabled 1: Enabled	0	1	☆
P3-22	Pre-torque direction reversed	0: Enabled 1: Disabled	0	1	☆
P3-24	Slip test function	0: Disabled 1: Enabled	0	1	★
Group P4: Input function parameters					
P4-00	Input filter time	0.001-0.200	0.020	0.001s	☆
P4-01	DI1 function selection	0: Invalid 1: Forward run (FWD) 2: Reverse run (REV) 3: Multi-speed terminal 1 (K1) 4: Multi-speed terminal 2 (K2)	1	1	★
P4-02	DI2 function selection		2	1	★
P4-03	DI3 function selection		3	1	★

Function code	Parameter name	Setting range	Default	Min. Unit	Property
P4-04	DI4 function selection	5: Multi-speed terminal 3 (K3) 6: Fault reset 7: RUN disabled 8: Inspection signal 9: Emergency input 10: RUN contactor feedback signal 11: Brake contactor feedback signal 12: Load cell terminal 1 13: Load cell terminal 2 14: Load cell terminal 3 15: Load cell terminal 4	4	1	★
P4-05	DI5 function selection		5	1	★
P4-06	DI6 function selection		6	1	★
P4-07	DI7 function selection		7	1	★
P4-08	DI8 function selection		0	1	★
P4-09	DI9 function selection		0	1	★
P4-10	DI10 function selection	16: External fault input 17: Motor overheat signal 18: Up speed judgment 19: Down speed judgment 20: Mult-speed logic selection 1 21: Multi-speed logic selection 2 22: Direct travel ride command The setting range is-0 122.The hundred's digit indicates the NO/NC type (1: NC,0: NO), and the lowest two digits indicate the selected function(Invalid if the number is larger than 22)	0	1	★
P4-11 to P4-12	Reserved	-	-	-	★
P4-13	Multi-speed combination filter time	0.000-0.200	0.020	0.001s	☆
Group P5: Output function parameters					

P5-00	FM function selection	0: Invalid 1: AC drive running 2: Zero-speed running 3: Zero-speed signal 4: Fault signal 5: RUN contactor control 6: Brake contactor control 7: Door pre-open signal	15	1	★
P5-01	DO1 function selection		3	1	★
P5-02	DO2 function selection		0	1	★
P5-03	Main control board relay function selection		4	1	★
P5-04	Extension board relay function selection	8: Bus undervoltage 9: FDT1 output 10: FDT2 output 11: Frequency reached 12: Overspeed output 14: Running time reached 15: Ready for RUN 16: Contact stuck control 17: Re-leveling output 18: Light-oad running FDT frequency detection:detects the output frequency of the AC drive and compares it with the frequency reference,and outputs a related signal via the DO	0	1	★
P5-05	Reserved	-	-	-	★
P5-06	Zero-speed output hysteresis time	0.000-2.000	0.000	0.001s	★
P5-07	AO function selection	0: Running frequency 1: Frequency reference 2: Output current 3: Output torque 4: Output voltage 5: AI1 6: AI2	0	1	★

Function code	Parameter name	Setting range	Default	Min. Unit	Property
P5-08	AO zero offset coefficient	-100.0 to 100.0%	0.0%	0.1%	☆
P5-09	AO gain	-10.00-10.00	1.00	0.01	☆
Group P6: Speed parameters					
P6-00	Speed 0	0.00 to maximum frequency	0.00	0.01Hz	★
P6-01	Speed 1	0.00 to maximum frequency	0.00	0.01Hz	★
P6-02	Speed 2	0.00 to maximum frequency	0.00	0.01Hz	★
P6-03	Speed 3	0.00 to maximum frequency	0.00	0.01Hz	★
P6-04	Speed 4	0.00 to maximum frequency	0.00	0.01Hz	★
P6-05	Speed 5	0.00 to maximum frequency	0.00	0.01Hz	★
P6-06	Speed 6	0.00 to maximum frequency	0.00	0.01Hz	★
P6-07	Speed 7	0.00 to maximum frequency	0.00	0.01Hz	★
P6-08	Running curve of speed 0	1-4	1	1	★
P6-09	Running curve of speed 1	1-4	1	1	★
P6-10	Running curve of speed 2	1-4	1	1	★
P6-11	Running curve of speed 3	1-4	1	1	★
P6-12	Running curve of speed 4	1-4	1	1	★
P6-13	Running curve of speed 5	1-4	1	1	★
P6-14	Running curve of speed 6	1-4	1	1	★
P6-15	Running curve of speed 7	1-4	1	1	★
P6-16	Inspection speed selection	0-7	0	1	★
P6-17	Emergency evacuation operation mode at power failure	0: Function disabled 1: UPS 2: 48 V battery power supply	0	1	★
P6-18	Analog minimum input	0.00-10.00	0.00	0.01V	☆
P6-19	Corresponding percentage of analog minimum input	0.0-100.0%	0.0%	0.1%	☆
P6-20	Analog maximum input	0.00-10.00	10.00	0.01V	☆
P6-21	Corresponding percentage of analog maximum input	0.0-100.0%	100.0%	0.1%	☆
P6-22	AI filter time	0.00-1.00s	0.10s	0.01s	☆

Function code	Parameter name	Setting range	Default	Min. Unit	Property
P6-23	AC drive function selection 1	0-65535 Bit0: Current cancellation at stop Bit1: No-oad-cell compensation during auto-tuning Bit2: Stop waiting Bit4: Maximum frequency upper limit selection Bit5: Analog frequency setting base	48	1	☆
P6-24	Motor overheat voltage threshold	0.00-11.00	0.00	0.01V	☆
P6-25	AC drive function selection 2	0-65535 Bit0: SPI communication fault detection Bit1: FA-03 and FA-05 modify property Bit2: Err16,Err17 and Err33 reset selection Bit3: No-load-cell compensation during emergency evacuation Bit4: Control mode restriction Bit5: Threshold selection of speed deviation too large	0	1	☆
P6-27	Zero-speed signal output delay	0-9999	0	1ms	☆
P6-28	Upper limit of emergency evacuation speed	0.00 to maximum frequency	8.00	0.01Hz	★
Group F7: Auxiliary function parameters					

P7-00	Acceleration time 1	1.0-100.0s	4.0s	0.1s	☆
P7-01	Deceleration time 1	1.0-100.0s	4.0s	0.1s	☆
P7-02	Time proportion of running curve 1 start segment	10.0-40.0%	40.0%	0.1%	★
P7-03	Time proportion of running curve 1 end segment	10.0-40.0%	40.0%	0.1%	★
P7-04	Acceleration time 2	1.0-100.0s	4.0s	0.1s	☆
P7-05	Deceleration time 2	1.0-100.0s	4.0s	0.1s	☆
P7-06	Time proportion of running curve 2 start segment	10.0-40.0%	40.0%	0.1%	★
P7-07	Time proportion of running curve 2 end segment	10.0-40.0%	40.0%	0.1%	★
P7-08	Acceleration time 3	1.0-100.0s	4.0s	0.1s	☆
P7-09	Deceleration time 3	1.0-100.0s	20.0s	0.1s	☆
P7-10	Time proportion of running curve 3 start segment	10.0-50.0%	40.0%	0.1%	★

Function code	Parameter name	Setting range	Default	Min. Unit	Property
P7-11	Time proportion of running curve 2 end segment	10.0-50.0%	40.0%	0.1%	★
P7-12	Acceleration time 4	0.5-100.0s	1.0s	0.1s	☆
P7-13	Deceleration time 3	0.5-100.0s	1.0s	0.1s	☆
P7-14	Time proportion of running curve 4 start segment	10.0-50.0%	40.0%	0.1%	★
P7-15	Time proportion of running curve 4 end segment	10.0-50.0%	40.0%	0.1%	★
P7-16	Slip test acceleration time	0.5-10.0	1.0	0.1s	★
P7-17	Set distance ofdirect travel ride	0.0-6553.5	0.0	0.1mm	★
P7-18	Actual distance of direct travel ride	0.0-6553.5	0.0	0.1mm	●
Group F8: Display parameters					
P8-00	Input/Output terminal state	-	-	-	●
P8-01	Display in running state	1-32767 Bit0: Speed reference Bit1: Running frequency Bit2: Frequency reterence Bit3: Bus voltage	32767	1	☆

