EV3200 Door Control Inverter

User Manual

Version	V1.4
Revision date	April 21, 2008
BOM	31011543

Emerson Network Power provides customers with technical support. Users may contact the nearest Emerson local sales office or service center.

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Contents

Chapter 1 Safety Information

This chapter provides safety information of the inverter.

1.1 Warnings, Cautions & Notes

WARNING	A **Warning** contains information, which is essential for avoiding a safety hazard.
CAUTION	A **Caution** contains information, which is necessary for avoiding a risk of damage to the product or other equipment.
NOTE	A **Note** contains information, which helps to ensure correct operation of the product.

1.2 Electrical Safety - General Warning

The voltages used in the EV3200 door control inverter (for short, controller) can cause severe electrical shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to the inverter.

Specific warnings are given at the relevant places in this guide.

1.3 System Design And Safety Of Personnel

The inverter is intended as a component for inverter system. If installed incorrectly, the inverter may present a safety hazard. The inverter uses high voltages and currents, carries a high level of stored electrical energy, and is used to control equipment that can cause injury.

System design, installation, commissioning and maintenance must be carried out by personnel who have the necessary training and experience. They must read this safety information and this guide carefully.

The supply must be disconnected by an approved electrical isolation device before gaining access to the electrical connections.

Careful consideration must be given to the function of the inverter which might result in a hazard, either through its intended behavior or through incorrect operation due to a fault. In any application where a malfunction of the inverter or its control system could lead to or allow damage, loss or injury, a risk analysis must be carried out, and where necessary, further measures taken to reduce the risk - for example, an over-speed protection device in case of failure of the speed control, or a fail-safe mechanical brake in case of loss of motor braking.

1.4 Motor

Ensure the motor is installed in accordance with the manufacturer's recommendations.

Ensure the motor shaft is not exposed.

If it is intended to use the capability of an inverter to run a motor at speeds above its designed maximum, it is strongly recommended that the manufacturer be consulted first.

Low speeds may cause the motor to overheat because the cooling fan becomes less effective. The motor should be fitted with a protection thermistor. If necessary, an electric force vent fan should be used.

It is essential that the correct value is entered into F6.03, motor rated current. This affects the thermal protection of the motor.

1.5 Adjusting Parameters

Some parameters have a profound effect on the operation of the inverter. They must not be altered without careful consideration of the impact on the controlled system. Measures must be taken to prevent unwanted changes due to error or tampering.

1.6 Electrical Installation

1.6.1 Electric Shock Risk

The voltages present in the following locations can cause severe electric shock and may be lethal:

- AC supply cables and connections
- DC and brake cables, and connections
- Output cables and connections
- Many internal parts of the inverter, and external option units

Unless otherwise indicated, control terminals are single insulated and must not be touched.

1.6.2 Isolation Device

The AC supply must be disconnected from the inverter using an approved isolation device before any cover is removed from the inverter or before any servicing work is performed.

1.6.3 STOP Function

The STOP function does not remove dangerous voltages from the inverter, the motor or any external option units.

1.6.4 Stored Charge

The inverter contains capacitors that remain charged to a potentially lethal voltage after the AC supply has been disconnected. If the inverter has been energized, the AC supply must be isolated at least ten minutes before work may continue.

Normally, the capacitors are discharged by an internal resistor. Under certain, unusual fault conditions, it is possible that the capacitors may fail to discharge, or be prevented from being discharged by a voltage applied to the output terminals. If the inverter has failed in a manner that causes the display to go blank immediately, it is possible the capacitors will not be discharged. In this case, consult Emerson Network Power Co., Ltd. or their authorized distributor.

1.6.5 Equipment Supplied By Plug And Socket

Special attention must be given if the inverter is installed in equipment which is connected to the AC supply by a plug and socket. The AC supply terminals of the inverter are connected to the internal capacitors through rectifier diodes that are not intended to give safety isolation. If the plug terminals can be touched when the plug is disconnected from the socket, a means of automatically isolating the plug from the inverter must be used (e.g. a latching relay).

1.6.6 Earthing Requirement

WARNING	Earth the inverter properly. Failure to observe this may cause electric shock

1.6.7 Capacitor And Varistors

Because the inverter outputs PWM pulse wave, capacitor and varistors should not be connected with the output terminals of the inverter, or the inverter may trip or components may be damaged, as shown in Figure 1-1.

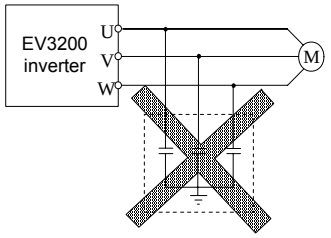


Figure 1-1 Capacitor connection with inverter output prohibited

1.7 Disposing Of Unwanted Inverter

When disposing the inverter, note that the capacitors may explode when they are burnt and poisonous gas may be generated when plastic parts are burnt. Please dispose the inverter as industrial waste.

Chapter 2 Product Specifications

This chapter provides model description and specifications of the inverter.

2.1 Model Description

The following figure provides the model description of the inverter.

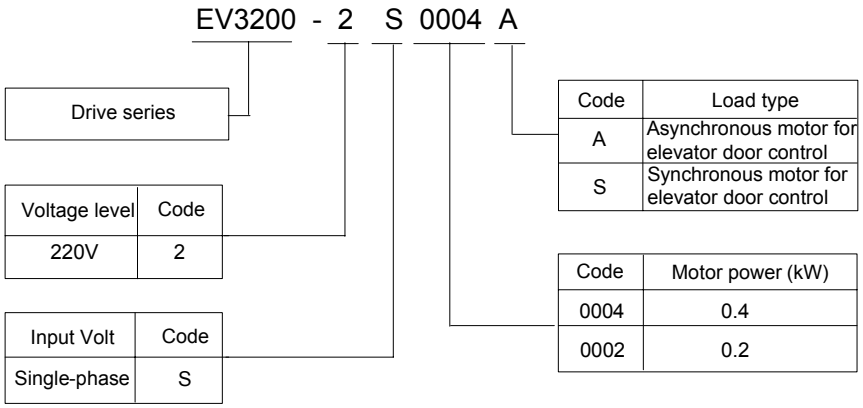


Figure 2-1 Inverter model description

2.2 Nameplate

The nameplate is on the bottom of the inverter enclosure, as shown in Figure 2-1.

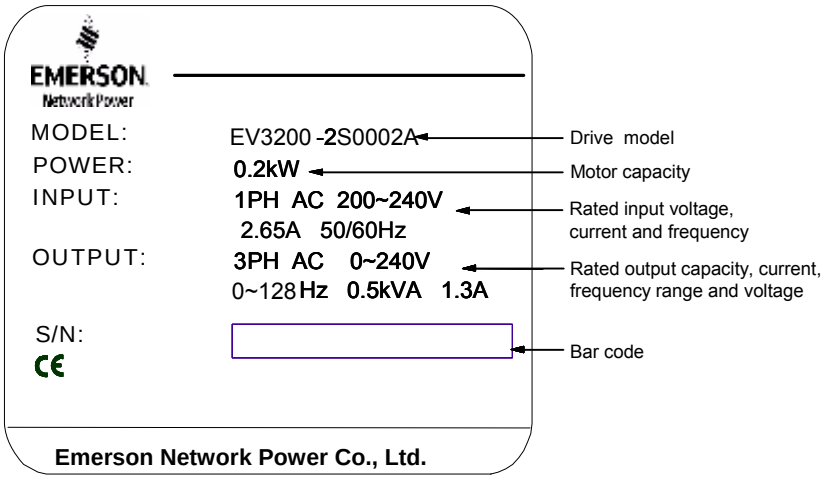


Figure 2-2 Inverter nameplate

2.3 Models

Inverter model	Rated input current (A)	Rated capacity (kVA)	Rated output current (A)	Motor power (kW)
EV3200-2S0002A	2.65	0.5	1.3	0.2
EV3200-2S0002S				
EV3200-2S0004A	5.3	1.0	2.5	0.4
EV3200-2S0004S				

2.4 Installation Size

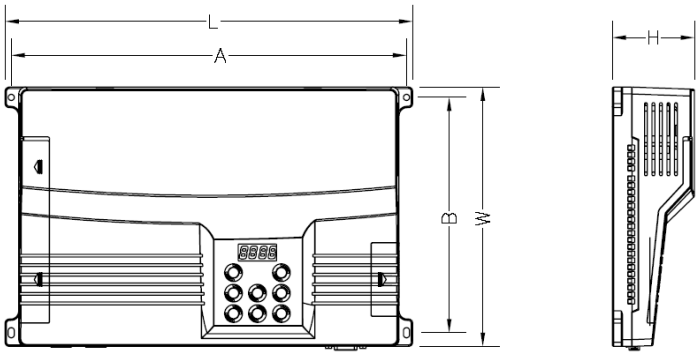


Table 2-1 Inverter external size and installation size

Inverter model	Installation size		External size			Installation hole diameter (mm)	Weight (kg)
	A (mm)	B (mm)	L (mm)	W (mm)	H (mm)		
EV3200-2S0002A	289	172.5	298	190	60	Φ4	0.9
EV3200-2S0002S							
EV3200-2S0004A							
EV3200-2S0004S							

2.5 Specifications

Items	Subitems	Specifications
Input	Voltage range	Single-phase AC power, 180V ~ 264V
	Frequency range	50Hz ± 5%, 60Hz ± 5%
Output	Voltage range	Three-phase: 0V ~ input voltage
	Frequency range	0Hz ~ 128Hz
	Overload ability	150% rated current for 1 minute, 180% rated current for 10 seconds
Main control functions	Load motor type	Three-phase AC asynchronous motor, three-phase AC synchronous motor
	Modulation mode	Optimized space voltage vector PWM modulation
	Control algorithm	Sensorless vector control, vector control with speed sensor
	Operation mode	Two modes: 1. The inverter operates as an inverter specially used for controlling the elevator door (elevator door control mode), 2. The inverter operates as a general purpose inverter
	Frequency resolution	Digital setting: 0.01Hz
	Door width auto learning	The inverter operates at the auto-learnt speed, and operates in the logic procedure of close door (CD) →open door (OD)→CD→stop. After the auto-learning operation, the door width information is saved and the auto learning process is over
	Auto tuning of motor's parameters	Purpose of auto tuning function of inverter is to obtain the motor's parameters automatically, and these parameters will be saved automatically after the tuning process is over
	Speed-adjusting range	Under rated load condition, 1:100 for vector control with speed sensor; 1:50 for sensorless vector control
Operation functions	OD, CDcontrol command input	Terminal control mode; keypad control mode; communication control mode (reserved)
	Frequency setting	Set the frequency via keypad; communication control mode (reserved)
	Multi-function terminal input signal	External reset signal, light curtain signal, safety edge signal, OD position limiting signal, CD position limiting signal, OD speed decrease signal, CD speed decrease signal, OD prohibition signal, torque maintaining signal, slow OD and CD signals, lock signal, emergency firemen service (EFS) signal, rush hour operation enable operation, operation enable signal, auto-learning command signal
	Output signal	3 relay-output: 250Vac/2A (cosΦ=1), 250Vac/1A (cosΦ=0.4), 30Vdc/1A
Display	4-digit LED display	Running frequency, reference frequency, output voltage, output current, output torque, DC bus voltage, status of input terminals, status of output terminals, door-operating position (pulse number)

Items	Subitems	Specifications
Protection functions		Over current protection, over voltage protection, low voltage protection, over heat protection, overload protection, output phase failure protection, motor protection, motor tuning error alarm, parameter setting error alarm, door width auto-learning error alarm, OD/CD error alarm, pulse generator (PG) error alarm, current detection circuit fault alarm, EEPROM read/write error alarm, over-speed protection
Environment	Application environment	Inside, free from direct sunlight, dust, corrosive gas, combustible gas, oil mist, steam, water drop, and so on
	Altitude	Lower than 1000m. Max altitude: 3000m (deration curve should be observed at 1000m ~ 3000m: derated 10% for every rise of 100m)
	Working temperature	-10°C ~ + 40°C, temperature change less than 0.5°C /minute Must be derated above 40°C: The output current must be derated 2% for every rise of 1°C. Max temperature: 50°C
	Humidity	Less than 95%RH, no condensation
	Vibration	3.5mm (2 ~ 9Hz), 10m/s^2 (9 ~ 200Hz), 15m/s^2 (200 ~ 500Hz)
	Storage temperature	-40°C ~ + 70°C
Structure	Protection	IP21
	Cooling	Forced air cooling (EV3200-2S0004A and EV3200-2S0004S) Natural air cooling (EV3200-2S0002A and EV3200-2S0002S)

Chapter 3 Electrical Installation

This chapter introduces the positions, specifications, and connections of the input and output terminals of the inverter.

WARNING	• Disconnect the input power of the inverter and wait for at least 10 minutes before removing the inverter cover. • Only trained and authorized professionals shall make cable connection within the inverter. • Carefully examine the cable connection before and after connecting the emergency stop or safety circuit loop.

WARNING	• The inverter had gone through voltage withstand test in factory, users shall not conduct voltage withstand test to the inverter. • It is prohibited to connect the input power cables of the inverter to the U, V, W output terminals of the inverter. • Generally the earth cable should be copper cable with section area great than 2.5mm^2, the earth resistance shall be less than 10Ω. • To ensure safety, the inverter and motor must be earthed properly. • An air breaker or fuse should be fitted on the input circuit to the inverter to provide input overcurrent protection and facilitate maintenance.

WARNING	• The control circuits are isolated from the power circuits in the drive by basic insulation (single insulation) only. The installer must ensure that the external control circuits are insulated from human contact by at least one layer of insulation (supplementary insulation) rated for use at the AC supply votlage. • If the control circuits are to be connected to other circuits classified as Safety Extra Low Voltage (SELV) (for example, to personal computer), an additional isolating barrier must be included in order to maintain the SELV classification.

CAUTION	• The control terminals of the inverter are on ELV circuit, do not touch them when they are energized. • If external equipment has interfaces that allow access with power on (that is, SELV circuit), protective isolation device shall be installed. Otherwise, the safety voltage characteristics of the SELV circuit of the external equipment will be reduced to the safety voltage characteristic of ELV circuit.

3.1 Wiring Of Power Terminals

3.1.1 Introduction To Power Terminals

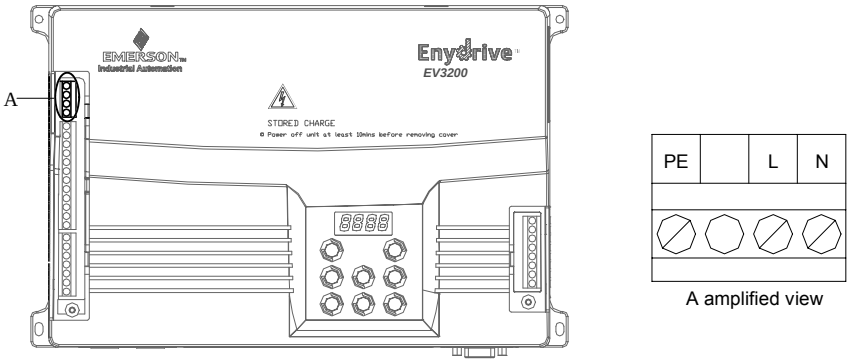


Figure 3-1 Input power terminals

Table 3-1 Function description of input power terminals

Terminal	Function description
L, N	Single-phase 220Vac power input terminal
PE	Protective earth point

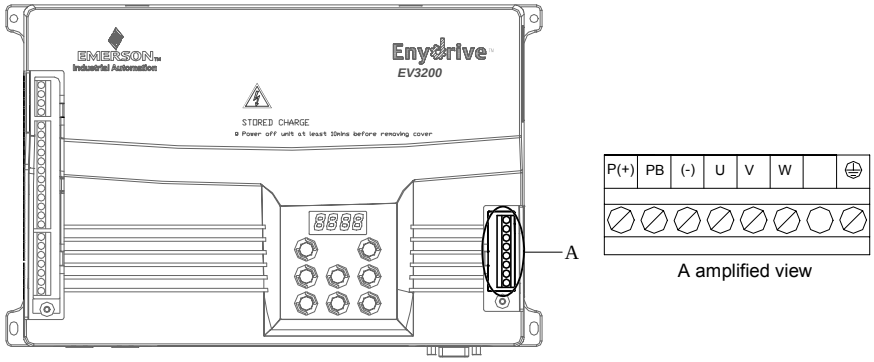


Figure 3-2 Output power terminals

Table 3-2 Function description of input power terminals

Terminal	Function description
P (+), PB, (-)	P (+): positive DC bus output terminal; PB: reserved; (-): negative DC bus output terminal
U, V, W	Motor connection terminal
⏚	Safety earth point

3.1.2 Connection Of Power Terminals

1. It is recommended to install an MCCB used for overcurrent protection in the input circuit of the inverter.
2. The cable diameter and MCCB capacity should be selected according to Table 3-3.

Table 3-3 Recommended MCCB capacity and copper-core insulating cable specifications

Inverter model	MCCB (A)	Power cables (mm^2)		
		Input cables	Output cables	Earth cables
EV3200-2S0002A EV3200-2S0002S	6	1.0	1.0	2.5
EV3200-2S0004A EV3200-2S0004S	10	1.0	1.0	2.5

WARNING	Proper overload/short-circuit protection devices must be added to the AC input side. In the north America region, it is recommended to use the UL listed slow-blow fuse.

WARNING	The protection ground cable may carry DC current. If Residual Current Device (RCD) is to be used, use Type B RCD.

Note

Max torque of the power terminals is 0.5Nm.

3.2 Control Terminals

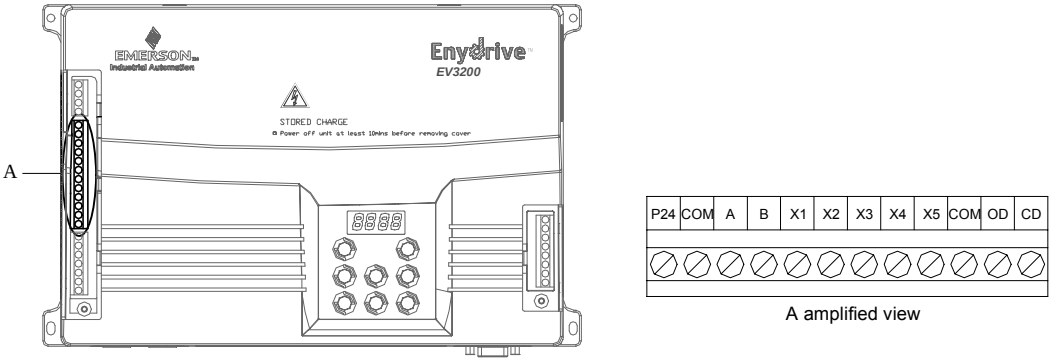


Figure 3-3 Control terminals

Table 3-4 Function description of control terminals

Terminal	Terminal function	Specifications
P24, COM	User terminal 24V power supply (COM being the reference earth)	+24V ± 15%, max output current: 200mA, with output shortcircuit protection function
A, B	AB pulse input terminal of incremental PG	Meeting the input requirements of pulse signal with frequency below 35kHz
X1 ~ X5	Multi-function input terminals (functions programmable, COM being the reference earth), or Z pulse input terminal of incremental PG	Terminal command valid when shorted with COM
OD	OD command input terminal	
CD	CD command input terminal	

Note

If the control cables are multi-core cables, it is recommended that the sectional area of a single strand of the control cables be 0.5mm^2. If the control cables are single-core cables, the cable sectional area should be greater than 1.0mm^2.

3.3 User Relay Output Terminals

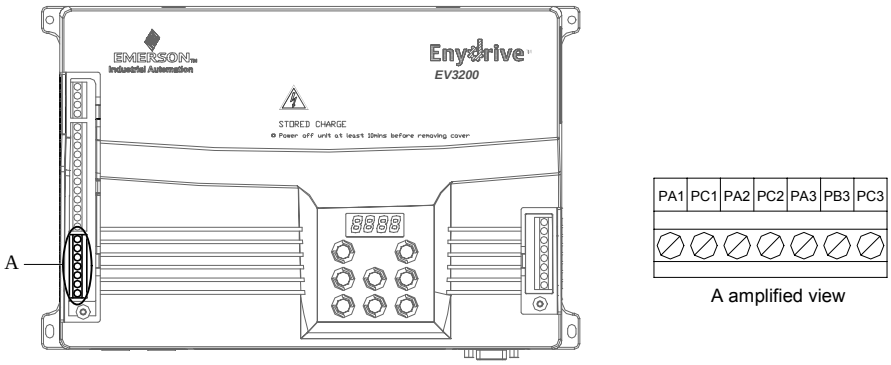


Figure 3-4 User relay output terminals

Table 3-5 Function description of user relay output terminals

Terminal	Terminal function	Specifications
PA1, PC1	When F9.22 is 0: normally closed contact output When F9.22 is 1: normally open contact output	Contact rating AC: 250V/1A (cosΦ=0.4), 250V/2A (cosΦ=1) DC: 30V/1A
PA2, PC2	When F9.22 is 0: normally closed contact output When F9.22 is 1: normally open contact output	
PA3, PB3, PC3	PA3, PB3: Normally closed contact output PA3, PC3: Normally open contact output	

3.4 PG Terminals Of Synchronous Motor

The motor of inverters EV3200-2S0002S and EV3200-2S0004S is three-phase AC synchronous motor. It can use the UWV incremental PG. For the UWV incremental PG, the PG signal is connected to terminal SK2. The pin assignment of terminal SK2 is shown in Figure 3-5.

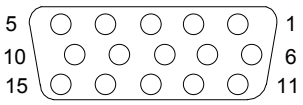


Figure 3-5 Pin assignment of terminal SK2

Table 3-6 Description of terminal SK2

Pin No.	Signal description	Pin No.	Signal description	Pin No.	Signal description
1	U-	6	U+	11	/
2	V-	7	V+	12	+5V
3	A-	8	A+	13	GND
4	B-	9	B+	14	Z-
5	W-	10	W+	15	Z+

3.5 Wiring Diagram Of Inverter

The basic wiring between the inverter's input, output terminals and external equipment is illustrated in Figure 3-6.

In the figure, the control terminals are used to control the inverter operation, and output the inverter status data to external monitoring equipment. The wiring method depends on your application.

