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User Manual

S610M Inverter Specialized for Elevator

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Release Note

Abstract

The manual elaborates the installation, operation, functional parameters setting, maintenance etc. of the S610M serial inverter special for elevator.

Targeted Readers

- ✓ Users
- ✓ Inverter design engineer
- ✓ Engineering and maintenance staff
- ✓ Technical support staff

CONTENTS

Preface

It is highly appreciated that you choose S610M series product of KATANA ELECTRIC CORPORATION.. To assist our customers to achieve competitive advantages is what we pursue all the time.

S610M serial inverter, specially designed for elevator, Assembled by Sword Electric Industrial Co. Ltd., is a new generation high-performance inverter adopting advanced integrative drive solutions.

S610M with optimized PWM controlling technology and electromagnetic compatibility (EMC) design is able to satisfy the environment-friendly requirements of low noises and little electromagnetic interference (EMI).

This manual elaborates wiring installation, parameters setting, errors diagnosis & analysis and cautions for routine maintenance. It is highly recommended that users should carefully read through this manual to ensure correct operations and optimal performance. Please keep it well for later inspection and maintenance reference.

Chapter 1 Safety Instructions

1.1 Definition of Safety

The following safety signs are presented in the manual with important detailed instructions about safe operation. Please abide by the instructions strictly.

Attentions：

Inappropriate operations may cause light or medium damages to the machine and personnel injuries.

Danger：

Inappropriate operations may cause serious damages to the machine and even casualties.

1.2 Precautions for safety

Danger：

- Please install on metal or incombustible materials, otherwise it may cause fire.
- Be sure not to put combustible matters nearby, otherwise it may cause fire.
- Be sure not to install it in an environment containing explosive gas, otherwise it may cause explosion.
- Only professional technical staff is allowed to work on wiring, otherwise electric shocks may occur.
- Be sure the power is completely off when wiring, otherwise electric shocks may occur.
- Be sure to connect the terminals to the ground without any mistakes, otherwise there may be risks of electric shocks.
- The cover plate must be closed well before power connection, otherwise electric shocks even explosion may occur.
- If the inverter has been stored without operations for over 2 years, it must be gradually powered on through a voltage regulator before operations to avoid electronic shocks or explosion.
- Avoid touching the terminals with hands when it is powered on, otherwise electric shocks may occur.
- Do not operate the inverter with damp hands; otherwise electric shocks may occur.
- Maintenance of the inverter should be conducted 10 minutes after it is powered off. Meanwhile the charge indicator should be completely off, or the positive and negative bus voltages are confirmed to be below 36V, otherwise electric shocks may occur.
- Only professional technical staff is allowed to change spare parts. Never leave thread or any metal objects inside the machine, otherwise it may cause fire.

- After the control panel is replaced, the parameters must be properly set before operation; otherwise there may be damages to the inverter and other properties.
- The exposed cable nose used for main circuit wiring must by wrapped with insulating tape to avoid electric shocks.
- Be sure not to mix the input terminals with the output terminals of main circuit of the inverter, otherwise there may be risks of damage to the machine, explosion or fire disaster.

Attentions

- Please hold the bottom of the product instead of the exterior cover when carrying or installing it, to avoid dropping down to hurt feet or causing damages to the machine.
- Installation shall be made in a place solid enough to bear the weight of the inverter, or the inverter may drop down and cause injuries and property damages.
- It is strictly prohibited to install the inverter nearby a water pipe, or where there may be water splash, otherwise the machine is in risk of damages.
- Do not install the inverter under direct sunlight, otherwise damages may occur.
- During installation, never drop the drilling debris into the inverter, otherwise it may cause failure.
- Never drop any foreign objects such as screw, gaskets and metal rods into the inverter; otherwise there is a risk of fire and damages to other properties.
- Terminals of the main circuit and the wire end sleeves must be firmly connected; otherwise there may be damages.
- Do not install or operate the inverter if it is damaged or short of spare parts, otherwise there is a risk of fire or injury.

1.3 Precautions for operation

Please pay attention to the following points when operating the S610M inverter:

1.3.1 Pertaining to the motor and mechanical load

1) Comparison with power frequency operation

The S610M series are voltage inverter with PWM wave output containing certain harmonic. Therefore, the temperature rise, noise and vibration of the motor are slightly larger in normal operation compared to power frequency operation.

2) Constant-torque low-speed operation

When driving an ordinary motor to run at low speed for a long time, the inverter needs to reduce output torque due to worse cooling effect of the motor. If constant torque operating at low speed for a long time is required, a variable-frequency motor is requisite.

3) Electronic thermal protection value of the motor

Thermal protection from the inverter is available to a matched motor. However, when the rated capacity of the motor does not match with that of the inverter, it is necessary to adjust the protection value or take other protective measures to ensure the safe operation of the motor.

4) Operating at a frequency above 50Hz

If the inverter needs to operate at a frequency above 50 Hz, in addition to the increased vibration and noises of the motor, the speed range of the motor bearings and mechanical devices must be confirmed in advance.

5) Lubrication of mechanical devices

Mechanical devices such as reduction gearbox and gears, which need lubrication, may suffer damages due to reduced lubrication effect when operating at low speed for a long time. Make sure to check in advance.

6) Negative torque load

Negative torque usually occurs in occasion of lifting the load, so the inverter is likely to trip due to over-current or over-voltage. Brake components with matched parameters should be considered for such occasions.

7) Motor insulation inspection prior to connecting with the inverter

Motor insulation inspection is necessary before the first time use or after a long time of being laid aside, to prevent the inverter from damages due to winding insulation failure of the motor. Please use 500V voltage megohmmeter for inspection, as shown in figure 1-1, and make sure that the measured insulation resistance is no less than 5MΩ.

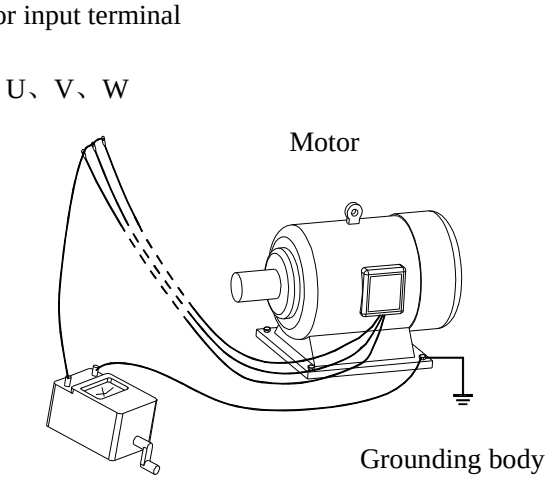


Figure 1-1 Motor insulation inspection sketch

1.3.1 Pertaining to the inverter

1) Capacitor or varistor used to improve power factor

Because of the PWM wave output, the capacitor used to improve power factor or the anti-thunder varistor installed at the output side of the inverter would cause tripping fault or component damages. Therefore, they must be removed. As shown in figure 1-2:

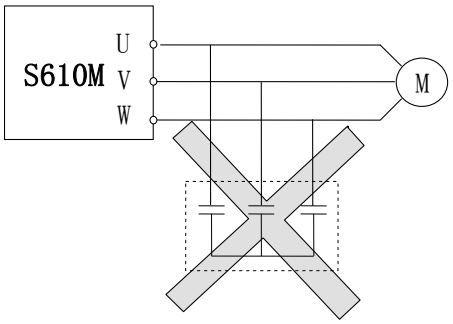


Figure 1-2 Capacitor prohibited at the output side of the inverter

2) Use of switch devices such as contactor installed at the output side of the inverter

If switch devices such as contactor is to be installed between the inverter and the motor, make sure to conduct on-off operation when the inverter has no output, otherwise the inverter may be damaged.

3) Usage beyond the rated voltage range

The S610M series are not suitable for use beyond the permitted working voltage range. If required, please use a corresponding step-up or step-down device for voltage transforming.

4) Lightning surge protection

The inverter with a built-in lightning surge protection device has a certain ability of self-protection against inductive lightning.

5) The altitude and derating use

At the altitude of above 1,000 meters, the inverter needs derating use because thin air causes poor cooling effect of inverter. The relation curve of altitude and rated current of the inverter is as shown in figure 1-3.

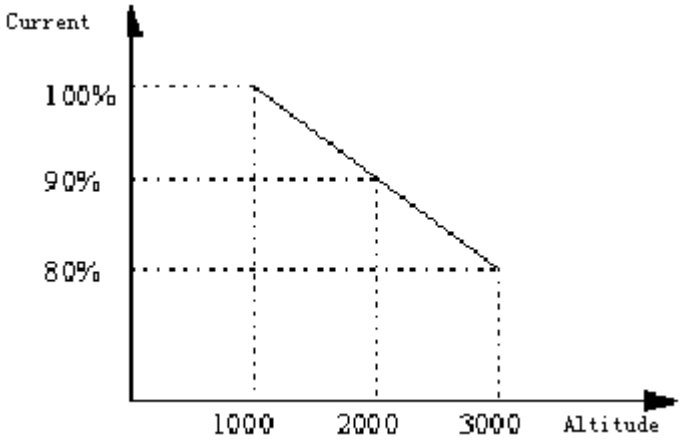


Figure 1-3 Rated output current and the derating for altitude

1.4 End of Life Cautions

When scrapping the inverter, please note:

1) Burning of electrolytic capacitors of main circuit and PCB may cause explosion.

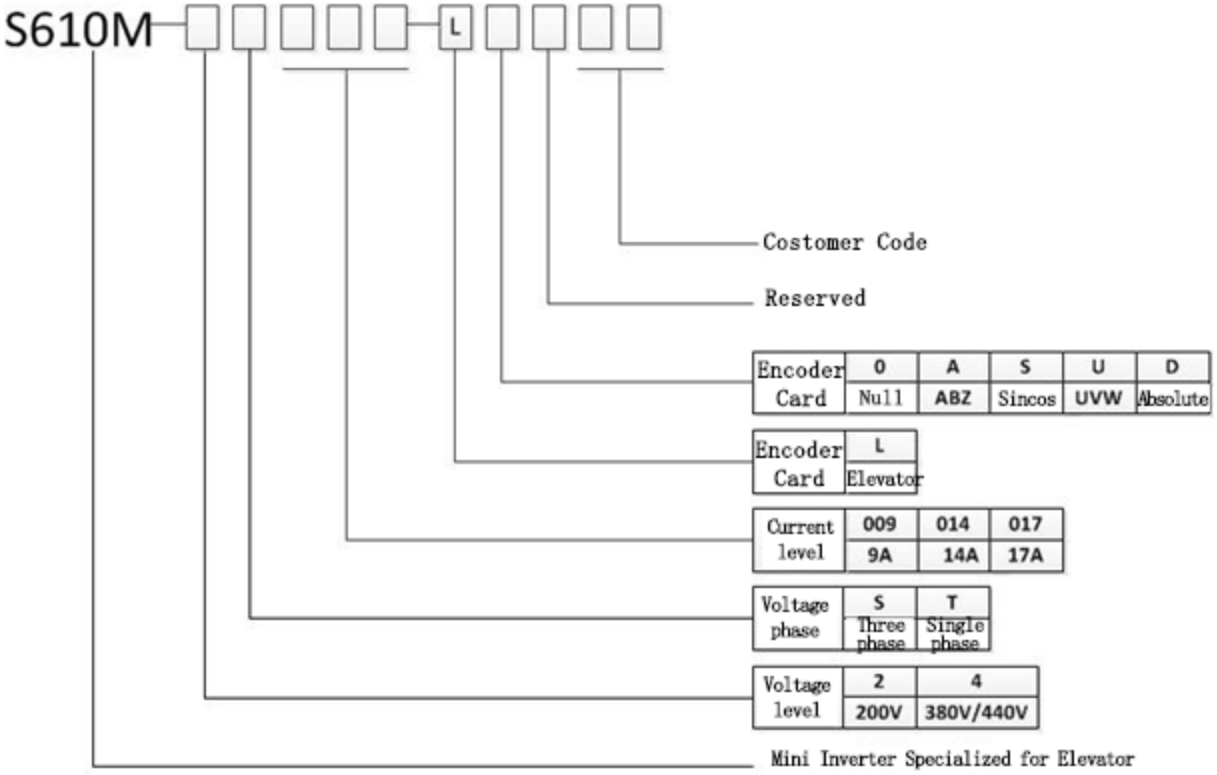
2) Burning of plastic components such as front panel may produce poisonous gas.

3) Please dispose the scrap inverter as industrial refuse.

Chapter 2 Specification & Installation Requirements

2.1 Model explanation

The inverter model No. on the nameplate, expressed in numbers and letters, contains information of product series, voltage level, current level, phase number, application industry, and customer code etc.



2.3 Inverter series explanation

Table 2-1 200V inverter series explanation

Cabinet Model	Inverter Model	Rated Capacity（kVA）	Rated Input Current (A)	Rated Output Current (A)	Adaptable Motor (kW)
Mini	S610M-2S009-L0000	3.5	13	9	1.5
	S610M-2S014-L0000	5.4	20	14	2.2
	S610M-2T009-L0000	3.5	10	9	1.5
	S610M-2T014-L0000	5.4	15	14	2.2
	S610M-2T017-L0000	6.5	19	17	3.7

Table 2-2 400V inverter series explanation

Cabinet Model	Inverter Model	Rated Capacity（kVA）	Rated Input Current (A)	Rated Output Current (A)	Adaptable Motor (kW)
Mini	S610M-4T009-L0000	6.0	10	9	3.7
	S610M-4T014-L0000	9.2	15	14	5.5
	S610M-4T017-L0000	11.0	19	17	7.5

2.4 Technical specifications

Input	Rated voltage; frequency	Single phase: 220V； 50Hz/60Hz Tri-phase: 220V； 50Hz/60Hz Tri-phase: 380V/440V； 50Hz/60Hz
	Working voltage range	Single/Three phase: 220V, 187V~264V Tri-phase: 380V/440V, 342V～480V
	Degree of input voltage unbalance	＜2%
	Input power frequency range	±5%
Output	Voltage	Tri-phase AC, 0V ~ input voltage
	Frequency	0Hz～100Hz
	Overload capacity	Operating for 90s under 150% of rated current; for 5s under 180% of rated current.
Main control performance	Control mode	Magnetic flux vector control without PG; Magnetic flux vector control with PG; V/F control.
	Modulation mode	Space vector PWM modulation
	Starting torque	150% of rated torque when the starting frequency is 0.5Hz(magnetic flux vector control without PG); 180% of rated torque when the starting frequency is 0.5Hz(magnetic flux vector control with PG)

	Speed control precision	Magnetic flux vector control without PG：±0.5%; Magnetic flux vector control with PG：±0.05%
	Frequency resolution	Digital setting: 0.01Hz; analog setting: max. frequency * 0.05%
	Torque boost	Manual torque boost 0.0～30.0%
	V/F curve	Four setting modes:one is user-defined V/F curve, and the other three are reduced torque curves (2.0 power, 1.7 power and 1.2 power)
	Automatic current limiting	Automatic limit on current during operation to avoid tripping caused by frequent overcurrent.
Operating function	Operation command channel	Operation command is given by operation panel, control terminals or communication.
	Frequency reference channel	Frequency is given by digital.
	Digital input terminal	8 road digital multifunctional inputs, X1～X8, low level input is available.
	Digital output terminal	2 road OC output
	Relay output terminal	3 programmable relay outputs, 2 of which are NO (normal open) output, and 1 of which is NC/NO output.
Operation panel	LED display	The set frequency, output frequency, output voltage and current etc. can be displayed.
	Parameter copy	Parameters can be copied quickly by using operation panel.
Working ambient	Usage site	Indoor, without direct sunlight, no dusts, no corrosive or flammable gases, no greasy mist, no vapors, no water dripping or salt etc.
	Altitude	Use by derating when the altitude is above 1000m. The output current shall be derated by 4‰ of the rated current for every 100m increase.
	Environment temperature	－10～＋40℃ (derating usage under ambient temperature of 40～50℃)
	Humidity	20%～90%RH, without water condensation
	Vibration	< 5.9 m/s^2（0.7g）.
	Storage temperature	－40～＋70℃
Others	Protective function	Overcurrent protection, overvoltage/undervoltage protection, overheat protection, overload protection, module protection etc.
	Protection grade	IP20
	Cooling method	Air cooling, with fan control
	Installation method	Wall-mounted

2.5 Installation Dimensions & Weight

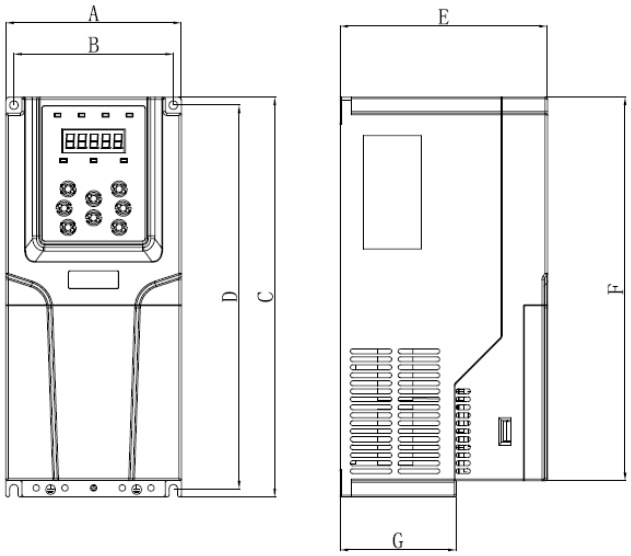


Figure 2-1 Installation dimensions

S610M-□□□□□-L0000	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	Bore Diameter Φ(mm)	Weight (kg)	Cabinet Size
S610M-2S009-L0000	110	100	250	240	130	240	73	5.3	1.9	Mini
S610M-2S014-L0000										
S610M-2T009-L0000										
S610M-2T014-L0000										
S610M-2T017-L0000										
S610M-4T009-L0000										
S610M-4T014-L0000										
S610M-4T017-L0000										

2.6 Model Selection Principle

Rated current of the motor, used as reference for inverter selection, should not exceed the rated output current of the selected inverter. If there are special requirements on the acceleration/deceleration time or overload capacity, the rated current of the selected inverter could be higher, but not exceeding two power levels above the minimum required current.