		Bit4: Output voltage Bit5: Output current Bit6: A11 Bit7: AI2 Bit8: Car load(%) Bit9: Startup compensation current (%) Bit10: Torque current (%) Bit11: Input state Bit12: Output state			
P8-02	Display in stop state	1-255 Bit0: Speed reference Bit1: Frequency reference Bit2: Bus voltage Bit3: AI1 Bit4: A2 Bit5: Car load (%) Bit6: Input state Bit7: Output state	255	1	☆
P8-03	Rated elevator speed	0.001-8.000	1.600	0.001 m/s	☆
P8-04	Heatsink temperature	0-100	-	1℃	●
P8-05	Main control board software version	0.00-99.99	-	0.01	●
P8-06	Drive board software version	0-65535	-	1	●
P8-07	Set running time	0-65550	0	1h	☆
P8-08	Accumulative running time(hour)	0-65500	0	1h	●
P8-09	Accumulative running time(s)	0-3600	0	1s	●

Function code	Parameter name	Setting range	Default	Min. Unit	Property
P8-10	High byte of running times	0-9999	0	1	●
P8-11	Low byte of running times	0-9999	0	1	●
P8-12	Short circuit to ground detection at power-on	0: Disabled 1: Enabled	0	1	☆
P8-13	Main control board software temporary version	0.00-99.99	-	0.01	●
P8-14	Main control board software customer version	0.00-99.99	-	0.01	●
P8-17	Year	2000-2100	2014	1	☆
P8-18	Month	0101-1231	0101	0101	☆
P8-19	Hour.minute	00.00-23.59	00.00	00.01	☆
Group P9: Protection function parameters					
P9-09	Fault auto reset times	0-3	0	1	☆
P9-11	Fault auto reset delay	0.1-100.0	1.0	0.1s	☆
P9-12	Input phase loss protection	0: Disabled 1: Enabled	1	1	☆
P9-13	Output phase loss protection	0-3 Bit0: Output phase loss detection during running Bit1: Output phase loss detection at startup	1	1	☆
P9-14	1st fault code	0-60	0	1	●
P9-15	1st fault subcode	0-999	0	1	●
P9-16	1st fault month and day	0-1231	0	1	●
P9-17	1st fault hour and minute	00.00-23.59	0	0.01	●
P9-18	2nd fault code	0-60	0	1	●
P9-19	2nd fault subcode	0-999	0	1	●
P9-20	2nd fault month and day	0-1231	0	1	●
P9-21	2nd fault hour and minute	00.00-23.59	0	0.01	●
P9-22	3rd fault code	0-60	0	1	●
P9-23	3rd fault subcode	0-999	0	1	●
P9-24	3rd fault month and day	0-1231	0	1	●
P9-25	3rd fault hour and minute	00.00-23.59	0	0.01	●
P9-26	4th fault code	0-60	0	1	●
P9-27	4th fault subcode	0-999	0	1	●
P9-28	4th fault month and day	0-1231	0	1	●
P9-29	4th fault hour and minute	00.00-23.59	0	0.01	●
P9-30	5th fault code	0-60	0	1	●
P9-31	5th fault subcode	0-999	0	1	●
P9-32	5th fault month and day	0-1231	0	1	●

Function code	Parameter name	Setting range	Default	Min. Unit	Property
P9-33	5th fault hour and minute	00.00-23.59	0	0.01	●
P9-34	6th fault code	0-60	0	1	●
P9-35	6th fault subcode	0-999	0	1	●
P9-36	6th fault month and day	0-1231	0	1	●
P9-37	6th fault hour and minute	00.00-23.59	0	0.01	●
P9-38	7th fault code	0-60	0	1	●
P9-39	7th fault subcode	0-999	0	1	●
P9-40	7th fault month and day	0-1231	0	1	●
P9-41	7th fault hour and minute	00.00-23.59	0	0.01	●
P9-42	8th fault code	0-60	0	1	●
P9-43	8th fault subcode	0-999	0	1	●
P9-44	8th fault month and day	0-1231	0	1	●
P9-45	8th fault hour and minute	00.00-23.59	0	0.01	●
P9-46	9th fault code	0-60	0	1	●
P9-47	9th fault subcode	0-999	0	1	●
P9-48	9th fault month and day	0-1231	0	1	●
P9-49	9th fault hour and minute	00.00-23.59	0	0.01	●

P9-50	10th fault code	0-60	0	1	●
P9-51	10th fault subcode	0-999	0	1	●
P9-52	10th fault month and day	0-1231	0	1	●
P9-53	10th fault hour and minute	00.00-23.59	0	0.01	●
P9-54	Latest fault code	0-60	0	1	●
P9-55	Latest fault subcode	0-999	0	1	●
P9-56	Latest fault month and day	0-1231	0	1	●
P9-57	Latest fault hour and minute	00.00-23.59	0	0.01	●
P9-58	Logic information of latest fault	0-65535	0	1	●
P9-59	Set frequency upon latest fault	0.00-99.00	0.00	0.01Hz	●
P9-60	Feedback frequency upon latest fault	0.00-99.00	0.00	0.01Hz	●
P9-61	Bus voltage upon latest fault	0.0-6500.0	0.0	0.1V	●
P9-62	Output voltage upon latest fault	0-65000	0	1V	●
P9-63	Output current upon latest fault	0.00-650.00	0.00	0.01A	●

Function code	Parameter name	Setting range	Default	Min. Unit	Property
P9-64	Torquecurrent upon latest fault	0.00-650.00	0.00	0.01A	●
P9-65	Output power upon latest fault	0.00-99.99	0.00	0.01 kW	●
P9-66	Input function state 1 upon latest fault	0-65535	0	1	●
P9-67	Input function state 2 upon latest fault	0-65535	0	1	●
P9-68	Output function state 1 upon latest fault	0-65535	0	1	●
P9-68	Output function state 2 upon latest fault	0-65535	0	1	●
Group PA: PG Parameters					
PA-00	Encoder PPR	100-9999	1024	1	★
PA-01	Encoder wire-breaking detection time	0.0-10.0	1.0	0.1s	★
PA-03	Encoder magnetic pole angle	0.0-359.9	0.0	0.1°	★
PA-04	Encoder current angle	0.0-359.9	0.0	0.1°	●
PA-05	Wiring mode	0-15	0	1	●
PA-06	PG card frequency-divisio n coefficient ratio	1-65535	1	1	●
Group Pb: Communicaton parameters(Reserved)					
Group PC:Special enhanced parameters					
PC-00	Action at command abnormal	0: Decelerate to stop 1: Block output immediately	1	1	★
PC-01	Deceleration time at abnormality	0.0-300.0	3.0	0.1s	★
PC-02	Up speed threshold	0.00Hz to maximum frequency	45.00	0.01Hz	★
PC-03	Down speed threshold	0.00Hz to maximum frequency	45.00	0.01Hz	★
PC-04	Door pre open judging frequency	0.00Hz to maximum frequency	5.00	0.01Hz	★
PC-05	Frequency detection level 1(FDT frequency 1)	0.00Hz to maximum frequency	50.00	0.01Hz	☆
PC-06	Frequency detection level 2(FDT frequency 2)	0.00Hz to maximum frequency	50.00	0.01Hz	☆
PC-07	Frequency detection hysteresis	0.0-100.0%	5%	0.1%	☆
PC-08	Frequency reached detection width	0.0-100.0%	0.0%	0.1%	☆
PC-09	Overspeed detection threshold	80-120%	115%	1%	☆

Function code	Parameter name	Setting range	Default	Min. Unit	Property
PC-10	Overspeed detection time	0.0-5.0	1.0s	0.1s	☆
PC-11	Action selection at overspeed	0: Decelerate to stop at abnomality 1: Alam and block output immpediately 2: Continue to run	1	1	●
PC-12	Speed deviation detection threshold	0-50%	30%	1%	●
PC-13	Speed deviation detection time	0.0-5.0s	1.0s	0.1s	●
PC-14	Action selection at speed deviation too arge	0: Decelerate to stop at abnomality 1: Alam and block output immpediately 2: Continue to run	1	1	●
Group Pd: Special function parameters					
Pd-00	Torque boost	0.1%-30.0%	1.0%	0.1%	★
Pd-01	Cut-of frequency of torque boost	0.00 to maximum frequency	50.00	0.01Hz	★
Pd-02	VIF slip compensation gain	0.0-200.0%	100.0%	0.1%	★
Pd-03	Oscillation suppression gain	0-100	20	1	★
Pd-04	AC drive function selection 3	0-65535	0	1	★
Pd-05	Position lock current coefficient	1.0-50.0%	15.0%	0.1%	★