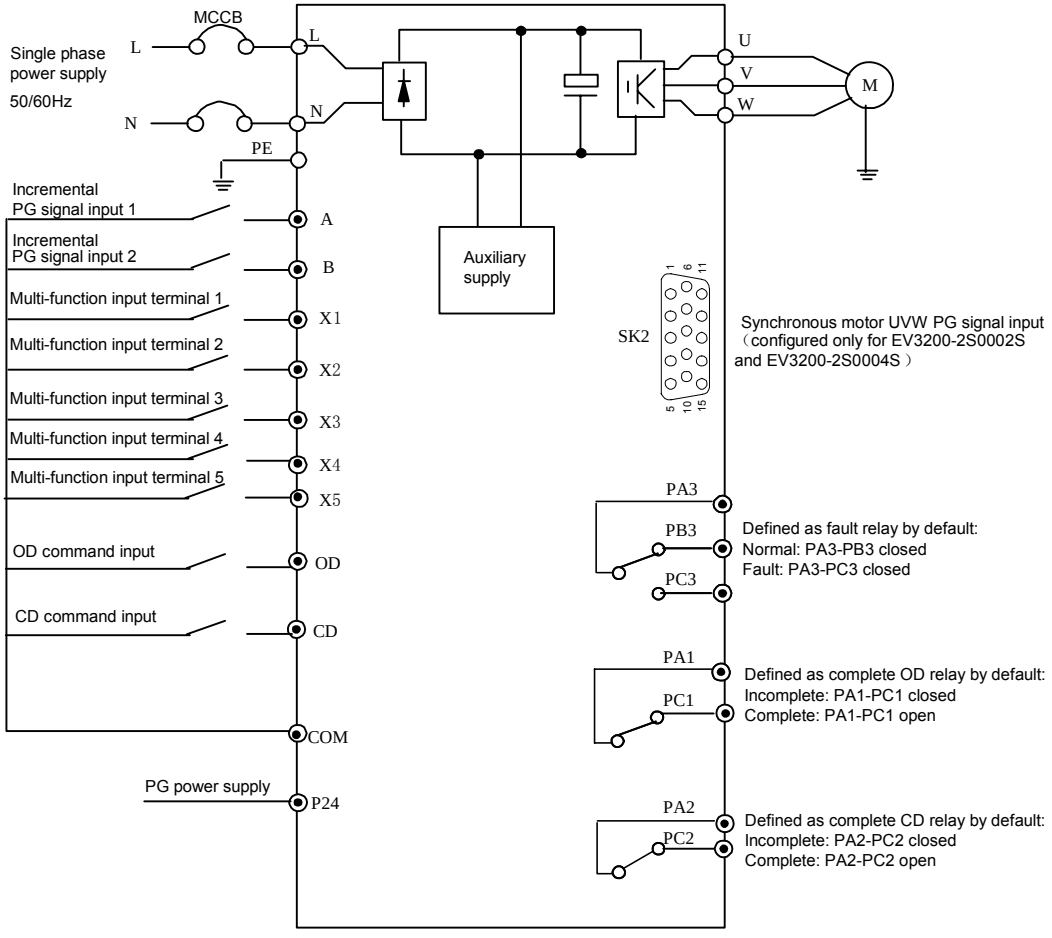


Figure 3-6 Basic wiring diagram

The 24V incremental PG of EV3200 door control inverter can input the following two kinds of PG signals. The PG working power supply should be 24V.

1. The wiring of open-collector output PG is shown in Figure 3-7.

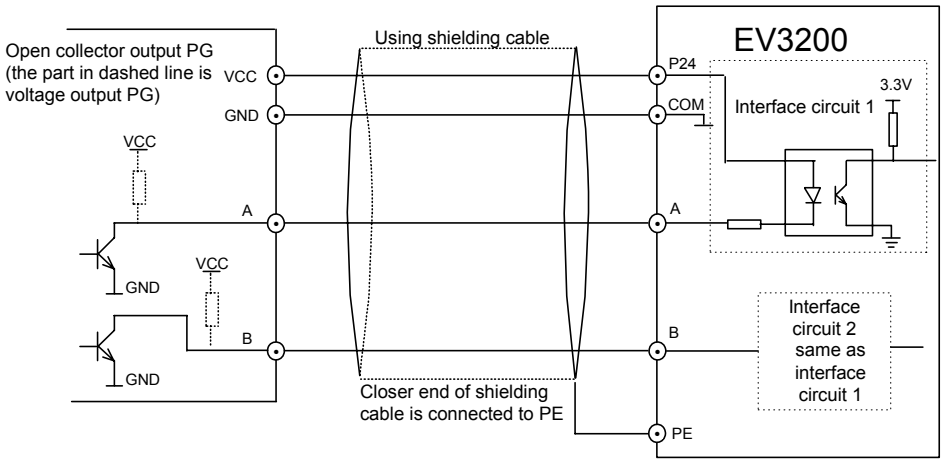


Figure 3-7 Wiring diagram of open-collector output PG

2. The wiring of the push-pull output PG is shown in Figure 3-8.

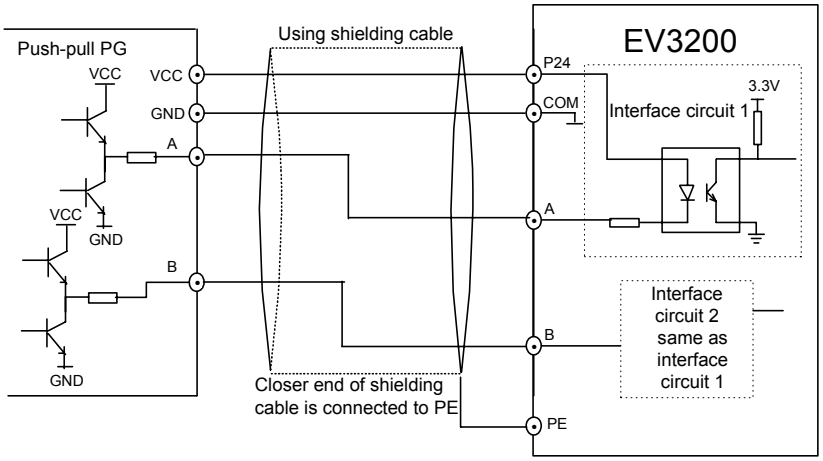


Figure 3-8 Wiring diagram of push-pull output PG

3.6 EMC

1. It is recommended to install an EMI filter and AC input reactor at the input side of the inverter.

With EMI filter installed, EV3200 series inverters comply with the requirements in IEC 61800-3 in the fields of conducted emission and radiated emission, with un-shielded AC power supply cables, and shielded output cable to the motor.

With AC input reactor installed, EV3200 series inverters comply with the requirements in IEC 61800-3 in the field of harmonic emission.

For the technical parameters of the EMI filter and the AC input reactor, see *Appendix 1 EMI Filter And AC Input Reactor.*

Note

1. The input EMI filter should be as close to the inverter as possible.

2. The EMI filter can reduce the interference of the inverter on other equipment connected to the same mains.

3. The EMI filter's enclosure must be properly earthed.

4. The EMI filter inside the enclosure should be placed closed to the input AC power supply and its power input cables inside the enclosure should be as short as possible.

5. The distance between the input cable and output cable of the EMI filter should be as far as possible, otherwise the high frequency noise may be coupled between the cables and thus bypass the filter.

2. Selection of control cables

Generally, the control cables should be shield cables, and the shield must be connected to the metal enclosure of the inverter by cable clamps at both ends.

3. Control cables, power cables and motor cables should be installed separately

Adequate clearance should be left between the cables, especially when the cables are laid in parallel and long. If the signal cables have to cross over the power cables, keep them vertical to each other, as shown in Figure 3-9.

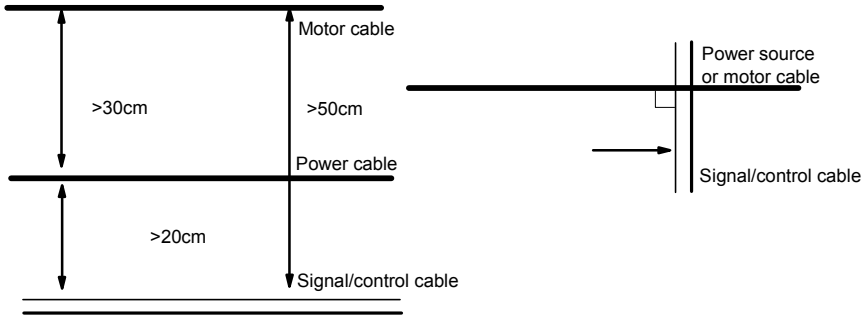


Figure 3-9 Wiring requirements

4. Installation requirements of relay, contactor and electro-magnetic braking kit, which may generate great interference, should be installed outside of the inverter and installed with surge suppressors.

The suppressors are generally varistor, RC filter or diode as illustrated in Figure 3-10.

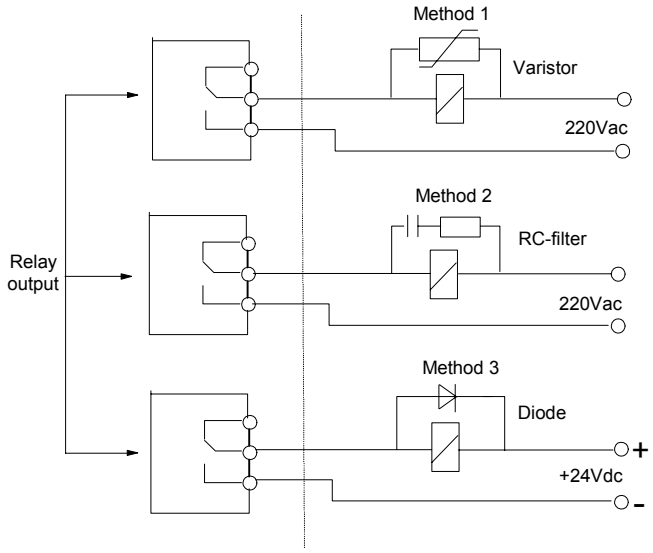


Figure 3-10 Relay, contactor and brake device

Chapter 4 Operation

This chapter tells how to use the operation keypad of the inverter, and introduces the basic application of the inverter.

4.1 Operation

4.1.1 Operation Keypad

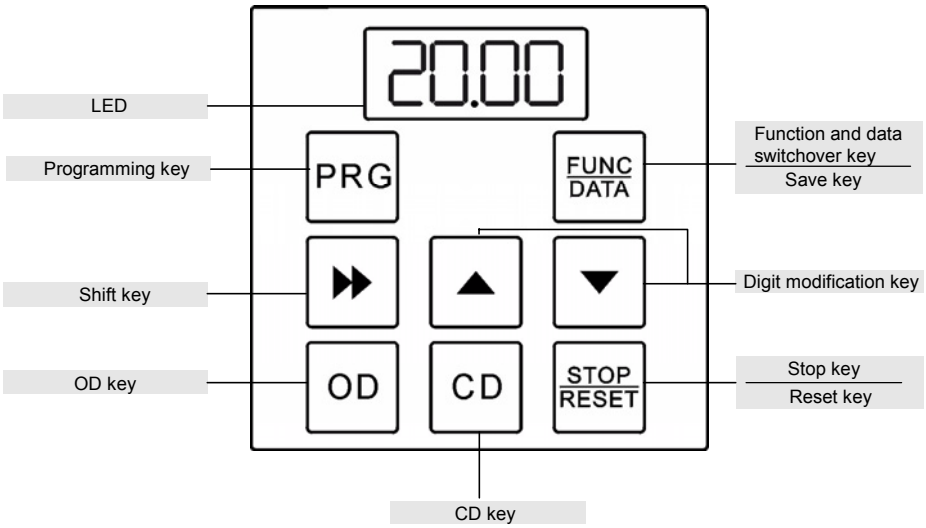


Figure 4-1 Operation keypad

Table 4-1 Operation keypad key runctions

Key	Name	Function
PRG	Programming	Switches between stopping status/operating status and programming state.
FUNC DATA	Function /Data	Select data monitor mode and data input confirmation
▲	Up	Increase
▼	Down	Decrease
▶▶	Shift	In the status of RUN and STOP, press this key to select the parameters that you want to display on the screen; when setting data, press this key to select the digit you want to modify
OD	OD key	In the keypad control mode, pressing this key opens the door (or initiates forward (FWD) spinning)
CD	CD key	In the keypad control mode, pressing this key closes the door (or initiates reverse (REV) spinning)
STOP RESET	Stop/Reset	In the keypad control mode, press this key to stop operating, or to reset and exit fault alarming status.

Note

1. In the keypad control mode of elevator-door control, pressing the OD key opens the door, pressing the CD key closes the door.
2. Under general-purpose inverter keypad mode, pressing the OD key initiates forward spinning, pressing the CD key initiates reverse spinning.

4.1.2 Description Of Inverter Operating Status

An inverter has 4 operating status.

- Stopping status-The inverter is switched on, has no fault, but without any operation.
- Programming state-Use operation keypad to modify and set function parameters.
- Operating status-The inverter's output terminals U, V and W have electricity outputs.
- Fault alarming status-When fault occurs either from external equipment, internal or wrong operation, the inverter's LED will display the fault code and lock output.

4.1.3 Description Of Inverter Operating Mode

The inverter has 4 operating modes: speed control, distance control 1, distance control 2, distance control 3.

4.1.4 Parameter Classification

The inverter has 141 function parameters, divided into 11 groups according to their functions:

1. F0 (F0.00-F0.08): basic operation function parameters
2. F1 (F1.00-F1.15): OD curve parameters
3. F2 (F2.00-F2.16): CD curve parameters
4. F3 (F3.00-F3.18): enhanced function parameters
5. F4 (F4.00-F4.12): door width auto-learning parameters
6. F5 (F5.00-F5.07): multi-function terminal parameters
7. F6 (F6.00 ~ F6.13): motor parameters
8. F7 (F7.00 ~ F7.10): vector control parameters
9. F8 (F8.00 ~ F8.10): communication parameters, reserved
10. F9 (F9.00 ~ F9.22): display and monitoring parameters
11. FE: factory parameters, for factory use, not open to users

4.1.5 Parameter Setting Method

The function parameters are set through the operation keypad.

Figure 4-2 shows the application chart.

Look at the example below: modifying F1.04 (max CD speed) from 20Hz to 30Hz.

1. Press the PRG key to enter programming state. The LED on the keypad will display the F0 parameter group.
2. Press the ▲ key to search the desired parameter group (F1).
3. Press the FUNC/DATA key to enter the corresponding function parameter F1.00 in F1 parameter group.
4. Press the ▲ key to enter the desired function parameter F1.04.
5. Press the FUNC/DATA key to display the function parameter value (20.00, with the ones place “0” blinking).
6. Press the ▶▶ key to shift to the digit to be modified, and press the ▲ or ▼ key to change the setting to 30.00.
7. Press the FUNC/DATA key to save and display the next parameter (F1.05).
8. Press the PRG key to exit to parameter group F1.
9. Press the PRG key to exit programming state (30.00 blinking).

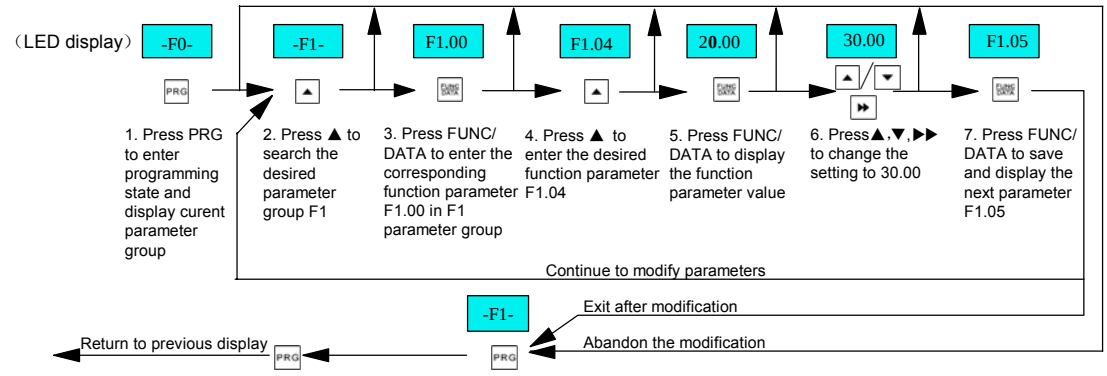


Figure 4-2 Function parameter setting method

Note

Some parameters cannot be modified because they are detected values or status parameters, e.g. F9.16, F9.17, and so on.

4.1.6 Display Of Parameters

1. Define the displayed parameters during operation or in stopping state through F9.00 and F9.01.
2. During operation, the parameters defined by F9.00 can be displayed one by one by pressing the ▶▶ key on the keypad.
3. In stopping status, the parameter defined by F9.00 can be displayed one by one by pressing ▶▶ key on the keypad.

4.2 Basic Applications

4.2.1 Motor Tuning

EV3200 series inverter uses vector control technique. It is necessary to tune the motor parameters before operation. Tuning can be started through the operation keypad. Before tuning, motor must be free of load; otherwise, the results will be inaccurate.

1. Tuning method in the case the load is asynchronous motor.

Example where the inverter settings are factory settings:

1) Set general-purpose inverter keypad control mode: Set F0.02 to 0.

2) Set PG type: Set F4.00 to 0 (24V incremental PG).

3) Set motor type: Set F6.00 to 0 (asynchronous motor).

4) Input motor nameplate parameters: Input correct motor nameplate parameters through parameters F6.01 ~ F6.03 and F6.05 ~ F6.06.

5) Set parameter tuning enable function: Set F6.07 to 1.

6) Press the OD key to start motor tuning and the LED displays "TUNE". In the tuning state, the motor runs in a fixed mode, so you need not interfere. After the tuning is over, the inverter stops automatically, F6.07 will be restored "0" and the settings of F6.08 ~ F6.13 will be updated. If the tuning is obviously abnormal, press the STOP/RESET key to stop it. Check the connections and motor ratings, then set F6.07 to 1 again. Press the OD key to start tuning.

A successful tuning can ensure correct control of the motor.

2. Tuning method in the case the load is synchronous motor.

The PG must be connected before synchronous motor tuning.

Taking the inverter with default settings as an example:

1) Set general-purpose inverter keypad control mode: Set F0.02 to 0.

2) Set the control mode as distance control 1 (close loop vector control at this time): Set F0.01 to 1.

3) Set motor type: Set F6.00 to 1 (synchronous motor).

4) Input motor nameplate parameters: Input correct motor nameplate parameters into F6.01 ~ F6.03 and F6.05 ~ F6.06.

5) Set the PG pulse No. per revolution: Set F4.01.

6) Set PG type. Set F4.00 to 1 (for UVW incremental PG).

7) Set parameter tuning enable function: Set F6.07 to 1.

8) Press the OD key to start motor tuning and the LED displays "TUNE". In the tuning state, the motor runs in a fixed mode, so you need not interfere. After the tuning is over, the inverter stops automatically, F6.07 will be restored "0" and the settings of F6.08 ~ F6.13 and F4.03 will be updated.

A successful tuning can ensure correct control of the motor.

Note

1. If in tuning the keypad displays fault, press the STOP/RESET key to reset the inverter, change the setting of F4.02, check the connections and motor ratings, set F6.07 to 1 again, and press the OD key to start tuning.

2. In synchronous motor tuning, if the PG direction is reversed by cable connection, the inverter will report E025 fault (PG fault). In this case, exchange the connections of any two-phase cables of the motor and restart the tuning.

3. For synchronous motors, you should conduct the tuning at least twice, and see if the difference between the magnetic pole initial angles (F4.03) obtained from the tuning is less than 10° . If bigger than 10° , the error is unacceptable, you should restart the tuning. If the difference is an integral multiple of 360° /motor polarity pair number, the tuning result is acceptable.

4.2.2 Basic Operating Modes

1. Operating frequency settings, tuning and operating control can be done via operation keypad.

1) In stopping state, press the PRG key to enter programming state and display parameter group F0.

2) Press the FUNC/ENT key to enter the parameters in F0 parameter group.

3) Set the main parameters (other parameters can use the defaults).

- F0.01=0, speed control 1 (sensorless vector control)
- F0.02=0, keypad control mode

4) Press the PRG key to return.

5) Press the OD key for FWD running, press the CD key for REV running.

6) Press the STOP/RESET key , the inverter stops (decelerates to stop).

7) Power-off.

2. Frequencies can be set and modified via the keypad and operating control through control terminals.

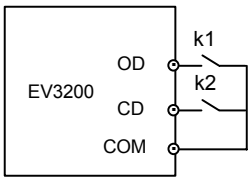


Figure 4-3 Wiring

Connect power cables according to Figure 4-3, and switch on after confirming the connection.

1) Press the PRG key to enter programming state.

2) Set the main parameters (other parameters can use the defaults).

- F0.01=0, speed control 1 (sensorless vector control)
- F0.02=5, in terminal control mode, the operating command is given via the control terminal. OD controls FWD running and CD controls REV running

3) Press the PRG key to return to stopping status.

4) Switch on K1, the inverter runs forward.

5) Switch off K1 and switch on K2, the inverter runs REV.

6) Switch off K1 and K2, the inverter stops (decelerates to stop).

7) Power-off.

Chapter 5 Parameter Table

This chapter lists the inverter parameters, briefly introduces the setting ranges, min. units, defaults of the parameters and marks whether they can be modified.