2.7 Cautions for Installation

注意 Attentions

- **Please hold the bottom of the inverter when moving around, so as to avoid hurting people or damages to equipment due to the machine falling off.**

- **Be sure to check if there are any damages on the appearance and the inner parts before installation.**
- **Please consider if the platform is able to withstand the weight or pressure during installation.**
- **Be sure not to install the machine in a place where water may splash around, to avoid any damages to the machine.**
- **Be sure not to drop any foreign objects, such as screws or metal stuff, into the inverter, to avoid any damages to the machine or fire disaster.**

Danger!

- **The inverter must be installed on metal or other nonflammable stand to avoid fire disaster.**
- **Never put any inflammable materials around the inverter to avoid any fire risks.**
- **Never install the inverter in the ambient containing any explosive gases to avoid any risks of explosion.**

2.8 Installation Ambient

2.8.1 Requirements for the ambient

To ensure safe operations, please follow the below requirements for the installation ambient:

◆ Please install the inverter in a clean ambient free from oil mist or dusts, or in an entirely closed cabinet where floating substances cannot invade.

◆ The system should be installed in an ambient without radioactive substances.

◆ The system should be installed in an ambient free from corrosive gases or liquids.

◆ The system should be installed in an ambient without direct sunlight.

◆ The system should be installed in an ambient with less salt.

◆ The ambient temperature should range from -10℃ to 40℃. If exceeding 40℃, the inverter needs external cooling or derating use.

◆ The inverter should be installed in an ambient with vibration of less than 5.9m/s^2（0.6g）.

◆ The ambient humidity is required to be lower than 90% without condensation.

◆ The inverter should be vertically installed.

◆ Altitude requirement: in regions exceeding 1000m, the cooling effect of the inverter becomes poor due to thin air. Therefore, the output current shall be derated by 4‰ of the rated current for every 100m increase.

◆ Please consult and confirm with us if there's any special requirements for installation.

2.8.2 Installation direction and interval requirements

Please install the S610M serial inverter special for elevator in a well-ventilated place, otherwise the safe operation cannot be guaranteed. The inverter is normally installed vertically. The interval requirements are shown as below.

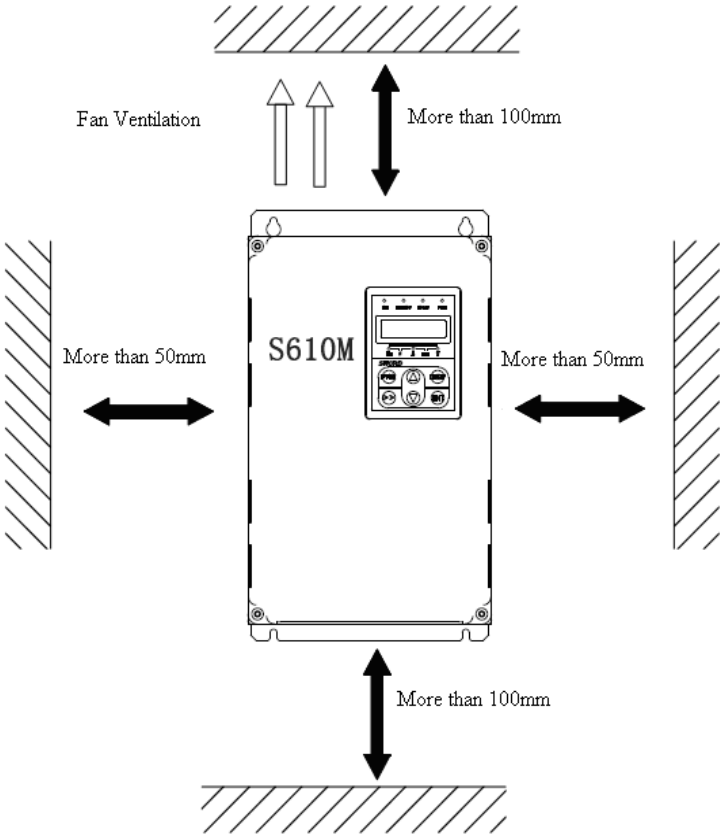


Figure 2-3 Installation interval

Chapter 3 Wiring and Installation Instructions for the Inverter

This chapter focuses on the configuration and wiring cautions for the inverter.

危 险 **Dangers**

- **Only after powering off the inverter completely and waiting for at least 10 mins, you can open the cover plate.**
- **Only after the charging indicator inside the inverter is off and the voltage between + and – terminals of main circuit drops below DC 36V, interior wiring is allowed.**
- **Interior wiring for the inverter can only be done by trained and authorized professional staff.**
- **The terminals of main circuit must be securely connected with the wires.**
- **The power line is prohibited to connect with terminals U, V or W.**
- **Please carefully check the wiring before and after connecting emergency stop or safety circuit.**
- **Check the voltage grade before powering on the inverter; otherwise it may cause personnel injuries and damages to devices.**

Attentions

- **Voltage withstanding test has been taken before leaving the factory, so users do not need to take the test again.**
- **The grounding line is normally a copper wire with a diameter of over 3.5mm, and the grounding resistance should be < 10Ω.**
- **The inverter carries leakage current, value of which is determined by the usage conditions. The inverter and the motor must be grounded for safety reason, and residual current device (RCD) is required to be installed.**
- **The inverter should be connected to power supply by air switch or fuse cutout for the convenience of overcurrent protection and outage maintenance at the input side.**

3.1 Wiring & Configuration of Main Circuit Terminals

3.1.1 Simplified diagram of main circuit wiring

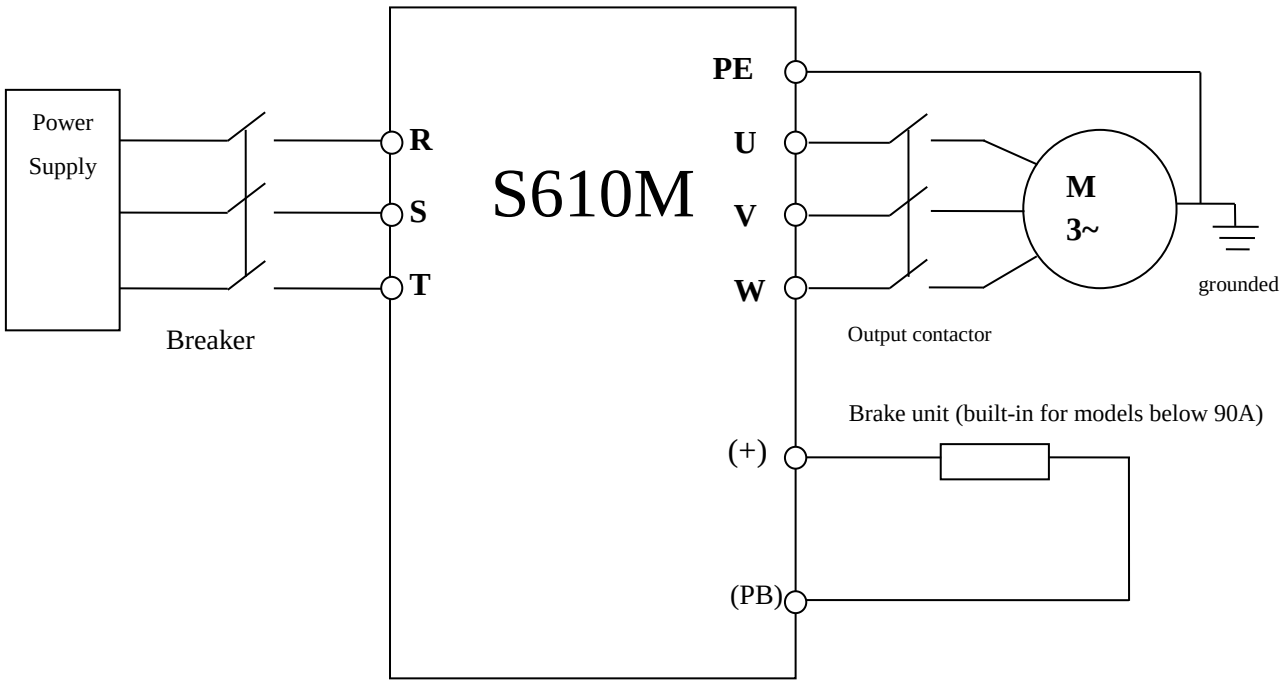


Figure 3-1 Simplified diagram of main circuit wiring

3.1.2 Main circuit terminals sequence

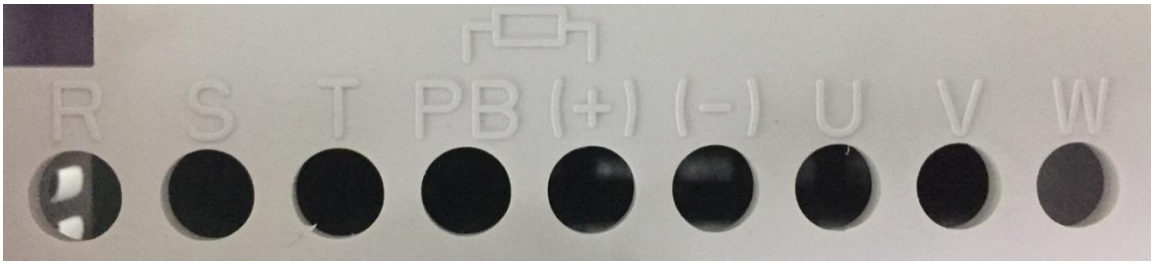


Figure 3-2 Screen Printing of Main Circuit Terminals

3.1.3 Main circuit terminals label and function description

Terminal Name	Function Description
R、S、T	3-phase AC input terminal
—	Negative output terminal of DC bus
＋、PB	+ refers to positive output terminal of DC bus + and PB are connected for connecting with the braking resistor
U、V、W	3-phase AC output terminal
PE	Shield grounding terminal

1. The power line is strictly prohibited to connect with output terminal U, V, or W of the inverter, otherwise it may cause interior damages.
2. An obvious breaking device such as circuit breaker or residual current circuit breaker should be installed between the inverter and the power grid for overcurrent protection at the input side and the convenience of outage maintenance. If large motor leakage current results in frequent tripping of residual current circuit breaker, replace the residual current circuit breaker with an ordinary circuit breaker without leakage protection under the condition that the motor leakage would not affect safety.
3. The input power line should be kept away from the output line.
4. It is strictly prohibited to have the inverter output terminals grounded, or short circuited, otherwise interior damages may occur.
5. The wiring distance between the inverter and the motor should be as short as possible. If the wiring distance is overlong, the higher harmonic leakage current at the output end would adversely affect the inverter and all peripheral devices. An AC output reactor is recommended if the motor cable exceeds 100m.
6. Because the inverter carries leakage current, the inverter and the motor must be grounded for safety reason. The grounding wire should be special yellow-green grounding wire, as thick and short as possible, and the grounding impedance is required to be lower than 10Ω.
7. In occasions of using two or more inverters together, please make sure that the grounding wires won't form a loop.

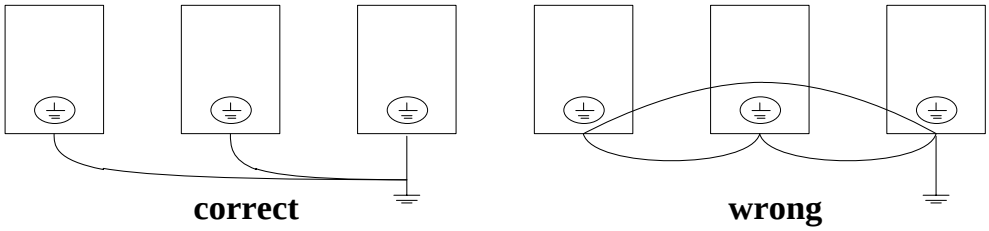


Figure 3-3 Grounding wiring

3.1.4 Specification selection of external brake resistor

The S610M serial inverter, which is special for elevator, has a built-in brake unit when the rated output current is under 17A (including 17A); users only need to externally connect with brake resistor. The brake resistor should be connected to the terminals "+" and "PB", and its cooling condition should be fully considered to make sure that it's well ventilated. Recommended value (R) and minimum value (M) of brake resistor is listed in the following table, and the chosen resistance should not be lower than the minimum value. Besides, considering that the resistance power is related to the floor height, the user can modify its power corresponding to the floor height and working condition.

Table 3-1 brake resistor of 400V class

Inverter Model	Brake Resistor Spec. (R)	Brake Resistor Spec.(Min.)	Brake Resistor Spec.(Max.)
S610M-4T009-L0000	1200W 136.0Ω	124.0Ω	163.0Ω
S610M-4T014-L0000	1800W 91.0Ω	82.5Ω	108.5Ω
S610M-4T017-L0000	2500W 65.0Ω	59.5Ω	78.5Ω

Table 3-2 brake resistor of 200V class

Inverter Model	Brake Resistor Spec. (R)	Brake Resistor Spec.(Min.)	Brake Resistor Spec.(Max.)
S610M-2S009-L0000	650W 75.0Ω	68.5Ω	88.5Ω
S610M-2S014-L0000	1000W 50.0Ω	44.5Ω	57.5Ω
S610M-2T009-L0000	650W 75.0Ω	68.5Ω	88.5Ω
S610M-2T014-L0000	1000W 50.0Ω	44.5Ω	57.5Ω
S610M-2T017-L0000	1200W 40.5Ω	37.0Ω	48.0Ω

Attentions: The connecting wire of brake resistor should be shorter than 5m.