Pd-06	Position lock speed loop KP	0.05-1.00	0.50	0.01	★
Pd-07	Position lock speed loop TI	0.05-2.00	0.60	0.01	★
Group PU:Monitoring parameters					
PU-00	Pre-torque current	-200.0 to 200.0%	0.0%	0.1%	●
PU-01	Logic intormation	0-65535	0	1	●
PU-02	Frequency reference	0.00-99.00	0.00	0.01Hz	●
PU-03	Feedback frequency	0.00-99.00	0.00	0.01Hz	●
PU-04	Bus voltage	0.0-6500.0	0.0	0.1V	●
PU-05	Output voltage	0-65000	0	1V	●
PU-06	Output current	0.00-650.00	0.00	0.01A	●
PU-07	Output torque	0.0-200.0%	0.0%	0.1%	●
PU-08	Torque current	0.00-650.00	0.00	0.01A	●
PU-09	Output power	-99.99 to 99.99	0.00	0.01 kW	●
PU-10	Car load	0.0-100.0%	0.0%	0.1%	●
PU-11	Car speed	0.000-65.000	0.000	0.001 m/s	●
PU-12	Communication interference	0-65535	0	1	●
PU-13	Input function state 1	0-65535	0	1	●
PU-14	Input function state 2	0-65535	0	1	●
PU-15	Output function state 1	0-65535	0	1	●
PU-16	Output function 2	0-65535	0	1	●

Function code	Parameter name	Setting range	Default	Min. Unit	Property
PU-17	AI1 voltage	0.00-20.00	0.00	0.01V	●
PU-18	AI2 voltage	0.00-20.00	0.00	0.01V	●
PU-19	AO1 voltage	0.00-20.00	0.00	0.01V	●
PU-20	Startup rollback coefficient	0-65535	0	1	●
PU-21	PG card pulses per second	0-65535	0	1	●
Group PP: User parameters					
PP-00	User password	0-65535	0	1	☆
PP-01	Param eterupdate	0: No operation 1: Restore default setting 2: Clear fault records	0	1	★
PP-02	User-defined parameter display	0: Invalid 1: Valid	0	1	★

Chapter 6 Commissioning

This chapter describes the AC drive operating modes and general commissioning methods.

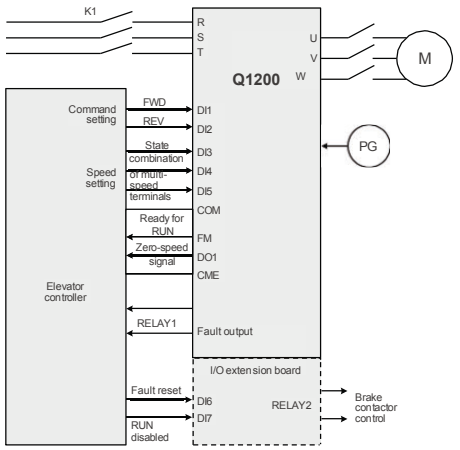
6.1 Multi-Speed as speed reference source

As a common mode for the elevator application, multi-speed used as the speed reference source features strong anti-interference capability, good adaptability, and feasibility.

Different from the traditional multi-speed mode that has the same acceleration/deceleration running curve fr different speeds, the multi-speed mode especially designed for the Q1200 provides a different acceleration/ deceleration running curve for each speed, making commissioning easier.

6.1.1 System wiring

Figure 7-1 System wiring of multi-speed as speed reference source



Note: The input and output terminals except RELAY2 have default setting at delivery. Change the setting only when required.

It is recommended that RELAY2 be used as the brake control output and connected to the brake control circuit of the system.

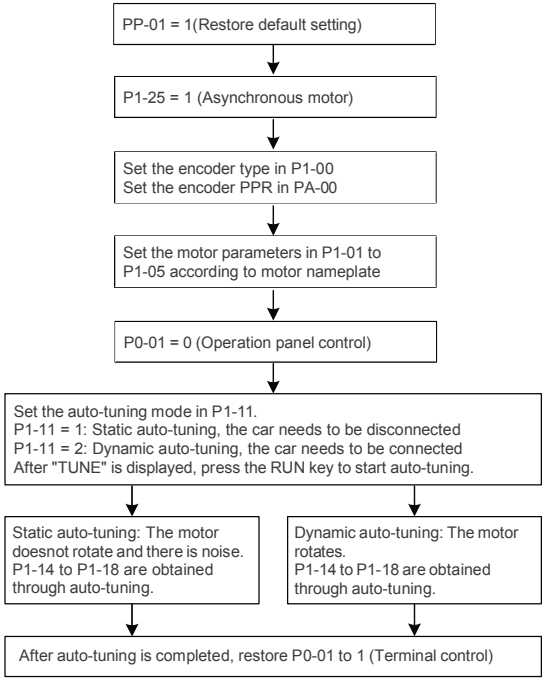
6.1.2 Parameter setting

This section describes the parameter setting in the commissioning procedure that is divided into three parts: motor auto-tuning, inspection running, and normal speed running.

1. **Motor auto-tuning**

1) Asynchronous motor auto-tuning

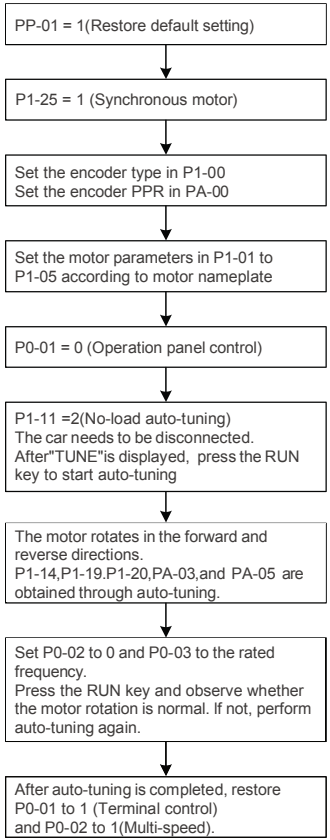
Figure 7-2 Asynchronous motor auto-tuning flowchart



Note that if P0-00 = 0(SVC) or 2 (V/F control), the encoder type and PPR need not be set.However, the CLVC mode is recommended for the elevator application.

2) Synchronous motor no-load auto-tuning

Figure 7-3 Synchronous motor no-load auto-tuning flowchart



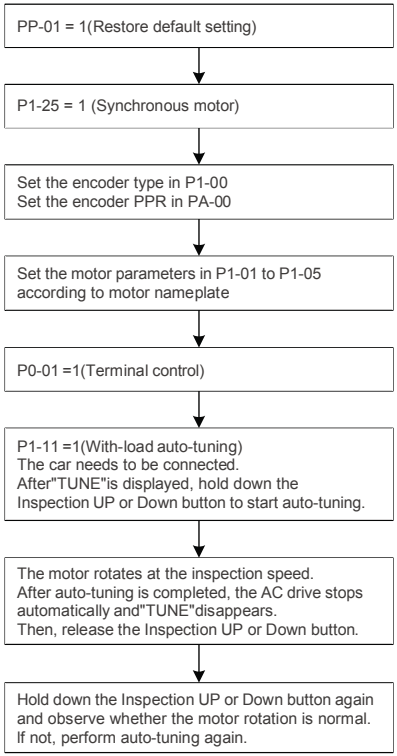
It is recommended that several times of auto tuning be performed; after ensuring that the value deviation of PA-03 is within 5 and PA-05 remains the same in several times of auto-tuning, then perform trial running

3) Synchronous motor with-load auto-tuning

A.Auto-tuning flowchart

The Q1200 provides an encoder angle identification method with the car connected(The user need not remove the steel rope).

Figure 7-4 Synchronous motor with-load auto-tuning flowchart



1. Precautions

- The AC drive spends 2s to store obtained data after auto tuning is completed, and does not respond to any input command at this moment
- This auto-tuning mode can be used only by professional personnel to prevent danger.
- The no load-cell pre-torque compensation function is disabled (P6 23 Bit1 = 0) to prevent abnormality.
- If auto-tuning fails to be performed, exchange any two of U,V,W cables of the AC drive,and perform auto-tuning again.