In the "Mod." column of the tables,

"O" means that the parameter can be modified during operation

"×" means that the parameter cannot be modified during operation

"*" means the actual measured or fixed parameters can not be modified

"–" means that it is set by the manufacturer and can not be modified by the user

Abbreviation in the table:

OD: opening door

CD: closing door

MS: multi-speed

5.1 Basic Operation Parameters F0

Parameter	Name	Setting range	Min. unit	Default	Mod.
F0.00	User password	0 ~ 9999 (0000 means no password)	*1*	0	○
F0.01	Control mode	0: speed control 1: distance control 1 2: distance control 2 3: distance control 3	1	0	×
F0.02	Control command selection	0: keypad control mode of general-purpose inverter 1: keypad control mode of the inverter used for controlling elevator door 2: terminal control mode of the inverter used for controlling elevator door 3: communication control mode of the inverter used for controlling elevator door (reserved) 4: Auto-demo mode 5: terminal control mode of general-purpose inverter 6: reserved 7: communication control mode of general-purpose inverter (reserved)	1	0	×
F0.03	Running direction selection	0: same as direction preset by actual motor wiring 1: reverse to direction preset by actual motor wiring	1	0	×
F0.04	Max.output frequency	50.00Hz ~ 128.0Hz	0.01Hz	50.00Hz	×
F0.05 ~ F0.08	Reserved				

5.2 OD Operation Parameters F1

Parameter	Name	Setting range	Min. unit	Default	Mod.
F1.00	OD start creep time for speed control	10 ~ 9999ms	1ms	500ms	○
F1.01	OD start creep distance for distance control	0 ~ 30.0% (door width)	0.1%	15.0%	○
F1.02	OD start creep speed	1.00 ~ 25.00Hz	0.01Hz	7.00Hz	○
F1.03	OD Acc time	0.1 ~ 3600s	0.1s	2s	○
F1.04	OD reference frequency	0.00 ~ F0.04 max frequency	0.01Hz	20.00Hz	○
F1.05	Rush hour operation OD speed	0.00 ~ F0.04 max frequency	0.01Hz	25.00Hz	○
F1.06	OD speed decrease point in distance control	60% ~ 95% (door width)	0.1%	70.0%	○
F1.07	OD Dec time	0.1 ~ 3600s	0.1s	2s	○
F1.08	OD ending creep speed	0 ~ 15.00Hz	0.01Hz	3.00Hz	○
F1.09	OD position limit in distance control	1 ~ 9999 (pulse number)	1	600	○

Parameter	Name	Setting range	Min. unit	Default	Mod.
F1.10	Switching point of OD complet maintaining torque	0.0% ~ 100.0% (motor rated torque)	0.1%	50.0%	○
F1.11	OD complet maintaining torque	0.0% ~ 100.0% (motor rated torque)	0.1%	50.0%	○
F1.12	OD operation curve selection in distance control	0: selecting manually preset curve 1: selecting optimum curve by auto-learning	1	0	×
F1.13	OD optimum curve correction factor	3.0% ~ 15.0% (door width)	0.1%	10.0%	○
F1.14 ~ F1.15	Reserved				

5.3 CD Operation Parameters F2

Parameter	Name	Setting range	Min. unit	Default	Mod.
F2.00	CD start creep time for speed control	10 ~ 9999ms	1ms	500ms	○
F2.01	CD start creep distance	0 ~ 30.0% (door width)	0.1%	15.0%	○
F2.02	CD start creep speed	1.00 ~ 25.00Hz	0.01Hz	6.00Hz	○
F2.03	CD Acc time	0.1 ~ 3600s	0.1s	2s	○
F2.04	CD reference frequency	0.00 ~ F0.04 max frequency	0.01Hz	15.00Hz	○
F2.05	Rush hour operation CD speed	0.00 ~ F0.04 max frequency	0.01Hz	20.00Hz	○
F2.06	CD speed decrease point in distance control	60% ~ 95% (door width)	0.1%	70.0%	○
F2.07	CD Dec time	0.1 ~ 3600s	0.1s	2s	○
F2.08	CD ending creep speed	0 ~ 15.00Hz	0.01Hz	2.00Hz	○
F2.09	CD position limit in distance control	1 ~ 9999 (pulse number)	1	600	○
F2.10	Swithcing point of CD complete maintainging torque	0.0% ~ 100.0% (motor rated torque)	0.1%	50.0%	○
F2.11	CD complete maintainging torque	0.0% ~ 100.0% (motor rated torque)	0.1%	50.0%	○
F2.12	CD speed for EFS	5.00 ~ 25.00Hz	0.01Hz	10.00Hz	○
F2.13	CD operation curve selection in distance control	0: selecting manually preset curve; 1: selecting optimum curve by auto-learning	1	0	×
F2.14	CD optimum curve correction factor	3.0% ~ 15.0% (door width)	0.1%	10.0%	○
F2.15	Distance control CD door locking point	000 ~ 9999	1	800	○
F2.16	CD speed after door locking point	0.00 ~ 20.00Hz	0.01Hz	5.00Hz	○

5.4 Enhanced Function Parameters F3

Parameter	Name	Setting range	Min. unit	Default	Mod.
F3.00	INI operation speed	0.00 ~ 20.00Hz	0.01Hz	5.00Hz	○
F3.01	OD time limit	0 ~ 3600s	1s	300s	○
F3.02	CD time limit	0 ~ 3600s	1s	300s	○
F3.03	Slow speed operation time limit	0 ~ 3600s	1s	400s	○
F3.04	Delay time for external OD command	0 ~ 9999S	1s	0s	○
F3.05	Delay time for external CD command	0 ~ 9999S	1s	0s	○
F3.06	Position of safety edge lift signal output	0% ~ 40.0% (door width)	0.1%	10.0%	×
F3.07	Function selection of OD upon CD obstruction	0: stop; 1: open the elevator door	1	1	×
F3.08	CD obstruction sensitivity	0 ~ 150.0% (motor rated torque)	0.1%	100.0%	○
F3.09	Dec time upon CD obstruction	10 ~ 2500ms	1ms	300ms	○
F3.10	OD obstruction sensitivity	0 ~ 150.0% (motor rated torque)	0.1%	0%	○
F3.11	Maintaining time for complete OD in demo mode	1 ~ 3600s	1s	2s	○
F3.12	Maintaining time for complete CD in demo mode	1 ~ 3600s	1s	2s	○
F3.13	Preset CD/OD times in demo mode	0 ~ 9999	1	0	○
F3.14	CD/OD times record in demo mode	0 ~ 9999	1	0	○
F3.15	Auto reset times upon fault	0 ~ 100	1	0	×
F3.16	Torque enhance coefficient	100% ~ 350%	1%	115%	×

Parameter	Name	Setting range	Min. unit	Default	Mod.
F3.17	Fan control	0: fan does not start during inverter operation 1: fan starts when heatsink temperature is higher than 65°C during inverter operation 2: fan starts during inverter operation	1	0	×
F3.18	Percentage or pulse number selection	0: F1.01, F1.06, F1.13, F2.01, F2.06 and F2.14 are percentages. 1: F1.01, F1.06, F1.13, F2.01, F2.06 and F2.14 are numbers	0	0	×

5.5 Door Width Self-learning Parameters F4

Parameter	Name	Setting range	Min. unit	Default	Mod.
F4.00	PG type	0: 24V incremental PG 1: UVW incremental PG (5V)	1	0	×
F4.01	Pulse number per revolution	0 ~ 4000	1	100	×
F4.02	PG direction	0: same as direction preset by PG wiring 1: reverse to direction preset by PG wiring	1	0	×
F4.03	Magnetic pole initial angle	0.0 ~ 359.9°	0.1	0	×
F4.04	Speed during door width auto-learning	2 ~ 20.00Hz	0.01Hz	5.00	×
F4.05	Selection of door-width auto-learning	0: disabled 1: enabled	1	0	×
F4.06	Low digits of pulse count for door wicth	0 ~ 9999 (pulse number)	1	0	×
F4.07	High digits of pulse count for door width	0 ~ 9999 (×10000)	1	0	×
F4.08	Actual door width	0 ~ 9999mm	1mm	0mm	×
F4.09	PG cable broken detection time for asynchronous motor	0 ~ 10s	0.1s	0s	×
F4.10	Ratio of gear	1 ~ 100	1.0	1.0	×
F4.11	Asynchronous single/dual motor selection	0: single motor control (asynchronous or synchronous). 1: dual motors control (asynchronous)	0	0	×
F4.12	Reserved				

5.6 Multi-function Input Terminal Parameters F5

Parameter	Name	Setting range	Min. unit	Default	Mod.
F5.00 F5.01 F5.02 F5.03 F5.04	Function selection for control terminals X1 ~ X5	0: No functions (can be set repetitively) 1: External reset (RESET) signal input 2: Normally open input contacts for light curtain signal 3: Normally closed input contacts for light curtain signal 4: Normally open input contacts for safety edge 5: Normally closed input contacts for safety edge 6: Normally open input for OD position limiting 7: Normally closed input for OD position limiting 8: Normally open input for CD position limiting 9: Normally closed input for CD position limiting 10: Normally open input contacts for OD speed decrease 11: Normally closed input contacts for OD speed decrease 12: Normally open input contacts for CD speed decrease 13: Normally closd input contacts for CD speed decrease 14: Terminal for inputting OD prohibition signal 15: Terminal for inputting torque maintaining prohibition signal 16: Low speed OD/CD enable signal input 17: Normally open input for lock signal 18: Normally closed input for lock signal 19: Emergency Firemen Service (EFS) function input 20: Rush hour operation enable signal input 21: Operation enable signal input (valid for X5 only) 22: Door width auto-learning command input (valid for X5 only)	1	0	×
F5.05	Function of programmable relay output PA1/PC1	0: Output signal 0 for complete OD (immediately output upon position limiting) 1: Output signal 0 for complete CD (immediately output upon position limiting) 2: Output signal 1 for complete OD (output after position limiting and lock) 3: Output signal 1 for complete CD (output after position limiting and lock) 4: Output signal 2 for complete OD (output after position limiting, lock, and door lock invalid) 5: Output signal 2 for complete CD (output after position limiting, lock, and door lock valid) 6: Fault relay output 1 (not including POFF status) 7: Fault relay output 2 (including POFF status) 8: Safety edge lift signal output 9: Lock signal synchronous output 10: Re-opening signal output 11: Obstruction signal output	1	2	×
F5.06	Function of programmable relay output PA2/PC2			3	
F5.07	Function of programmable relay output PA3/PB3/PC3			6	

5.7 Motor Parameters F6

Parameter	Name	Setting range	Min. unit	Default	Mod.
F6.00	Motor type selection	0: asynchronous motor; 1: synchronous motor	1	0	×
F6.01	Motor rated power	0 ~ 500W	1W	370	×
F6.02	Motor rated voltage	0 ~ 250V	1V	220	×
F6.03	Motor rated current	0.10 ~ 9.90A	0.01A	1.94	×
F6.04	Motor max allowable operation current	100.0% ~ 200.0% (motor rated current)	0.1%	150.0%	×
F6.05	Motor rated frequency	1.00Hz ~ 128.0Hz	0.01Hz	50.00Hz	×
F6.06	Motor rated spinning speed	1 ~ 9999rpm	1r/min	1400	×

Parameter	Name	Setting range	Min. unit	Default	Mod.
F6.07	Motor tuning	0: disable 1: enable	1	0	×
F6.08	Stator resistance	00.00 ~ 99.99ohm	0.01ohm	Applicable motor value	×
F6.09	Stator inductance	0 ~ 9999mH	1mH	Applicable motor value	×
F6.10	Rotor resistance	00.00 ~ 99.99ohm	0.01ohm	Applicable motor value	×
F6.11	Rotor inductance	0 ~ 9999mH	1mH	Applicable motor value	×
F6.12	Mutual inductance	0 ~ 9999mH	1mH	Applicable motor value	×
F6.13	Exciting current with no load	0.00 ~ 99.99A	0.01A	Applicable motor value	×

5.8 Vector Control Parameters F7

Parameter	Name	Setting range	Min. unit	Default	Mod.
F7.00	ASR proportional gain 1	0.000 ~ 6.000	0.001	0.600	×
F7.01	ASR integral time 1	0 (integral function disabled), 0.032-32.00s	0.001s	1.000	×
F7.02	ASR proportional gain 2	0.000 ~ 6.000	0.001	0.600	×
F7.03	ASR integral time 2	0 (integral function disabled), 0.032-32.00s	0.001s	1.000	×
F7.04	ASR changing frequency	0.00 ~ 50.0Hz	0.01Hz	5.00	×
F7.05	Slip compensation gain	0 (reserved), 50.0 ~ 250.0% (for accounting the slip value)	0.1%	100.0%	×
F7.06	Motoring torque limit	0.0 ~ 200.0% (inverter rated current)	0.1%	100.0%	×
F7.07	Braking torque limit	0.0 ~ 200.0% (inverter rated current)	0.1%	100.0%	×
F7.08	Current loop's proportional gain KP	0 ~ 9999	1	500	○
F7.09	Current loop's integral time KI	0 ~ 9999	1	300	○
F7.10	Filtering coefficient	0 ~ 63	1	27	○

5.9 Communication Parameters F8 (Reserved)

Parameter	Name	Setting range	Min. unit	Default	Mod.
F8.00	Modbus baud rate selection	0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps 6: 76800bps 7: 125000bps	1	4	×
F8.01	Modbus data format	0: RTU, 1 start bit, 8 data bits, 2 stop bits, no parity 1: RTU, 1 start bit, 8 data bits, 1 stop bit, even parity 2: RTU, 1 start bit, 8 data bits, 1 stop bit, odd parity 3: ASCII, 1 start bit, 7 data bits, 2 stop bits, no parity 4: ASCII, 1 start bit, 7 data bits, 1 stop bit, even parity 5: ASCII, 1 start bit, 7 data bits, 1 stop bit, odd parity	1	0	×
F8.02	Local number	0 (broadcast address), 1 ~ 127	1	5	×
F8.03	Modbus communication failure detection time	0: disable the function 0.1 ~ 100.0s	0.1s	0	×
F8.04	Modbus communication delay	0.01 ~ 1.000s	0.001s	0.01s	×
F8.05	CAN communication station enable	Bit0: station 1 enable Bit1: station 2 enable Bit2: station 3 enable Bit3: station 4 enable Corresponding station =1 means to enable the station Corresponding station=0 means to disable the station	1	0	×
F8.06	CAN baud rate selection	0: 10000bps 1: 20000bps 2: 40000bps 3: 80000bps 4: 1250000bps	1	0	×

Parameter	Name	Setting range	Min. unit	Default	Mod.
F8.07	CAN communication failure detection time	0: disable the function 0.1 ~ 100.0s	0.1s	0s	×
F8.08	CAN communication delay	0.01 ~ 1.000s	0.001s	0.01s	×
F8.09 ~ F8.10	Reserved				

5.10 Monitoring And Recording Parameters F9

Parameter	Name	Setting range	Min. unit	Default	Mod.
F9.00	Parameters displayed by LED	The display of each parameter is controlled by a binary bit. "1" for display: Bit0: running frequency (Hz) Bit1: reference frequency (Hz) Bit2: output voltage (V) Bit3: output current (A) Bit4: output torque (%) Bit5: DC bus voltage (V) Bit6: Status of input terminal (No unit) Bit7: Status of output terminal (No unit) Bit8: low digits of pulse of door position (0 ~ 9999) Bit9: high digits of pulse of door position (0 ~ 9999)	1	31 (0000011111B)	○
F9.01	Selection of parameters displayed by LED in stopping status (blink)	0: preset OD frequency (Hz) 1: preset CD frequency (Hz) 2: status of input terminal (no unit) 3: status of output terminal (no unit) 4: DC bus voltage (V) 5: low digits of pulse counted for door position (0 ~ 9999) 6: high digits of pulse counted for door position (0 ~ 9999)	1	0	○
F9.02 F9.03 F9.04	Type of latest fault Type of second lastest fault Type of third lastest fault	0: no fault record 1: Over-current in Acc process (E001) 2: Overcurrent in Dec process (E002) 3: Overcurrent in constant speed operation (E003) 4: Overvoltage in Acc process (E004) 5: Overvoltage in Dec process (E005) 6: Overvoltage in constant speed operation (E006) 7 ~ 8: Reserved 9: Output phase loss (E009) 10: Reserved 11: Heatsink overheating (E011) 12: Reserved 13: Inverter overload (E013) 14: Motor protection (E014) 15: Reserved 16: EEPROM read or write fault (E016) 17: Reserved 18: Reserved 19: Current detecting circuit fault (E019) 20 ~ 23: Reserved 24: Motor tuning error (E024) 25: PG error (E025) 26: Overspeed protection (E026) 27: Reserved 28: Parameter setting error (E028) 29: Door width auto-learning error (E029) 30: OD overtime error (E030) 31: CD overtime error (E031)	1	0	*
F9.05	DC Bus Voltage (V) at the latest fault	0 ~ 999V	1V	0V	*
F9.06	Output current (A) at the latest fault	0.00 ~ 99.99A	0.01A	0.00A	*

Parameter	Name	Setting range	Min. unit	Default	Mod.
F9.07	Frequency (Hz) at the latest fault	0.00Hz ~ 128.00Hz	0.01Hz	0.00Hz	*
F9.08	Status of input terminal at the latest fault	0 ~ 127 (0: OFF；1: ON) CD/OD/X5/X4/X3/X2/X1	1	0	*
F9.09	Status of output terminal at the latest fault	0 ~ 7 (0: OFF；1: ON) PC3/PC2/PC1	1	0	*
F9.10	High digits of pulse counted for door position at fault time	0 ~ 9999 (×10000)	1	0	*
F9.11	Low digits of pulse counted for door position at fault time	0 ~ 9999	1	0	*
F9.12	High digit of OD times	0 ~ 9999 (×10000)	1	0	*
F9.13	Low digit of OD times	0 ~ 9999	1	0	*
F9.14	High digit of CD times	0 ~ 9999 (×10000)	1	0	*
F9.15	Low digit of CD times	0 ~ 9999	1	0	*
F9.16	Total operation time	0 ~ 65535 hours (max.)	1 hour	0	*
F9.17	Total running time	0 ~ 65535 hours (max)	1 hour	0	*
F9.18	Parameter initialization	0: no operation 1: Clear the record 2: Load defaults 3 ~ 100: reserved	1	0	×
F9.19	Software version No.	1.00 ~ 99.99	0.01	Actual version No.	-
F9.20	Product configuration No.	3200 ~ 3299	1	Actual configuration No.	-
F9.21	Heatsink temperature	0 ~ 100°C	1	0	*
F9.22	Relay output polarity selection	0: relays PA1/PC1 and PA2/PC2 serve as output NC relays 1: relays PA1/PC1 and PA2/PC2 serve as output NO relays	1	0	×

Chapter 6 Parameter Description

This chapter introduces in detail the inverter parameters, their setting ranges, defaults, and points needing attention.

WARNING	Only qualified personnel is allowed to test this product, otherwise, accidents might occur
	Make sure that the mechanical system and electrical connections of elevator door are correct, accidents might occur
	All the parameters must be set properly according to relevant industrial standards, otherwise, accidents might occur
	Don't walk to the area where the door is under testing, otherwise, personal injuries might occur

Reference frequency: Target frequency at which the inverter operates stably.

Operating frequency: The inverter's actual output frequency during operation.

The data in "【】" are defaults of corresponding parameters.

6.1 Basic Operation Parameters F0

F0.00 User passward	Setting range: 0 ~ 9999【0】

Set up any non- zero number as user's password to enable the password protection function.

0000: no password

Note

Once user's password is set, you can only read the parameters but not set or modify them if you don't input the correct password.

F0.01 Control mode	Setting range: 0 ~ 3【0】

0: speed control

The inverter operates in sensorless vector control mode. When the inverter is used to control an elevator door, the speed can be changed by connecting different speed contacts, and the complete CD or OD can is controlled by a limit switch.

1: distance control 1

The inverter operates in vector control mode with speed sensor. The PG parameters must be set correctly, otherwise the accuracy of control and door width cannot be ensured. When the inverter controls an elevator door, the door width should be obtained by auto-learning, and the result will be saved. Besides, the distance control parameters should be set correctly. During operation, the pulse count value will be compared with the preset value to achieve speed decrease and complete CD or OD.

In this mode, PG must be connected to the motor shaft.

2: distance control 2

The inverter operates in vector control mode without speed sensor. When the inverter controls elevator door, the PG parameters must be set correctly, otherwise the accuracy of door width cannot be ensured. The door width should be obtained via auto-learning, and the door width information should be saved after auto-learning. Besides, the distance control parameters should be set correctly. During operation, the pulse count will be compared with the preset value to achieve speed decrease and complete CD or OD.

In this mode, PG may not be connected to the motor shaft.

3: distance control 3

The inverter operates in vector control mode without speed sensor. When the inverter controls elevator door, the PG parameters must be set correctly, otherwise the accuracy of door width cannot be ensured. The door width should be obtained via auto-learning, and the door width information should be saved after auto-learning. Besides, the distance control parameters should be set correctly. During operation, the pulse count will be compared with the preset value to achieve speed decrease and complete CD or OD.

CD and OD completion judgement logic: when OD position limiting pulse and OD limit switch mounted on the elevator door are both active, OD is complete; when CD position limiting pulse and CD limit switch mounted on the elevator door are both active, CD is complete.

In this mode, PG may not be connected to the motor shaft.

F0.02 Control command selection	Setting range: 0 ~ 7【0】

0: keypad control mode of general-purpose inverter

The starting and stopping of the inverter is controlled through the keypad of the inverter. The inverter runs forward if the OD key is pressed, reversely if the CD key is pressed, and stops if the STOP/RESET key is pressed. In this control mode, the inverter operates as a general-purpose inverter and will not follow the command for elevator door control. Besides, the motor parameters tuning is only active in keypad control mode.

1: key control mode for controlling elevator door

The starting and stopping of the inverter is controlled through the keypad of the inverter. Pressing the OD key opens the elevator door, pressing the CD key closes the elevator door, and pressing the STOP/RESET key stops the inverter.

2: terminal control mode for controlling elevator door

The elevator control system sends OD and CD commands to realize door opening or closing. The operating logic is shown in Figure 6-1.

K_1	K_2	Running command
0	0	Stop
1	0	OD
0	1	CD
1	1	OD

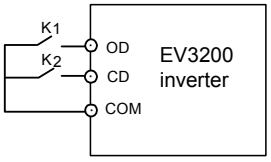


Figure 6-1 Terminal control logic

3: communication control mode for controlling elevator door (reserved)

OD, CD and auto-learning are performed according to the definition of the control word in protocol.

4: auto-demo mode

Auto-demo mode is used for demonstrating the operation or commissioning of the inverter in the factory, no need to be controlled by the control system. The auto-demo mode can be set after the inverter's operation curve is set in keypad control mode for elevator door control. Press the OD key to start the demonstration of OD and CD repetitively, the times and interval between CD and OD can be set by F3.11, F3.12 and F3.13. Pressing the STOP/RESET key stops the demo.

5: terminal control mode of general-purpose inverter

The starting and stopping of the motor can be controlled via OD and CD terminals. The operation logic is shown in Figure 6-2. In this control mode, the inverter will not perform the functions of elevator door control.

K_1	K_2	Running command
0	0	Stop
1	0	FWD
0	1	REV
1	1	FWD

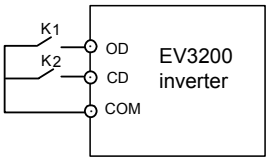


Figure 6-2 Terminal control mode of general-purpose inverter

6: reserved

7: communication control mode of general-purpose inverter (reserved)

Irrelevant to the door control logic, the running frequency in general-purpose inverter mode is the OD high speed phase frequency by default.

Note

1. Door width auto-learning is valid only in keypad control mode and terminal control mode for elevator door control.

2. In keypad control mode, pressing the OD key starts auto-learning. In terminal control mode for elevator door control, you need to set F5.04 to 22, and input the valid level to start auto-learning.

F0.03 Running direction selection	Setting range: 0, 1【0】

This parameter changes the motor running direction. The motor running direction is determined after the motor is wired correctly. You can change the setting of this parameter to change the direction without rewiring the motor.

0: same as preset direction

1: reverse to preset direction

F0.04 Max. output frequency	Setting range: 50.00 ~ 128.00Hz【50.00】

The parameter defines the allowable max output frequency of the inverter.

6.2 OD Operation Parameters F1

6.2.1 OD Operation Curve For Speed Control

In speed control mode, the locations of various control contacts (operating switches mounted on elevator door) are shown in Figure 6-3.

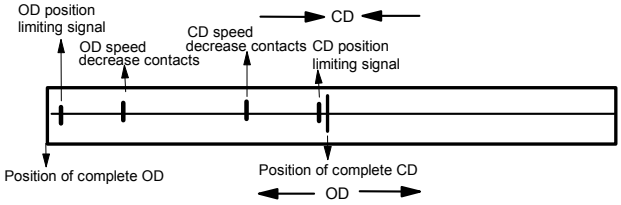


Figure 6-3 Speed decrease contacts for speed control

Set the parameters in F1 group related to speed control, define the speed decrease contacts and position limiting signal accurately. OD operation curve is illustrated in Figure 6-4.