3.2 Wiring & Configuration of Control Circuit Terminals

3.2.1 Control circuit terminals sequence

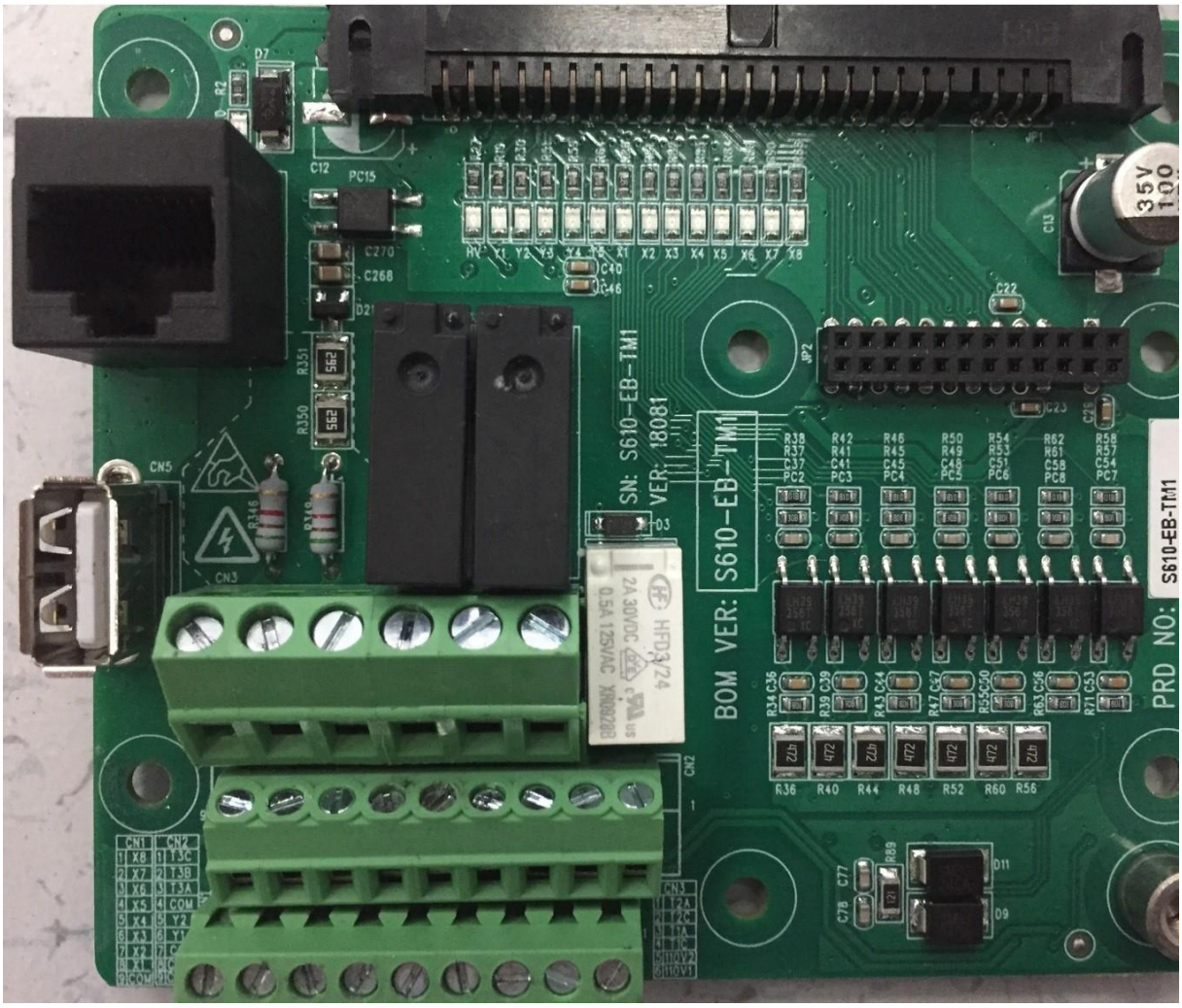


Figure 3-4 Control Circuit Terminals

Before the inverter is put into use, the terminals should be accurately wired. The function table of the control terminals is listed as below:

Table 3-3 Function Description of Control Circuit Terminals

Terminal No.	Terminal screen printing	Name	Function Description	Specification
JP1			Control board interface	
JP2		PG card interface	AB type PG card interface Sin/Cos type PG card interface	
CN1	COM	Common	Common port of switch input	Opto-coupler isolation input Input impedance: 4.7kΩ; Input voltage range: 10～30V
	X1	Multifunctional Input X1	These terminals are programmable and can be defined as multifunctional digital input terminals. Please refer to functions description of input terminals (Common port: COM).	
	X2	Multifunctional Input X2		
	X3	Multifunctional Input X3		

Terminal No.	Terminal screen printing	Name	Function Description	Specification
	X4	Multifunctional Input X4		
	X5	Multifunctional Input X5		
	X6	Multifunctional Input X6		
	X7	Multifunctional Input X7		
	X8	Multifunctional Input X8		
CN2	CANH	CAN Communication		Standard CAN communication interface. Please use twisted-pair wire or shielded wire.
	CANL			
	Y1	Open collector output Y1	These terminals are programmable and can be defined as multifunctional digital output terminals. Please refer to functions description of output terminals.	Opto-coupler isolation open-collector output Working voltage range: 9～30V Max. output current: 100mA
	Y2	Open collector output Y2		
	COM	Y1/Y2 public port		
	R3A	Programmable relay output 3	They can be programmed to be defined as multifunctional relay output terminals. Please refer to functions description of output terminals.	A-B: Normal Close (NC); A-C: Normal Open (NO); Contact capacity: DC24V-1A
	R3B			
	R3C			
CN3	HV	Door lock AC110V input		Input voltage range: 110±20%
	HGND			
	R1A	Programmable relay output 1	They can be programmed to be defined as multifunctional relay output terminals. Please refer to functions description of output terminals.	Contact capacity: AC250V/DC24V-5A The overvoltage grade of input voltage of the relay output terminal is grade II.
	R1C			
	R2A	Programmable relay output 2		
	R2C			
CN4		Interface of Handheld Keyboard	Apply to connect with Handheld Keyboard	
CN5		Interface of Bluetooth	Apply to connect with Bluetooth Module	

Attentions:

1. It is recommended using multicore shielded cable or twisted wire (above **1mm^2**) as the connecting wire for control circuit terminals.
2. When shielded cable is in use, the near end of the shielded layer (i.e. the end nearby the inverter) should be connected with the grounding terminal PE of the inverter.
3. The control cable should be wired more than 20cm away from main circuit and high-voltage circuit (including power line, motor line, relay line, contactor line etc.). Vertical wiring is strongly recommended instead of parallel wiring, so as to avoid false operation of the inverter due to interference.

3.2.2 Wiring for multifunctional input terminals

Multifunctional input terminals of S610M include X1~X8, low electric level input is available.

3.2.3 Wiring for multifunctional output terminals

The multifunctional output terminals Y1 and Y2 use the internal 24V power supply.

3.3 Wiring for the encoder

S610M inverter is compatible with many types of encoder, including AB, Sin/Cos, to meet client's requirements.

Table 3-4 Encoder card

Encoder Card	Function
AB encoder card with frequency dividing output（SW-PG ABC1）	Support open collector and push-pullsignals AB encoder, 1 frequency dividing OC output, applicable to closed-loop vector control of asynchronous traction machine.
AB encoder card with frequency dividing output（SW-PG ABD1）	Support open collector and push-pull signals AB encoder, 1 frequency dividing differential output, applicable to closed-loop vector control of asynchronous traction machine.
Sincos encoder card with frequency dividing output（SW-PG-C1）	Support sinccos signal (ERN1387/487), 1 frequency dividing OC output, applicable to closed-loop vector control of synchronous traction machine.
Sincos encoder card with frequency dividing output（SW-PG-D1）	Support sinccos signal (ERN1387/487), 1 frequency dividing differential output, applicable to closed-loop vector control of synchronous traction machine.

Attentions:、

- **The signal line of encoder must be separately wired away from main circuit and other power lines. Close parallel wiring is prohibited.**
- **Wiring of encoder should use shielded line. The end of the shielded line near to the inverter should be connected to the PE terminal.**
- **Poor motor grounding or large system disturbance on site may cause unstable operation of the inverter. When this happens, please disconnect the encoder grounding at the motor side, and only keep the single-ended grounding of the encoder.**
- **Encoder with hot plug is prohibited.**

3.3.1 AB encoder card

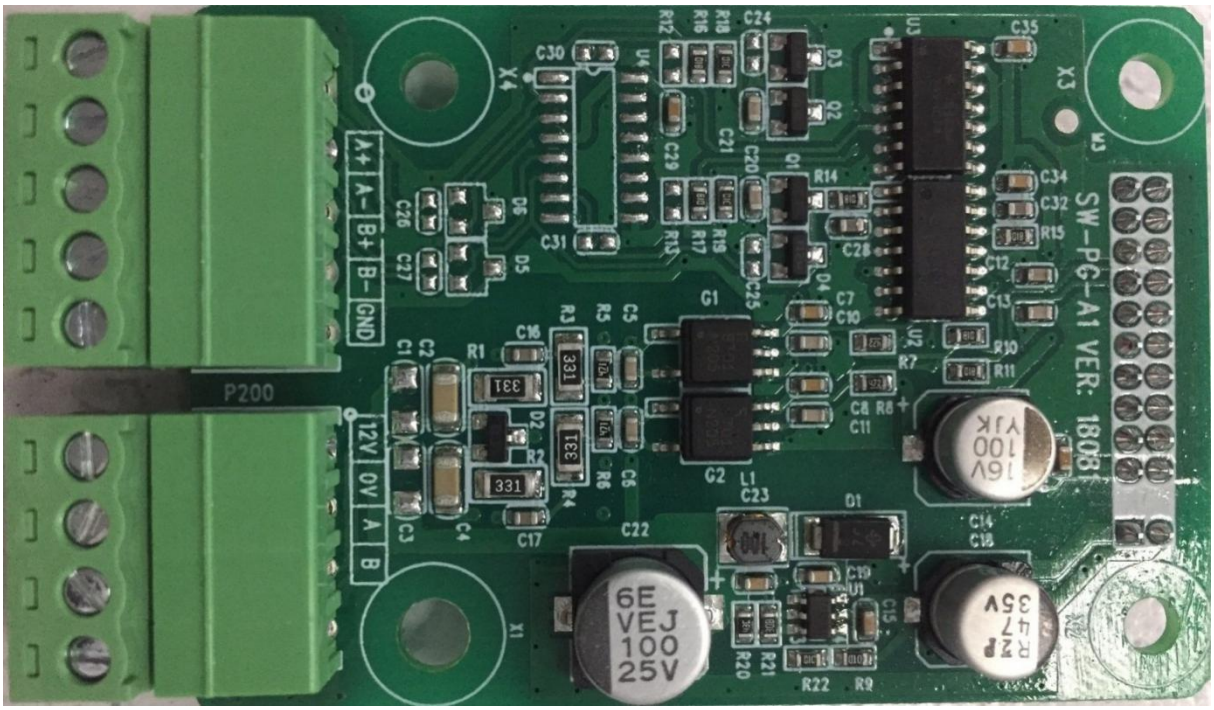


Figure 3-6 Sketch of PG card for asynchronous motor

Table 3-4 Terminal function description of AB encoder card

Terminal No.	Terminal Type	Terminal screen printing	Name	Function Description	Specification
P200	Interface terminal of encoder	12V	Power supply	+12V power supply	Max. allowable output current:200mA
		0V	Power Ground	+12V Power supply ground	
		A	A signal of the encoder	Signal input of encoder phase A	Signal input of encoder, Max. input frequency ≤100KHz
		B	B signal of the encoder	Signal input of encoder phase B	
CN1	Frequency dividing terminal	A+	A+ signal of frequency dividing	OC output phase A/differential output phase A+	Connection of open collector output: A+/B+/GND Connection of differential output: A+/A-/B+/B-
		A-	A- signal of frequency dividing	Differential output phase A-	
		B+	B+ signal of frequency dividing	OC output phase B/differential output phase B+	
		B-	B- signal of frequency dividing	Differential output phase B-	
		GND	Common port	Reference ground of frequency dividing output	

The following figure 3-7 shows the wiring diagram of the open collector encoder.

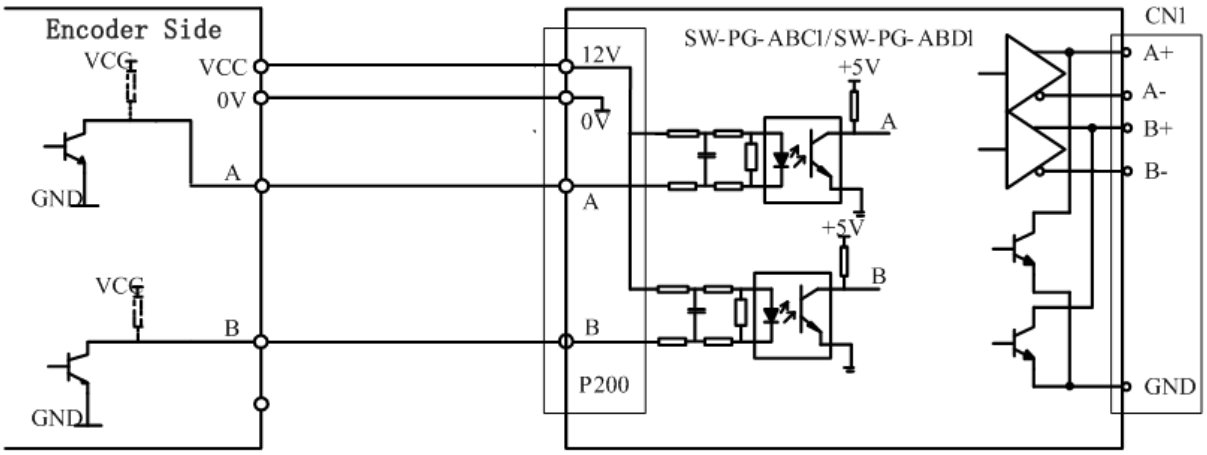


Fig.3-7 PG wiring diagram of collector open signal

The following figure 3-8 shows the wiring diagram of the push-pull signal encoder.

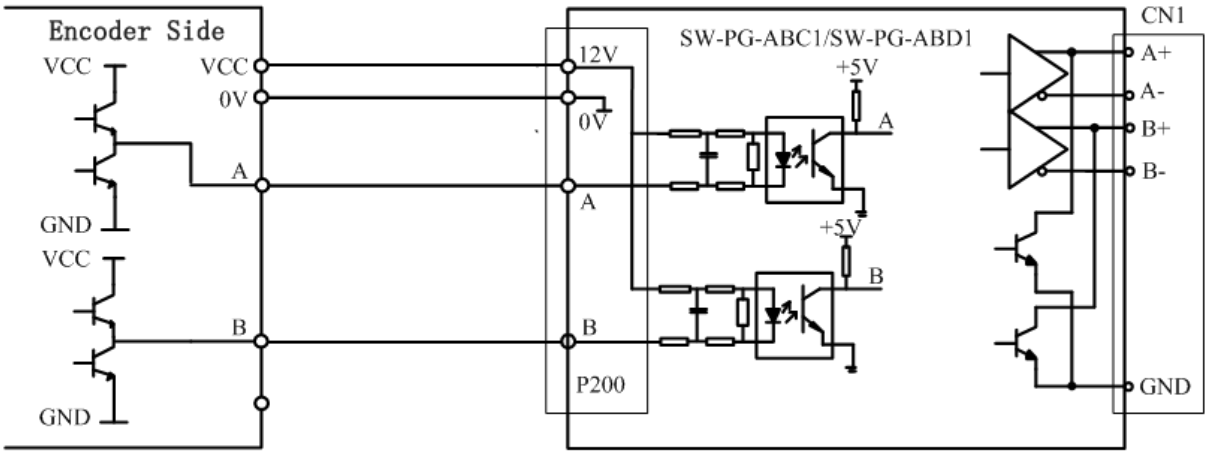


Fig.3-8 PG wiring diagram of push-pull signal encoder

3.3.2 Sincos Encoder Card

The Sincos encoder card (SW-PG-C1/SW-PG-D1) need use convert wiring. Signal input terminal of encoder adopts DB15 wiring terminal. When using, just connect it with the DB15 male connector of the encoder signal line.