2. Inspection running

Before the elevator enters the inspection running stage, perform the following setting:

- Inspection speed selection (P6-16)
- Speeds for multi-speed running (P6-00 to P6-07)
- Acceleration/deceleration running curves (P6-08 to P6-15)
- Specific acceleration/deceleration time(P7-00 to P7-15) Example:
- If speed 2 is used as the inspection speed, set P6-16 to 2.
- Then, set the frequency reference corresponding to speed 2 in P6 02. The AC driveoutputs this frequency during inspection running.
- Set the running curve of speed 2 in P6-10. The default value is curve 1.
- If the acceleration/deceleration time of curve 1 need to be modified, set P7 00 to P7-03.

Note that if the terminal functions are different from the default setting, check and setgroup P4 and P5 parameters correctly before inspection running.

3. Normal speed running

Before the elevator enters the normal speed trial running, perform the following operations:

- Check that the encoder wiring and cable connection between the AC drive and the motor are correct.
- Set all involved speeds.
- Select the running curves corresponding to the speeds. It is recommended that curve1 is used for the normal speed running; if several speeds are used, use curve 1 for the lowest speed).
- Set the acceleration/deceleration time and start and end segments of all curves to guarantee good riding comfort.

- Adjust group P2 and P3 parameters to improve the riding comfort during running and startup.

4. Setting example

Assume that the speed reference combinations of the AC drive are as follows:

- Inspection: speed 2, frequency reference 10Hz, running curve 4
- Creeping: speed 3, frequency reference 3Hz, running curve 3
- Normal speed: speed 7, frequency reference 48Hz, running curve 1

The parameter setting is as follows.

Stage	Function code	Parameter name	Value	Remarks
Inspection	P6-16	Inspection speed selection	2	
	P6-02	Speed 2	10	
	P6-10	Running curve of speed 2	4	Running curve 4 is defined by P7-12 to P7-15.
Creeping	P6-03	Speed 3	3	
	P6-11	Running curve of speed 3	3	Running curve 3 is defined by P7-08 to P7-11.
Normal speed	P6-07	Speed 7	48	
	P6-15	Running curve of speed 7	1	Running curve 1 is defined by P7-00 to P7-03.

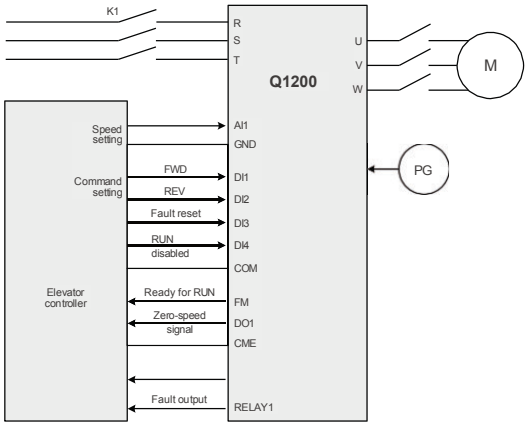
Note that this example lists only the speed related parameters. Other parameters to be set during multi-speed commissioning are not described here.

6.2 AI as speed reference source

Using AI as the speed reference source is also a common mode, in which the speed reference and RUN command are set through AI terminals.

6.2.1 System wiring

Figure 7-5 System wiring of AI as speed reference source



6.2.2 Parameter setting

When AI is used as the speed reference source, the AC drive executes commands sent by the elevator controller. The AI signal is assumed as 0-10V input.

The motor auto-tuning method is the same as that for multi-speed mode.

The following table lists the parameter setting.

Type	Function code	Parameter name	Value
Analog function parameters	P6-02	Speed reference source	2
	P6-19	Corresponding percentage of analog minimum input	0
	P6-21	Corresponding percentage of analog maximum input	100
	P6-18	Analog minimum input	0

Type	Function code	Parameter name	Value
Analog function parameters	P6-20	Analog maximum input	10
	P6-22	AI filter time	0.1
Motor encoder parameters	Groups P1 and PA	Obtained through motor auto-tuning. See asynchronous motor aute tuning descriptions in section 7.1.	
Vector control speed loop parameters	Group P2	Adjusted based on the actual running characteristics	
Input terminal parameters (group P4)	P4-03	DI3 function selection	7
	P4-04	DI4 function selection	6

6.3 Inspection running

The inspection running mode can be implemented through multi-speed control based on the elevator inspection running characteristics.

Enable the AC drive to enter the inspection mode in the following ways:

1. Make the inspection signal of the input terminal active.

After this signal becomes active, if P6-16 is a non-zero value, the AC drive runs at the speed selected by P6-16.

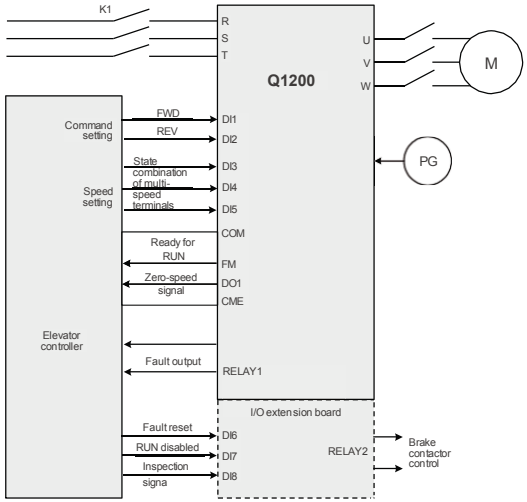
2. Set P6-16 (Inspection speed selection) to a non zero value, and make the selected speed equal to P6-16.

For example, if P6-16 is set to 1 and state combinations of mult-speed DI terminals correspond to speed 1, the AC drive enters the inspection running state.

The slip test and angte free auto-tuning functions can be used only in the inspection running mode. Enable the AC drive to the inspection running mode before the system starts up.

6.3.1 System wiring

Figure 7-6 System wiring of inspection running



6.3.2 Parameter setting and running curve

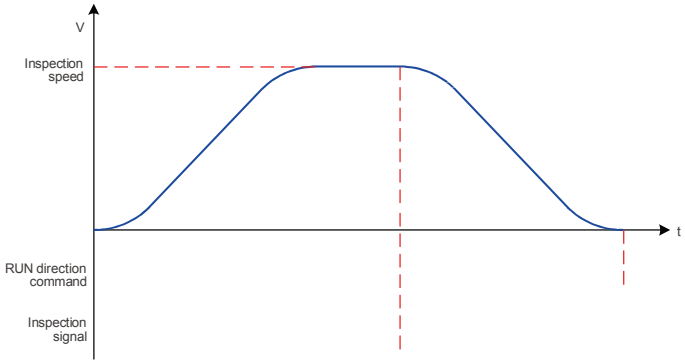
The running sequence of the inspection running mode is different from those of the normal speed running mode in the aspect of stop process.

For example, if P6-16 =2 , when there is forward (reverse) RUN command and the inspection signal of the input terminal is active, the Q1200 runs at the frequency of speed 2, and the acceleration time is determined according to the running curve corresponding to speed 2.

In the stop process, if the inspection signal is canceled first, the AC drive decelerates to 0 according to the deceleration time for speed 3 until the forward (Reverse) RUN command is cancelled, as shown in the following figure.

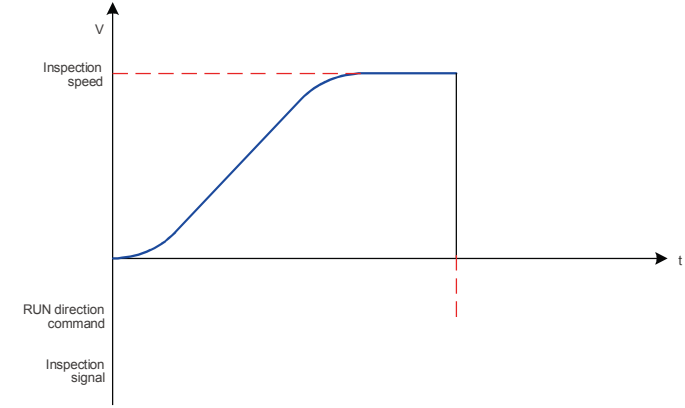
The deceleration time can be short to a small value (for example, 1s) to achieve quick stop.

Figure 7-7 Stop process time sequence of inspection signal



If the forward (Reverse) RUN command is cancelled directly during inspection running, the AC drive stops output immediately, as shown in the following figure.