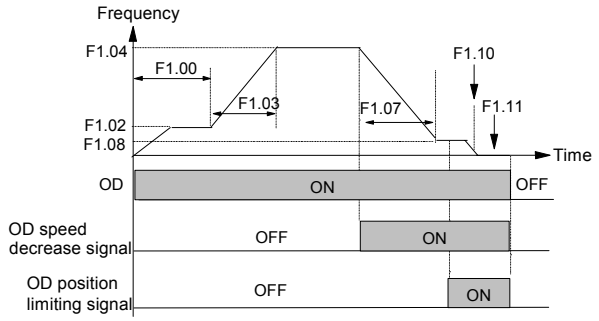


Figure 6-4 OD operation curve for speed control

OD process of speed control:

1. When the OD command is active, the inverter starts at start creep speed, and then operates at constant speed in low-speed section.

2. Timing begins when OD starts. When the OD start creep time (F1.00) is over, the inverter starts to operate at OD reference frequency (F1.04), and accelerates according to OD Acc time (F1.03), and then operates at high speed after the acceleration.

3. When the OD speed decrease signal is active, the inverter decelerates within OD Dec time (F1.07) to OD ending creep speed (F1.08), and operates at constant ending speed in low-speed section when deceleration is over.

4. When OD position limiting signal is active, the inverter continues to run at OD low speed, and the inverter judges the output torque. If the torque is bigger or equal to the threshold of OD torque changing (F1.10), the inverter will keep the OD torque of F1.11, ending the whole OD process.

5. When OD command is cancelled, the inverter will not maintain the OD torque any more.

6.2.2 OD Operation Curve For Distance Control

Distance control is based on the self-learned door width information. In the OD and CD processes, the pulse is counted in real time, and compared with the preset pulse value, so as to judge when to decrease the OD speed and CD speed, and when the OD process and CD process should be over. The control process is shown in Figure 6-5.

Three distance control modes are available, respectively distance control 1, distance control 2 and distance control 3, which have the same control logic and operation curve. In distance control 1, the PG information is used both in control and pulse counting, and under this condition, the PG must be connected to the shaft of the motor. In distance control 2 and distance control 3, the PG information is only used in pulse counting, and under this condition, the PG need not to be connected to the shaft of the motor.

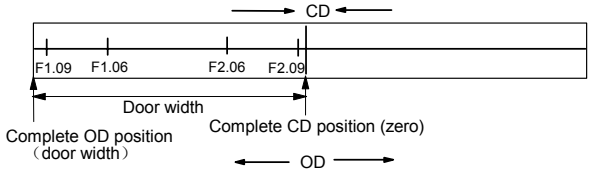


Figure 6-5 Illustration of distance control

The operation curve parameters in group F1 related to distance control should be set correctly.

Door width auto-learning should be implemented before distance control. The OD speed curve of distance control is illustrated in Figure 6-6.

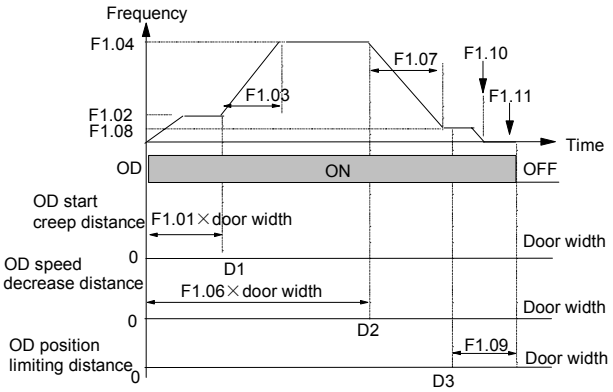


Figure 6-6 OD operation curve for distance control

OD process of distance control:

1. When the OD command is active, the inverter starts at start creep speed (F1.02), and then operates at constant speed in low-speed section.

2. When reaching D1, the inverter starts to operate at OD reference frequency (F1.04), and accelerates according to OD Acc time (F1.03), and then operates at high speed after the acceleration.

3. When reaching D2, the inverter decelerates within OD Dec time (F1.07) to OD ending creep speed (F1.08), and operates at constant ending speed in low-speed section when after the deceleration.

4. When reaching D3, the inverter continues to run at OD low speed in OD ending phase. If the output torque is bigger or equal to the threshold of OD torque changing (F1.10), the inverter will maintain the torque of F1.11, thus the whole OD process is over.

5. When OD command is disabled, the inverter exits the OD torque maintaining status.

Note

1. Acc time is the time taken for the inverter to accelerate from 0Hz (zero speed) to the maximum frequency (maximum speed).

2. Dec time is the time taken for the inverter to decelerate from maximum frequency (maximum speed) to 0Hz (zero speed).

F1.00 OD start creep time for speed control	Setting range: 10 ~ 9999ms 【500】

Defines the duration the inverter operates at start creep speed in OD process under speed control.

F1.01 OD start creep distance for distance control	Setting range: 0 ~ 30.0% (door width)【15.0%】

In OD process under distance control, the pulse number is recorded in real time. When the pulse number is bigger or equal to the product of F1.01 and the door width, the inverter switches from OD start creep speed (F1.02) to OD high speed (F1.04).

F1.02 OD start creep speed	Setting range: 1.00 ~ 25.00Hz 【7.00Hz】

Defines the low operating frequency (speed) in OD process.

F1.03 OD Acc time	Setting range: 0.1s ~ 3600s【2.0s】

Defines the time taken for the inverter to accelerate from the OD start creep speed to the OD frequency.

F1.04 OD reference frequency	Setting range: 0.00 ~ max frequency 【20.00Hz】

Defines the high operating frequency (speed) in OD process.

F1.05 Rush hour operation OD speed	Setting range: 0.00 ~ max frequency【25.00Hz】

When the rush hour operation signal is active, this parameter defines the frequency (speed) the inverter operates at high speed in OD process, or the running frequency in the general-purpose inverter mode.

F1.06 OD speed decrease point in distance control	Setting range: 60% ~ 95%(door width)【70%】

In the OD process under distance control, the pulse number is recorded in real time. When the pulse number is bigger or equal to the product of F1.06 and the door width, the inverter will switch from OD speed to OD ending creep speed.

F1.07 OD Dec time	Setting range: 0.1 ~ 3600s【2.0s】

Defines the time taken for the inverter to decelerate from the OD frequency (high speed) to the OD ending creep speed in OD process.

F1.08 OD ending creep speed	Setting range: 0 ~ 15.00Hz【3.00Hz】

Defines the motor's low frequency (speed) after the OD low speed signal is active in OD process.

F1.09 OD position limit in distance control	Setting range: 1 ~ 9999【600】

In OD process under distance control, the pulse number is recorded in real time. When the result of total door-width pulse number subtracts the pulse number already passed is smaller or equal to the value of F1.09, OD completion processing is implemented.

F1.10 Threshold for OD torque changing	Setting range: 0.0% ~ 100.0% (motor rated torque)【50.0%】

In OD process, if the OD position limiting signal is active or the pulse count for distance control reaches the product of F1.09 and the door width, the inverter continues to run at low speed in the ending phase of OD. When the door reaches the limited position, the motor is caught. When the motor catching torque is bigger or equal to the product of F1.10 and motor's rated torque, the door is in complete OD status and maintaining the current torque until the door opens again or stops.

F1.11 Maintaining torque at OD completion	Setting range: 0.0% ~ 100.0% (motor ratd torque)【50.0%】

When the motor is in OD operating process, the OD position limiting function is enabled. When the torque of catching spinning motor is bigger or equal to the setting of F1.10, and in the mean time the torque maintaining prohibition function is disabled, the inverter maintains at complete OD status with the maintaining torque of the product of F1.11 and motor's rated torque.

F1.12 OD operation curve selection in distance control	Setting range: 0 ~ 1【0】

0: F1.04 setting is observed in OD operation.

1: F1.04 and F1.06 are invalid, the OD process observes the best OD speed and speed decrease point calculated automatically based on the door width, OD optimum curve correction factor (F1.13), Acc time and Dec time. As the operation curve shows in Figure 6-7, when the OD creep distance S1, OD optimum curve correction factor (F1.13) and door width S are determined, adjust the OD Acc time (F1.03) and OD Dec time (F1.07) to regulate the Acc slope and Dec slope of the operation curve (the shorter the time, the steeper the slope, and the higher the max frequency), so as to achieve the highest OD efficiency.

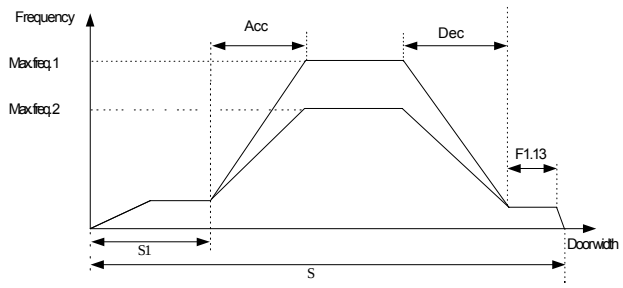


Figure 6-7 Optimum OD curve for distance control

F1.13 OD optimum curve correction factor	Setting range: 3.0% ~ 15.0% (door width)【10.0%】

When the inverter runs at the optimum OD curve (F1.12 = 1), the pulse number is recorded in real time in the OD process under distance control. When the left pulse number is smaller than or equal to the product of F1.13 and the door width, the inverter will switch from OD speed to OD ending creep speed. See Figure 6-7.

6.3 CD Operation Parameters F2

6.3.1 CD Operation Curve For Speed Control

Set the parameters in F2 group related to speed control, define the speed decrease contacts and position limiting signal accurately. CD operation curve is illustrated in Figure 6-8.

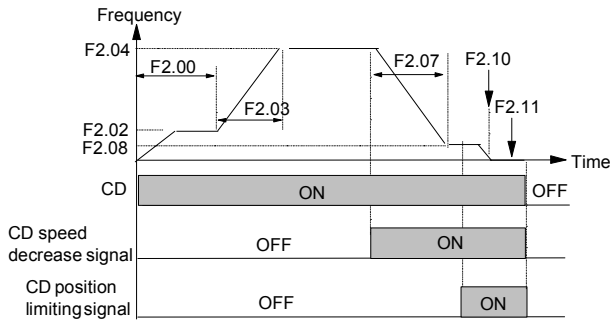


Figure 6-8 CD operation curve for speed control

CD process of speed control:

1. When the CD command is active, the inverter starts at start creep speed (F2.02), and then operates at constant speed in low-speed section.

2. Timing begins when CD starts. When the CD start creep time (F2.00) is over, the inverter starts to operate at CD reference frequency (F2.04), and accelerates according to CD Acc time (F2.03), and then operates at high speed after the acceleration.

3. When the CD speed decrease signal is active, the inverter decelerates within CD Dec time (F2.07) to CD ending creep speed (F2.08), and operates at constant ending speed in low-speed section when deceleration is over.

4. When CD position limiting signal is active, the inverter continues to run at CD low speed, and the inverter judges the output torque. If the torque is bigger or equal to the threshold of CD torque changing (F2.10), the inverter will keep the CD torque of F2.11, thus the whole CD process is over.

5. When OD command is cancelled, the inverter will not maintain the OD torque any more.

6.3.2 CD Operation Curve For Distance Control

The operation curve parameters in group F2 related to distance control should be set correctly.

Door width auto-learning should be implemented before distance control. The CD speed curve of distance control is illustrated in Figure 6-9.

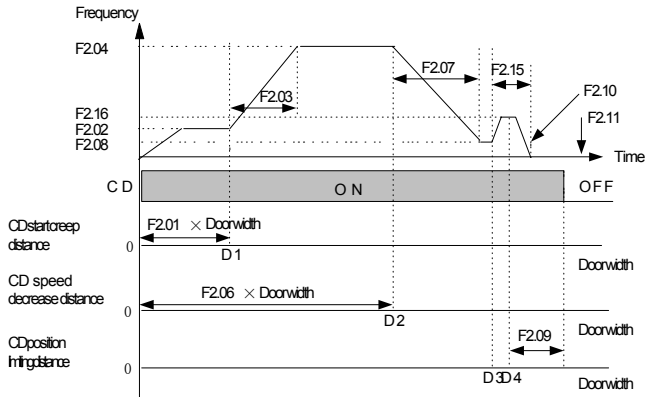


Figure 6-9 CD operation curve for distance control

CD process of distance control 1:

1. When the CD command is active, the inverter starts at start creep speed (F2.02), and then operates at constant speed in low-speed section.

2. When reaching D1, the inverter starts to operate at CD reference frequency (F2.04), and accelerates according to CD Acc time (F2.03), and then operates at high speed after the acceleration.

3. When reaching D2, the inverter decelerates within CD Dec time (F2.07) to CD ending creep speed (F2.08), and operates at constant ending speed in low-speed section when after the deceleration.

4. When reaching D3, the inverter will run at the CD speed after door locking point (F2.16), speeding up the CD process.

5. When reaching D4, the inverter continues to run at CD speed after door locking point. If the output torque is bigger or equal to the threshold for CD torque changing (F2.10), the inverter will maintain the torque of F2.11, thus the whole CD process is over.

5. When CD command is disabled, the inverter exits the CD torque maintaining status.

F2.00 CD start creep time for speed control	Setting range: 10 ~ 9999ms 【500ms】

Defines the duration the inverter operates at start creep speed in CD process under speed control.

F2.01 CD start creep distance	Setting range: 0 ~ 30.0% (door width) 【15.0%】

In CD process under distance control, the pulse number is recorded in real time. When the pulse number is bigger or equal to the product of F2.01 and the door width, the inverter switches from CD start creep speed (F2.02) to CD high speed (F2.04).

F2.02 CD start creep speed	Setting range: 1.00 ~ 25.00Hz 【6.00Hz】

Defines the low operating frequency (speed) in CD process.

F2.03 CD Acc time	Setting range: 0.1s ~ 3600s【2.0s】

Defines the time taken for the inverter to accelerate from the CD start creep speed to the CD frequency.

F2.04 CD reference frequency	Setting range: 0.00 ~ max frequency【15.00Hz】

Defines the high operating frequency (speed) in CD process.

F2.05 Rush hour operation CD speed	Setting range: 0.00 ~ max frequency【20.00Hz】

When the rush hour operation signal is active, this parameter defines the frequency (speed) the inverter operates at high speed in CD process, or the running frequency in the general-purpose inverter mode.

F2.06 CD speed decrease point in distance control	Setting range: 60% ~ 95% (door width)【70%】

In the CD process under distance control, the pulse number is recorded in real time. When the pulse number is bigger or equal to the product of F2.06 and the door width, the inverter will switch from CD high speed to CD ending creep speed.

F2.07 CD Dec time	Setting range: 0.1 ~ 3600s【2.0】

Defines the time taken for the inverter to decelerate from the CD frequency (high speed) to the CD ending creep speed in CD process.

F2.08 CD ending creep speed	Setting range: 0 ~ 15.00Hz【2.00】

Defines the motor's low frequency (speed) after the CD low speed signal is active in CD process.

F2.09 CD position limit in distance control	Setting range: 1 ~ 9999【600】

In CD process under distance control, the pulse number is recorded in real time. When the pulse number is smaller than or equal to the value F2.09, CD completion processing is implemented.

F2.10 Threshold for CD torque changing	Setting range: 0.0% ~ 100.0%【50.0%】

In CD process, if the CD position limiting signal is active or the pulse count for distance control reaches the product of F2.09 and the door width, the inverter continues to run at low speed in the ending phase of CD. When the door reaches the limited position, the motor is caught. When the motor catching torque is bigger or equal to the product of F2.10 and motor's rated torque, the door is in complete CD status and maintaining the current torque until the door opens again or stops.

F2.11 Maintaining torque at CD completion	Setting range: 0.0% ~ 100.0%【50.0%】

When the motor is in CD operating process, the CD position limiting function is enabled. When the torque of catching spinning motor is bigger or equal to the setting of F2.10, and in the mean time the torque maintaining prohibition function is disabled, the inverter maintains at complete CD status with the maintaining torque of the product of F2.11 and motor's rated torque.

F2.12 CD high speed for EFS	Setting range: 5.00 ~ 25.00Hz【10.00】

Defines the high speed at which the inverter operates when emergency fireman service (EFS) signal is active.

F2.13 CD operation curve selection in distance control	Setting range: 0 ~ 1【0】

0: F2.04 setting is observed in CD operation.

1: F2.04 and F2.06 are invalid, the CD process observes the best CD speed and speed decrease point calculated automatically based on the door width, CD optimum curve correction factor (F2.14), Acc time and Dec time. As the operation curve shows in Figure 6-10, when the CD distance S1, CD optimum curve correction factor (F2.14) and door width S are determined, adjust the CD Acc time (F2.03) and CD Dec time (F2.07) to regulate the Acc slope and Dec slope of the operation curve (the shorter the time, the steeper the slope, and the higher the max frequency), so as to achieve the highest CD efficiency.

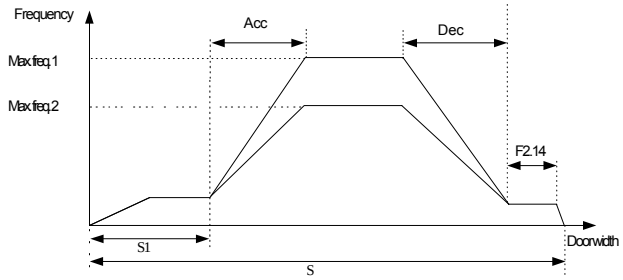


Figure 6-10 Optimum CD curve for distance control

F2.14 CD optimum curve correction factor	Setting range: 3.0% ~ 15.0%【10.0%】

When the inverter runs at the optimum CD curve (F2.13 = 1), the pulse number is recorded in real time in the CD process under distance control. When the left pulse number is smaller than or equal to the product of F2.14 and the door width, the inverter will switch from CD speed to CD ending creep speed. See Figure 6-10.

F2.15 Distance control CD door locking point	Setting range: 3.0% ~ 15.0%【10.0%】

In CD process under distance control, the pulse number is recorded in real time. When the pulse number is smaller than or equal to the pulse number set by F2.15, the CD door locking processing is implemented.

F2.16 CD speed after door locking point	Setting range: 0 ~ 20.00Hz 【5.00】

Defines the operating frequency after the door locking point in the CD process.

6.4 Enhanced Function Parameters F3

F3.00 INI operation speed	Setting range: 0.00 ~ 20.00Hz【5.00Hz】

1. Defines the first time OD and CD speed after inverter power-on, under distance control, without 3-section speed curve.

2. Defines the OD and CD speed when slow OD and CD signals are active, without 3-section speed curve.

F3.01 OD time limit	Setting range: 0 ~ 3600s【300s】

Defines the maximum time of OD operation. You should set it properly according to the actual conditions. The setting must be bigger or equal to the sum of all the settings of OD (parameter group of OD curve), otherwise error may occur (E028). Setting F3.01 correctly can protect the system against abnormal operation of elevator door. Normal operation time will not exceed F3.01, but when the OD position limit is invalid and causes the OD process unable to

be completed, the operation time may exceed F3.01, and OD error (E030) will be activated. E029 will be activated if OD overtime occurred during the door width auto-learning. When you set F3.01 to 0 or 3600, that is, set the OD time limit to infinity, F3.01 is invalid.

F3.02 CD time limit	Setting range: 0 ~ 3600s【300s】

Defines the maximum time of CD operation. You should set it properly according to the actual conditions. The setting must be bigger or equal to the sum of all the settings of CD (parameter group of CD curve), otherwise error may occur (E028). Setting F3.02 correctly can protect the system against abnormal operation of elevator door. Normal operation time will not exceed F3.02, but when the CD position limit is invalid and causes the CD process unable to be completed, the operation time may exceed F3.02, and CD error (E031) will be activated. E029 will be activated if OD overtime occurred during the door width auto-learning. When you set F3.02 to 0 or 3600, that is, set the CD time limit to infinity, F3.02 is invalid.

F3.03 Slow speed operation time limit	Setting range: 0 ~ 3600s【400s】

Defines the maximum time of slow OD and CD operation when slow operation enable signal is active. You should set it properly according to the actual conditions. The setting must be bigger or equal to the sum of all the settings of OD or CD (parameter group of OD curve and CD curve), otherwise error may occur (E028). Setting F3.03 correctly can protect the system against abnormal slow operation of elevator door. Normal operation time will not exceed F3.03, but when the OD or CD position limit is invalid and causes the OD or CD process unable to be completed, the operation time may exceed F3.03, and OD or CD error (E030, E031) will be activated. When you set F3.03 to 0 or 3600, that is, set the OD or CD time limit to infinity, F3.03 is invalid.

F3.04 Delay time for external OD command	Setting range: 0 ~ 9999s【0s】

Defines the time interval from the OD command becoming invalid to the end of maintaining time of complete OD state. If the maintaining time is equal to or greater than F3.04, the inverter will stop. If the door is not opened to the position completely and OD command is cancelled at that time, the inverter will stop immediately and the delay function is invalid. If F3.04 is set to 9999, the OD delay, once triggered, will be maintained endlessly.

F3.05 Delay time for external CD command	Setting range: 0 ~ 9999s【0s】

Defines the time interval from the CD command becoming invalid to the end of maintaining time of complete CD state. If the maintaining time is equal to or greater than F3.05, the inverter will stop. If the door is not closed to the position completely and CD command is cancelled at that time, the inverter will stop immediately and the delay function is invalid. If F3.05 is set to 9999, the CD delay, once triggered, will be maintained endlessly.

F3.06 Position of safety edge lift signal output	Setting range: 0% ~ 40.0%(door width)【10%】

When the door position ≤ F3.06 × door width, safety edge lift is needed. In this case, if safety edge lift signal output function is configured, safety edge lift signal will be activated. when the door position ≥ F3.07 × door width, safety edge lift signal will not be activated.

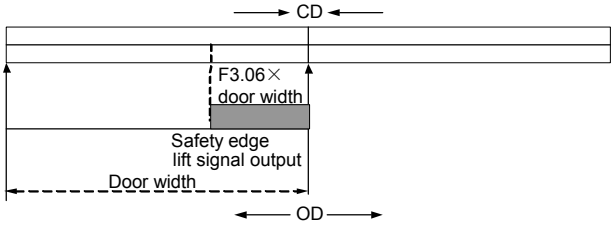


Figure 6-11 Safety edge lift signal output position

F3.07 Function selection of OD upon CD obstruction	Setting range: 0 ~ 1【1】

Defines the handling method in the case CD process is obstructed.

0: stop. The CD process can continue only after 10s, unless OD operation is conducted within 10s.

1: re-open the elevator door

F3.08 CD obstruction sensitivity	Setting range: 0 ~ 150%【100%】

During CD process, the motor's output torque is detected in real time. When the output torque is bigger than or equal to the product of F3.08 and motor rated torque, it is regarded that the CD process is obstructed, and the situation will be addressed according to the setting of F3.07

When set to 0, CD obstruction sensing is disabled.

F3.09 Dec time upon abnormality	Setting range: 10 ~ 2500ms【300ms】

Defines the time taken for the inverter to decelerate from current CD speed to zero in the case CD process is obstructed.

Under the precondition of no over-current in Dec process, F3.09 should be set as small as possible.

F3.10 OD obstruction sensitivity	Setting range: 0 ~ 150%【0%】

During CD process, the motor's output torque is detected in real time. When the output torque is bigger than or equal to the product of F3.10 and motor rated torque, it is regarded that the OD process is obstructed, the inverter will stop immediately. The door can be opened 10s later, or if CD operation is implemented within 10s.