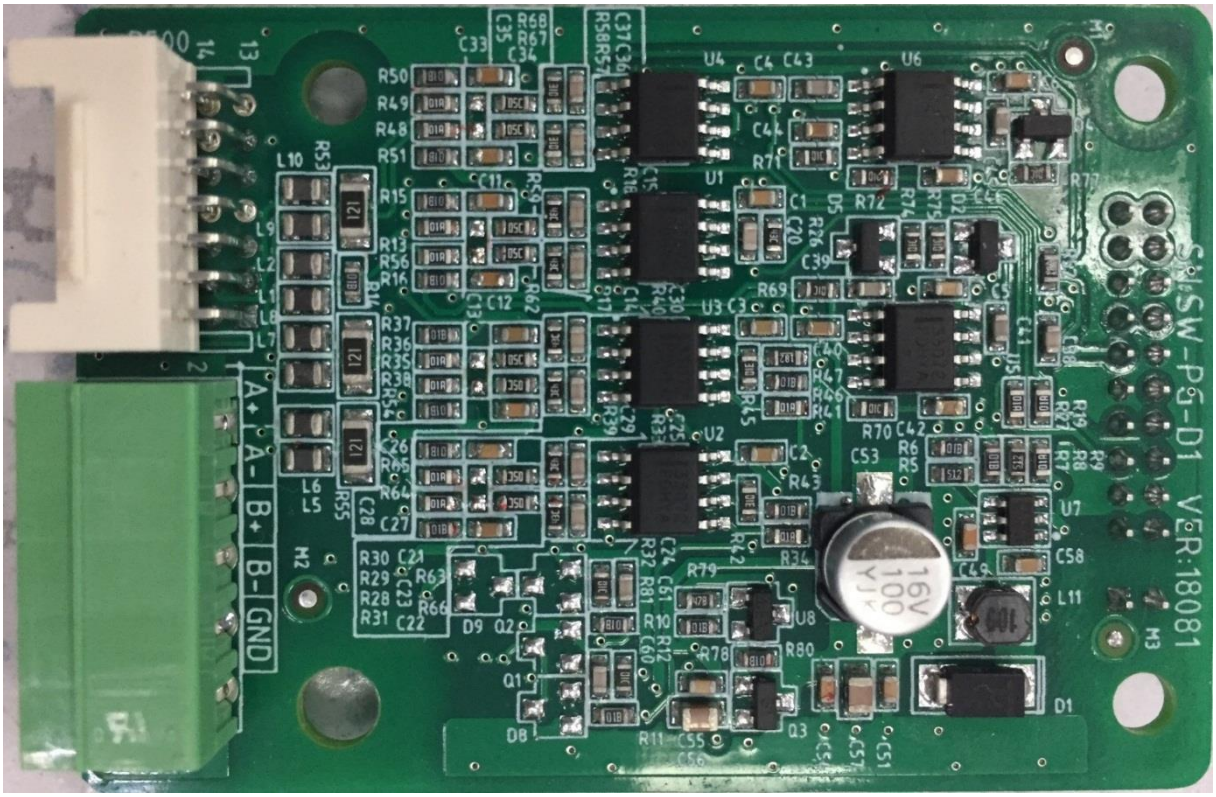


Fig. 3-9 Sketch of PG card for sincos encoder card

Fig.3-10 Convert Wiring of Sincos Encoder Card

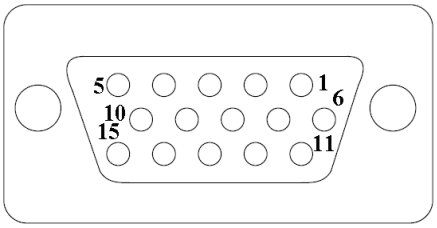


Fig.3-11 Sequence diagram of the DB15 pins

Table 3-5 DB15 pin definition of the Sincos encoder card

Socket No.	Terminal No.	1	2	3	4	5	6	7	8

P500	Definition	B-	NC	Z+	Z-	A+	A-	0V	B+
	Terminal No.	9	10	11	12	13	14	15	
	Definition	+5V	C-	C+	D+	D-	NC	NC	

Sin&Cos Encoder wiring diagram as shown below:

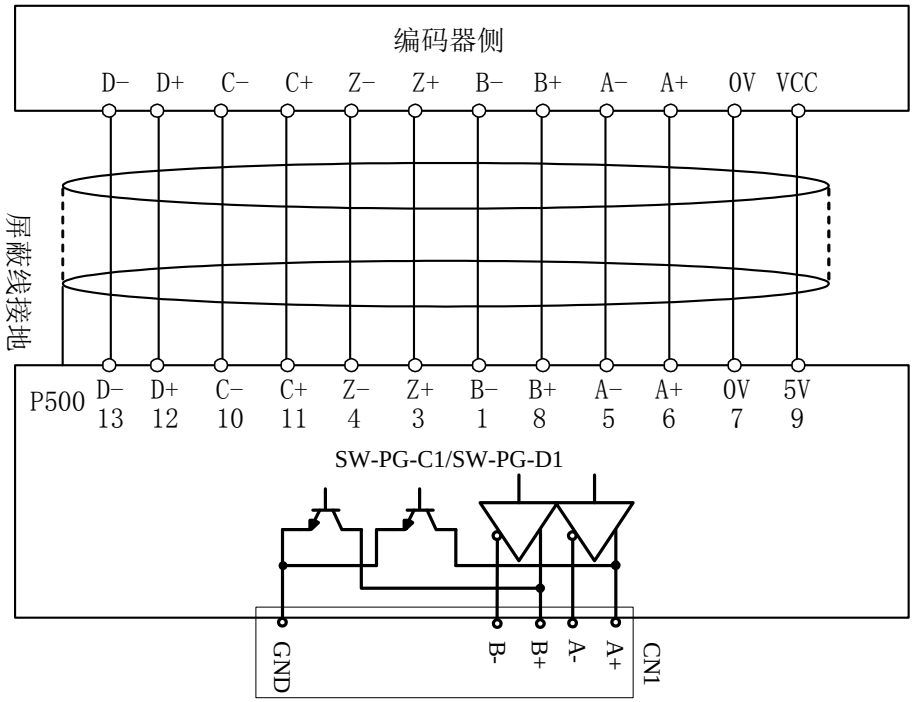


Fig. 3-12 SIN/COS Encoder wiring diagram

Table 3-6 Frequency dividing output definition of the Sincos encoder card

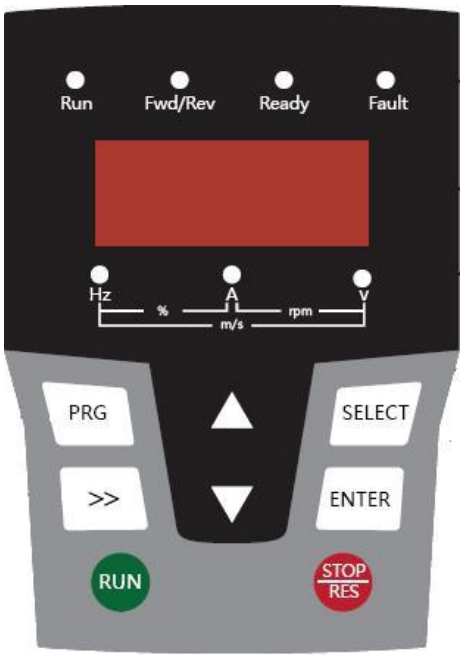
Terminal No.	Terminal Type	Terminal screen printing	Name	Function Description	Specification
CN1	Frequency Dividing Terminal	A+	A+ signal of frequency dividing	Frequency dividing output of encoder B- phase	Open collector output
		A-	A- signal of frequency dividing	Frequency dividing output of encoder B+ phase	
		B+	B+ signal of frequency dividing	Frequency dividing output of encoder A- phase	
		B-	B- signal of frequency dividing	Frequency dividing output of encoder A+ phase	
		GND	Common port	Reference ground of frequency dividing output	

Chapter 4 Commissioning Instructions for the Inverter

S610M inverter is standardly equipped with an operating panel with LED indicators. The operation panel is the major unit for the inverter to receive commands and display parameters. LED indicators display the basic status of the inverter. Operations such as view and modification of the inverter parameters, error record review, and current operating status monitoring can be conducted through the 7 segment code display.

3.1 Operation Panel Instruction

4.1.1 Appearance of the operation panel



Optional configuration of Handheld Operator

Standard configuration of Fixed Operation Panel

Figure 4-1 Picture of real operation panel

4.1.2 Description of each function area

4.1.2.1 Description of operating status indicators:

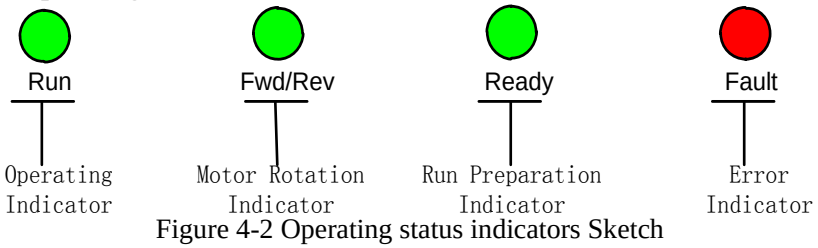


Figure 4-2 Operating status indicators Sketch

Table 4-1 Description of operating status indicators

Indicator name	Displayed status	Description	Color
Run	Off	The inverter is shut down.	Green
	On	The inverter is operating.	

Indicator name	Displayed status	Description	Color
Fwd/Rev	On	The inverter is operating forward (upward).	Green
	Off	The inverter is operating in reverse (downward).	
Ready	Off	The inverter is ready.	Green
	On	The inverter is not ready.	
Fault	Off	Currently no errors	Red
	On	Error is occurring currently	

4.1.2.2 Description of value unit indicators

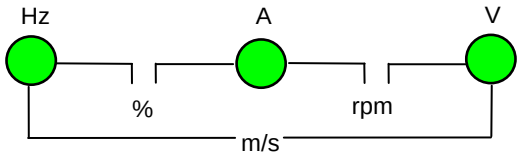
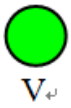


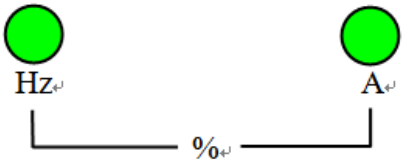
Figure 4-3 Value unit indicators

The displayed value unit of the digital tube is Hz (frequency/hertz).

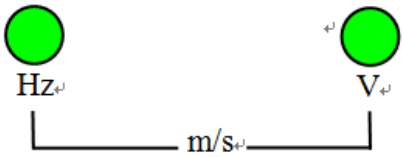
The displayed value unit of the digital tube is A (current/ampere).



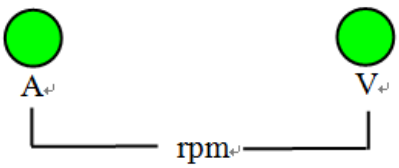
The displayed value unit of the digital tube is V (voltage/volt).



When both the indicators are on, % is displayed.



When both the indicators are on, m/s (speed) is displayed.



When both the indicators are on, rpm (revolution) is displayed

4.1.2.3 Description of keys on the operation panel

There are 8 keys in total on the handheld operation panel. 6 keys are for setting or modifying the inverter parameters, and the other 2 keys are for auxiliary functions, “RUN” and “STOP/RES”.

Table 4-2 Functions list of the operation panel

Key	Name	Function
PRG	Program/Exit	Enter or exit the programming status.
ENTER	Function/Data	Enter sub-menu or confirm data
△	Increment	Increment data or function code
▽	Decrement	Decrement data or function code
>>	Shift	Select modified bit of the data under editing state; Shift to display the status parameter under other states.
SELECT	Multifunction	Under the operation panel control mode, double click the “Select” key to start the motor, click the key once to stop the motor. When the inverter is shut down, press the key to reset the current error.
DISP		
RUN	Operating	Start the motor under operation panel control
STOP/RES	Stop/Reset	Press the key to stop the motor under operation panel control When the inverter is shut down, press the key to reset the current error.

4.1.3 Status display of the operation panel

Statuses of the operation panel are displayed as shutdown status, operating status, error status, and function code editing status etc.

1) Shutdown status display

When the inverter is in shutdown state, shutdown status parameters are displayed on the operation panel. Meanwhile the indicators “Run” and “Fwd/Rev” are off. When key “>>” is pressed, the shutdown status parameters would be circularly displayed (defined by function code F13.05).

2) Operating status display

After the inverter receives a valid operating command, it starts operation and the operating status parameters are displayed on the operation panel. Meanwhile the indicator “Run” is on, and whether “Fwd/Rev” is on or off is determined by the actual operating direction. When key “>>” is pressed, the operating status parameters would be circularly displayed (defined by function code F13.05).

3) Error status display

When the inverter detects an error signal, it would enter into error alert state. The indicator “Fault” is on, and the error code is displayed with blinking. When key “>>” is pressed, the shutdown parameters and error code would be circularly displayed. The error can be reset either by the control terminal or through “STOP/RES” key on the operation panel. If the error continues, its error code is continuously displayed.

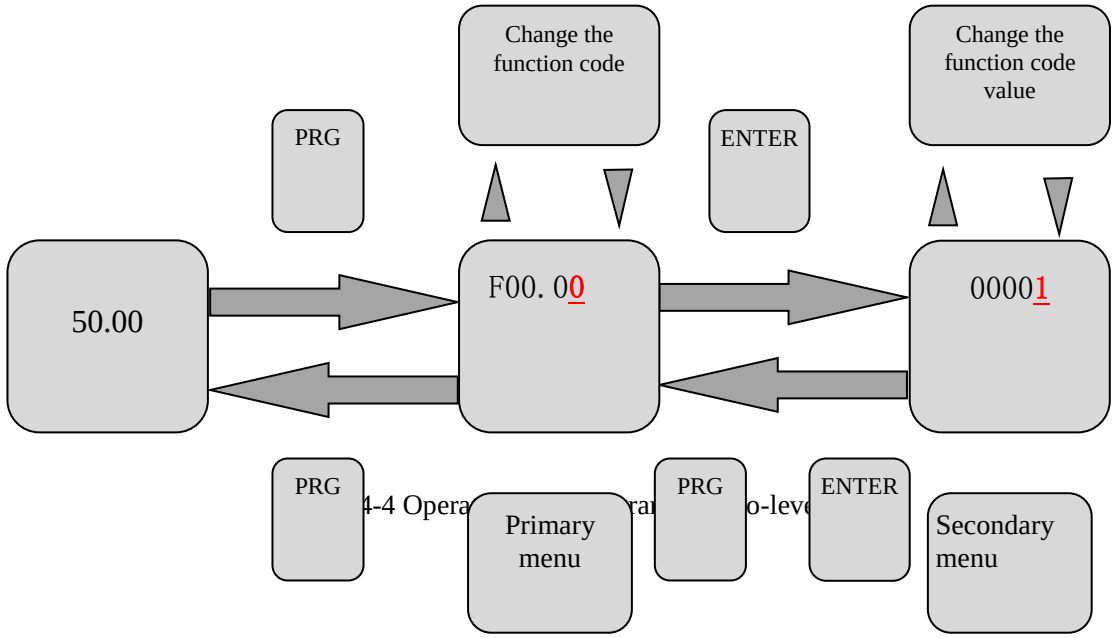
4) Function code editing status display

In the state of shutdown, operating or error, when key “PRG” is pressed, the inverter enters into editing state (if user password is set, please refer to F00.00 description). The editing state is displayed by two-level menus in light of the following sequence: function code group or function code # → function code parameters. When “ENTER” key is pressed, the inverter enters into the state of function parameters display. Parameters can be saved by pressing “ENTER” key, and exit the menu by pressing “PRG”.

4.1.4 Function code check and operation description

Operation flow for two-level menus: the operation panel parameters setting adopt two-level menus for quick and convenient check and modification on parameters.

The two level menus are: function codes (primary menu), and set value of function codes (secondary menu).



4-4 Opera ra o-leve

Explanation: Press key “PRG” or “ENTER” to return to the primary menu from the secondary menu. The difference between “ENTER” and “PRG” is: when “ENTER” is pressed, the parameter setting is saved before the operation panel display is back to the primary menu moving to the next function code automatically; when “PRG” is pressed, the operation panel display is directly back to the primary menu remaining at the current function code without saving the parameter setting.

Note: in the above figure, the displayed shutdown parameter is the set frequency. The factory default value is 50.00Hz. The bold underlined part refers to the blinking unit.