Figure 7-8 Stop process time sequence at RUN command cancellation



Assume that for speed 2, inspection frequency 10Hz, and running curve 4 are used for inspection running. The following tables lists the parameters to be set.

Function code	Parameter name	Value	Default	Remarks
P6-02	Speed 2	10.00Hz	0.00Hz	The rated motor frequency is 50.00Hz.
P6-10	Running curve of speed 2	4	1	-
P6-16	Inspection speed selection	2	0	Running curve 4 is defined by P7-12 to P7-15.
P7-12	Acceleration time 4	2.0s	20.0s	
P7-13	Deceleration time 4	1.0s	20.0s	Set it to the minimum value to ensure that the speed is reduced to a very small value before the brake is applied.

6.4 Emergency evacuation at power failure

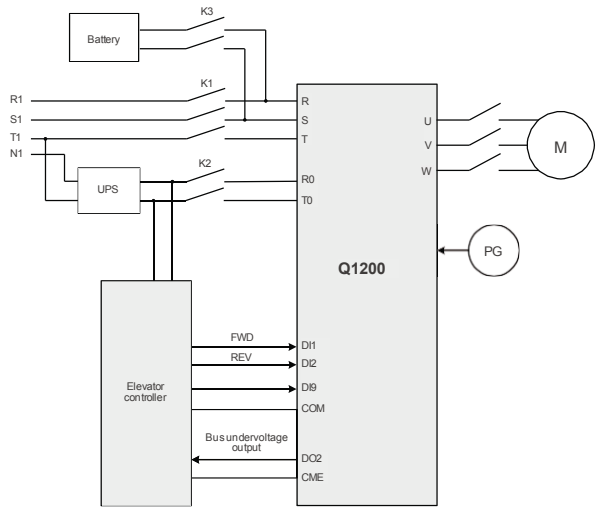
Passengers may be trapped in the car if power failure suddenly happens during use of the elevator.
The Q1200 provides two standby power supply modes to prevent this problem.

- 48V battery power supply
  The power of the AC drive main circuit is supplied by the 48V battery, and other working power is supplied by the UPS (Or inverter power).
- UPS
  The main circuit and working power of the AC drive are supplied by the UPS higherthan 220 V.

6.4.1 48V Battery

1. Wiring of 48V battery power supply

Figure 7-9 48V battery power supply for emergency evacuation



Note that this mode is used, the AC drive needto be modified with adding the
UPS power interfaces R0 and T0.

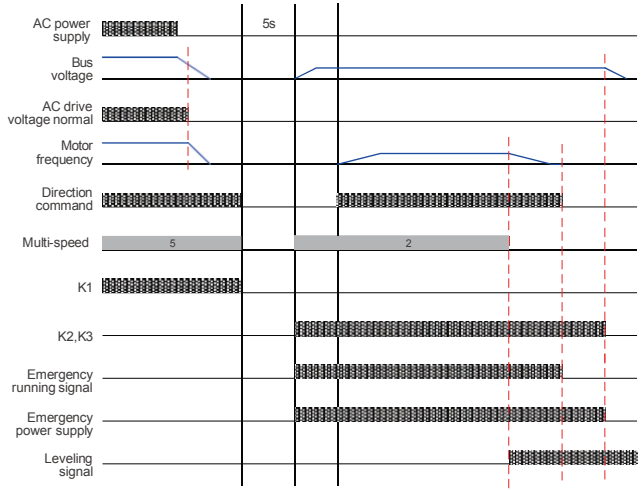
2. Running time sequence

Perform wiring according to the preceding figure, use DO2 for bus undervoltage output and use speed 2 as the emergency evacuation speed. The following table lists the parameters to be set.

Function code	Parameter name	Value	Default	Remarks
P4-09	DI9 function selection	9	0	Emergency input
P5-02	DO2 function seection	8	0	Bus undervoltage
P6-02	Speed 2	2.00Hz	0.00Hz	The rated motor fequency is 50.00 Hz.
P6-10	Running curve of speed 2	3	1	
P6-17	Emergency evacuation operation mode at power failure	2	0	48V battery power supply
P7-08	Acceleration time 3	30.0s	4.0s	Increasing the acceleration time can prevent too large impact current.

The following takes the up direction as an example to shown the time sequence.

Figure 7-10 Time sequence of emergency evacuation



The AC drive receives the emergency running signal from the elevator controller through the DI terminal. Based on this signal, the AC drive determines to enter the emergency evacuation state.

Contactors K1, K2, and K3 are controlled by the elevator controller.

3. Precautions

1. Set the running frequency and acceleration/deceleration time properly based on theelevator conditions.
   It is recommended that the acceleration/deceleration time be larger than 10s
   Set the running frequency according to the following formula:
   Running frequency < (48V - 5V) × Rated motor frequency/(1.414 Rated motor voltage)

2. The battery supplies 48 V power to the main circuit, and the auxiliary power such as UPS supplies the working power.

3. It is recommended that the steady output current of the battery be larger than the magnetizing current of the motor.

4. The AC drive determines whether it is emergency running according to the signal input to the related DI terminal.
   The running speed is given through mult-speed setting, and the acceleration/decelerationtime selected for this speed is used, but it is linear rather than S curve.

5. The AC drive does not detect the DC bus voltage. Before the brake is released, ensurethat 48V voltage has been input to the main circuit.

6. The AC drive monitors the speed during running of the battery as the power supply. If the speed exceeds P6-28 (Upper limit of emergency evacuation speed), the AC drivereports fault Err32 and performs protection.

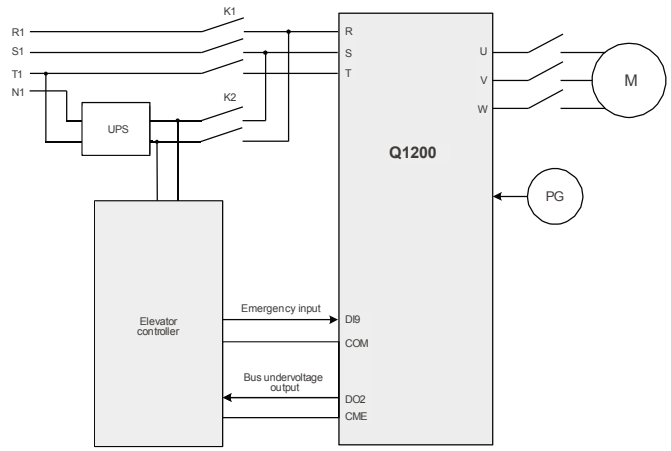
7. The direction of drive load is not allowed during emergency running. The externalcontroller must select the running direction of balanced load or braking load.
   The Q1200 provides the "Light-load running" signal, and determines whether to output this signal according to the load conditions. The external controller determines the emergency running direction based on this signal.

8. The contactor to the AC drive main circuit and the contactor to the UPS must not beclosed at the same time; otherwise, the UPS and battery will be damaged.

6.4.2 UPS

1. Wiring of UPS power supply

Figure 7-11 UPS power supply for emergency evacuation



2. Running time sequence

When UPS is used for power supply at emergency evacuation in multi-speed control, the following wiring need to added:

- Wiring to the terminals respectively with "Emergency input" and "Bus undervoltage output" signals
- Wiring between the UPS and the AC drive in stop state

Assume that speed 2 is used as the emergency evacuation speed. The following tablelists the parameters to be set.

Function code	Parameter name	Value	Default	Remarks
P4-09	DI9 function selection	9	0	Emergency input

P5-02	DO2 function seection	8	0	Bus under voltage
P6-02	Speed 2	2.00Hz	0.00Hz	The rated motor fequency is 50.00 Hz.
P6-10	Running curve of speed 2	3	1	
P6-17	Emergency evacuation operation mode at power failure	1	0	UPS
P7-08	Acceleration time 3	30.0s	4.0s	Increasing the acceleration time can prevent too large impact current.

The running time sequence of UPS is the same as that of 48V battery power supply.

The AC drive receives the UPS emergency running signal from the elevator controller through the DI terminal. Based on this signal, the AC drive determines to enter the emergency evacuation state.

Contactors K1, K2, and K3 are controlled by the elevator controller.

6.5 Analog load cell commissioning

This section describes the analog load cell commissioning method on the prerequisite that FWD and REV commands respectively indicate up direction and down direction of the elevator.

6.5.1 Parameter setting

Assume that AI1 is used for the pre-torque input. Set the following parameters:

P3-09=2

P3-10 = elevator balance coefficient

In the case of car ne load, view the AI1 sampling value (PU-17) on the operation panel and enter this value in P3-18.