When set to 0, OD obstruction sensing is disabled.

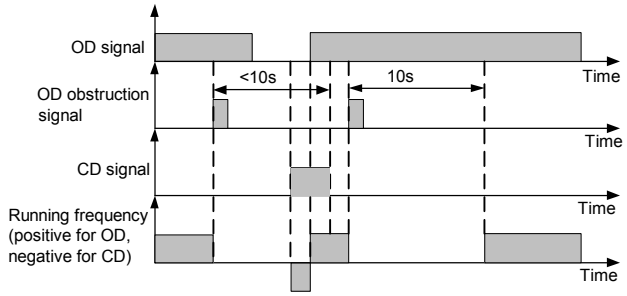


Figure 6-12 Time sequence diagram for OD obstruction

F3.11 Maintaining time for complete OD in demo mode	Setting range: 1 ~ 3600s【2.0】

Defines the interval from complete OD to CD in demo mode. It can be set according to the actual requirement of demo.

F3.12 Maintaining time for complete CD in demo mode	Setting range: 1 ~ 3600s【2.0】

Defines the interval from complete CD to OD in demo mode. It can be set according to the actual requirement of demo.

F3.13 Preset CD/OD times in demo mode	Setting range: 0 ~ 9999【0】

Defines the operation times in demo mode. When the actual operation times is bigger than the setting of F3.13, the demo is ended automatically.

If F3.13=0, this function is disabled and demo will not be ended automatically.

F3.14 CD/OD times record in demo mode	Range: 0 ~ 9999【0】

F3.14 is the recorded CD and OD times in demo mode. The value is saved upon power off. When the inverter is powered on the next time, the operation times in demo mode will be counted and added to the previous value of F3.14. One is added every time the door is opened or closed.

Demo mode is a cyclic operation of OD and CD. Pressing the OD key starts the demo. The door is opened according to the operation curve. The inverter starts timing after the door is opened completely. When the time reaches the setting of F3.11, the inverter starts reverse running, and the door is closed. The inverter starts timing after the door is closed completely. When the time reaches the setting of F3.12, the door is opened again. The door is thus opened and closed repeatedly. Pressing the ESC key ends the demo.

Demo can be under both speed control and distance control. It can be used for demonstration and burning test.

F3.15 Auto restet times upon fault	Setting range: 0 ~ 100【0】

When fault occurs while the inverter is running, the inverter stops its output. Two seconds later, it will reset automatically and continue to run.

Setting this parameter disables the automatic reset function, and the inverter can only be reset by manually.

Note

The inverter will not reset automatically when E024, E025, E028, E029, E030, E031 faults occur.

F3.16 Torque enhance coefficient	Setting range: 100% ~ 350%【115%】

This parameter is used to enhance the switching torque in first time operation or self-learning process, so as to prevent error action.

F3.17 Fan control	Setting range: 0 ~ 2【0】

0: fan does not start during inverter operation
1: fan starts when heatsink temperature is higher than 65°C during inverter operation
2: fan starts during inverter operation

F3.18 Percentage or pulse number selection	Setting range: 0 ~ 1【0】

0: F1.01, F1.06, F1.13, F2.01, F2.06 and F2.14 are percentages.
1: F1.01, F1.06, F1.13, F2.01, F2.06 and F2.14 are numbers.
After confirming the setting of F3.18 as 0, function codes F1.01, F1.06, F1.13, F2.01, F2.06 and F2.14 are based on the percentage of door width. On the other hand, after confirming the setting of F3.18 as 1, such function codes are based on the actual pulse number.

Note

1. After changing F3.18 from 0 to 1, and after getting the door width or the door width total pulse number, function codes F1.01, F1.06, F1.13, F2.01, F2.06 and F2.14 must be reset based on the door width pulse number.

2. When F3.18 is set to 1, the setting ranges of F1.01, F1.06, F1.13, F2.01, F2.06 and F2.14 are 0 ~ 32767. If the set pulse number is bigger than 9999, only the higher 4 digits will be displayed, while the decimal point after the forth digit will be lighted to indicate that the fifth digit is not displayed.

6.5 Door Width Self-learning Parameters F4

F4.00 PG type	Setting range: 0, 1【0】

Set F4.00 correctly according to the selected PG type.

If 24V incremental PG (open-collector or push-pull type) is selected, set F4.00 to 0. If UVW incremental PG is selected, set F4.00 to 1.

Note

1. For inverters EV3200-2S0002A and EV3200-2S0004A, the default setting of this parameter is 0.

2. For inverters EV3200-2S0002S and EV3200-2S0004S, the default setting of this parameter is 1.

3. Function code F4.00 changes automatically with the change of F6.00. The value of F4.00 is always kept the same as F6.00.

F4.01 Pulse number per revolution	Setting range: 0 ~ 4000【100】
F4.02 PG direction	Setting range: 0, 1【0】

EV3200 inverter adopts vector control mode. Relevant parameters of PG must be set if close loop vector control mode is adopted.

In distance control mode, relevant parameters of PG should also be set correctly so as to ensure the control effects.

EV3200 can only use two-phase PG.

Note

1. EV3200 asynchronous inverter can only use 24V open collector or 24V push-pull PG.

2. EV3200 synchronous inverter can use 5V UVW incremental PG.

3. For EV3200-2S0002A and EV3200-2S0004A, the default setting of F4.01 is 100.

4 For EV3200-2S0002S and EV3200-2S0004S, the default setting of F4.01 is 2500.

5. Function code F4.01 changes automatically with the change of F6.00. When F6.00 is set to 0, F4.01 will change automatically to 200; when F6.00 is set to 1, F4.01 will change automatically to 2500.

F4.03 Magnetic pole initial angle	Setting range: 0.0 ~ 359.9【0】

When driving a synchronous motor, the magnetic pole nitial angle of the motor will be obtained automatically after tuning.

F4.04 Speed during door width auto-learning	Setting range: 2.00 ~ 20.00Hz【5.00】

Defines the operating frequency in door width auto-learning process.

In order to reduce the door width error, this parameter must not be too big so as to avoid the shock when the door is in complete OD or CD status.

F4.05 Selection of door-width auto-learning	Setting range: 0, 1【0】

0: disabled

1: enabled

Set F4.05 to 1, press OD (or when terminal auto-learning command is valid), and the inverter will begin door-width auto-learning automatically.

After the auto-learning, the setting of F4.05 will be restored to 0 automatically.

Process of door-width auto-learning: After auto-learning is started, the door will be closed, opened and then closed. After the auto-learning is finished, the door width information will be saved automatically.

Note

1. Relevant parameters of PG must be input correctly before the auto-learning.

2. During auto-learning, there must not be any obstacles on the slide rail of the door.

3. If you use the terminal to input the auto-learning command, you should set F4.05 to 1 in advance as well.

4. If you use terminal to input the auto-learning command, you are required to set F4.05 to 1 in advance.

5. Door width auto-learning function is valid in distance control mode (F0.01=0).

6. The door width can be obtained manually when the inverter in standby state. First, set F4.07 to 9999, close the elevator door manually, and the inverter will display the CD complete pulse value (P1); then pull the door open completely, and the inverter will display the OD complete pulse value (P2). The high digits and low digits of P1 and P2 can be displayed by setting the F9.01. Refer to description of F9.01.

Calculate the door width (door width=|P2 - P1|), and input the door width through F4.06 and F4.07.

F4.06 Low digits of pulse count	Setting range: 0 ~ 9999【0】

The parameter saves the four low digits of pulse count obtained by door width auto-learning (max: four digits).

F4.07 High digits of pulse count	Setting range: 0 ~ 9999(× 10000)【0】

The parameter saves the high digits of pulse count obtained by door width auto-learning.

Door width= F4.07 × 10000+F4.06

The pulse number of door width obtained by auto-learning can be changed via operation keypad.

F4.08 Actual door width	Setting range: 0 ~ 9999mm【0mm】

You may input the actual door width through F4.08, that is complete CD is 0 and complete OD is the actual width set by F4.08. When F4.08 is not 0, the door position is the actual position in the unit of mm; when F4.08 is 0, the door position is expressed by pulse number.

F4.09 PG cable broken detection time for asynchronous motor	Setting range: 0.0 ~ 10.0s【0s】

When the PG input signal is detected abnormal, after the time set by F4.09, the inverter will report PG cable broken fault. If F4.09 is set to 0, PG cable broken detection function is disabled.

F4.10 Ratio of gear	Setting range: 1.0 ~ 100.0【1.0】

The ratio of shaft radius of traction wheel to motor shaft radius, as shown in Figure 6-13.

Ratio of gear = shaft radius of traction wheel N1/motor shaft radius N2.

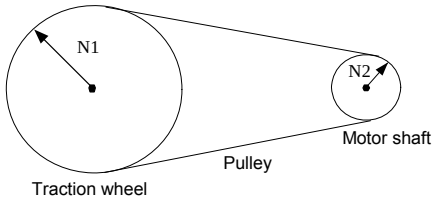


Figure 6-13 Illustration of ratio of gear

F4.11 Asynchronous single/dual motor selection	Setting range: 0 ~ 1【0】

0: single motor control (asynchronous or synchronous).

1: dual motors control (asynchronous).

When F4.11 is set 0, the inverter works in the single motor control mode, which is the only mode for synchronous motors. When F4.11 is set 1, the inverter works in dual asynchronous motors control mode, the inverter then can two asynchronous motors whose parameters are set the same. However, the motor tuning operation requires the single motor control mode (F4.11 = 0), or the system will report E028.

6.6 Multi-function Input Terminal Parameters F5

Functions and parameters of control terminals X1 ~ X5 are defined by the following parameters.

F5.00 Function selection for control terminal X1	Setting range: 0 ~ 20【0】
F5.01 Function selection for control terminal X2	Setting range: 0 ~ 20【0】
F5.02 Function selection for control terminal X3	Setting range: 0 ~ 20【0】
F5.03 Function selection for control terminal X4	Setting range: 0 ~ 20【0】
F5.04 Function selection for control terminal X5	Setting range: 0 ~ 22【0】

Control terminals X1 ~ X5 are programmable input terminals, and their functions can be defined by F5.00 ~ F5.04. The functions are listed in Table 6-1.

Table 6-1 Function selection for multi-function inputs

Settings	Functions	Settings	Functions
0	No functions	12	Normally open input contacts for CD speed decrease
1	External reset (RESET) signal input	13	Normally closd input contacts for CD speed decrease
2	Normally open input contacts for light curtain signal	14	Terminal for inputting OD prohibition signal
3	Normally closed input contacts for light curtain signal	15	Terminal for disabling torque maintaining
4	Normally open input contacts for safety edge	16	Low speed OD/CD enable signal input
5	Normally closed input contacts for safety edge	17	Normally open input for lock signal
6	Normally open input for OD position limiting	18	Normally closed input for lock signal
7	Normally closed input for OD position limiting	19	EFS function input
8	Normally open input for CD position limiting	20	Rush hour operation enable signal input
9	Normally closed input for CD position limiting	21	Operation enable signal input (valid for X5 only)
10	Normally open input contacts for OD speed decrease	22	Door width auto-learning command input (valid for X5 only)
11	Normally closed input contacts for OD speed decrease		

Note

When setting parameters from F5.00 to F5.04, only 0 (no function) can be set repetitively, other settings (1 ~ 22) can not.

0: No function

1: External reset (RESET) signal input

When a fault occurs, the inverter can be reset via this terminal. This function is enabled at the falling edge of the pulse, and its function is the same with that of the RESET key on the keypad.

2, 3: Normally open/closed input contacts for light curtain signal

In CD process, if this terminal is activated, CD obstruction protection will be executed. During the re-opening process, the inverter will not response to CD command.

If the door has reached the CD position limit, this protection signal is ineffective.

4, 5: Normally open/closed input contacts for safety edge

In CD process, if this terminal is activated, CD obstruction protection will be executed. During the re-opening process, the inverter will not response to CD command.

If the door has reached the CD position limit, this protection signal is ineffective.

6, 7: Normally open/closed input for OD position limiting

In OD process under speed control, the inverter will take actions of OD position limiting after this signal is enabled.

8, 9: Normally open/closed input for CD position limiting

In CD process under speed control, the inverter will take actions of CD position limiting after this signal is enabled.

10, 11: Normally open/closed input for OD speed decrease

In OD process under speed control, the inverter starts low speed operation in ending phase after the normally open/closed input for OD speed decrease is enabled.

12, 13: Normally open/closed input for CD speed decrease

In CD process under speed control, the inverter starts low speed operation in ending phase after the normally open/closed input for CD speed decrease is enabled.

14: Terminal for inputting OD prohibition signal

OD command will not be executed if this signal is enabled.

15: Terminal for inputting torque maintaining prohibition signal

In CD/OD torque maintaining process, the inverter will maintain the 0 torque if this signal is enabled.

16: Low speed OD/CD enabling signal input

If this signal is enabled, the motor operates at low speed according to the speed set by F3.00.

17/18: Normally open/closed input for lock signal

19: EFS signal input

When this signal is activated, OD is prohibited, and the door closes at the high speed set by F2.12.

20: Rush hour operation enable signal input

When the signal is activated, the OD speed and CD speed are the speeds set by F1.05 and F2.05 respectively.

21: Operation enable signal input

when X5 is not set to 21, the door is controlled by the external door control signals.

When X5 is set to 21:

- If X5 is valid, external door control is enabled.
- If X5 signal is invalid, the inverter will stop immediately when in operation state, and does not respond when in stopping state.

22: Door width auto-learning command input

Under terminal control mode (F0.02=2), when X5 is set to 22:

- If F4.05=1 and X5 terminal input command is valid, door width auto-learning will start.
- If F4.05=0 and X5 terminal input command is valid, door width auto-learning will not start.

F5.05 Function of programmable relay output PA1/PC1	Setting range: 0 ~ 11 【2】
F5.06 Function of programmable relay output PA2/PC2	Setting range: 0 ~ 11 【3】
F5.07 Function of programmable relay output PA3/PB3/PC3	Setting range: 0 ~ 11 【6】

Functions of programmable relay are shown in Table 6-2.

Table 6-2 Relay output functions

Settings	Functions	Settings	Functions
0	Output signal 0 for complete OD	6	Fault relay output 1
1	Output signal 0 for complete CD	7	Fault relay output 2
2	Output signal 1 for complete OD	8	Safety edge lift signal output
3	Output signal 1 for complete CD	9	Lock signal synchronous output
4	Output signal 2 for complete OD	10	Re-opening signal output
5	Output signal 2 for complete CD	11	Obstruction signal output

0: Output signal 0 for complete OD

In OD process, when the inverter receives OD position limiting signal or when the pulse count number reaches the OD position limit, the relay will activate to output OD complete signal.

Complete OD signal is disabled in demo mode, general-purpose inverter operation mode and CD process.

1: Output signal 0 for complete CD

In CD process, when the inverter receives CD position limiting signal or when the pulse count number reaches the CD position limit, the relay will activate to output CD complete signal.

The complete CD signal is disabled in demo mode, general-purpose inverter operation mode and OD process.

2: Output signal 1 for complete OD

In OD process, when the inverter receives OD position limiting signal or when the pulse count number reaches the OD position limit, and at the same time the inverter torque reaches the setting of F1.10, the relay will activate to output OD complete signal.

The complete OD signal is disabled in demo mode, general-purpose inverter operation mode and CD process.

3: Output signal 1 for complete CD

In CD process, when the inverter receives CD position limiting signal or when the pulse count number reaches the CD position limit, and at the same time the inverter torque reaches the setting of F2.10, the relay will activate to output CD complete signal.

The complete CD signal is disabled in demo mode, general-purpose inverter operation mode and OD process.

4: Output signal 2 for complete OD

In OD process, when the inverter receives OD position limiting signal or when the pulse count ed reaches the OD position limit, locking signal is invalid and at the same time the inverter torque reaches the setting of F1.10, the relay will activate to output OD complete signal.

The complete OD signal is disabled in demo mode, general-purpose inverter operation mode and CD process.

5: Output signal 2 for complete CD

In CD process, when the inverter receives CD position limiting signal or when the pulse count ed reaches the CD position limit, locking signal is disabled and at the same time

the catching torque reaches the setting of F2.10, the relay will activate to output CD complete signal.

The complete CD signal is disabled in demo mode, general-purpose inverter operation mode and OD process.

6: Fault relay output 1

When the inverter has fault, the relay will output fault signal. But when parameter setting error (E028) occurs, the inverter only displays the alarm information and will not output fault relay output signal 1.

7: Fault relay output 2

When the inverter has fault or the inverter's DC bus voltage is low (LED displays "P.oFF"), the relay will output fault signal. But when parameter setting error (E028) occurs, the inverter only displays the alarm information and will not output fault relay output signal 2.

8: Safety edge lift signal output

When width left open in CD is less than or equal to F3.06 setting, the relay outputs safety edge lift signal. When it is bigger than F3.06 setting, there is no output of safety edge lift signal.

9: Lock signal output

Synchronously input/output lock signal

10: Door re-opening signal output

In door re-opening process, the relay outputs the door re-opening signal.

11: Obstruction signal output

When the door is obstructed in OD or CD process, the relay outputs this signal.

6.7 Motor Parameters F6

F6.00 Motor type selection	Setting range: 0 ~ 1【0】

0: asynchronous motor

1: synchronous motor

Note

1. For EV3200-2S0002A and EV3200-2S0004A, the default setting of this parameter is 0.

2. For EV3200-2S0002S and EV3200-2S0004S, the default setting of this parameter is 1.

F6.01 Motor rated power	Setting range: 0 ~ 500W【370】
F6.02 Motor rated voltage	Setting range: 0 ~ 250V【220】
F6.03 Motor rated current	Setting range: 0.10 ~ 9.90A【1.94】
F6.04 Motor max allowable operation current	Setting range: 100.0% ~ 200.0%【150%】
F6.05 Motor rated frequency	Setting range: 1.00 ~ 128.00Hz【50.00】
F6.06 Motor rated spinning speed	Setting range: 1 ~ 9999rpm【1400】

Set the motor parameters according to the nameplate.

Note

1. Relevant parameters of motor (F6.01 ~ F6.06) must be input correctly before auto-tuning.

2. The motor power should match that of the inverter, that is, the setting of F069 can be only one grade higher or two grades lower than standard motor capacity, to ensure the performance.

F6.07 Motor tuning	Setting range: 0, 1【0】

0: disable 1: enable

Enter the motor parameters according to the nameplate (F6.01 ~ F6.06) before tuning. First set F6.07 to 1, press OD on the operation keypad, the inverter will execute auto-tuning function.

After tuning completed, setting of F6.07 will be restored to 0 automatically.

Note

1. Do not start tuning with load on motor;

2. Make sure the motor is in stopping status before tuning, otherwise, the tuning can not be processed normally;

3. Tuning can be performed in keypad control mode only (F0.02=0, factory default value);

F6.08 Stator resistance	Setting range: 0.00 ~ 99.99Ω【7.73】
F6.09 Stator inductance	Setting range: 0 ~ 9999mH【357】
F6.10 Rotor resistance	Setting range: 0.00 ~ 99.99Ω【5.23】
F6.11 Rotor inductance	Setting range: 0 ~ 9999mH【357】
F6.12 Mutual inductance	Setting range: 0 ~ 9999mH【325】
F6.13 Exciting current with no load	Setting range: 0.00 ~ 99.99A【1.08】

After auto-tuning, settings of F6.08 ~ F6.13 will be updated.

Each time after changing the parameters on the motor's nameplate, the settings of F6.08 ~ F6.13 will be restored to defaults automatically.

Motor's parameters are illustrated in Figure 6-14.

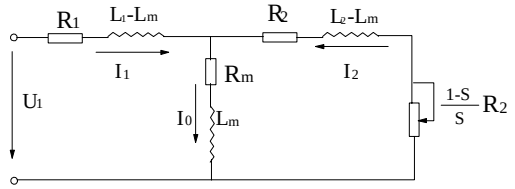


Figure 6-14 Steady-state equivalent circuit of asynchronous motor

In Figure 6-14, R_1, L_1, R_2, L_2, L_m, I_0 represent stator resistance, stator inductance, rotor resistance, rotor inductance, mutual inductance and exciting current respectively.

6.8 Vector Control Parameters F7

F7.00 Speed regulator's proportional gain 1	Setting range: 0.000 ~ 6.000【0.600】

F7.01 Speed regulator's integral time 1	Setting range: 0, 0.032 ~ 32.00s 【1.000】
F7.02 Speed regulator's proportional gain 2	Setting range: 0.000 ~ 6.000 【0.600】
F7.03 Speed regulator's integral time 2	Setting range: 0, 0.032 ~ 32.00s 【1.000】
F7.04 Speed regulator's changing frequency	Setting range: 0.00 ~ 50.00Hz 【5.00】

Speed regulator's proportional gain P and integral time I can be set by F7.00 ~ F7.04 to change the speed response of vector control.

1. Structure of speed regulator (ASR) is shown in Figure 6-15, where K_P is proportional gain P, and K_I is integral time I.

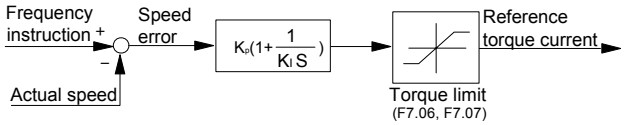


Figure 6-15 Simplified speed regulator diagram

If the integral time is set at 0 (F7.01=0, F7.03=0), which means integral function is disabled, and the speed loop is simply a proportion regulator.

2. Adjustment of proportional gain P and integral time I for speed regulator.

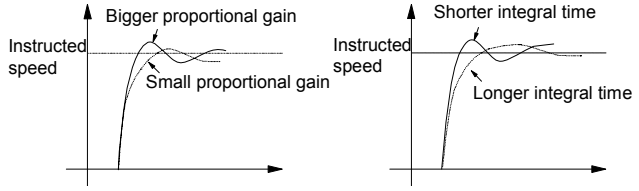


Figure 6-16 Speed regulator's step response vs. P and I

Increasing P will fasten system transient response, but system oscillation may occur given too big P.

Decreasing I will fasten transient response, but system oscillation and overshoot may occur given too small.

Normally, you may tune P first, increase its value as long as no system oscillation occurs; then adjust I, ensuring fast response without overshoot. Figure 6-17 shows better speed step response if P, I are set properly.

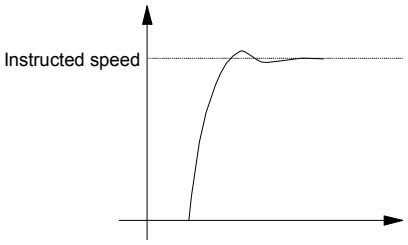


Figure 6-17 Step response with better dynamic performance

3. Speed regulator's P, I Settings in High/Low Speed Applications

If the system is required to respond quickly both in low and high frequency operation with load and, then the user may set speed regulator's switching frequency in F7.04. Normally, when the system runs at low frequency, the transient response performance can be improved by increasing P and decreasing I.

Adjust speed regulator's parameters following the procedures below:

Set appropriate switching frequency F7.04.

First tune P (F7.00) and I (F7.01) for high-speed application, ensuring no oscillation and short response time.