4.1.5 Operation examples

Example 1: To modify the rated speed of the motor

To modify the function code F01.05 from 1440RPM to 1439RPM is shown as below:

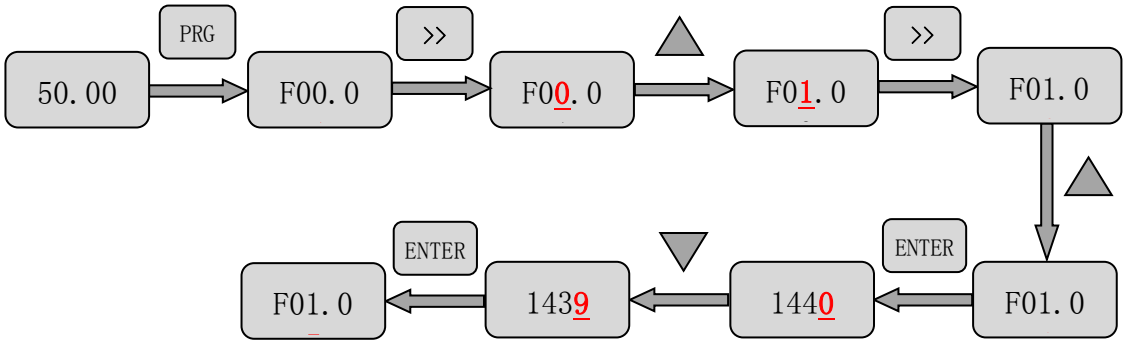


Figure 4-5 Example for modifying the rated speed of the motor

Example 2: To restore to the factory default setting

Set F13.03=2 to restore the parameter to the factory default setting, which is shown as below:

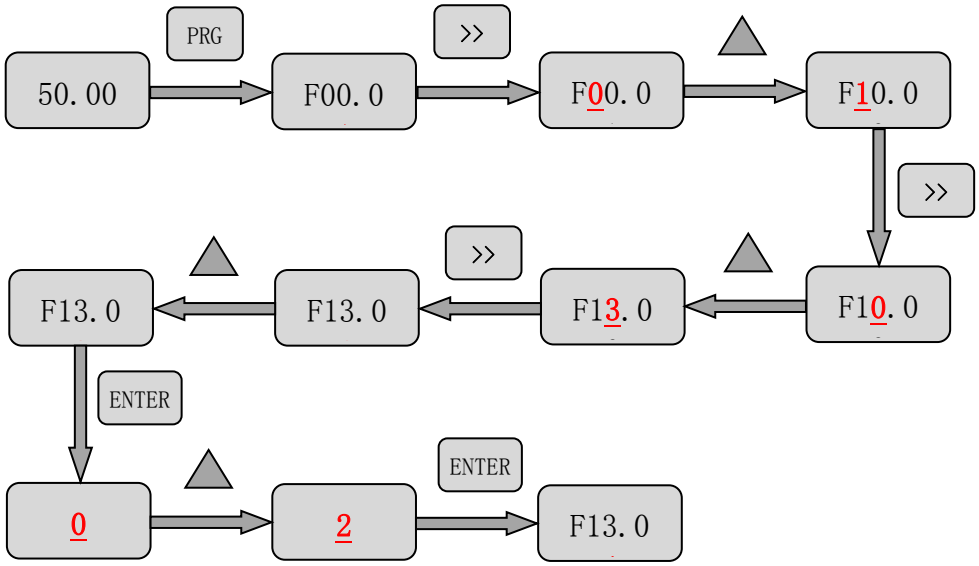


Figure 4-6 Example for restoring to the factory setting

4.2 Operation modes of the inverter

4.2.1 Operating mode of the inverter

Operating mode means the way in which the inverter receives the run commands (such as start, stop) and speed command. S610M serial inverter supports five operating modes, which can be chosen through function code F00.02:

1. Under operation panel control: use RUN and STOP keys on the operation panel for run commands control, and F00.03 for setting speed command.

2. Reserved

3. Under the terminal speed control: use the terminals UP (upward) and DN (downward) to control the run commands and multi-speed terminals MS1~MS3 to set speed commands.

4. CAN communication speed reference/given control: operational command is given by CAN communication. Speed command is given by CAN communication multi-speed.

5. CAN communication distance control: operational command is given by CAN communication. According to master PC communication set target floor, operating speed is directly berthed and automatically calculated in the view of distance principle.

Attentions:

Switching test must be conducted before the command channel is switched, otherwise injuries or damages to equipment might occur.

4.2.2 Working states of the inverter

Working states of S610M include shutdown state, operating state and motor parameters auto tuning state.

1. Shutdown state: After the inverter is powered on and initialized, if there is no operation command input, or if shutdown command is received during operating, the inverter enters into shutdown state.

2. Operating state: after receiving the operating command, the inverter enters into operating state.

3. Motor parameters auto tuning state: after F01.16 is set to none zero, when receiving the operating command, the inverter enters into motor parameters identification state. After the identification of motor parameters is completed, the inverter enters into shutdown state.

4.2.3 Control and operation modes of the inverter

Control Modes

S610M inverter has three control modes, which can be set through F00.01:

1. Open-loop vector control: i.e. speed-sensorless vector control, without PG installed, with high control performance to accurately control the speed and torque of the motor. With features of low frequency, high torque, steady speed and high precision, this control mode is able to achieve high-precision torque control and speed control. It is mainly applied in scenarios requiring high robustness which cannot be satisfied by V/F control.

2. Closed-loop vector control: PG needs to be installed on the shaft of the controlled motor to ensure control performance. Such control mode is suitable for scenarios requiring quicker torque response, higher torque and speed control precision, and high-precision position control assisted by PG feedback (i.e. servo control).

3. V/F control: it is applicable for regular scenarios requiring not very high performance. Such control mode can be applied in multiple motors driven by one inverter.

For elevator control, please choose closed-loop vector control. V/F control is can be used in situation without high requirment of elevator, open-loop vector contor is prohibited.

Operation Modes

S610M inverter has six operation modes: auto tuning operation, multi-speed operation, distantce control operation, inspection operation, emergency operation, normal operation.

Auto tuning operation: after setting the function code F01.16 to 1 or 2, there'll be operation commands, and then the inverter can start auto tuning operation.

Multi-speed operation: when the running speed is given by multi-speed terminals MS1～MS3, it's called multi-speed operation. Set F00.02=2 or F00.02=3 to start multi-speed operation.

Distance control operation: When operating speed is automatically calculated by the inverter via distance, here named it as distance control operation. When F00.02=4, enter distance control operation mode.

Inspection operation: under inspection operation, the running speed is set by F03.08(inspection operating speed) (effective when F00.02=1 and 2). Operation speed is decided by CAN communication multi-speed (effective when F00.02=3), operation speed is decided by functioon code F20.08(inspection operating speed) (effective when F00.02=4), here named it as inspection operation mode. Set F00.02 to 1,2,3 or 4 to start inspection operation mode.

Emergency operation: when the emergency terminal is effective, the running speed (emergency speed) is set by F03.09, and it's called emergency operation. Set F00.02 to1,2,3 or 4 to start inspection operation.

Normal operation: it's a mode controlled either by operation panel (set F00.02=0), or analog terminal (set F00.02=1).

4.3 The inverter commissioning

4.3.1 Check before powering on

Please always check the peripheral wiring before power connection, and ensure the safety of parts and personnel. At least 2 persons operate together and do cut off the power supply if any abnormal situations arise.

1) Be sure that the wiring connection of main circuit and control circuit is correct.
2) Be sure that the peripheral wiring is correct according to the schematic diagram.
3) Be sure that there are no loose screws, no screws left in the cabinet, and no loose wire connecting.
4) Be sure to check if there is any short circuit to the ground
   ① between PE and R, S, T
   ② between PE and U, V, W
   ③ between＋, － and PE
   ④ between control line and PE
   ⑤ between communication line and PE
   ⑥ between the power supply of encoder and PE
5) Be sure that the following items are grounded to the earth reliably:
   ① the cabinet shell
   ② the inverter
   ③ the motor shell
   ④the isolating transformer
   ⑤ the encoder shield

Attentions:

▲a. Be sure that the cabinet shell and the motor shell are grounded at a single point.

▲b. Be sure that the wiring of input terminal (R, S, T) and output terminal (U, V, W) of the main circuit must be correct, otherwise the inverter may be burned after power connection.

▲c. It is suggested that the encoder shield should be grounded at the inverter side to avoid disturbance of poor motor grounding; it can also be grounded at the motor side if the motor is grounded excellently to achieve a better anti-disturbance effect.

6) Check the wiring of communication line, encoder line, control signal line and power line:
   ① The communication line must be twisted-pair line, and the twist distance should be less than 35 cm;
   ② Communication line and power line should be wired separately;
   ③ Control signal line and power line should be wired separately;
   ④ Encoder line and power line should be wired separately;
   ⑤ Vertical wiring is suggested if there is not enough space, or the signal line should be shielded.

Attentions:

The pulse signals of the encoder feedback ensure precise system control, so please check it carefully as a key part before commissioning. The encoder must be solidly installed and reliably wired. It is preferred to connect the encoder wire into the control cabinet directly. Additional connection is necessary if the wire is not long enough, and the additional wire must be shielded which should be iron welded with the original wire of the encoder.

7) Ensure all the air switches in the cabinet are in OFF state.

4.3.2 Operation after being powered on for the first time

After making sure the correct wiring and power supply, please close the AC air switch at the input side of the inverter, and power on the inverter. “8.8.8.8.8” will be displayed on the operation panel at first. When the contactor is normal closed and the nixie tube display becomes the set frequency, initialization of the inverter is completed. The first-time powering on process is as shown in Figure 4-8:

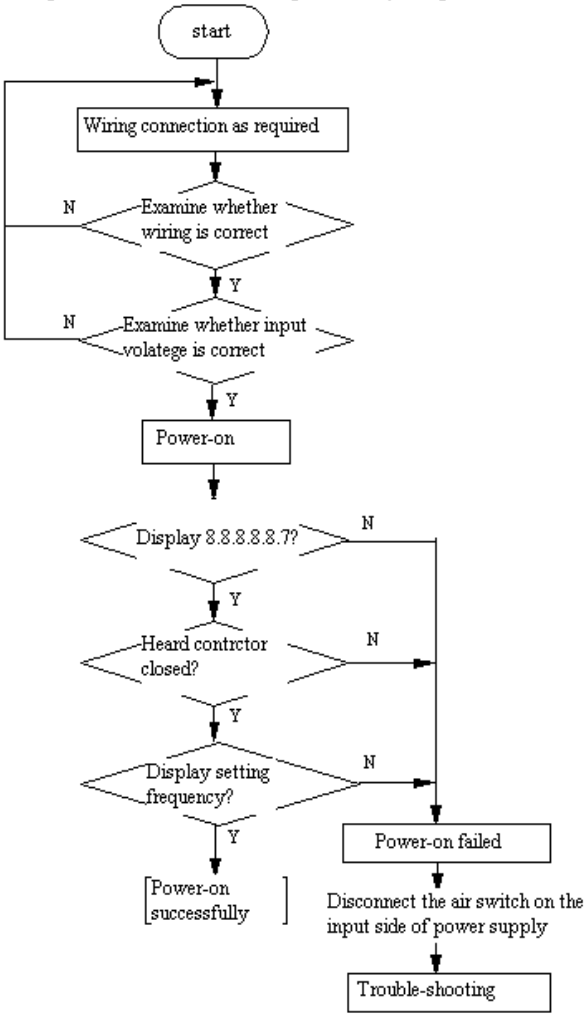


Figure 4-7 Operation flow for the inverter being powered on for the first time

Chapter 5 Function Codes in Brief

The function codes of S610M serial inverter special for elevator are using (Group # + Function Code) for identification, i.e. the function code "FX.YZ" refers to the "YZ" parameter in the group X. For example, "F07.08" refers to the 8th parameter in group 07.

Clarification:

"○" in the colomn of "Modification"means: the parameter value is able to be modified under shutdown and operation states of the inverter.

"×" in the colomn of "Modification"means: the parameter value is not allowed to be modified under the operation state of the inverter.

"*" in the colomn of "Modification"means: the parameter value is an actual inspection record which cannot be modified.

"-" in the colomn of "Modification"means: the parameter value is factory default value, which can only be set by the manufacturer, not allowed for users to modify.

Function Code	Name	Setting Range	Minimum Unit	Factory Default Value	Modification	Ruser Set
Group F00 Basic Parameters						
F00.00	User's password	0: no password Other: password protection	1	0	○	
F00.01	Control mode selection	The units: control mode selection 0: without PG vector control 1: with PG vector control The tens: motor type selection 0: asynchronous 1: synchronous	1	11H	×	
F00.02	Operation mode selection	0: digital reference control through operation panel 1: analog value reference control through terminals（reserved） 2: multi-speed reference control through terminals 3: CAN communication speed reference control 4: CAN communication distance control	1	2	×	
F00.03	Digital speed given by operation panel	0～F0.04	0.001m/s	1.500m/s	○	
F00.04	Elevator rated speed	0.100～4.000m/s	0.001m/s	1.500m/s	×	
F00.05	Running direction setting	0: In the same direction 1: In the opposite direction	1	0	○	

F00.06	Mechanical parameters of the motor (display parameters)	10.0～6000.0	0.1	60.0	*	
F00.07	Maximum output frequency	5.00~ 100.00Hz	0.01Hz	50.00	×	
F00.08	Torque boost	0.0%～30.0%	0.1%	0	○	
F00.09	One-key debugging of elevator menu	0: Normal menu 1: only displays the menu relating to elevator debugging Note: not to be saved after powering off	1	0	○	
F00.10	Setting of elevator maintenance time	0: ineffective 1: 0～65535 hrs	1	0	×	
Group F01 Motor Parameters						
F01.00	Rated power of the motor	0.4~90.0KW	0.1kW	Model confirmed	×	
F01.01	Rated voltage of the motor	0～rated voltage of the inverter	1V	Rated voltage of the inverter	×	
F01.02	Rated current of the motor	0.1~299.9A	0.1A	Model confirmed	×	
F01.03	Rated frequency of the motor	1.00~100.00Hz	0.01Hz	Model confirmed	×	
F01.04	Rated speed of the motor	0～60000RPM	1RPM	1440	×	
F01.05	Stator resistance of asynchronous motor, $\%R_1$	0.00～50.00%	0.01%	Model confirmed	×	
F01.06	Leakage inductance of asynchronous motor, %X	0.00～50.00%	0.01%	Model confirmed	×	
F01.07	Rotor resistance of asynchronous motor, $\%R_2$	0.00～50.00%	0.01%	Model confirmed	×	
F01.08	Mutual inductance of asynchronous motor, %Xm	0.0～2000.0%	0.1%	Model confirmed	×	
F01.09	No-load current of asynchronous motor, Io	0.1～299.9A	0.1A	Model confirmed	×	
F01.10	Stator resistance of synchronous motor, $\%R_1$	0.00～50.00%	0.01%	Model confirmed	×	
F01.11	Direct-axis inductance of synchronous motor	0.0~999.9mH	0.1mH	Model confirmed	×	
F01.12	Quadrature axis of synchronous motor	0.0~999.9mH	0.1mH	Model confirmed	×	
F01.13	Counter emf of	0~ rated voltage of the inverter	1	Model	×	

	synchronous motor			confirmed		
F01.14	Initial angle of synchronous motor	0～359.9°	0.1°	0	×	
F01.15	Initial angle of Z pulse of synchronous motor	0～359.9°	0.1°	0	×	
F01.16	Auto tuning of the motor parameters	0: no action 1: action (motor in rotary state) 2: action (motor in static state 1) 3: action (motor in static state 2) 4: action (motor in static state 3)	1	0	×	
F01.17	Motor-overload protection factor setting	20.0～110.0%	0.1%	100.0	×	
F01.18	Oscillation inhibition factor	0～100	1	20	○	
F01.19	Gain compensation of slip frequency	50.0%~250.0%	0.1%	100.%	×	
F01.20	Static tuning coefficient of synchronous motor	50%~100%	1	80%		
Group F02 Start & Stop Control Parameters						
F02.00	Delay time of starting	0.00~2.00s	0.01s	0.50	×	
F02.01	Delay time of brake release when starts	0.00~2.00s	0.01s	0.50	×	
F02.02	Maintaining time of zero-speed starting	0.00~4.00s	0.01s	0.80	×	
F02.03	Starting speed	0.000~0.200m/s	0.001m/s	0.00	×	
F02.04	Maintaining time of starting speed	0.00~2.00s	0.01s	0.00	×	
F02.05	Daley time of braking when stops	0.00~2.00s	0.01s	0.50	×	
F02.06	Maintaining time of zero-speed when stops	0.00~4.00s	0.01s	0.50	×	
F02.07	Release delay of operating contactor	0.00~2.00s	0.01s	0.50	×	
F02.08	Time of starting slope	0.00~2.00s	0.01s	0.00	×	
F02.09	Delay of torque revocation when stops	0~800ms	1ms	10ms	×	
F02.10	Detection time of contactor error	0.00~2.00s	0.01s	0.50	×	
F02.11	Delay of operation permission revocation	0~6999ms	1ms	0ms	×	
F02.12	Reserved					
F02.13	Open brake frequency of none close loop	0.00~10.00HZ	0.01HZ	0.00	×	