In the case of car full-load, enter the AI1 sampling value (PU-17) in P3-19.

P3-18 and P3-19 can also be obtained through load cell auto-tuning.

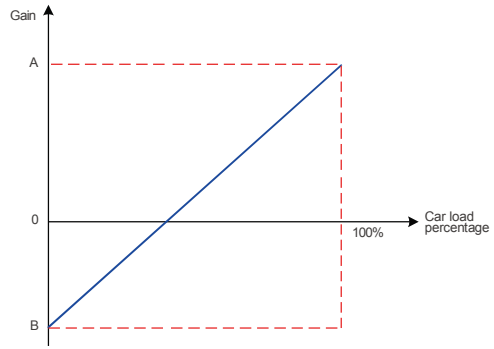
Set P3-11 properly; generally, the value 0.6 is used.

6.5.2 Commissioning when balance coefficient incorrect

In certain sites, no load compensation is correct, but the compensation effect becomespoor when the car load increases; this is caused by incorrect elevator balance coefficient.

If the balance coefficient is unknown, calculate the balance coefficient (P3-10) and gain(P3-11) according to the no-load and full-load compensation test.

Figure 7-12 Compensation curve



The commissioning procedure is as follows:

1. Set P3-10 to 50%
2. Perform car no-load auto-tuning. Run the elevator in the up and down directions.
3. Adjust P3-11 to ensure that there is no rollback or over torque compensation at the instantaneous moment of brake release both in the up and down directions. Record P3-11 = B.
4. Put full load in the car and perform car ful-load auto-tuning. Run the elevator in the up and down directions.

5. Adjust P3-11.When the compensation is proper, record P3-11 =A

According to the preceding figure, the oblique line is the correct compensation curve ofthe elevator. The cross point between this line and the horizontal axis is the balance compensation point, that is, balance coefficient Calculate the balance coefficient according to the following formula:

P3-10 =100xB/(A+ B)
P3-11 =(A+B)/2

For example,if B = 0.7, and A = 0.4, then P310 = 36.4%and P3-11 = 0.55

6.5.3 Commissioning when running direction incorrect

If the FWD command instructs down direction, and the REV command instructs updirection, which is opposite to the prerequisite, compensation causes bad consequenceon the system.

In this case, record the sampling values P3-18 and P3-19 at car no-load and full-load andthe coefficient efficient P3-10.

Assume that P3-18 =X,P3-19 =Y P310 =Z Then,set P3-19 = X, P3-18 = Y P3-10 = 100-Z.

6.6 No-Load-Cell commissioning

6.6.1 Parameter setting

Function code	Parameter name	Value
P1-00	Encoder type	0
P3-09	Startup pre torque selection	5
P3-02	Brake release delay	>0.5s

6.6.2 Commissioning description

Increase Pd-05 (Position lock current coefficient) gradually to a value that ensures that rollback is as small as possible and the motor does not jitter after the brake is released.

View PU-20 during commissioning to check rollback.

If the motor has obvious oscillation when Pd-07 (Position lock speed loop TI) is smaller than 1.00,increase Pd-05.

The default setting of Pd-06 (Position lock speed loop KP) is proper. Do not change it to a very large value because this may result in motor oscillation.

6.7 Commissioning of direct travel ride

The Q1200 provides the direct travel ride function, which eliminates creeping of the elevator at arrival and improves the running efficiency. This function requires that:

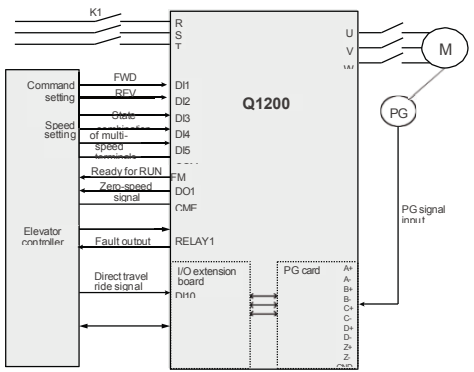
1. The elevator controller outputs a direct travel ride signal to the AC drive.
2. This signal is sent when the car arrives at the posiion with a fixed distance

to theleveling position, and keeps active until the AC drive stops.

6.7.1 Wiring

The following figure is a wiring example, in which the elevator uses the SIN/COS encoder and I/O extension card for open collector output.

Figure 7-13 Wiring of direct travel ride function



1. The PG card pulse input terminal on the i/O extension board of the AC drive receives the frequency-division output signal from the PG card.

This terminal can be connected only to the PG card with open collector output. Select the correct PG card model according to the descriptions of PG card in Chapter 3.

Rollback is as smal as possible and the motor does not jitter after the brake is released.pulse output terminal on the I/O extension board of the AC drive.

There are two output terminals; one is open collector output, and the other is differential output. Select the correct terminal according to he input type of the controller.

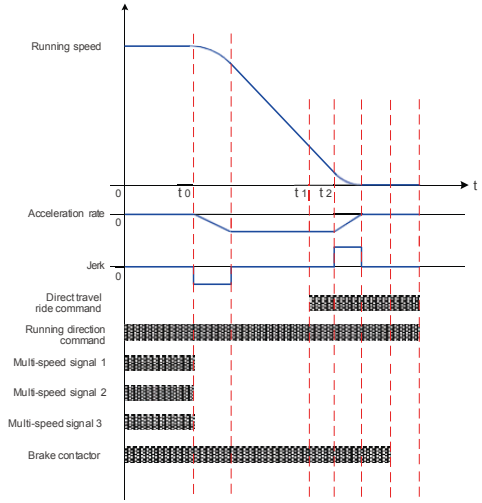
6.7.2 Parameter setting

Besides the motor parameters and encoder parameters, the parameters listed in the following table are also need to set correctly (with Figure 7-13 as an example).

Function code	Parameter name	Value	Default	Remarks
P4-10	DI10 function selection	22	0	Direct travel ride command(NO)
P7-17	Set distance of direct travel ride	100.0mm	0.0mm	Distance from the car to the leveling position when the direct travel ride command is active (set based on actual conditions)
P8-03	Rated elevator speed	1.600m/s	1.600m/s	-
PA-06	PG card frequency-division coefficient ratio	1	1	Set according to the PG card frequency-division ratio

6.7.3 Time sequence

Figure 7-14 Time sequence of direct travel ride



1. At the speed switchover point, the elevator controller cancels all the multi-speed signals,making the target speed of the AC drive be 0.

2. When the car runs to the position with a specified distance to the leveling zone, the elevator controller issues the direct travel ride command.

3. When the AC drive reaches zero speed, the brake is applied.

4. After the brake is applied completely, the direction command and direct travel ridecommand are cancelled. The direct travel ride command can also be cancelled before next-time deceleration.

6.7.4 Commissioning description

After setting the parameters and performing all wiring, register a call and perform trialrunning.

After the car arrives, view the value of P7-18, and perform the following operations:

1.P7-18 = 0

The AC drive does not use the direct travel ride function at stop. There are two reasons:

1) The AC drive does not receive the direct travel ride command.

To solve the problem, check wiring of the direct travel ride command signal and functionselection of the corresponding DI terminal of the AC drive.

if the direct travel ride command is active, the corresponding LED segment in PU-14 isON.

2) The end time segment of AC drive deceleration is too long. That is, the time from t2 tozero-speed in Figure 7-14 is too long.in this case. even if the AC drive receives the direct travel ride command, it cannotexecute the command because it has enter the deceleration stage and the stop distancecannot be adjusted.

To solve the problem, reduce the end time segment of AC drive deceleration.

For example, if speed 4 is used for the normal speed running, and P6-12 (Running curveof speed 4) is set to 1, then decrease the value of P7-02 (Time proportion of running curve1 start segment).

2. P7-18 ≠ 0

The AC drive uses the direct travel ride function. Adjust P7 -17 based on the actual levelingconditions:

Increase P7-17 at under-leveling

Decrease P7-17 at over-leveling.

When P7-17 is increased or decreased to a certain value, P7-18 will not change along with P7-17. It indicates that P7-17 reaches the upper limit or lower limit.

1. At the speed switchover point, the elevator controller cancels all the multi-speed signals when the direct travel ride command is received.

- If P7-17 reaches the upper limit, increase the deceleration time.