Next, tune P (F7.02) and I (F7.03) for low-speed application, ensure no oscillation and good response performance at low frequency.

F7.05 Slip compensation gain	Setting range: 0, 50.0% ~ 250.0% 【100.0%】

F7.05 is used in calculating slip frequency. The setting 100% means rated slip frequency corresponds to rated torque current. The user may decrease/increase the settings of F7.05 to adjust the speed control's difference accurately.

F7.06 Motoring torque limit	Setting range: 0.0% ~ 200.0% 【100.0%】
F7.07 Braking torque limit	Setting range: 0.0% ~ 200.0% 【100.0%】

Torque limiting is used to limit the speed regulator's output torque current.

Torque limit is the percentage of the inverter's rated current; if the torque limit is 100%, then the torque current limit is the inverter's rated current. F7.06 and F7.075 limit the output torque in motorizing state and braking state respectively, as shown in Figure 6-18.

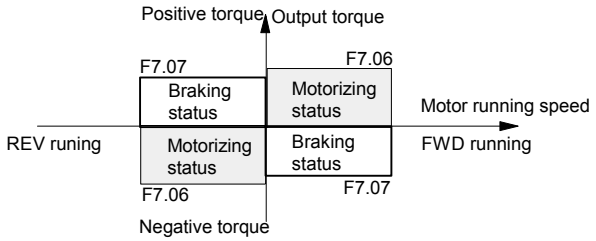


Figure 6-18 Torque limiting function

F7.08 Current loop's proportional gain KP	Setting range: 0 ~ 9999【500】
F7.09 Current loop's integral time KI	Setting range: 0 ~ 9999【300】

F7.08 and F7.09 are PI regulator parameters of current loop. Increasing current loop KP or KI can fasten system transient response to output torque; reducing KP or KI can increase system stability.

Too big current loop KP or KI increases the possibility of system oscillation; too small KP or KI may affect the system torque output capability.

Note

Normally, there is no need to change the PI parameters of current loop. Do not change them unless absolutely necessary.

F7.10 Filtering coefficient	Setbting range: 0 ~ 63【27】

This parameter is the filtering coefficient for high speed and low speed feedback, as shown in Figure 6-19.

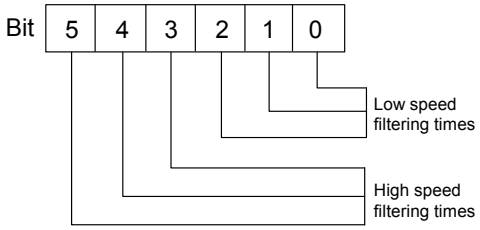


Figure 6-19 Filtering coefficient

Each filtering parameter accounts for 3 bits. The decimal number converted from the 3-bit number is the filtering times of the filtering parameter.

For example, high speed filtering needs 3 times, the corresponding binary number is 011B, therefore the corresponding Bit 5, Bit 4, and Bit 3 are respectively 0, 1 and 1; low speed filtering needs 1 time, the corresponding Bit 2, Bit 1 and Bit 0 are respectively 0, 0 and 1; so the 6-bit binary number is 011001B, which, if converted to a decimal number, is 25, thus 25 is the setting of F2.13.

Note

Normally, the filtering coefficient does not need adjustment, but in applications subject to bit interference, the filtering times can be increased.

6.9 Communication Parameters F8 (Reserved)

EV3200 inverter provides reserved standard RS485 and CAN communication ports, which use open Modbus serial communication protocol.

If you wish to control EV3200 inverter through communication, you may connect it to a computer or an PLC, or you may control it through a communication adapter.

F8.00 Modbus baud rate selection	Setting range: 0 ~ 7【4】

Defines the serial communication speed rate.

0: 1200bps

1: 2400bps

2: 4800bps

3: 9600bps

4: 19200bps

5: 38400bps

6: 115200bps

7: 125000bps

F8.01 Modbus data format	Setting range: 0 ~ 5【0】

Defines the data format adopted in serial communication protocol.

0: RTU, 1 start bit, 8 data bits, 2 stop bits, no parity

1: RTU, 1 start bit, 8 data bits, 1 stop bit, even parity

2: RTU, 1 start bit, 8 data bits, 1 stop bit, odd parity

3: ASCII, 1 start bit, 7 data bits, 2 stop bits, no parity

4: ASCII, 1 start bit, 7 data bits, 1 stop bit, even parity

5: ASCII, 1 start bit, 7 data bits, 1 stop bit, odd parity

F8.02 Local Number	Setting range: 0 ~ 127【5】

Defines the address of the local inverter in the case a host controls multiple inverters. The address of each inverter shall not repeat.

0 is defined as the broadcast address.

F8.03 Modbus communication failure detection time	Setting range: 0, 0.1 ~ 100.0s【0】

If communication control mode is not selected (F0.02=0 ~ 2 or F0.02=4 ~ 5), this function is disabled.

When F8.03=0, this function is disabled.

When F8.03 is not set to 0, if the communication interrupt lasts longer than the setting of F8.03, fault code E017 (communication error) will be displayed, and the inverter will stop.

F8.04 Modbus communication delay	Setting range: 0.01 ~ 1.000s【0.01】

You may define the response delay of the inverter in communication according to the speed of the Modbus main station.

In RTU mode, the actual communication delay shall not be less than 3.5 character spaces. In ASCII mode, the actual communication delay shall not be less than 1ms.

F8.05 CAN communication station enable	Setting range: 0 ~ 15【0】

This parameter is used to select to enable or disable the communication stations.

Bit 0: station 1 enable

Bit 1: station 2 enable

Bit 2: station 3 enable

Bit 3: station 4 enable

Corresponding station =1 means to enable the station

Corresponding station=0 means to disable the station.

F8.06 CAN baud rate selection	Setting range: 0 ~ 4【0】

Defines the data format adopted in CAN communication protocol.

0: 10kbps

1: 20kbps

2: 40kbps

3: 80kbps

4: 125kbps

F8.07 CAN communication failure detection time	Setting range: 0, 0.1 ~ 100.0s【0】

If communication control mode is not selected (F0.02=0 ~ 2 or F0.02=4 ~ 5), this function is disabled.

When F8.07=0, this function is disabled.

When F8.07 is not set to 0, if the communication interrupt lasts longer than the setting of F8.07, fault code E017 (communication error) will be displayed, and the inverter will stop.

F8.08 CAN communication delay	Setting range: 0.01 ~ 1.000s【0.01】

You may define the response delay of the inverter in communication according to the speed of the CAN main station. The contents of the CAN communication protocol can be modified according to your requirement.

6.10 Monitoring And Recording Parameters F9

F9.00 Parameters displayed by LED	Setting range: 1 ~ 1023【31】

F9.00 is to set the parameters that can be displayed on LED. For parameters that have been selected, you may scroll through them by pressing ⏭ on the keypad.

The display of each parameter is controlled by a binary bit, "1" for display, "0" for not display. Therefore whether these 10 parameters can be displayed is determined by 10-bit binary code. For example, Bit 0 controls whether to display operating frequency, if Bit 0=0, the frequency will not be displayed, if Bit 0=1, the frequency will be displayed. The representation of each bit is shown below:

Bit 0: running frequency (Hz)

Bit1: reference frequency (Hz)

Bit 2: output voltage (V)

Bit 3: output current (A)

Bit 4: output torque (%)

Bit 5: DC bus voltage (V)

Bit 6: Status of input terminal (No unit)

Note

Terminal input status is represented by a 10-bit binary code. Each bit represents ON/OFF state of an input terminal. The bit is "1" if the inverter detects the terminal is on, and is "0" if the inverter detects the terminal is off. We define the relation of bits and terminals as follows:

Bit	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Input terminal	CD	OD	X5	X4	X3	X2	X1

The number displayed by LED is the decimal number of the corresponding binary code.

Bit 7: Status of output terminal (no unit)

Note

Terminal input status is represented by a 4-bit binary code. Each bit represents ON/OFF state of an input terminal. The bit is "1" if the inverter detects the terminal is activated, and is "0" if the inverter detects the terminal is not activated. We define the relationship of bits of the binary code and terminals as follows:

Bit	bit2	bit1	bit0
Output terminal	PA3/PB3/PC3	PA2/PC2	PA1/PC1

The number displayed by LED is the decimal number of the corresponding binary code.

Bit 8: Low digits of pulse of door position (0 ~ 9999)

Bit 9: High digits of pulse of door position (0 ~ 9999)

Note

Door position = High digits of pulse counted for door position × 10000+low digits of pulse counted for door position

How to set the values

To determine what you want to display first and then set the corresponding bit to "1". For example, if you need to display the corresponding parameters controlled by Bit 0 ~ Bit 4, and not display other parameter, the setting should be 0000011111.

• To convert the binary code into the decimal code, the calculation formula is: $\sum_{i=0}^{7} bit_i \cdot 2^i$, where, i: 0 ~ 9.

As mentioned above, to convert the binary code into decimal code: $1 \times 2^0 + 1 \times 2^1 + 1 \times 2^2 + 1 \times 2^3 + 1 \times 2^4 = 31$

Therefore, this parameter is set to 31.

F9.01 Selection of parameters displayed by LED in stopping status	Setting range: 0 ~ 6【0】

0: Preset OD frequency (Hz)

1: Preset CD frequency (Hz)

2: Status of input terminal (No unit)

3: Status of output terminal (No unit)

4: DC bus voltage (V)

5: Low digits of pulse counted for door position (0 ~ 9999)

6: High digits of pulse counted for door position (0 ~ 9999)

Door position = High digits of pulse counted for door position × 10000+ Low digits of pulse counted for door position

Note

1. LED will display the parameter set in F9.01 as default upon power on, e.g., F9.01 =4, DC bus voltage will be displayed when the inverter is powered on. Other parameters at stopping status can be scrolled through by pressing ⏭.

2. For F9.00 and F9.01, the displayed low digits and high digits of pulse counted for door position, when F4.08 is set bigger than 0, are the same as F4.08.

F9.02 Type of latest fault	Setting range: 0 ~ 31【0】
F9.03 Type of second lastest fault	Setting range: 0 ~ 31【0】
F9.04 Type of third lastest fault	Setting range: 0 ~ 31【0】
F9.05 DC Bus Voltage (V) at the latest fault	Setting range: 0V ~ 999V【0】
F9.06 Output current (A) at the latest fault	Setting range: 0.00A ~ 99.99A【0.00】
F9.07 Frequency (Hz) at the latest fault	Setting range: 0.00Hz ~ 128.00Hz【0.00】
F9.08 Status of input terminal at the latest fault	Setting range: 0 ~ 127【0】
F9.09 Status of output terminal at the latest fault	Setting range: 0 ~ 7【0】
F9.10 High digits of pulse counted for door position at fault time	Setting range: 0 ~ 9999【0】
F9.11 Low digits of pulse counted for door position at fault time	Setting range: 0 ~ 9999【0】

EV3200 series inverter can diagnose 18 kinds of faults intelligently and can memorize the types of the latest 3 faults (F9.02, F9.03, F9.04), and also the voltage, current, frequency and the terminal status at the latest fault (F9.05 ~ F9.09) for your reference.

Refer to *Chapter 8 Troubleshooting* for details.

F9.12 High digit of OD times	Setting range: 0 ~ 9999*10000【0】
F9.13 Low digit of OD times	Setting range: 0 ~ 9999【0】
F9.14 High digit of CD times	Setting range: 0 ~ 9999*10000【0】
F9.15 Low digit of CD times	Setting range: 0 ~ 9999【0】

F9.12 and F9.13 record OD times.

OD times=F9.12 × 10000+F9.13

F9.14 and F9.15 record CD times.

CD times= F9.14 × 10000+F9.15

F9.16 Total operation time	Setting range: 0 ~ 65535 hours【0】

Records the inverter's actual operation time with power on in the unit of hour. The maximum value is 65535 hours. Once the operation time exceeds 65535 hours, the inverter will time from 0.

F9.17 Total running time	Setting range: 0 ~ 65535 hours【0】

Records the inverter's actual running time in the unit of hour. The maximum value is 65535 hours. Once the running time exceeds 65535 hours, the inverter will time from 0.

F9.18 Parameter initialization	Setting range: 0 ~ 100【0】

0: Parameter modification enabled

In this status, the parameter can be read and revised.

1: Clear the record

Clear the record in F9.02 ~ F9.15.

2: Load defaults

Recover the factory settings of F0 ~ F5, F7 ~ F8, F9.00 ~ F9.01 and F9.22 according to inverter model.

3 ~ 100: customized (reserved)

F9.19 Software version No.	Setting range: 1.00 ~ 99.99

The software version No. available to users for enquiry.

For example, "1.00" refers to the software of EV3200 series inverter whose version No. is 1.00.

F9.20 Product configuration No.	Setting range: 32XX

For example: 3200 refers to the standard EV3200 product.

F9.21 Heatsink temperature	Setting range: 0 ~ 100

The real-time temperature of heatsink.

F9.22 Relay output polarity selection	Setting range: 0 ~ 1【0】

0: relays PA1/PC1 and PA2/PC2 serve as output NC relays.

1: relays PA1/PC1 and PA2/PC2 serve as output NO relays.

Chapter 7 Application Guidance

This chapter introduces the basic procedures and parameter setting methods for the elevator door control system using EV3200 series inverter. Applications of speed control and distance control are introduced below, including the system configuration and parameter settings.

7.1 Motor Type Setup

Prior to motor tuning, first of all, you need to set the tuning parameters correctly according to the motor. Then, you can press the [OD] key to start tuning. During the tuning process, the keypad displays TUNE. When the tuning is over, the parameters will be saved automatically. Follow the procedures shown in Figure 7-1 to set the tuning parameters.

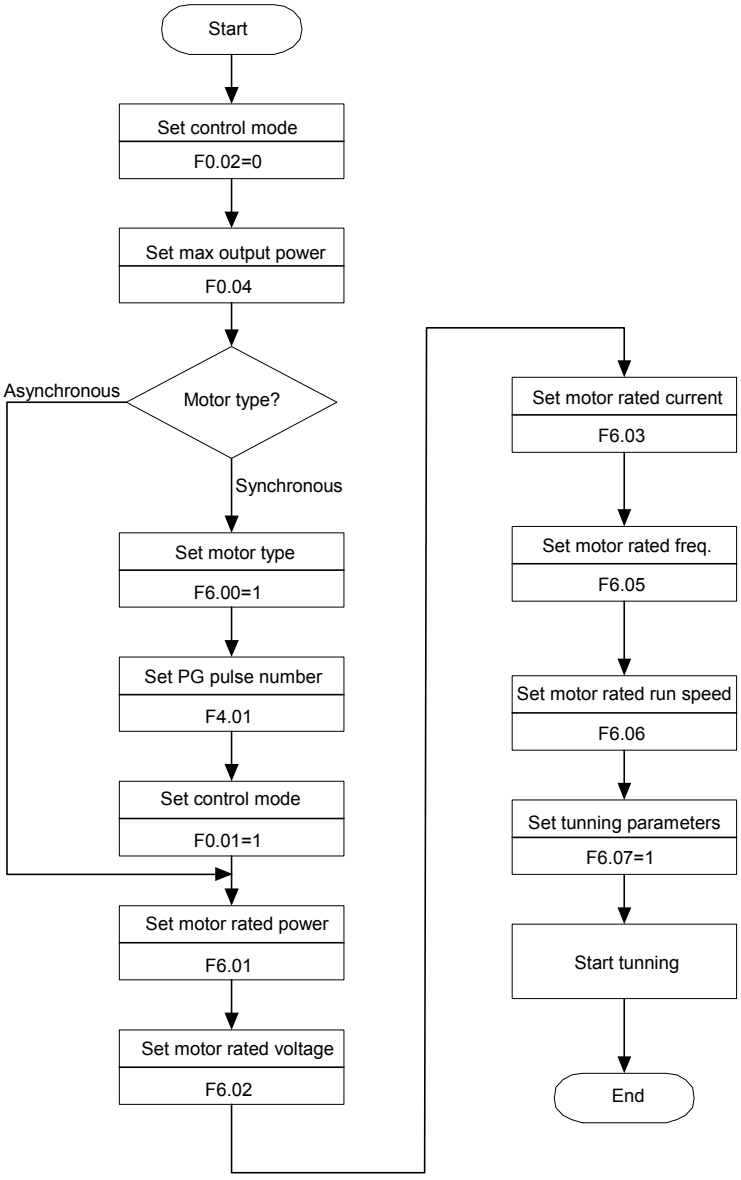


Figure 7-1 Motor tuning procedures

Note

During the tuning, the motor should be connected without load. Otherwise, the motor parameters obtained from tuning will be incorrect, and the tuning might fail.

Table 7-1 Motor parameters setting table

Parameter	Name	Setting	Remark
F0.01	Control mode	0	Parameters in this table are factory settings, adjust the OD parameters according to the actual OD operating conditions
F0.02	Control command selection	0	
F0.04	Max. output frequency	50Hz	
F4.00	PG type	0	
F4.01	Pulse number per revolution	200	
F4.02	PG direction	0	
F6.00	Motor type selection	0	
F6.01	Motor rated power	*	
F6.02	Motor rated voltage	*	
F6.03	Motor rated current	*	
F6.05	Motor rated frequency	*	
F6.06	Motor rated spinning speed	*	
F6.07	Motor tuning	0	

7.2 Speed Control

7.2.1 System Wiring Diagram

In speed control, speed decrease contacts are used to decrease the speed, and the position limiting signal is used to judge whether the door is opened or closed completely. System wiring diagram for speed control 1 is shown in Figure 7-2.

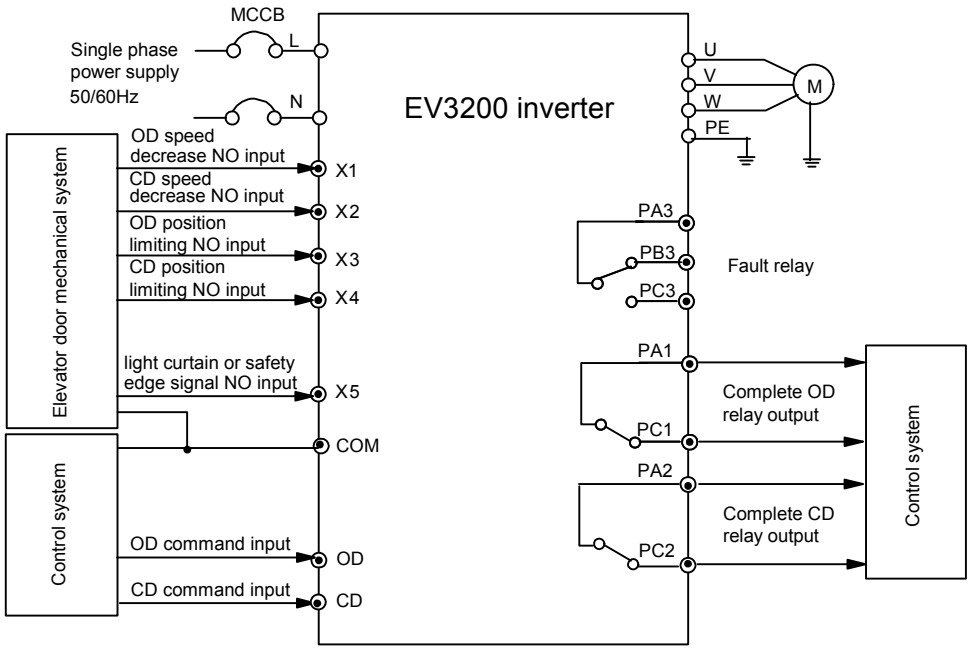


Figure 7-2 System wiring diagram for speed control

7.2.2 Testing Procedures

1. Wiring according to Figure 7-2.

2. Switch on the inverter, set F9.18 to 2, load defaults. Refer to *4.1 Operation* for parameter setting.

3. Carry out motor tuning according to instructions provided in *7.1 Motor Type Setup*.

4. Set F0.02 to 1 (keypad control mode), set the parameters according to Table 7-2, press OD to start the operation. If bumping or unsmooth operation occurs in the process, adjust the CD or OD curve according to the OD curve for speed control shown in Figure 6-4 and CD curve for speed control shown in Figure 6-8.

Note

If the actual operation is reverse to OD/CD command, please change the setting of F0.03 or change the phase connection of motor.

5. After testing, set F0.02 to 2 (terminal control mode), and the inverter will begin to work normally.

7.2.3 Parameter Settings

Figure 7-2 provides the parameter settings.

Table 7-2 Parameter settings for speed control

Function code	Name	Setting	Remark
F0.01	Control mode	0	Speed control
F5.00	Function selection for control terminal X1	10	Normally open input contacts for OD speed decrease
F5.01	Function selection for control terminal X2	12	Normally open input contacts for CD speed decrease
F5.02	Function selection for control terminal X3	6	Normally open input for OD position limiting
F5.03	Function selection for control terminal X4	8	Normally open input for CD position limiting
F5.04	Function selection for control terminal X5	2/4	Normally open input contacts for light curtain signal/ safety edge
F5.05	Function of programmable relay output PA1/PC1	2	Output signal 1 for complete OD
F5.06	Function of programmable relay output PA2/PC2	3	Output signal 1 for complete CD
F1.00	OD start creep time for speed control	500ms	Parameters in this table are factory settings, adjust the OD parameters according to the actual OD operating conditions
F1.02	OD start creep speed	7Hz	
F1.03	OD Acc time	0.5s	
F1.04	OD reference frequency	20Hz	
F1.05	Rush hour operation OD speed	25Hz	
F1.07	OD Dec time	0.5s	
F1.08	OD ending creep speed	3Hz	
F1.10	Threshold for OD torque changing	50.0%	
F1.11	Maintaining torque at OD completion	50.0%	
F2.00	CD start creep time for speed control	500ms	Parameters in this table are factory settings, adjust the CD parameters according to the actual CD operating conditions
F2.02	CD start creep speed	6Hz	
F2.03	CD Acc time	0.5s	
F2.04	CD reference frequency	15Hz	
F2.05	Rush hour operation CD speed	20Hz	
F2.07	CD Dec time	0.5s	
F2.08	CD ending creep speed	2Hz	
F2.10	Threshold for CD torque changing	50.0%	
F2.11	Maintaining torque at CD completion	50.0%	
F2.12	CD high speed for EFS	10Hz	
F3.08	CD obstruction sensitivity	100.0%	Parameters in this table are factory settings, adjust the parameters according to the actual conditions
F3.09	Dec time upon abnormality	300ms	
F3.10	OD obstruction sensitivity	100.0%	

Note

1. Setting of F3.01 (OD time limit) must be bigger than the sum of time in all phases of OD curve.
2. Setting of F3.02 (CD time limit) must be bigger than the sum of time in all phases of CD curve.

7.3 Distance Control 1

7.3.1 System Wiring Diagram

For distance control 1, PG should be installed on the motor shaft. In distance control, the speed decrease and complete CD and OD judgments are made according to the actual number of pulses counted. System wiring diagram for distance control is shown in Figure 7-3 and Figure 7-4.