	control					
F02.14	Braking frequency of none close loop control	0.00~10.00HZ	0.01HZ	0.00	×	
F02.15	Open brake frequency of none close loop control (UPS operation)	0.00~10.00HZ	0.01HZ	1.50	×	0~1000
F02.16	Braking frequency of none close loop control (UPS operation)	0.00~10.00HZ	0.01HZ	1.50	×	0~1000
Group F03 Speed Parameters						
F03.00	Multi-section speed 0	0～F0.04	0.001M/S	0	○	
F03.01	Multi-section speed 1	0～F0.04	0.001M/S	0	○	
F03.02	Multi-section speed 2	0～F0.04	0.001M/S	0	○	
F03.03	Multi-section speed 3	0～F0.04	0.001M/S	0	○	
F03.04	Multi-section speed 4	0～F0.04	0.001M/S	0	○	
F03.05	Multi-section speed 5	0～F0.04	0.001M/S	0	○	
F03.06	Multi-section speed 6	0～F0.04	0.001M/S	0	○	
F03.07	Multi-section speed 7	0～F0.04	0.001M/S	0	○	
F03.08	Inspection speed	0.000~0.630 m/s	0.001 M/S	0.2M/S	×	
F03.09	Emergency speed	0.020~0.150 m/s	0.001 M/S	0.1M/S	×	
F03.10	Speed detection of up forced deceleration	0～100.0% （F00.04）	0.1%	97.0%	×	
F03.11	Speed detection of down forced deceleration	0～100.0% （F00.04）	0.1%	97.0%	×	
F03.12	Overspeed setting	80.0%～130.0% （F00.04）	0.1%	120.0%	×	
F03.13	Detection time of overspeed	0: Prohibited 0.01~2.00s：Inspection time	0.01S	0.30S	×	
F03.14	Speed deviation range	0: Prohibited 10.0%~50.0%(F00.04)：speed deviation range	0.1%	20.0%	×	
F03.15	Detection time of speed deviation	0: Prohibited 0.1~5.0 s：Inspection time	0.1S	1.0	×	
F03.16	Crawling speed	0.020~0.500 m/s	0.001 M/S	0.050 M/S	×	
F03.17	Selection of multi-speed detection	0～7 0：invalid 1～7: the corresponding multi-speed is 1～7（F03.01～F03.07）when none of the digital input terminals is set as inspection operation terminal INS.	1	0	×	

		Note: this function is invalid when any digital input terminal is set as inspection operation terminal INS.				
Group F04 Analog input curve(reserved)						
Group F05 Acceleration and Deceleration Parameters						
F05.00	Rapid deceleration when stops	0.020~9.999 m/s3	0.001 m/s3	0.35 m/s3	×	
F05.01	Acceleration speed	0.020~9.999 m/s2	0.001 m/s2	0.55 m/s2	×	
F05.02	Rapid acceleration when starts	0.020~9.999 m/s3	0.001 m/s3	0.35 m/s3	×	
F05.03	Rapid acceleration near the end	0.020~9.999 m/s3	0.001 m/s3	0.6 m/s3	×	
F05.04	Deceleration	0.020~9.999 m/s2	0.001 m/s2	0.55 m/s2	×	
F05.05	Rapid deceleration at the beginning	0.020~9.999 m/s3	0.001 m/s3	0.6 m/s3	×	
F05.06	Rapid deceleration near the end	0.020~9.999 m/s3	0.001 m/s3	0.35 m/s3	×	
F05.07	Acceleration under inspection operation	0.020~9.999 m/s2	0.001 m/s2	1.0 m/s2	×	
F05.08	Deceleration under inspection operation	0.020~9.999 m/s2	0.001 m/s2	1.0 m/s2	×	
F05.09	Acceleration under emergency operation	0.020~9.999 m/s2	0.001 m/s2	1.0 m/s2	×	
F05.10	Deceleration under emergency operation	0.020~9.999 m/s2	0.001 m/s2	1.0 m/s2	×	
F05.11	Acceleration under auto tuning operation	0.020~9.999 m/s2	0.001 m/s2	0.15 m/s2	×	
F05.12	Deceleration under auto tuning operation	0.020~9.999 m/s2	0.001 m/s2	0.15 m/s2	×	
F05.13	Deceleration under abnormal condition	0.020~9.999 m/s2	0.001 m/s2	1.0 m/s2	×	
F05.14	Deceleration when stops	0.020~9.999 m/s^2	0.001 M/S^2	0.55 M/S^2	×	
Group F06 Control Performance Parameters						
F06.00	Zero-speed starting P (F02.01:working during the maintaining time of zero-speed starting and only valid under closed-loop control)	1~2000	1	200	○	
F06.01	Zero-speed starting I (F02.01:working during the maintaining time of zero-speed starting and only valid under closed-loop control)	0~9999	1	100	○	

F06.02	ASR1-P	0.1~200.0	0.1	20.0	○	
F06.03	ASR1-I	0～9.999	0.001	0.200	○	
F06.04	ASR1 output filter	0 ～ 8 （ corresponding to 0 ～ 2^8/10ms）	1	0	○	
F06.05	ASR2-P	0.1~200.0	0.1	200	○	
F06.06	ASR2-I	0～9999	0.001	200	○	
F06.07	ASR2 output filter	0 ～ 8 （ corresponding to 0 ～ 2^8/10ms）	1	0	○	
F06.08	ASR1/2 switching frequency	0.0～100.0	0.1	10.0	○	
F06.09	None zero speed torque limit value	0.0%~+200.0%(rated current of the inverter)	0.1%	180.0%	○	
F06.10	Zero-speed torque limit value	0.0%~+200.0%(rated current of the inverter)	0.1%	180.0%	○	
F06.11	ACR-P(No-start current loop: P)	1~5000	1	1000	○	
F06.12	ACR-I(No-start current loop: I)	0~8000	1	640	○	
F06.13	ACR-P0(Start current loop: P)	1~5000	1	2000		
F06.14	ACR-I0(Start current loop: I)	0~8000	1	640		
F06.15	Anti-vibration factor for the elevator	-1000～1000	1	0	×	
F06.16	Pre-torque selection	0: auto-torque compensation 1: auto-torque compensation 2 2: analog value reference of weighing-sensor (reserved) 3: pre-torque digital setting (reserved)	1	1	×	
F06.17	Vibration suppression mode selection of auto-torque compensation 2	0: vibration suppression mode 1 1: vibration suppression mode 2 2: vibration suppression mode 3 3: vibration suppression mode 4	1	0	×	
F06.18	Selection of zero speed torque limit	0: use set torque to limit 1: use default torque to limit	1	0	×	
F06.19	Pre-torque offset when going up (reserved)	0.0%～100.0%	0.1%	50.0%	×	
F06.20	Gain on the driving side when going up (reserved)	0.000～7.000	0.001	1.000	×	
F06.21	Gain on the braking side when going up (reserved)	0.000～7.000	0.001	1.000	×	
F06.22	Pre-torque offset when going down (reserved)	0.0%～100.0%	0.1%	50.0%	×	

F06.23	Gain on the drive side when going down (reserved)	0.000～7.000	0.001	1.000	×	
F06.24	Gain on the brake side when going down (reserved)	0.000～7.000	0.001	1.000	×	
F06.25	Digital setting of pre-torque (reserved)	-100.0%~100.0%	0.1%	10%	×	
F06.26	Voltage outer loop KP	0~1000	1	0	×	
F06.27	Voltage outer loop TI coefficient	0.001~1.000	0.001	0.050	×	
F06.28	Magnetic flux set percentage of geared motor	50%~130%	1%	100%	×	
F06.29	PerUnit of weak magnetic Max. current	0~4096	1	410	×	
F06.30	Margin of Max. voltage	0~100.0	0.1	3.0	×	
F06.31	Control optimization mode selection	LED unit: SVC mode selection of asynchronous motor LED tens: SVC mode selection of synchronous motor LED hundreds: V/F mode selection LED thousands: slip compensation optimization enable mode 0: mode 0 1: mode 1	1	1111H	×	
F06.32	FVC coefficient of asynchronous motor	0~100	1	10	×	
F06.33	SVC filter time of asynchronous motor	0~200	1	15	×	
F06.34	SVC filter time of synchronous motor	10~1000	1	100	×	
F06.35	0 current given at SVC mode of synchronous motor	0~100	1	30	×	
F06.36	Mode 1 switch frequency	0~100%	1%	25%	×	
F06.37	Mode 1 low-frequency current given	0~2000	1	1200	×	
F06.38	Mode 1 adjust coefficient	0~100	1	12	×	
F06.39	Current filtering coefficient	Units: 0~3 D axial current filtering Tens: 0~3 Q axial current filtering	1	00H	×	
F06.40	Mode 1 low-frequency current given (UPS operation)	0~2000 (relative motor rated current) 1000 corresponds to motor rated current	1	800	×	0~2000

Group F07 Input & Output Terminal Setting						
F07.00	Function selection of input terminal X1	0：Non functional 1：Upward(UP) 2：Downward(DN) 3：Multi-speed selection1 4：Multi-speed selection2 5：Multi-speed selection3 6：External reset input 7：External error input 8：Inspection input 9：Operation permission of the inverter 10：Emergency operation input 11：Operating contactor feedback input(CSM) 12：Braking feedback input (BSM) 13：Up forced deceleration speed input (UPF) 14：Down forced deceleration speed input (DNF) 15: Up leveling input 16: Down leveling input Others：reserved	1	9	×	
F07.01	Function selection of input terminal X2		1	6	×	
F07.02	Function selection of input terminal X3		1	1	×	
F07.03	Function selection of input terminal X4		1	2	×	
F07.04	Function selection of input terminal X5		1	3	×	
F07.05	Function selection of input terminal X6		1	4	×	
F07.06	Function selection of input terminal X7		1	5	×	
F07.07	Function selection of input terminal X8		1	0	×	
F07.08	Function selection of input terminal X9 (Reserved)		1	0	×	
F07.09	Function selection of input terminal X10 (Reserved)		1	0	×	

F07.10	Terminal filtering time	0～500	1ms	10	○	
F07.11	Input terminal activeness setting	Binary setting: 0: positive logic, active under conducting state 1: negative logic, active under off state LED units digit： BIT0～BIT3：X1～X4 LED tens digit： BIT0～BIT3：X5～X8 LED hundreds digit： BIT0～BIT1：X9~X10	1	000	○	
F07.12	Functions(Y1) of open collector output	0：Non functional 1: inverter running signals 2: frequency arrival signals 3: frequency level detection signals (FDT1) 4: frequency level detection signals (FDT2) 5: the inverter is ready for operation 6: stopping the inverter caused by undervoltage 7: inverter failure 8: up signal output 9: down signal output 10: in zero-speed operation 11: braking control output 12: operating contactor control output 13: signal of Motor Brake enables to open 14: Direction signal of light-load 15: Output of pre-open door 16: Braking power output 17: Basic pole block error output (E030) Other：reserved	1	0	×	
F07.13	Functions(Y2) of open collector output	Same as Y1	1	0	×	
F07.14	Relay 1 output	Same as Y1	1	13	×	
F07.15	Relay 2 output	Same as Y1	1	10	×	
F07.16	Relay 3 output	Same as Y1	1	7	×	
F07.17	Reserved					
F07.18	Output terminal activeness setting	Binary setting: 0: active under conducting state 1: active under off state LED units digit: BIT0～BIT3：Y1, Y2, relay 1, relay 2 LED tens digit: BIT0: relay 3	1	0	○	

F07.18	Frequency arrival (FAR) detected width	0.00～100.00	0.01Hz	2.50	○	
F07.20	FDT1 level	0.00～100.00	0.01Hz	50.00	○	
F07.21	FDT1 delay	0.00～100.00	0.01Hz	1.00	○	
F07.22	FDT2 level	0.00～100.00	0.01Hz	25.00	○	
F07.23	FDT2 delay	0.00～100.00	0.01Hz	1.00	○	
F07.24~ F07.37	Reserved					
Group F08 Encoder Parameters						
F08.00	PG type	0: ABZ incremental 1: SIN/COS 2：Endata Absolute Value —Heidenhain ECN1313/ECN413 (reserved) 3：UVW incremental (reserved) Note: 0 is for asynchronous motor and 1~3 are for synchronous motor	1	1	○	
F08.01	PG pulses per revolution	1～10000	1	2048	○	
F08.02	PG rotating direction	0: A ahead of B 1: B ahead of A	1	0	×	
F08.03	Speed measurement filtering constant of the encoder	Units digit: 0~9 high speed filtering Tens digit: 0~9 low speed filtering Hundreds digit: 0~9 zero- speed filtering constant Thousands digit: 0：speed measurement method1 1: speed measurement method 2 2:reserved	1	1011H	○	
F08.04	PG thread break detection time	0.0：no action 0.1～10.0	0.1s	2.0	○	
F08.05	SIN/COS encoder zero-offset correction	0: no correction 1:correction	1	0	×	
F08.06	SIN/COS encoder zero-offset of A phase	0~4096	1	2252	*	
F08.07	SIN/COS encoder zero-offset of B phase	0~4096	1	2252	*	
F08.08	SIN/COS encoder zero-offset of C phase	0~4096	1	2252	*	
F08.09	SIN/COS encoder zero-offset of D phase	0~4096	1	2252	*	
Group F09 Protection Parameters Setting						
F09.00	Relay output action selection when in errors	LED units digit: undervoltage error action selection 0: no action 1: action (undervoltage regarded as an error)	1	000	×	

		LED tens digit: action selection for auto reset interval error 0: no action 1: action LED hundreds digit: reserved				
F09.01	Error screen selection 1	LED units digit: SCI communication error screen selection (reserved) LED tens digit: contactor error screen selection LED hundreds digit: EEPROM error screen selection LED thousands digit: reserved 0: not screened. Error reported and shutdown. 1: not screened. Error alert and continues operation. 2: screened	1	0000	×	
F09.02	Error screen selection 2	LED units digit: input phase loss error screen selection LED tens digit: output phase loss error screen selection 0: not screened. Error reported and shutdown. 1: not screened. Error alert and continues operation. 2: screened	1	00	×	
F09.03	Optimized mode selection	LED units digit: Prohibit to select the optimization protection of encoder wire-broken. 0: Start the optimization protection of encoder wire-broken. 1: Forbid the optimization protection of encoder wire-broken. LED tens digit: Power on and Auto-tuning selection of synchronous motor. 0:Start power on and auto-tuning of synchronous motor. 1:Forbid power on and auto-tuning of synchronous motor. Note: F08.00=2 invalid LED hundreds digit: Large tuning selection of poweon CD angular deviation 0: Turn on tuning 1: Prohibit tuninng LED thousands digit: Cancel mode selection of torque slope when stopping. 0: No PI mode 1: PI mode	1	0	×	

F09.04	Motor overload protection selection	0: no action 1: general motor (low-speed compensation needed) 2: variable-frequency motor (no need for low-speed compensation)	1	1	×	
F09.05	Selection 1 of special errors shielding	LED units: Sincos Encoder CD error shielding selection LED tens: Sincos Encoder AB low-speed error shielding selection LED hundreds: Encoder Z pulse error shielding selection LED thousands: Car uncontrollable error shielding selection 0: Unshielded, warn the error and stop 1: Shielded	1	0000	×	
F09.06	Selection 2 of special errors shielding	LED units: Basic pole sealing error shielding selection. LED tens: CAN communication error shielding selection LED handreds: error shielding selection of magnetic pole tuning LED thousands: reserved 0: Unshielded, warn the error and stop 1: Shielded	1	0000	×	
F09.07	Error locking selection	0: error locking prohibited 1: error locking permitted	1	0	×	
F09.08	Wiring-brake action selection of Encoder	0: Warn the error and stop 1: Cut-over SVC then warn the error after stop	1	0	×	
F09.09	Selection of special protection disposition	LED units: derating diagnosis for flying car distance protection. 0: Prohibit 1: Enable LED tens: one-key slip enable 0: Prohibit 1: Enable LED hundreds: poweron handling mode of terminal operation command 0: operation terminal is available at the undervoltage state, need trigger operation terminal to enable runing command after bus-voltage normal. 1: operation terminal is available at the undervoltage state, only need keep operation terminal as the state of electric level available, runing command can be enabled after bus-voltage normal. LED thousands: Auto-reset enable for basic pole sealing error	1	0000	×	