  For example, if speed 4 is used for the normal speed running, and P6-12 (Running curve of speed 4) is set to 1, then increase the value of P7-01 (Deceleration time 1)

  This increases the deceleration distance.

  The speed switchover point needs to be adjusted accordingly.
- If P7-17 reaches the lower limit, reduce the end time segment of AC drived eceleration.

For example, if speed 4 is used for the normal speed running, and P6 12 (Running curve of speed 4) is set to 1, then decrease the value of P7-02 (Time proportion of running curve 1 start segment).

Note that a very small value of P7-02 may affect the riding comfort.

3. The deviation between the leveling error at light-load running and that at heavy-load running is very large.

For example, the leveling error at heavy-load running is within 2 mm, but that at light-load running is larger than 5 mm.

To solve the problem, decrease the speed loop integral time set in P2-01 and P2-04 to improve the speed loop control accuracy and reduce the deviation.

6.7.5 Calculating speed switchover point

The deceleration distance can be adjusted only within a certain range when the directtravel ride command is received. Therefore, the speed switchover point (t0 in Figure 7-14)at which the system starts to decelerate must be accurate.

The distance from t0 to AC drive stop is calculated according to the following formula:

$$L = V \times tdec \times \left(\frac{2 + Kf - Ks}{4}\right) + \frac{V}{12} \times \frac{Ks^2 - Kf^2}{2 - Ks - Kf}$$

$$tdec = \frac{V \times Tdec}{V_{max}}$$

In the formula:

- V is the car speed before speed switchover (m/s).
- Vmax is the car speed (m/s) at the maximum frequency output by the AC drive(P0-05)
- Tdec is the set deceleration time (s).
- Ks is the time proportion of the running curve start segment (%).
- Kf is the time proportion of the running curve end segment (%).

Example:

- Speed 4 is used for normal speed running, P604 (Speed 4) = rated frequency, and maximum frequency = rated frequency
- P6-12 (Running curve of speed 4)= 1
- P7-01 (Deceleration time 1) = 4s

P7-02 (Time proportion of running curve 1 start segment) = 20.0%
P7-03 (Time proportion of running curve 1 end segment) = 20.0%
P8-03 (Rated elevator speed) = 1 m/s

The calculation result base on these parameters is:
Vmax = 1m/s, V = 1m/s
Tdec = 4s, Ks = 0.2, Kf = 0.2
Then, L is calculated as 2 m.
The elevator controller performs speed switchover and stars to decelerate at the position 2m away from the leveling position.

Chapter 7 Maintenance and troubleshooting

7.1 Maintenance

7.1.1 Routine maintenance

The influence of the ambient temperature, humidity, dust and vibration will cause the aging of the components inside the AC drive, which may cause potential faults or reduce the service life of the AC drive. Therefore, it is necessary to carry out routine and periodic maintenance.

⚠ Danger
There is still voltage on the filter capacitor after power-off. Wait until the CHARGE indicator goes off and test with a multimeter that the residual voltage is lower than 36V and then perform repair or

Routine maintenance involves checking:
- Whether abnormal noise exists during motor running
- Whether the motor vibrates excessively
- Whether the installation environment of the AC drive changes
- Whether the cooling fan works properly
- Whether the AC drive overheats

Routine cleaning involves:
- Keep the AC drive clean all the time
- Remove the dust, especially metal powder on the surface of the AC drive, to prevent the dust from entering the AC drive.
- Clear the oil stain on the cooling fan of the AC drive

7.1.2 Periodic inspection

Perform periodic inspection on the items that are difficult to check during running. Periodicinspectioninvolves:
- Check and clean the air filter periodically.
- Check whether the screws become loose.
- Check whether the AC drive is corroded.
- Check whether the wiring terminals have arc signs.
- Carry out the main circuit insulation test.

⚠ Caution
Before measuring the insulating resistance with megameter (500 VDC megameter recommended) disconnect the main circuit from the AC drive. Do not use the insulating resistance meter to test the insulation of the control circuit. The high voltage test need not be performed again because it has been completed before delivery.

7.1.3 Replacement of vulnerable components

Vulnerable components of the AC drive include the cooling fan and filter electrolytic capacitor. Their service life is related to the operating environment and maintenance.

The service life of the two components is listed in the following table.

Table 8-1 Service life of cooling fan and filter electrolytic capacitor

Component	Service life	Possible damage cause	Judging criteria
Fan	2 to 3 years	• Bearing worn • Blade aging	• Check whether there is crack on the blade. • Check whether there is abnormal vibration noiseupon startup.
Electrolytic capacitor	4 to 5 years	• Input power supply in poor quality • High ambient temperature • Frequent load jumping • Electrolytic aging	• Check whether there is liquid leakage • Check whether the safety valve has projected. • Measure the static capacitance • Measure the insulating resistance.

7.1.4 Storage of the AC drive

For storage of the AC drive, pay attention to the following two aspects:

1. Pack the AC drive with the original packing box provided by Robotsy.
2. Long-term storage degrades the electrolytic capacitor. Thus, the AC drive must be energized once every 2 years, each time lasting at least 5 hours. The input voltage must be increased slowly to the rated value with the regulator.

7.2 Troubleshooting

7.1.1 Faults and troubleshooting

The Q1200 has almost 50 pieces of alarm information and protective functions. If a fault occurs, AC drive stops output, enables the contact of the fault relay to act, and displays the fault code on the operation panel.

Before seeking for help, find the possible causes and rectify the fault according to the instructions in this chapter. If the fault persists, contact your agent or our company.

Note that faults Err33, Err16, Err17 can be reset only after power-on again.

Fault code	Name	Possible causes	Solution
Err02	Overcurrent during acceleration	• The main circuit output is grounded or short circuited. • Motor auto-tuning is performed improperly. • The load is too heavy. • The encoder signal is incorrect. • The UPS feedback signal is abnormal.	• Check the contactors: a. Check whether the RUN contactor at the AC drive output side is normal. b.Check whether the shorting PMSM stator contactor causes short circuit at the AC driveoutput side. • Check motor cables: a. Check whether the motor cables have damaged jacket,possibly short circuited toground, or connected insecurely. b. Check insulation of motor power terminals,and check whether the motor winding is short circuited or grounded. • Check whether there is mechanical stuck. • Check motor parameters: a. Check whether motor parameters comply with the nameplate. b. Perform motor auto-tuning again.
Err03	Overcurrent during deceleration	• The main circuit output is grounded or short circuited. • Motor auto-tuning is performed improperly. • The deceleration rate is too short. • The encoder signal is incorrect.	

Err04	Overcurrent at constant speed	The main circuit output is grounded or short circuited. • Motor auto-tuning is performed properly. • The load is too heavy. • The encoder is seriously interfered with.	Check whether the balance coefficient is correct. • Check the encoder: a.Check whether encoder pulses per revolution (PPR) isset correctly. b.Check whether the encoder signal is interfered with. whether the encoder cable runs through the duct independently, whether the cable is too long, and whether the shield is grounded at one end. c.Check whether the encoderis installed reliably, whether the rotating shatt is connected to the motor shaft reliably by observing whether the encoder is stable during normal-speed running. d.Check whether the encoder wirings are correct. For asynchronous motor, perform SVC and compare the current to judge whether the encoder works properly. • Check whether UPS feedback is active in non-UPS running state (Err02). • Check whether the acceleration/deceleration rate is too large (Err02, Err03)
Err05	Overvoltage during acceleration	• The input voltage is too high. • The regeneration power of the motor is too high. • The braking resistance is too large, or the braking unit fails. • The acceleration rate is too short.	• Observe whether the bus voltage is normal and whether it rises too quickly during running. a. Check whether the cable connecting the regen. resistor is damaged, whether the cooper wire touches the ground, and whether the connection is reliable. b.Check whether the

Err06	Overvoltage during deceleration	The input voltage is too high. • The braking resistance is too large, or the braking unit fails. • The deceleration rate is too short.	resistance is proper based on the recommendation in chapter 3 and select a proper regen. resistor. • Check for the balance coefficient.
Err07	Overvoltage at constant speed	• The input voltage is too high. • The braking resistance is too large, or the braking unit fails.	
Err08	Control power fault	• The input voltage is too high. • The drive control board is faulty.	• Adjust the input voltage • Contact us or our agent directly.
Err09	Under voltage	• Instantaneous power failure. occurs on the input power supply. • The input voltage is too low. • The drive control board fails.	• Check whether the external power fails during running. • Check whether wiring of all power input cables is secure. • Contact us or our agent directly.
Err10	AC drive Overload	• The brake circuit is abnormal. • The load is too heavy. • The encoder feedback signal is abnormal. • Motor parameters are incorrect. • Motor cables are abnormal.	• Check the brake circuit and power supply. • Reduce the load. • Check whether the encoder feedback signal and setting are correct,and whether the encoder initial angle of the PMSM is correct. • Check the setting of the motor parameters and perform motor auto-tuning again. • Check the motor cables(see the instructions for Err02)