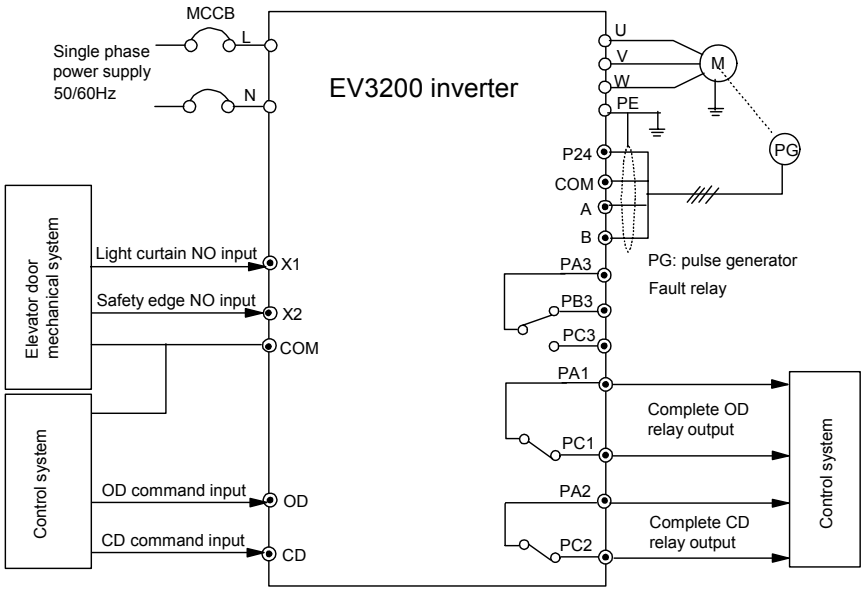


Figure 7-3 System wiring diagram for distance control 1(asynchronous motor)

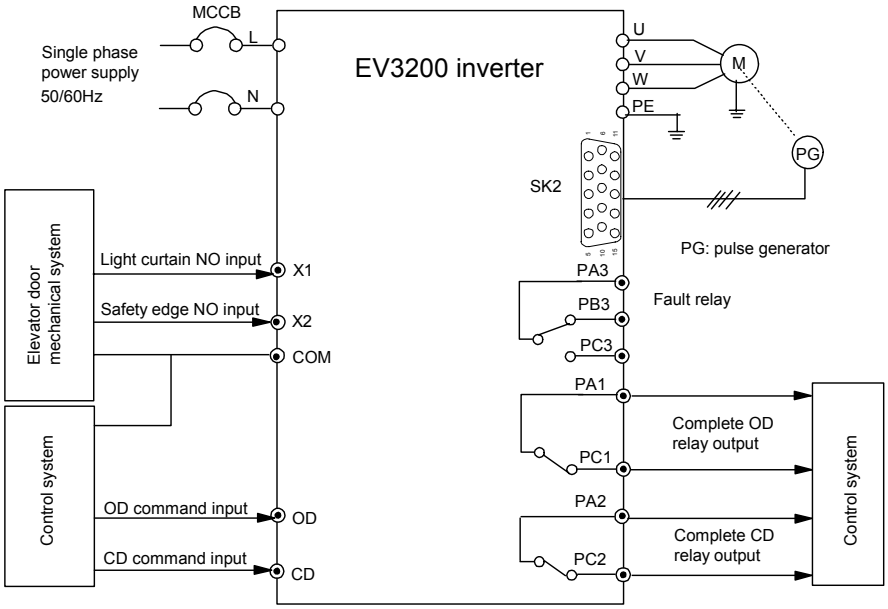


Figure 7-4 System wiring diagram for distance control 1(synchronous motor, UVW incremental PG)

7.3.2 Testing Procedures

1. Do the wiring according to Figure 7-3 and Figure 7-4 (refer to *3.4 PG Terminals Of Synchronous Motor* and *3.5 Wiring Diagram Of Inverter* for PG wiring).

2. Switch on the inverter, set F9.18 to 2 to restore the factory settings.

3. Carry out motor tuning according to instructions provided in *7.1 Motor Type Setup*. The parameters will be saved automatically after tuning.

4. Set F0.01 to 1, set F4.01 and F4.02 (0: forward, 1: reverse) correctly. After exiting the programming status, press OD (or CD) to start the operation in keypad control mode, and adjust F4.02 setting according to the actual operating conditions. If over current or over load occurs, or the output current exceeds the motor rated current, adjust the setting of F4.02 to ensure correct PG parameter settings, and restart the inverter.

5. Switch off the inverter, connect the elevator door mechanical system and switch on the inverter again.

6) Set F0.02 to 1 (keypad control mode), select auto-learning speed properly via F4.04, set F4.05 to 1, press OD to start door-width auto learning, and the motor operates according to the procedures of CD→OD→CD. The inverter stops after the last motor catching. The door width information will be saved automatically after auto-learning.

Note

If the actual operation direction is reverse to OD/CD command, change the setting of F0.03 to 1, and change the setting of F4.02 accordingly.

7. Switch on the inverter again, in first time operation (OD or CD), the inverter will operate at the speed set by F3.00. When the door is opened or closed completely, the inverter will switch to OD (or CD) completion torque maintaining status.

8. Set relevant parameters according to Table 7-3. The CD and OD parameters can be adjusted according to Figure 6-8 and Figure 6-9.

9. Set F0.02 to 2 (terminal control mode), and the inverter can work normally.

7.3.3 Parameter Settings

Figure 7-3 provides the parameter settings.

Table 7-3 Parameter settings for distance control 3

Function code	Name	Setting	Remark
F0.01	Control mode	3	Distance control 3
F5.00	Function selection for control terminal X1	2	Normally open input contacts for light curtain signal
F5.01	Function selection for control terminal X2	4	Normally open input contacts for safety edge
F5.05	Function of programmable relay output PA1/PC1	2	Output signal 1 for complete OD
F5.06	Function of programmable relay output PA2/PC2	3	Output signal 1 for complete CD
F1.01	OD start creep distance for distance control	15%	Parameters in this table are factory settings, adjust the OD parameters according to the actual OD operating conditions
F1.02	OD start creep speed	7Hz	
F1.03	OD Acc time	0.5s	
F1.04	OD reference frequency	20Hz	
F1.05	Rush hour operation OD speed	25Hz	
F1.06	OD speed decrease point in distance control	70.0%	
F1.07	OD Dec time	0.5s	
F1.08	OD ending creep speed	3Hz	
F1.09	OD position limit in distance control	95.0%	
F1.10	Threshold for OD torque changing	50.0%	
F1.11	Maintaining torque at OD completion	50.0%	
F1.12	OD operation curve selection in distance control	0	
F2.01	CD start creep distance	15%	Parameters in this table are factory settings, adjust the CD parameters according to the actual CD operating conditions
F2.02	CD start creep speed	6Hz	
F2.03	CD Acc time	0.5s	
F2.04	CD reference frequency	15Hz	
F2.05	Rush hour operation CD speed	20Hz	
F2.06	CD speed decrease point in distance control	70.0%	
F2.07	CD Dec time	2.0s	
F2.08	CD ending creep speed	2Hz	
F2.09	CD position limit in distance control	95.0%	
F2.10	Threshold for CD torque changing	50.0%	
F2.11	Maintaining torque at CD completion	50.0%	
F2.12	CD high speed for EFS	10Hz	
F2.13	CD operation curve selection in distance control	0	
F3.00	INI operation speed	5Hz	Parameters in this table are factory settings, adjust the parameters according to the actual conditions
F3.08	CD obstruction sensitivity	100%	
F3.09	Dec time upon abnormality	300ms	
F3.10	OD obstruction sensitivity	100%	

Note

1. Setting of F3.01 (OD time limit) must be bigger than the sum of time in all phases of OD curve.

2. Setting of F3.02 (CD time limit) must be bigger than the sum of time in all phases of CD curve.

3. Setting of F3.03 (slow speed operation time limit) must be bigger than the sum of time in all phases of OD and CD curves.

7.4 Distance Control 2

In this mode, refer to Figure 7-3 for the system configuration, the PG may not be connected to the motor shaft.

For distance control 2 mode, except that F0.01 should be set to 2 (distance control 2), all parameter settings are the same as those for distance control 1 mode. Refer to the testing procedures of distance control 1 mode for the testing procedures of distance control 2 mode.

7.5 Distance Control 3

7.5.1 System Wiring Diagram

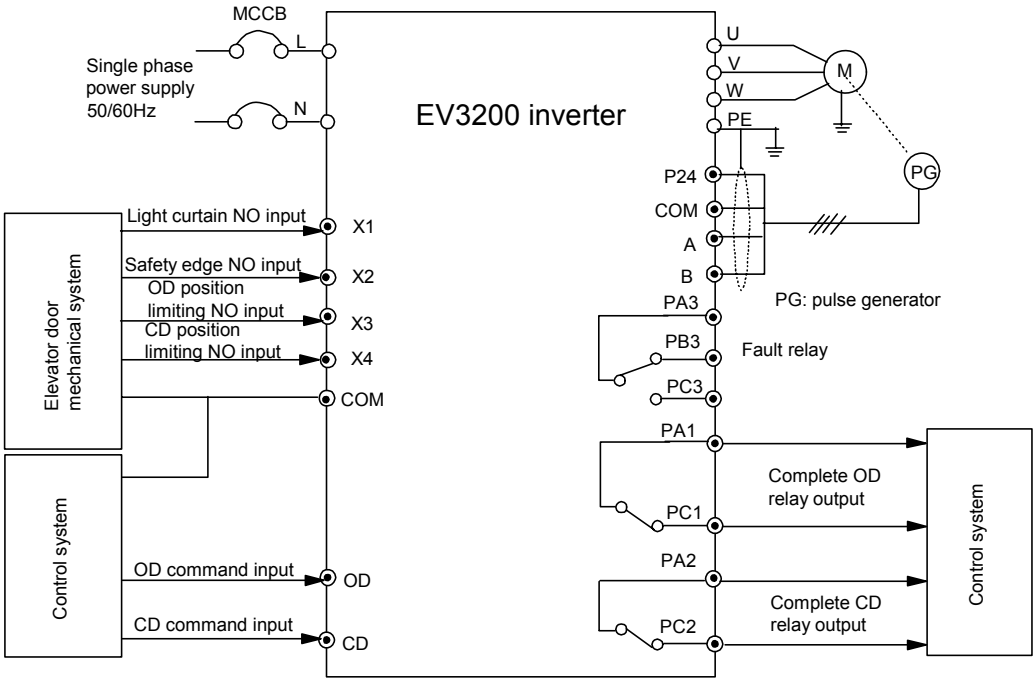


Figure 7-5 System wiring diagram for distance control 3(asynchronous motor)

7.5.2 Testing Procedures

1. Do the wiring according to Figure 7-5.

2. Switch on the inverter, set F9.18 to 2 to restore the factory settings.

3. Carry out motor tuning according to instructions provided in *7.1 Motor Type Setup*. The parameters will be saved automatically after tuning.

4. Set F0.01 to 3, set F4.01 and F4.02 (0: forward, 1: reverse) correctly. After exiting the programming status, press OD (or CD) to start the operation in keypad control mode, and adjust F4.02 setting according to the actual operating conditions. If over current or over load occurs, or the output current exceeds the motor rated current, adjust the setting of F4.02 to ensure correct PG parameter settings, and restart the inverter.

5. Switch off the inverter, connect the elevator door mechanical system and switch on the inverter again.

6. Set F0.02 to 1 (keypad control mode), select auto-learning speed properly via F4.04, set F4.05 to 1, press OD to start door-width auto learning, and the motor operates according to the procedures of CD→OD→CD. The inverter stops after the last motor catching. The door width information will be saved automatically after auto-learning.

Note

If the actual operation direction is reverse to OD/CD command, change the setting of F0.03 to 1, and change the setting of F4.02 accordingly.

7. Switch on the inverter again, in first time operation (OD or CD), the inverter will operate at the speed set by F3.00. When the door is opened or closed completely, the inverter will switch to OD (or CD) completion torque maintaining status.

8. Set relevant parameters according to Table 7-4. The CD and OD parameters can be adjusted according to Figure 6-8 and Figure 6-9.

9. Set F0.02 to 2 (terminal control mode), and the inverter can work normally.

7.5.3 Parameter Settings

Figure 7-4 provides the parameter settings.

Table 7-4 Parameter settings for distance control 3

Function code	Name	Setting	Remark
F0.01	Control mode	1	Distance control 1
F5.00	Function selection for control terminal X1	2	Normally open input contacts for light curtain signal
F5.01	Function selection for control terminal X2	4	Normally open input contacts for safety edge
F5.02	Function selection for control terminal X3	6	Normally open input for OD position limiting
F5.03	Function selection for control terminal X4	8	Normally open input for CD position limiting
F5.05	Function of programmable relay output PA1/PC1	2	Output signal 1 for complete OD
F5.06	Function of programmable relay output PA2/PC2	3	Output signal 1 for complete CD
F1.01	OD start creep distance for distance control	15%	Parameters in this table are factory settings, adjust the OD parameters according to the actual OD operating conditions
F1.02	OD start creep speed	7Hz	
F1.03	OD Acc time	0.5s	
F1.04	OD reference frequency	20Hz	
F1.05	Rush hour operation OD speed	25Hz	
F1.06	OD speed decrease point in distance control	70.0%	
F1.07	OD Dec time	0.5s	
F1.08	OD ending creep speed	3Hz	
F1.09	OD position limit in distance control	95.0%	
F1.10	Threshold for OD torque changing	50.0%	
F1.11	Maintaining torque at OD completion	50.0%	
F1.12	OD operation curve selection in distance control	0	
F2.01	CD start creep distance	15%	Parameters in this table are factory settings, adjust the CD parameters according to the actual CD operating conditions
F2.02	CD start creep speed	6Hz	
F2.03	CD Acc time	0.5s	
F2.04	CD reference frequency	15Hz	
F2.05	Rush hour operation CD speed	20Hz	
F2.06	CD speed decrease point in distance control	70.0%	
F2.07	CD Dec time	2.0s	
F2.08	CD ending creep speed	2Hz	
F2.09	CD position limit in distance control	95.0%	
F2.10	Threshold for CD torque changing	50.0%	
F2.11	Maintaining torque at CD completion	50.0%	
F2.12	CD high speed for EFS	10Hz	
F2.13	CD operation curve selection in distance control	0	
F3.00	INI operation speed	5Hz	Parameters in this table are factory settings, adjust the parameters according to the actual conditions
F3.08	CD obstruction sensitivity	100%	
F3.09	Dec time upon abnormality	300ms	
F3.10	OD obstruction sensitivity	100%	

Chapter 8 Troubleshooting

EV3200 can detect 19 types of faults. When fault occurs, you can get the information of fault codes, DC bus voltage, output current, operating frequency and terminal status by reviewing the values of F9.02 ~ F9.09. You can check the faults according to the following table and note down the fault phenomena before seeking technical service.

Fault code	Fault type	Possible cause	Action to take
E001	Over-current in Acc process	1) Acc time is too short. 2) Restart the motor in motion when momentary stop occurs. 3) Incorrect external wiring 4) Incorrect wiring of PG 5) Output phase failure	1) Prolong the Acc time; 2) Start the motor after it stops. 3) Wiring correctly 4) Change the setting of F4.02 or the wiring of PG 5) Check the cable connection of the motor
E002	Overcurrent in Dec process	1) Dec time is too short 2) Output phase failure	1) Increase Dec time or adjust PI parameters 2) Check the cable connection of the motor
E003	Overcurrent in constant speed operation	1) Sudden change of load 2) Abnormal load\ 3) Output phase failure	1) Adjust PI parameters 2) Check load 3) Check the cable connection of the motor
E004	Overvoltage in Acc process	1) Abnormal input voltage 2) Unsuitable setting of PI parameters 3) Big load inertia	1) Check input power source. 2) Adjust PI parameters 3) Connect external braking resistor
E005	Overvoltage in Dec process	1) Dec time is short 2) Unsuitable selection of braking resistor 3) Abnormal input voltage 4) Unsuitable setting of PI parameters	1) Prolong Dec time 2) Re-select the braking resistor 3) Check input voltage 4) Adjust PI parameters
E006	Overvoltage in constant speed operation	1) Abnormal change of input voltage 2) Energy regenerated by negative torque load	1) Mount input reactor 2) Connect external braking resistor
E007 E008	Reserved		
E009	Output phase loss	The output cables of the inverter are broken, phase failure or 3-phase loads are severely unbalanced	Check the 3-phase output cables of the inverter and check if the 3-phase loads are balanced
E010	Reserved		
E011	Heatsink overheating	1) Air duct blocked 2) IGBT abnormal	1) Clear the air duct 2) Seek service
E012	Reserved		
E013	Inverter overload	1) Heavy load 2) Low mains voltage 3) PG error	1) Select inverters with bigger ratings 2) Check mains voltage 3) Check the PG wiring or replace the PG
E014	Motor protection	1) Motor rated current setting error 2) Motor's max allowable operating current set too small 3) Motor model selection error	1) Check the setting of F6.03 2) Check the setting of F6.04 3) Select applicable motor
E015	Reserved		
E016	EEPROM read or write fault	Fault occurs during the read-write of control parameters	Seek service
E017, E018	Reserved		
E019	Current detecting circuit fault	1) Current detecting circuit fails 2) Power source fails	Seek service
E020 E021 E022 E023	Reserved		
E024	Motor tuning error	1) Motor parameter setting error 2) Tuning overtime	1) Set the motor parameters correctly according to the motor nameplate 2) Check if the motor is broken away from its load and check the motor cables

Fault code	Fault type	Possible cause	Action to take
E025	PG error	1) PG signal cable broken 2) PG signal reverse-connected 3) Output cable connection error or disconnected (synchronous motor)	1) Rectify the PG connection 2) Change the setting of F4.02 (PG reversed) or change the connection of any two phases of the motor 3) Check the output cable connection (synchronous motor)
E026	Overspeed error	1) Output cable phase failure 2) Initial angle of synchronous motor error	1) Check that the output cable is not disconnected 2) Check that the initial angle of the synchronous motor is correct through tuning
E027	Reserved		
E028	Parameter setting error	1) OD width auto-learning is not set as keypad control mode or terminal control mode 2) General keypad operation mode is not used in motor tuning process 3) CD and OD time is set shorter than all the settings of CD and OD time 4) In the dual motors control mode, tuning is conducted or synchronous motor is used 5) F5.00 (X1 terminal) is not set as zero (0) when the load is a synchronous motor, and incremental PG is used	1) Set F0.02=1 or F0.02=2 in OD width auto-learning 2) Set F002 to 0 in motor tuning 3) Set the OD and CD time to a bigger value and ensure the setting of F006 is bigger than the sum of all the settings of CD and OD time 4) The tuning can be conducted only in the single motor mode (F4.11 = 0), and only one motor can be connected. Besides, the synchronous motor can only be used in the single motor mode (F4.11 = 0). 5) F5.00 (X1 terminal) must be set as zero (0) when the load is a synchronous motor, and incremental PG is used
E029	Door width auto-learning error	1) The OD width obtained from the auto-learning process is 0. 2) The OD width obtained from the auto-learning process is out of the limits 3) Door width auto-learning overtime	1) Check the PG wiring and relevant parameters 2) Check the mechanical system of the elevator door
E030	OD overtime error	1) The motor running direction is reverse to the definition of OD 2) OD contacts error or setting error 3) PG cable is broken	1) Change the phase rotation of the motor or set F0.03 to 1 2) Check OD contacts signal 3) Check PG cable 4) Check the mechanical system of elevator door
E031	CD overtime error	1) The motor running direction is reverse to the definition of CD 2) CD contacts error or setting error 3) PG cable is broken	1) Change the phase rotation of motor or set F0.03 to 1 2) Check CD contacts signal 3) Check PG cable

Chapter 9 Maintenance

Lots of factors such as ambient temperature, humidity, acid/alkali substances, dust, vibration, internal component aging and wearing may raise the chance of the occurrence of potential faults. Therefore, it is quite necessary to conduct daily checking and periodical maintenance to the inverters that are operated or stored.

If the inverter is transported from a distant place, routine inspections such as integrity of components and tightening of screws must be done before using the inverter.

During normal operation, clean the dust inside the inverter periodically, and check if the screws become loose.

If the inverter has not been used for a long time, it is recommended to energize it every six months for more than half an hour to keep the internal electronic elements in good conditions.

	For the drive that has been stored for more than two years, when supplying AC power to the drive, use a voltage regulator to raise the input voltage to rated input voltage gradually, otherwise the drive may be damaged

	During drive's operation, the voltage is very high. Misoperation may result in serious personal injuries. Within a certain period of time after the power is cut off, dangerous high voltage still exsit inside the drive. Maintenance of drive shall only be done by qualified, trained professionals. Before maintenance, maintenance personnel must take off personal metal articles such as: watches, rings. Working uniforms and tools used during the operation must satisfy insulation requirements to avoid electric shock.

	Before check and maintenance, please confirm the following items first. Otherwise, there is the hazard of electric shock: The inverter has been switched off; Use a volt-meter to test the voltage between terminals P(+) and P(-)and the voltage should be below 36V.

9.1 Daily Maintenance

Daily maintenance is required when using the inverter so as to ensure the good operating environment. Besides, the daily operating data, parameter settings, parameter modification, etc. should be recorded, and filed.

Through daily maintenance and checking, various abnormal phenomena and the reasons for them can be found in time so as to eliminate the potential faults, ensure the normal operation of the inverter and prolong the inverter's life.

Refer to Table 9-1 for daily checking items.

Table 9-1 Daily maintenance and check items

Check item	Check guide			Criteria for judgment
	Check sub-item	Period	Check method	
Operating environment	1) Temperature, humidity 2) Dust, water and drip 3) Gas	Anytime	1)Thermometer, humidiometer 2) Visual inspection; 3) Visual inspection and smelling	1) Temperature should be lower than 40°C, derate the inverter otherwise; the humidity should meet specifications 2) No dust accummulation, no dripping, no condensation 3) No abnormal color or smell
Inverter	1) Vibration 2) heat 3) Noise	Anytime	1) Visual inspection 2) Thermometer, visual inspection 3) Listening	1) Stable operation, no vibration 2) Proper ventilation and temperature 3) No abnormal noise
Motor	1) Vibration 2) heat 3) Noise	Anytime	1) Visual inspection, listening 2) Thermometer 3) Listening	1) No abnormal vibration or abnormal noise 2) Normal temperature 3) No abnormal noise
Operating parameter	1) Input voltage 2) Output voltage 3) Output current 4) Internal temperature	Anytime	1) Voltmeter 2) Voltmeter 3) Ammeter 4) Thermometer	1) Within specifications 2) Within specifications 3) Within specifications 4) Temperature rise less than 40°C

9.2 Periodical Maintenance

You should check the inverter every 3 ~ 6 months according to the actual environment so as to eliminate the potential faults and ensure the performance of the inverter and prolong its life.

Only trained personnel is allowed maintaining the drive.
Never leave metal parts like screws or pads in the drive, otherwise the drive may be damaged.
Do not reform the drive by yourself, otherwise the drive might become malfunctioned.

🕮 **Note**

Some IC components on the control board are sensitive to ESD, so do not touch these components.