		0: Forbidden 1: Enable				
Group F10 VF Control Parameters						
F10.00	V/F curve setting	0: user-defined V/F curve 1: 2.0 power curve 2: 1.7 power curve 3: 1.2 power curve	1	0	×	
F10.01	V/F frequency 3	F10.03～F01.03	0.01Hz	0.00 Hz	×	
F10.02	V/F voltage 3	F10.04～100.0	0.1%	0.0	×	
F10.03	V/F voltage 2	F10.05 ～F10.01	0.01Hz	0.00 Hz	×	
F10.04	V/F voltage 2	F10.06～F10.02	0.1%	0.0	×	
F10.05	V/F frequency 1	0.00～F10.03	0.01Hz	0.00 Hz	×	
F10.06	V/F voltage 1	0～F10.04	0.1%	0.0	×	
F10.07	Torque boost cut-off point	0.0～50.0 (relative to F01.03)	0.1%	10.0	○	
F10.08	AVR function	0: no action 1: keeps acting 2: no action only when decelerating	1	2	×	
F10.09	IF controls min. given value of excitation current	0~150%Io (no-load current of Motor)	1%	0	×	
F10.10	IF controls step length of excitation current	0~100	1	5	×	
F10.11	VF slip compensation gain	0~200%	1%	100%	×	
F10.12	Filter time of VF slip compensation	0~1000ms	1ms	200ms	×	
F10.13	Reserved					
Group F11 Performance Parameters						
F11.00	Carrier frequency	Rated output current 48A or below：1.0~15.0KHz	0.1	8.0	×	
		Rated output current 60A~71A：1.0~10.0KHz		8.0		
		Rated output current90A ：1.0~10.0KHz		7.0		
		Rated output current 110A~176A: 1.0~6.0KHz		4.0		
F11.01	Voltage regulation selection	LED units digit: BIT0: overmodulation enable 0: disenable 1: enable BIT1: disposition method of overmodulation zone 0: method 0 1: method 1	1	100	×	

		BIT2: Waving mode 0: 7 segment mode 1: cut 7 to 5 segment mode BIT3: dead-time compensation selection 0: dead-time compensation 1: dead-time uncompensation LED tens digit: BIT0: narrow pulse control 0: uncontrol 1: control BIT1: PWM selection 0: normal PWM 1: random PWM BIT2: over-voltage stalling selection (reserved) 0: prohibit (when braking resistor installed) 1: permit BIT3: prohibit reduce carrier wave selection 0: permit reduce carrier wave 1: prohibit reduce carrier wave LED hundreds digit: BIT0: Random sampling selection 0: prohibit 1: permit BIT1: PI parameter of current loop tuning calculation enable 0: disenable 1: enable BIT2: mixed sampling selection 0: prohibit 1: permit BIT3: reduce carrier wave selection under special working condition of elevator. 0: permit reduce carrier wave 1: prohibit reduce carrier wave LED thousands digit: reserved				
F11.02	Stalling over-voltage point (reserved)	120.0～150.0（Udce）	0.1%	140.0	×	
F11.03	Auto current-limit level	20.0～200.0（Ie）	0.1%	150.0	×	
F11.04	Frequency decrease rate during current limiting (reserved)	0.00～99.99	0.01 Hz/s	10.00	○	
F11.05	Auto current-limit action selection (reserved)	0: invalid at constant speed 1: valid at constant speed Note: always valid at acceleration/deceleration	1	1	×	
F11.06	Action voltage of the brake unit(reserved)	380~750V	1	Model confirmed	×	

F11.07	Dynamic braking selection	0: no action 1: action	1	1	×	
F11.08	Usage rare of dynamic braking	0.0~100.0%	0.1%	100.0%	○	
F11.09	Fan control	0: Auto operation 1: Fan keeps running when powered on Note: continue to run for 3 minutes after being powered off	1	0	×	
F11.10	Speed threshold at zero-speed	0.001~0.010m/s	0.001m/s	0.003m/s	○	
F11.11	Random sampling to control frequency	2.0~15.0KHZ	0.1	8.0	×	
F11.12	Random sampling delay setting	0~65535	1	0	×	
F11.13	Random zero vector	0~3	1	0	×	
Group F12 Communication Parameters (Reserved)						
F12.00~ F12.03	RESERVED					
F12.04	Type of CAN communication extension card	0：CANlink 1：Reserved	1	0	×	
F12.05	Baud rate of CAN communication	0：20 Kbps 1：50 Kbps 2：100 Kbps 3：125 Kbps 4：250 Kbps 5：500 Kbps	1	1	×	
F12.06	CAN local machine address	1~127: local machine CAN node ID.	1	1	×	
F12.07	CAN slave machine address	0: No slave machine 1~127: slave machine CAN node ID.	1	0	×	
F12.08	Detection time of Can communication overtime (under CAN mode)	0.0~10.0S Note: available under CAN communication mode(F00.02=3 or 4)	0.1	2.0S	×	
F12.09	Detection time of Can communication overtime (don't under CAN mode)	0.0~10.0S Note: available under non CAN communication mode(F00.02！=3 and 4), 0.0 don't detect CAN communication error.	0.1	0.0S	×	
F12.10~ F12.12	RESERVED					
Group F13 System Management						

F13.00	Reserved					
F13.01	Reserved					
F13.02	Parameters protection setting	0: Modification on all parameters permitted 1: except main digital frequency reference (F00.03) and this parameter (F13.02), modification on other parameters prohibited 2: except this parameter (F13.02), modification on all other parameters prohibited	1	1	○	
F13.03	Parameter initialization	0: parameter modification status 1: delete error records 2: restore to factory default setting	1	0	×	
F13.04	Parameters copy	0: no action 1: upload parameters 2: download parameters 3: download parameters (except motor parameters) Note: no upload/download of the inverter parameters	1	0	×	
F13.05	Parameters display selection	Binary setting: 0：no display；1：displayed LED units digit： BIT0：output frequency (no display when shutdown) BIT1：the set frequency (flashing) BIT2：output current (no display when shutdown) BIT3：output voltage (no display when shutdown) LED tens digit： BIT0：AI1 BIT1：AI2 BIT2：reserved BIT3：DI (terminal status setting). When set to 1, the lower 9 bits display X1～X9，while higher bits display output terminals Y1, Y2, and relay A, B. LED hundreds digit： BIT0：output power (no display when shutdown) BIT1：output torque (no display when shutdown) BIT2: feedback speed(m/s) BIT3: given speed(m/s)	1	1C07H	○	

		(flashing) LED thousands digit： BIT0：Bus voltage BIT1：Operating speed (R/MIN) BIT2：The set speed (R/MIN) (flashing) Note: The set frequency is displayed by default when the inverter is shutdown, while output frequency is displayed by default during operation, if the above are all set to zero.				
Group F20 CAN Communication Distance Control Parameters 1						
F20.00	Floors quantity	2~64	1	2	×	
F20.01	Present floor setting	0: No action Set present floor as 1~F20.00	1	0	×	
F20.02	Run speed	0.100～F00.04	0.001m/s	1.500m/s	×	
F20.03	Start frequency under fast running mode	0.00~5.00	0.01Hz	0	×	
F20.04	Terrace of fast starting	0.00~Min (1.00, F20.02)	0.01Hz	0	×	
F20.05	Terrace starting delay	0~10	5ms	2	×	
F20.06	Delay time of staring under low speed	0.00~5.00	0.01s	0	×	
F20.07	Average acceleration/deceleration speed	0.10~2.00	0.01 m/s2	0.30	×	
F20.08	Inspection Speed	(F20.11) ~0.63	0.01m/s	0.30	×	
F20.09	Inspection acceleration time	0.1~3.0	0.1s	1.0	×	
F20.10	Inspection deceleration time	0.1~2.0	0.1s	0.3	×	
F20.11	Operation speed of non fast running terminal station.	0.05~Min(0.20,F20.08)	0.01m/s	0.10	×	
F20.12	Search leveling speed of non terminal station.	0.05~0.30	0.01m/s	0.20	×	
F20.13	Speed of hoistway self-tuning	0.10~0.50	0.01m/s	0.30	×	
F20.14	Security diagnosis of elevator	0: prohibit 1: start security diagnosis	1	0	×	
F20.15	Class of forced deceleration switch	1~3	1	1	×	
F20.16	Instal quantity of leveling switch	0:1 piece 1:2 pieces	1	0	×	
F20.17	Time adjustment of S curve	0~90	1%	56	×	
F20.18	Leveling switch mode	0: China Mode (utilize magnetic shielding plate)	1	1	×	

		1: Iran Mode (utilize magnetic bean) Note: In China Mode, only need to use parameters of Group F22 to compensate the leveling; In Iran Mode, need to use parameters of Group F22 and F23 to compensate the leveling.				
F20.19	Speed of slight motion leveling	0.03~0.10	0.01m/s	0.05	×	
F20.20	Speed of door pre-opening	0.00~0.50	0.01m/s	0.30	×	
Group F21 CAN Communication Distance Control Parameters 2						
F21.00	Length of leveling plugin plate	10~800	1mm	300	×	
F21.01	Delay starting of Bottom floor interval of hoistway tuning.	1.0~20.0	0.1S	2.0	×	
F21.02	Height difference of upward first class forced deceleration switch.	-10.000~10.000	0.001m	0	*	
F21.03	Height difference of upward second class forced deceleration switch.	-10.000~10.000	0.001m	00.000	*	
F21.04	Height difference of upward third class forced deceleration switch.	-10.000~10.000	0.001m	00.000	*	
F21.05	Height difference of downward first class forced deceleration switch.	-10.000~10.000	0.001m	00.000	*	
F21.06	Height difference of downward second class forced deceleration switch.	-10.000~10.000	0.001m	00.000	*	
F21.07	Height difference of downward third class forced deceleration switch.	-10.000~10.000	0.001m	00.000	*	
F21.08	Switch-on time of leveling switch	0~200ms	1ms	2	×	
F21.09	Disposition method of the first-class forced exchange	0~1	1	0	×	
F21.10	Interval of double-leveling photo-switch	0~600	1mm	300	×	
F21.11	Height of upward	00.000~60.000	0.001m	00.000	×	

	forced deceleration switch 1					
F21.12	Height of upward forced deceleration switch 2	00.000~60.000	0.001m	00.000	×	
F21.13	Height of upward forced deceleration switch 3	00.000~60.000	0.001m	00.000	×	
F21.14	Height of downward forced deceleration switch 1	00.000~60.000	0.001m	00.000	×	
F21.15	Height of downward forced deceleration switch 2	00.000~60.000	0.001m	00.000	×	
F21.16	Height of downward forced deceleration switch 3	00.000~60.000	0.001m	00.000	×	
F21.17	Decelerate of upward forced deceleration switch 1	0.020~2.000	0.001m/s2	1.200	*	
F21.18	Decelerate of upward forced deceleration switch 2	0.020~2.000	0.001m/s2	1.000	*	
F21.19	Decelerate of upward forced deceleration switch 3	0.020~2.000	0.001m/s2	0.900	*	
F21.20	Decelerate of downward forced deceleration switch 1	0.020~2.000	0.001m/s2	1.200	*	
F21.21	Decelerate of downward forced deceleration switch 2	0.020~2.000	0.001m/s2	1.000	*	
F21.22	Decelerate of downward forced deceleration switch 3	0.020~2.000	0.001m/s2	0.900	*	
F21.23	Speed limit of upward forced deceleration switch 1	0.00~6.00	0.01m/s	0.00	*	
F21.24	Speed limit of upward forced deceleration switch 2	0.00~6.00	0.01m/s	0.00	*	
F21.25	Speed limit of upward forced deceleration switch 3	0.00~6.00	0.01m/s	0.00	*	
F21.26	Speed limit of downward forced deceleration switch 1	0.00~6.00	0.01m/s	0.00	*	
F21.27	Speed limit of downward forced deceleration switch 2	0.00~6.00	0.01m/s	0.00	*	
F21.28	Speed limit of downward forced	0.00~6.00	0.01m/s	0.00	*	

	deceleration switch 3					
F21.29~ F21.91	Height of floors 1…63	00.000~60.000	0.001m	00.000	×	
Group F22 Upward Running Leveling Distance Compensation						
F22.00~ F22.63	Leveling distance compensation of upward running floor 1… floor 64	-200～200	1mm	0	×	
Group F23 Reserved Downward Running Leveling Distance Compensation						
F23.00~ F23.63	Leveling distance compensation of downward running floor 1… floor 64	-200～200	1mm	0	×	
Group F90 Error Records						
F90.00	Error record 1	Errors of the inverter: 0：no abnormal records 1：over current when the inverter accelerates (E001) 2：over current when the inverter decelerates (E002) 3：over current when the inverter operates at constant speed (E003) 4：over voltage when the inverter accelerates (E004) 5：over voltage when the inverter decelerates (E005) 6：over voltage when the inverter operates at constant speed (E006) 7：Abnormal voltage sharing of bus capacitor (E007) (Reserved) 8：Input phase loss (E008) 9：Output phase loss (E009) 10：Quick overcurrent protection (E010) 11：Radiator 1 overheat (E011) 12：Radiator 2 overheat (E012) 13：Inverter overload (E013) 14：Motor overload (E014) 15：External error (E015) 16：EEPROM reading & writing error (E016) 17：Communication abnormal of serial port (E017) 18：Abnormal contactor (E018) 19：Abnormal circuit by current detection (E019) Hall or amplifying circuit 20: CAN communication abnormal	1	0	*	

		(E020) 21~22: reserved 23：Parameter copy error in the operation panel（E023） 24：Poor auto tuning（E024） 25：PG error（E025） 26: vector current loss error(E026) 27：Brake unit error（E027） 28: Error of hardware seal-wave OE lost (E028) 29: Error of overcurrent led by door-lock switch off. (E029) 30: Security circuit switches off during operation. (E030) 31: Output contactor error (E031) 32: Brake error(E032) 34: Overlarge speed deviation error (E034) 35: Overspeed error(E035) 36: Elevator maintenance failure 37: Error of elevator operating command (E037) 42: Switch dislocation error of hoistway self-tuning. 43: Impulse Z loss error(E043) 44: Sincos encoder zero-bias error(E044) 49: Error of tuning 3 stalling (E049) 71: Error of one-key slip time too short during adjacent two times. (E071) 73: Error of forced exchange speed calculation when curve creation. (E073) 74: Error of curve calculation overflow (E074) 75: Leveling switch error (E075) 76: Leveling compensation error (E076) 77: Error of self-tuning forced height too low (E077) 80: Error of slight motion leveling (E080) Note: 1. E007 is not detected by inverters of 380V and below 90Kw, but can be detected by other models. 2. E010 can only be reset 10 seconds after it occurred. 3. If overcurrent occurs, it needs 6				

		seconds delay to reset. 4. Axxx will be displayed on the operation panel when failure warning starts (e.g. when contactor error occurs, E018 will be displayed on the operation panel if error protection acts, while A018 will be displayed if operation continues with warning. Other: reserved				
F90.01	Sub-code of error recording 1	0～65535	1	0	*	
F90.02	Bus voltage when error occur	0～999	1V	0V	*	
F90.03	Output voltage when error occur	0～480V	1V	0V	*	
F90.04	Actual current when error occurs	0.0～999.9	0.1A	0.0	*	
F90.05	Set frequency when error occurs	0.00Hz~100.00Hz	0.01Hz	0.00Hz	*	
F90.06	Operating frequency when error occurs	0.00～100.00	0.01Hz	0.00	*	
F90.07	Operating status of the inverter when error occurs	0～FFFFH	1	0000	*	
F90.08	Error record 2	0～99	1	0	*	
F90.09	Sub-code of error record 2	0～65535	1	0	*	
F90.10	Error record 3	0～99	1	0	*	
F90.11	Sub-code of error record 3	0～65535	1	0	*	
F90.12	Error record 4	0～99	1	0	*	
F90.13	Sub-code of error record 4	0～65535	1	0	*	
F90.14	Error record 5	0～99	1	0	*	
F90.15	Sub-code of error record 5	0～65535	1	0	*	
Group F91 Inverter Parameters						
F91.00	Serial number	0～FFFF	1	610	*	
F91.01	Software version #	0.00~99.99	1	2.01.06	*	
F91.02	Customized version #	0～9999	1	1.00	*	
F91.03	Temporary version #	00.000~64.999	1	Factory setting	*	
F91.04	Rated capacity	Output power 0～999.9 KVA（Auto decided and set by the model）	0.1kVA	Factory setting	*	