Fault code	Name	Possible causes	Solution
Err12	Power supply phase loss	• The power input phases are not symmetric • The drive control board fails.	• Check whether the three phases of power supply are balanced and whether the power voltage is normal. If not,adjust the power supply. • Contact us or our agent directly.
Err13	Power output phase loss	• The output wiring of the main circuit is loose. • The motor is damaged.	• Check whether the motor wiring is secure. • Check whether the RUN contactor on the output side is normal. • Eliminate the motor fault.
Err14	Heatsink overheat	• The ambient temperature is too high. • The fan is damaged • The air filter is clogged.	• Lower the ambient temperature. • Clear the air filter. • Replace the damaged fan. • Check whether the installation clearance of the AC drive satisfies the requirement.
Err15	External fault or output abnormal	• The elevator controller is faulty. • The braking output side is short circuited. • The U,V,W output side is abnormal.	• Eliminate problems of the elevator controller. • Check that wiring of the regen. resistor and braking unit is correct, without short circuit. • Check whether the main contactor works properly. • Contact us or our agent directly.
Err16	Current control fault	• The magnetizing current deviation is too large. • The torque current deviation is too large. • The torque time limit is exceeded.	• Check the circuit of the encoder. • Check whether the output circuit breaker is off. • Check whether the setting of current loop parameters is too small. • Check whether the encoder initial angle is incorrect. If it is incorrect,perform angle auto-tuning.

			Check whether the load is too heavy.
Err17	Encoder reference signal abnormal	• The deviation between the current position and the absolute position is too large at arrival of Z signal. • The deviation between the absolute position angle and the accumulation angle is too large.	Check: • Whether the encoder is normal • Whether the encoder wiring is correct and reliable • Whether the PG card wiring is correct • Whether the grounding of the control cabinet and motor is reliable
Err18	Current detection fault	The drive control board fails.	Contact us or our agent directly.
Err19	Motor auto-tuning fault	• The motor cannot rotate properly. • Motor auto tuning times out. • The encoder of the PMSM is abnormal.	• Enter the motor parameters correctly. • Check the motor wiring and whether phase loss occurs on the contactor on the output side. • Check that encoder wiring is correct and encoder PPR is set correctly. • Check whether the brake is released during no load auto-tuning. • Check whether the Inspection Up/Down button is released before the synchronous motor with-load auto tuning is completed.

Fault code	Name	Possible causes	Solution
Err20	Speed feedback incorrect	Subcode 1: AB signals are lost during motor auto-tuning. Subcode 3: The motor cable phase sequence is incorrect. Subcode 4: Z signal cannot be detected during motor auto-tuning. Subcode 5: The cables of the SIN/COS encoder break Subcode 7: The cables of the U,V,W encoder break Subcode 8: The angle deviation is too large. Subcode 9: Overspeed occurs or the speed deviation is too large. Subcode 10,11: The AB or CD signals of the SIN/COS encoder are interfered with Subcode 12: The speed detected is 0 at torque limit. Subcode 13: The encoder AB signals are lost during running. Subcodes 14: Z signal is lost during running. Subcode 19: The AB analog signal cables break during low-speed running.	Subcodes 1,4,5,7,8,10,11,13,14,19: Check all signal wiring of the encoder. Subcode 3:Exchange any two phases of the motor U,V,W cables. Subcode 9: Set P1-00,P1-12,and P1-25 for the PMSM correctly. Subcode 12: Check whether there is mechanical stuck and whether the brake is released during running. Subcode 55: Check the grounding and eliminate interference problems.

		Subcode 55: CD signals are incorrect during motor auto-tuning or Z signal is seriously interfered with.	
Err21	Parameter setting error	The maximum frequency is smaller than the rated frequency.	Set the maximum frequency correctly.
Err23	Short circuited to ground	The output is short circuited to ground.	• Check whether the motor or contactor on the output side is short circuited to ground. • Contact us or our agent directly.
Err24	RTC clock fault	Subcode 101: The RTC clock information of the main control board is abnormal.	Subcode 101: • Replace the clock battery. • Replace the main control board.
Err25	Storage data abnormal	Subcodes 101,102: The storage data of the main control board is abnormal.	Subcodes 101,102:Contact us or our agent directly.
Err32	Emergency running overspeed	The speed during running with battery power supply exceeds P6-28	• Check whether the battery voltage is normal. • Check whether cable connection between the battery and the AC drive becomes loose. • Check whether P6-28 is set too small.
Err33	Overspeed fault	The running speed remains larger than PC-09 for more than the time in PC-10.	Check: • Whether the motor power is proper • Whether the elevator load is too heavy • Whether the encoder signals are correct • Whether PC-09 and PC-10 are set too small

Fault code	Name	Possible causes	Solution
Err34	Speed deviation too large	The deviation between the AC drive feedback frequency and the frequency reference remains larger than PC-12 for more than the time in PC-13.	Check: • Whether the motor power is proper • Whether the elevator load is too heavy • Whether the encoder signals are correct • Whether PC-12 and PC-13 are set too small
Err36	Contactor fault	• The contactor feedback signal is active before startup. • There is no feedback signal after the contactor is closed	Check • Whether the contactor contact and feedback contact are normal • Whether the functions of ACdrive input terminal are set correctly • Whether the control circuit power of the contactor is normal
Err37	Brake feedback abnormal	The brake output and feedback signals are inconsistent for more than 2s.	• Check whether the brake coil and feedback contact are normal. • Check the signal feature (NO,NC) of the feedback contact. • Check whether the control circuit power of the brake coil is normal.
Err38	Contact stuck	The feedback signal of the brake or RUN contactor remains active for more than 2.5s at stop.	• Check wiring • Check whether the brake and RUN contactors are normal
Err39	Motor overheat	The motor overheat signal is active.	• Check whether the motor damaged and the motor is used correctly. • Improve the heat dissipation conditions of the motor.

Err40	Elevator running conditions not met	The set elevator running time is reached	The elevator is used for a very longtime and needs to be maintained
Err55	DSP communication protection	The wiring between the drive control board and the main control board is abnormal.	Check wiring between the drive control board and the Main control board.

7.2.2 Symptoms and Diagnostics

The following symptoms may occur during use of the AC drive. When these symptoms occur, perform simple analysis according to the following table.

No.	Symptom	Solutions
1	There is no display at power-on.	• Check with a multimeter whether the AC drive power supply is consistent with the rated AC drive voltage.If not, eliminate the power supply problems. • Check whether the three phase rectifier bridge is normal. If it is damaged, contact us or our agent for technical support. • Check whether the CHARGE indicator is ON. If this indicator is OFF, the fault may occur on the rectifier bridge or snubber. If this indicator is ON, the fault may be caused by the switch mode power supply.Contact us or our agent for technical support.
2	The power circuit breaker trips after power-on.	• Check whether the power supply is grounded or short circuited. If yes,eliminate the problems. • Check whether the rectifier bridge is damaged. If yes.contact us or our agent for technical support.

No.	Symptom	Solutions
3	The motor does not rotate after the AC drive runs.	Check whether there is balanced three phase output from the U,V,W cables. • If yes,the cause is motor cabling problem,motor damage,or locked rotor due to mechanical reasons. Eliminate the problems. • If there is output but the three phase output is unbalanced,the cause is damage of the AC drive board or output module. Contact us or our agent for technical support. • If there is no output voltage, the cause may be damage of the AC drive board or output module. Contact us or our agent for technical support.
4	The AC drive display is normal after power-on, but the power circuit breaker trips during running.	• Check whether inter-phase short-circuit occurs in the output module. If yes, contact us or our agent for technical support. • Check whether motor lear wire is short circuited or grounded. If yes,eliminate the problems. If yes. eliminate the problems. • If trip occurs only sometimes and the distance between the mtor and the AC drive is far, install an AC output reactor.