General Inspection:

1. Check if screws of control terminals are loose. If so, tighten them with a screwdriver.

2. Check if the main circuit terminals are properly connected, and check if the connection points of mains cables or buses, or screws are over heated.

3. Check if the power cables and control cables are damaged, especially the skin of the cables.

4. Check if the insulating tapes around the cable lugs are stripped or the connection between the cable and cable lugs is loose.

5. Before the insulation test of the motor, the motor must be disconnected from the inverter. Otherwise, the inverter might be damaged.

🕮 **Note**

Dielectric test of the inverter has already been done in the factory. It is not necessary for the user to do dielectric test again in order to avoid potential damage of its internal components.

9.3 Replacing Weary Parts

Components that are easily damaged mainly include electrolyte capacitors of filters. Their lifetime depends largely on their application environment and maintenance.

Normally, lifetime of electrolyte capacitor is: 40,000 ~ 50,000 hours.

You can decide the time when the components should be replaced according to their life and the inverter's total service time.

Abnormal components found during checking should be replaced immediately.

The model and parameters of the new component should be the same as or very similar to the old component.

🕮 **Note**

The inverter may be damaged if the new component's model and parameters are different from those of the exchanged component.

Possible cause of damages of electrolyte capacitor: high ambient temperature, aging of electrolyte and big pulse current.

Criteria: Check if over-current or over-voltage failures occur frequently during inverter startup with load, or if there is any leakage of liquids, or if the safety valve protrudes. Measure static capacitance and insulation resistance.

9.4 Storage

1. The following points must be followed for the temporary and long-term storage of the inverter.

Table 9-2 Storage environment of the inverter

Item	Requirements	Remark
Ambient temperature	-40°C ~ 70°C	Long-time storage temperature should be less than 30°C to avoid the deterioration of the capacitor. Condensation and frozen caused by sharp temperature change should be avoided
Relative humidity	20 ~ 90%	Use plastic film to seal the inverter and desiccant, etc.
Storage environment	Store in locations free of direct sun shine, dust, corrosive or combustible gases, oil mist, vapor, water drop, vibration and salt	

2. Long-time storage will cause the deterioration of electrolytic capacitors. Therefore, the inverter must be powered on periodically. For the inverter that has been stored for a long time, it should be powered on without driving a motor for at least half an hour every half year.

9.5 Warranty

Emerson Network Power will offer warranty service if the inverter has faults in the following situations:

1. There are 18 months defects liability period as of the date of manufacture for the inverter, providing that the inverter is used as required in this user manual. After the 18 months, servicing will be charged properly;

2. Even within the 18 months, servicing will be charged in case of the following situations:

- Damages incurred to the inverter due to mis-operations that are not in compliance with the User Manual.
- Damages incurred to the inverter due to wrong wire connections.
- Damages incurred to the inverter due to fire, flood, abnormal voltage and so on.
- Damages incurred to the inverter due to the improper application of the inverter.
- The service will be charged based on the costs. If there are any contracts, the contracts prevail.

Appendix 1 EMI Filter And AC Input Reactor

EMI filter should be provided by the user. Test proved that the filters described below can be used with EV3200 series inverter.

Inverter model	Filter model	Filter rated current (A)	Filter max. power consumption (W)	Filter operation leakage current (mA)	Terminal torque (Nm)	Weight (kg)
EV3200-2S0002A	Schaffner FS6512-12-07	12	3.7	51.2	0.8	0.65
EV3200-2S0004A						
EV3200-2S0002S						
EV3200-2S0004S						

Figure 1 shows the dimensions of the EMI filter.

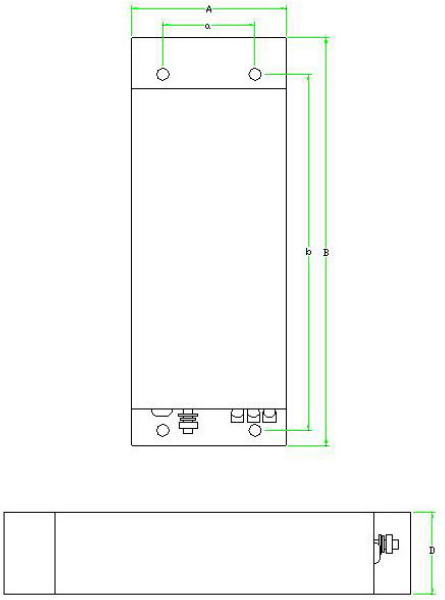


Figure 1 Dimensions of EMI filter

The dimensions A, a, B, b, and D of the EMI filter shown in Figure 1 differ with the filter model. Refer to the following table:

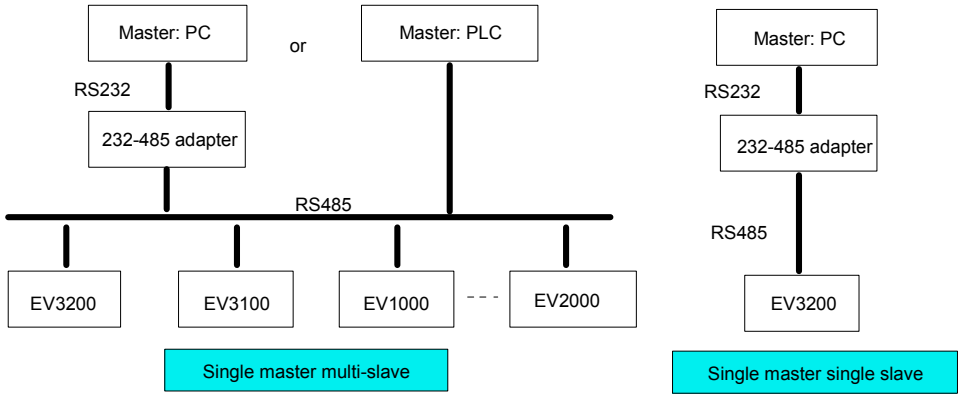
EMI filter model	Dimensions				
	A (mm)	a (mm)	B (mm)	b (mm)	D (mm)
Schaffner-FS6512-12-07	74	48	193	173	40

The AC input reactor specifications are listed in the following table.

Controller model	Rated current of AC input reactor (A)	Inductance of AC input reactor (mH)
EV3200-2S0002A	2.4	4.5
EV3200-2S0004A	3.2	9.75
EV3200-2S0002S	2.4	4.5
EV3200-2S0004S	3.2	9.75

Appendix 2 Modbus Communication Protocol

Network Topology:



Interfaces

RS485 or RS232: asynchronous, half-duplex.

Default: 8-N-2, 19200bps. See parameter settings of parameter group F8.

Communication mode

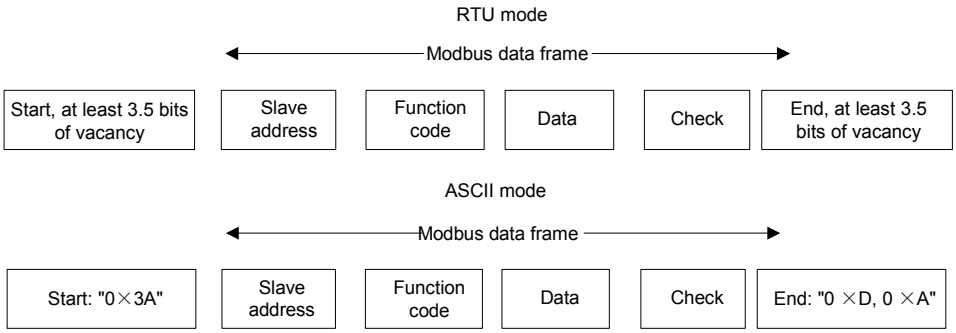
1. The protocol is Modbus protocol.

2. The inverter is a slave in the network. It communicates in 'point to point' master-slave mode. It will not respond to the command sent by the master via broadcast address.

3. In the case of multi-inverter communication or long-distance transmission, connecting a 100 ~ 120Ω resistor in parallel with the master signal line will help to enhance the immunity to interference.

Protocol format:

Modbus protocol supports both RTU and ASCII mode. The frame format is illustrated as follows:



Modbus adopts "Big Endian" representation for data frame. This means that when a numerical quantity larger than a byte is transmitted, the most significant byte is sent first.

RTU mode:

In RTU mode, the idle time between frames is decided by the bigger value between parameter setting and the Modbus minimum idle time. The minimum Modbus idle time between frames should be no less than 3.5 bytes. The checksum adopts CRC-16 method. All data except checksum itself sent will be counted into the calculation. Please refer to the examples given in the end of this appendix for details on CRC Check. Note that at least 3.5 bytes of Modbus idle time should be kept, and the start and end idle time need not be summed up to it.

The table below shows the data frame of reading parameter 002 from Inverter No. 1.

Address	Function parameter	Register address		Quantity of inputs		Check sum	
0x01	0x03	0x00	0x02	0x00	0x01	0x25	0xCA

The table below shows the reply frame from Inverter No.1.

Address	Function parameter	Reply bytes	Register content		Check sum	
0x01	0x03	0x02	0x00	0x00	0xB8	0x44

ASCII mode

In ASCII mode, the frame head is “0x3A”, and default frame tail is “0x0D” or “0x0A”. The frame tail can also be configured by users. Except frame head and tail, other bytes will be sent as two ASCII characters, first sending higher nibble and then lower nibble. The data have 7 bits. “A” ~ “F” corresponds to the ASCII code of respective capital letter. LRC check is used, the check covers the information from slave address to data.

The following example shows the command frame of writing “1000 (0x3E8)” into Register 003 of Inverter No. 1.

	Frame head	Address		Function parameter		Register address				Content written				Check sum		Frame tail	
Code	:	0	1	0	6	0	0	0	2	0	F	A	0	4	8	CR	LF
ASCII	3A	30	31	30	36	30	30	30	33	30	33	45	38	30	42	0D	0A

Protocol function

The main function of Modbus is to read and write parameters. Different function parameters decide different operation requests. The Modbus protocol supports the following function codes:

Function parameter	Description
0x03	Read inverter’s parameter and operation status parameters
0x06	Modify single inverter’s parameter or control parameters. Not save them upon power-off
0x41	Modify single inverter’s parameter or control parameters. Saving them upon power-off
0x10	Modify several inverters’ parameter or control parameters. Not save them upon power-off

All inverter’s parameters, control and status parameters are mapped to Modbus R/W Register. The R/W properties of the parameters and their setting ranges are specified in the user manual. The group number of the inverter’s parameter maps to the most significant byte of the register address, and the index number of the parameter in the group maps to the least significant byte. The control and status parameters of the inverter are virtually taken as parameter group. The relationship of group number of the parameters and the most significant byte of register address is listed below:

F0 group: 0x00. F1 group: 0x01. F2 group: 0x02.

F3 group: 0x03. F4 group: 0x04. F5 group: 0x05.

F6 group: 0x06. F7 group: 0x07. F8 group: 0x08.

F9 group: 0x09. FE group: 0x0E.

For example, the register address of F3.02: 0x302, register address of FE.01: 0xE01.

Inverter status parameter group: 0x33. Index of inverter status parameters:

Register address	Parameter
0x3300	Operation status
0x3301	Running frequency
0x3302	Output current
0x3303	Output voltage
0x3304	Frequency setting
0x3305	DC bus voltage
0x3306	Software version
0x3307	Product configuration
0x3308	Angle of synchronous machine
0x3309	Reserved
0x3310	Input terminal group status (0: OFF 1: ON), X1 ~ X5, OD, CD corresponding to bits 0 ~ 6 respectively

Bit definition of inverter status word:

Status word (bit)	Value	Meaning	Remark
bit0	1	OD	Current operation direction of door
	0	CD	
bit1	1	Inverter ready for running	Inverter needs to get ready before accepting running commands
	0	No running preparation	
bit2	1	Running	Inverter state
	0	Standby	
bit3	1	Inverter faulty	Inverter being faulty
	0	Inverter normal	Inverter normal and ready for running
bit4 ~ bit15			Reserved

Inverter control parameter group: 0x32

Register address	Parameter
0x3201	Inverter main control word
0x3202	Restore factory defaults
0x3203 ~ 0x3204	Reserved
0x3205	Setting output terminal group status (0: OFF, 1: ON) (setting range: 0 ~ 3), 0: not open, 1: open No. 1 relay; 2: open No. 1 and No. 2 relays; 3: open all three relays

Bit definition of inverter control word:

Control word (bit)	Value	Meaning	Remark
bit0	1	Running command valid	This bit works with the inverter enable bit to run the inverter for OD and CD
	0	Running command invalid	
bit1	1	OD, auto-learning,, FWD running	Elevator door running direction, auto-learning, RWD/REV running in general drvie mode
	0	CD, REV running	
bit2	1	Reserved	
	0		
bit3	1	Inverter enable	Indicating the inverter state: normal or faulty. Function same as terminal EN
	0	Inverter disable	
bit4	1	Reset valid	Inverter fault has been reset, including all communication control modes
	0	Reset invalid	
bit5	1	Stop request valid	Valid for all communication control modes
	0	Stop request invalid	
bit6 ~ bit15			Reserved

Format and meaning of Modbus function code and data unit: The following takes RTU mode as an example to describe the frame format. The length of data unit in ASCII mode should be doubled.

Protocol data unit format of reading parameters:

Request format:

Protocol data unit	Data length (bytes)	Range
Function parameter	1	0x03
Initial register address	2	0x0000 ~ 0xFFFF
Register quantity	2	0x0001 ~ 0x0004

Response format:

Protocol data unit	Data length (bytes)	Range
Function parameter	1	0x03
Number of bytes read out	1	2*register quantity
Contents	2*register quantity	

If the operation fails, error code and exception code forming the protocol data unit will be replied. The error code is (Parameter + 0x80). The exception code denotes cause of the error; see the table below.

Exception code	Meaning
0x03	Data error, exceeding upper or lower limit
0x18	Information frame error, including data length or check sum error
0x20	Parameter cannot be modified
0x21	Parameter cannot be modified during operation
0x22	Parameter protected by password

Example:

Request frame: read two function parameters, F0.01 as the initial address.

Address	Function parameter	Register address		Quantity of inputs		Check sum	
0x01	0x03	0x00	0x01	0x00	0x02	0x95	0xCB

Response frame: read two function parameters, from high to low, that is, from F0.02 to F0.01

Address	Function parameter	Bytes	Content of inputs				Check sum	
			F0.02		F0.01			
0x01	0x03	0x04	0x00	0x03	0x00	0x01	0x0A	0x33

Request frame: read 3305 DC bus voltage status parameter

Address	Function parameter	Register address		Quantity of inputs		Check sum	
0x01	0x03	0x33	0x05	0x00	0x01	0x9B	0x4F

Response frame:

Address	Function parameter	Bytes	Content of inputs		Check sum	
0x01	0x03	0x02	0x01	0x47	0XF9	0xE6

Protocol data unit format of modifying single inverter's parameters:

Request format:

Protocol data unit	Data length (bytes)	Range
Function parameter	1	0x06
Register address	2	0x0000 ~ 0xFFFF
Register content	2	0x0000 ~ 0xFFFF

Response format:

Protocol data unit	Data length (bytes)	Range
Function parameter	1	0x06
Register address	2	0x0000 ~ 0xFFFF
Register content	2	0x0000 ~ 0xFFFF

For modifying single inverter's parameters, the request frame is the same as the response frame: If the operation fails, error code and exception code forming the protocol data unit will be replied. The error code is (Parameter + 0x80). For the error code, refer to the above description.

Example:

Request frame: change F0.02 setting to 3.

Address	Function parameter	Register address		Register content		Check sum	
0x05	0x06	0x00	0x02	0x00	0x03	0x69	0x8F

Response frame: setting change success, return to original value

Address	Function parameter	Register address		Register content		Check sum	
0x01	0x06	0x00	0x02	0x00	0x03	0x69	0x8F

Parameter 0x41 is to modify single inverter' parameter or control parameter and save it in a non-volatile memory. The format is similar to that of 0x06. The only difference is that 0x41 parameter is saved upon power failure, while 0x06 not.

Protocol data unit format of modifying several inverter's parameters:

Request format:

Protocol data unit	Data length (bytes)	Range
Function parameter	1	0x06
Initial register address	2	0x0000 ~ 0xFFFF
Operation register quantity	2	0x0000 ~ 0x016
Register bytes number	1	2* operation register quantity
Register contents	2*operation register quantity	Depending on parameter range

Response format:

Protocol data unit	Data length (bytes)	Range
Function parameter	1	0x06
Register address	2	0x0000 ~ 0xFFFF
Operation register quantity	2	0x0000 ~ 0x016

Example:

Request frame: initial address F1.01, change two function parameters, the change contents in the sequence from low to high, as in the table below.

Address	Function parameter	Initial address		Register quantity		Bytes	Modification contents				Check sum	
							F1.01		F1.02			
05	10	01	01	00	02	04	00	64	02	58	68	86

Response frame:

Address	Function parameter	Register address		Register quantity		Check sum	
0x05	0x10	0x01	0x01	0x00	0x02	0x10	0x70

In RTU mode, when changing multiple function parameters, the max number is 22. In ASCII mode, the max number is halved. If the operation request fails, error code and exception code forming the protocol data unit will be replied. The error code is (Parameter + 0x80). For the error code, refer to the above description.

Modbus error detection mechanism:

Check sum of ASCII mode: LRC check sum covers the information part from slave address to data, equal to the complement the of sum of the check data characters. For example: The complement of (01H+06H+00H+03H+03H+0xE8H) is 0AH。

Check sum of RTU mode: CRC-16 check sum covers information from slave address to data. The calculation is shown below:

```
unsigned int crc_check (unsigned char *data, unsigned char length)
{
    int i;
    unsigned crc_result=0xffff;
  while(length--)
{
    crc_result^=*data++;
for(i=0;i<8;i++)
     {
          if(crc_result&0x01)
                crc_result=(crc_result>>1)^0xa001;
          else
                crc_result=crc_result>>1;
    }
}
return (crc_result=((crc_result&0xff)<<8)|(crc_result>>8));}
```

Appendix 3 EU Declaration Of Conformity

According to the Low Voltage Directive 2006/95/EC
with the Amendment Directive 93/68/EEC and the Directive for Electromagnetic Compatibility 89/336/EEC

For the following equipment:

Product :	Adjustable Speed Drive
Type Designation/Trademark :	EV3200-2S0004A/ 2S0002A/ 2S0004S/ 2S0002S
Manufacturer's Name :	Emerson Network Power Co. Ltd
Manufacturer's Address :	No.1 Kefa Road, Science & Industry Park, Nanshan District,
	Shenzhen, 518057, China

is herewith confirmed to comply with the requirements set out in the Council Directive 2006/95/EC for electrical equipment used within certain voltage limits and the Amendment Directive 93/68/EEC and with the requirements of the Directive 89/336/EEC. For the evaluation of the compliance with this Directives, the following standards were applied:

EN61800-5-1:2003 Adjustable speed electrical power drive system
Part 5-1 Safety requirements-Electrical, thermal and energy

EN61800-3:2004 Adjustable speed electrical power drive system
Part 3: EMC requirements and specific test methods

LVD Compliance technical report issued by Emerson Network Power Co. Ltd, report number: F3AS241AZ& F3AS221AZ&F3AS241SZ&F3AS221SZ -TSR-2V1, dated Jun. 21, 2007.

EMC Compliance technical report issued by Emerson Network Power Co. Ltd, report number: EV3200-F3AS241AZ&F3AS221AZ&F3AS241SZ&F3AS221SZ-TCC-2V1, dated May 30, 2007.

Responsible for making this declaration is the manufacturer.

CE

Person responsible for making this declaration

Name, Surname : Weiguo Zeng

Position/Title : Director, Test Dept of R&D

Signature

2007-06-21

Date

Emerson Network Power Co. Ltd.

Maintenance Record (1)

Customer's company:	
Address:	
Post Code:	Contact person:
Tel:	Fax:
Drive's SN:	
Power:	Model:
Contract number:	Purchasing Date:
Service provider:	
Contact person:	Tel:
Servicing engineer:	Tel:
Maintenance date:	
Customer's comments on service quality: ☐**Excellent** ☐**Satisfactory** ☐ **Acceptable** ☐**Unsatisfactory** Other Opinions: Signature: DD MM YYYY	
Visiting Record of Customer Service Center: ☐**by phone-calls** ☐**by questionnaire** Others: Signature: DD MM YYYY(date)	

Note: This paper becomes invalid if the user cannot be revisited!

Emerson Network Power Co. Ltd.

Maintenance Record (2)

Customer's company:	
Address	
Post Code:	Contact person:
Tel:	Fax:
Drive's SN:	
Power:	Model:
Contract NO.	Purchasing Date:
Service provider:	
Contact person:	Tel:
Servicing person :	Tel:
Maintenance date:	
Customer's comments on service quality: ☐**Excellent** ☐**Satisfactory** ☐ **Acceptable** ☐**Unsatisfactory** Other Opinions: User's Signature: DD MM YYYY	
Visiting Record of Customer Service Center: ☐**by phone-calls** ☐**by questionnaire** Others: Signature: DD MM YYYY(date)	

Note: This paper becomes invalid if the user cannot be revisited!

Notice

1. The warranty range is confined to the inverter only.

2. **Warranty period is 18 months**, within which period Emerson Network Power conducts free maintenance and repairing to the drive that has any fault or damage under the normal operation conditions.

3. **The start time of warranty period is the delivery date of the product**, of which the product SN is the sole basis of judgment. Inverters without a product SN shall be regarded as out of warranty.

4. Even within 18 months, maintenance will also be charged in the following situations:

- Damages incurred to the drive due to mis-operations, which are not in compliance with the User Manual;
- Damages incurred to the drive due to fire, flood, abnormal voltage, etc;
- Damages incurred to the drive due to the improper use of inverter functions.

5. The service fee will be charged according to the actual costs. If there is any contract, the contract prevails.

6. Please keep this paper and show this paper to the maintenance unit when the product needs to be repaired.

7. If you have any question, please contact the distributor or our company directly.

ENP Services China

Emerson Network Power Co., Ltd.

Address: No.1 Kefa Rd., Science & Industry Park, Nanshan District, 518057, Shenzhen, PRC

Customer Service Hotline: +86 755 86010537, 400-887-6510

Complaint Hotline: +86 755 86010800

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2. **Warranty period is 18 months**, within which period Emerson Network Power conducts free maintenance and repairing to the drive that has any fault or damage under the normal operation conditions.

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Complaint Hotline: +86 755 86010800

To Customers:

Thank you for choosing our products. We are expecting your comments about the quality of the products, so that we can improve our work and serve you better. We really appreciate if you would fill in the form after the product has operated for 1 month, and then mail or fax it to the Customer Service Center of Emerson Network Power. We will send you an exquisite souvenir upon the receipt of the completed Product Quality Feedback Paper. You will receive a special gift if you can give us any advices on improving the product and service quality.

Customer Service Dept

Emerson Network Power Co., Ltd.

Product Quality Feedback Form

User's name		Tel:	
Address		Post code	
Product model		Installation date	
Product SN			
Product outline or structure			
Product performance			
Product package			
Product manual			
Product quality condition in using			
Your advices on product improvement			

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