F91.05	Rated voltage	0~999V (Auto decided and set by the model)	1V	Factory setting	*	
F91.06	Rated current	0~299.9A (Auto decided and set by the model)	0.1A	Factory setting	*	
Group F92 Status Display Parameters						
F92.00	Given speed	-10.000~10.000m/s	0.01m/s	0.00	*	
F92.01	Instruction speed (after integrator)	-10.000~10.000m/s	0.01m/s	0.00	*	
F92.02	Feedback speed	-10.000~10.000m/s	0.01m/s	0.00	*	
F92.03	The set frequency	-100.00~100.00Hz	0.01Hz	0.00	*	
F92.04	Instruction frequency (after integrator)	-100.00~100.00Hz	0.1Hz	0.0	*	
F92.05	Output frequency	-100.00~100.00Hz	0.01Hz	0.00	*	
F92.06	Output voltage	0~480V	1V	0	*	
F92.07	Output current	0.0~3Ie	0.1A	0.0	*	
F92.08	Torque current	-300.0~+300.0％	0.1%	0.0	*	
F92.09	Flux current	0~+100.0％	0.1%	0.0	*	
F92.10	Power of the motor	0.0~200.0%（relative to rated power of the motor）	0.1%	0.0	*	
F92.11	Estimated frequency of the motor	-100.00~100.00Hz	0.01Hz	0.00	*	
F92.12	Actual frequency of the motor	-100.00~100.00Hz	0.01Hz	0.00	*	
F92.13	Bus voltage	0~800V	1V	0	*	
F92.14	Operating status of the inverter	0～FFFFH bit0：Operating/Shutdown bit1：Reverse/forward bit2: Operating at zero speed bit3：during acceleration bit4：during deceleration bit5：Operating at constant speed bit6：during pre-excitation bit7：during auto tuning bit8：during overcurrent limiting bit9: during DC overvoltage limiting bit10：during torque limiting bit11：During speed limiting bit12：inverter error bit13：speed control	1	0	*	

		bit14：torque control bit15: CD direction of Sincos encoder				
F92.15	Digital input terminal status	0～7FFH 0：off；1：on Bit 10 display HV(basic pole block)signal	1	00	*	
F92.16	Digital output terminal status	0～1FH 0：off；1：on	1	0	*	
F92.17~ F92.24	Reserved					
F92.25	Temperature of radiator 1	0.0～150.0	0.1℃	0.0	*	
F92.26	Temperature of radiator 2	0.0～150.0	0.1℃	0.0	*	
F92.27	Accumulative power-on time	0～65535	1 hr	0	*	
F92.28	Accumulative operating time	0～65535	1 hr	0	*	
F92.29	Accumulative operating time of the fun	0～65535	1 hr	0	*	
F92.30	ASR controller output	(rated torque relative to the motor)	0.1%	0.0	*	
F92.31	Higher bits of accumulative power consumption	0~65535*10000kWh	10000kWh	0		
F92.32	Lower bits of accumulative power consumption	0~9999kWh	1kWh	0		
F92.33	Operating efficiency of motor	0.0~100.0％	0.1％	0.0％		
F92.34	Segment display of the inverter running status	0~FFFFH bit0：run/stop bit1：reverse/forward bit2:zero-speed operation bit3：during acceleration bit4：during deceleration bit5：operating at constant speed bit6:during pre-excitation bit7：during auto tuning bit8：during over-current limiting bit9：during DC overvoltage limiting bit10：during torque limiting bit11：during speed limiting bit12：inverter failure bit13：speed control bit14：torque control bit15：CD direction of Sincos encoder	1	0		

F92.35	Segment display of digital input status	0~7FFH，0: off; 1: on	1	00		
F92.36	Segment display of digital output status	0~1FH，0: off; 1: on	1	0		
F92.37	Present floor	1~F20.00	1	1	*	
F92.38	Present location high byte	0~255 Unit : 65.535m	1	0	*	
F92.39	Present location low byte	65.535m	0.01m	0	*	
F92.40	Mark of hoistway self-tuning sucess	0: don't lern 1: learn sucessfully 2: learn unsucessfully	1	0	*	
Group F99 Factory Parameters						
F99.00	Factory password input	**** Note: the rest parameters in this group will be shown only after the correct password is input.	1	Factory setting	—	

Note: ○: modifiable under inspection；×: not modifiable under inspection；*: actual parameter value, not modifiable; —: Factory setting, not modifiable.

Chapter 6 Function Codes in Detail

6.1 Basic Parameters (Group F00)

Function Code	Parameter Name	Setting Range	Factory Default Value
F00.00	User's password	00000～65535	00000

This function is to prohibit unauthorized personnel from reading and modifying any parameters. This function is ineffective when F00.00=00000.

To make this function effective, first enter 5 digits as the user's password and then press "ENTER" to confirm. Without any further operations on buttons for 5 minutes, the password will be effective. After entering the password, if no further button operations for more than 5 minutes, password protection would be locked again.

Modification to the password: press "PRG" to enter into password verification state, enter the correct password to enter into parameter editing state, choose F00.00 (F00.00＝00000 displayed), enter new password and press ENTER to confirm. If there are not any further operations on buttons for 5 minutes, the new password becomes effective.

Function Code	Parameter Name	Setting Range	Factory Default Value
F00.01	Control mode selection	0～12H	11H

Units digit: mode selection of motor control

0: Open-loop vector control (without PG vector control)

i.e. speed-sensorless vector control, which can be applied for high-performance general variable-speed driving.

1: Closed-loop vector control (with PG vector control)

i.e. speed sensor vector control, which is mainly applied for high-precision speed control, torque control, simple servo control, and other strictly required high-performance control. Elevator control is also in this mode.

2: V/F control

Controlled constant voltage/frequency ratio, which is especially applicable for multiple motors driven by one inverter, to improve current speed regulation system.

Function Code	Parameter Name	Setting Range	Factory Default Value
Tens digit: motor type selection 0: asynchronous 1: synchronous			
F00.02	Operation mode selection	0～4	0
0. Under operation panel control: use RUN and STOP keys on the operation panel for run commands control, and F00.03 for setting speed command. 1. Reserved 2. Under the terminal speed control: use the terminals UP (upward) and DN (downward) to control the run commands and multi-speed terminals MS1~MS3 to set speed commands. 3. CAN communication speed reference/given control: operational command is given by CAN communication. Speed command is given by multi-speed of CAN communication. 4. CAN communication distance control: operational command is given by CAN communication. According to master PC communication set target floor, operating speed is directly berthed and automatically calculated in the view of distance principle.  **Attentions:** **When speed instruction is given via analog, the positive and negative polarities of set speed output are jointly determined by analog value and forward & reverse operation command. XNOR logic exists here. For example, if AI1 is 0V～+10V, i.e. the polarity is forward and operation command is reverse, the final result is reverse; if AI1 is 0V～-10V, i.e. the polarity is reverse and operation command is reverse, the final result is forward. The polarities of the set speed is fully determined by forward & reverse operation command (forward & reverse terminal operation or operating direction set by keyboard control – F00.05) when the set speed is given via other speed instructions.**			
F00.03	Digital speed given by the operation panel	0～F00.04（m/s）	1.500
It defines the initial value of speed setting when the inverter is under operation panel control. This function code can be modified to change running speed during operation and the modification can be saved after re-powering on.			
F00.04	Rated speed of the elevator	0.100～4.000m/s	1.500
F00.04 means the rated speed on the elevator nameplate, and all the speed set value through the function codes should not exceed it.			
F00.05	Running direction setting	0～1	0
0: In same direction; 1: In opposite direction			

Function Code	Parameter Name	Setting Range	Factory Default Value
When the elevator running command and the actual direction are different, the actual direction can be changed by modifying this parameter.			
F00.06	Mechanical parameters of the motor (display parameters)	10.0～6000.0	60.0
It reflects the correspondence between elevator speed and motor speed. This parameter are display parameter.			
F00.07	Maximum output frequency	5.00～100.00 Hz	50.00
The max. output frequency is the permitted highest output frequency.			

Attentions:

It must be carefully set according to nameplate parameters of the motor in use and its actual operating conditions.

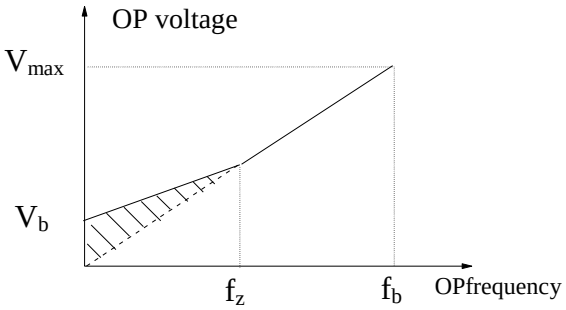
F00.08	Motor torque boost	0.0%～30.0%	0

To compensate low-frequency torque, the output (OP) voltage can be boosted (valid under V/F control). This function code is relative to max. output voltage, as shown in Figure 2-1.

In figure 6-1, variables are defined as follow:

f_b: basic operating frequency, i.e. the min. value of output frequency when the inverter is outputting rated voltage of the motor. The factory default setting of S610M inverter is rated frequency of the motor.

V_{max}: Rated frequency of the motor, i.e. the corresponding output voltage when the inverter is outputting basic operating frequency.



$V_{b:}$ voltage of manual torque boostV_{max}: rated voltage

f_z: cut-off frequency of torque boost

f_b: basic running frequency

Function Code	Parameter Name	Setting Range	Factory Default Value

Figure 6-1 Torque boost (the boosted quantity shown as the shadow)

Attentions:

1. Improper setting of this parameter may cause the motor heating or over-current protection.

2. For definition of fz, please refer to F10.07.

3. 0.0% is automatical torque boost.

F00.09	One-key debugging of the elevator menu	0～1	0

0: Normal menu

1: One-key debugging of the elevator menu

By this function, the operation panel displays the mode of one-key debugging, which means only the commonly used parameters for on-site debugging will be shown to facilitate elevator debugging. In this mode, when the last function code of current group is reached by flipping up/down, next group of function codes will automatically show up. In other words, functions codes can be progressively increased/decreased to the next group.

F00.10	Setting of elevator maintenance time	0～65535 hr	0

0: invalid

1: 0～65535 hours. This is to define the operating time before next round of maintenance for the elevator, e.g. when F00.10 is set to 3000, the elevator needs maintenance after running for a time of 3000 hours (check F92.28 for operating time), and the inverter will report error E036. After maintenance, add 3000 more hours to this parameter, i.e.set F00.10=6000, then maintain the elevator after another 3000 hours (check F92.28 for operating time). The inverter will report error E036.

6.2 Motor Parameters (Group F01)

Function Code	Name	Setting Range	Factory Default Value
F01.00	Rated power of the motor	0.4～90.0kW	Model confirmed
F01.01	Rated voltage of the motor	0～rated voltage of the inverter	Rated voltage of the inverter
F01.02	Rated current of the motor	0.1～299.9A	Model confirmed
F01.03	Rated frequency of the motor	1.00～300.00Hz	Model confirmed
F01.04	Rated speed of the motor	0～60000RPM	1440

Function Code	Name	Setting Range	Factory Default Value
The above functions are to set the parameters of the motor driven by the inverter. In order to guarantee control performance, please carefully follow the motor nameplate parameters to correctly set F01.00～F01.04. **Attentions:** **The inverter must be configured to match the motor in terms of power level. Normally the motor power is allowed to be 2 levels smaller than that of the inverter. Beyond the range, there is no guarantee for control performance.**			
F01.05	Stator resistance of asynchronous motor, %R1	0.00～50.00%	Model confirmed
F01.06	Leakage inductance of asynchronous motor, %X	0.00～50.00%	Model confirmed
F01.07	Rotor resistance of asynchronous motor, %R2	0.00～50.00%	Model confirmed
F01.08	Mutual inductance of asynchronous motor, %Xm	0.0～2000.0%	Model confirmed
F01.09	No-load current of asynchronous motor, Io	0.1～299.9A	Model confirmed

The meaning of above parameters is as shown in Figure 2-2:

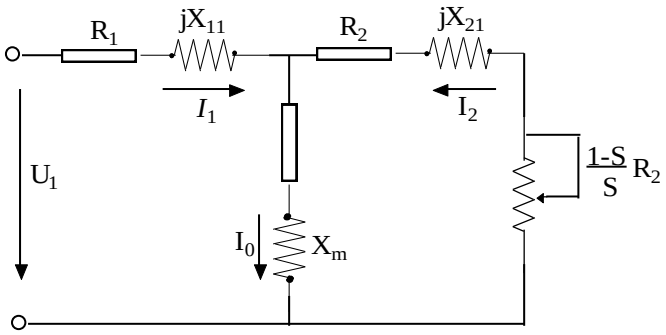


Figure 2-2 Steady-state equivalent circuit diagram of asynchronous motor

In Figure 2-2, R1, X11, R2, X21, Xm and Io represent stator resistance, stator leakage inductance, rotor resistance, rotor leakage inductance, mutual inductance, and no-load current respectively. The function code F01.06 is the sum of leakage inductance of stator and rotor.

F01.05～F01.08 are the percentage of the above parameters of asynchronous motor. The formulas are:

1) Resistance formula (of stator or rotor):

$$\%R = \frac{R}{V/(\sqrt{3}\times I)}\times 100\ \% \quad (1)$$

R: stator resistance, or the actual rotor resistance converted to stator equivalent;
V: rated voltage
I: rated current of the motor

2) Inductance (leakage or mutual) formula:

$$\%X = \frac{X}{V/(\sqrt{3}\times I)}\times 100\% \quad (2)$$

Function Code	Name	Setting Range	Factory Default Value
X: the sum of leakage inductance of stator and rotor (converted to stator equivalent) or mutual inductance, relative to basic frequency; V: rated voltage; I: rated current of the motor When the motor parameters are all known, please follow the above formulas to input the calculated values to F01.06～F01.09. F01.10 is no-load current of asynchronous motor, which can be entered by users directly. After asynchronous motor tuning is completed successfully, the values of F01.06～F01.09 will be updated accordingly. After the motor power F01.00 is modified, F01.02 and F01.06～F01.10 will be set as the default parameters of the motor with corresponding power.			
F01.10	Stator resistance of synchronous motor, %R1	0.00～50.00%	Model confirmed
F01.11	Direct-axis inductance of synchronous motor	0.0~999.9mH	Model confirmed
F01.12	Quadrature axis of synchronous motor	0.0~999.9mH	Model confirmed
F01.13	Counter emf of synchronous motor	0~inverter rated voltage	Model confirmed
Set values of F01.10~F01.13 will be updated if tuning synchronous motor.			
F01.14	Initial angle of synchronous motor	0～359.9°	0
F01.15	Initial angle of Z pulse of synchronous motor	0～359.9°	0
F01.14 displays the initial angle of synchronous motor for control algorithm, and F01.15 displays the initial angle of Z pulse of synchronous motor.			
F01.16	Auto tuning of the motor parameters	0～2	0
Auto tuning of the motor **The auto tuning of asynchronous motor is as follows:** **0: no action** **1: action (asynchronous motor in rotary state)** Before auto tuning, please make sure to correctly enter the nameplate parameters of the controlled motor (F01.00~F01.04). During auto rotary tuning, the motor is in static state at first, and %R1, %X, %R2 will be automatically measured; then the motor enters into rotary state, %Xm & Io will be automatically measured. All the measured values will be auto input into F01.05~F01.09. If bit9 of F11.01 (bit 1 of LED hundreds digit: current loop PI parameter tuning calculation enable) enable, parameter of current loop will automatically write into F06.11~F06.14. After auto tuning is completed, F01.16 will be set to 0 automatically. **2: action (asynchronous motor in static state 1)** Before auto tuning, please make sure to correctly enter the nameplate parameters of the controlled motor (F01.00~F01.04). During auto static tuning, the motor is in static state, and %R1, %X, %R2, %Xm & Io will be automatically			

Function Code	Name	Setting Range	Factory Default Value

measured and then input into F01.05~F01.09. If bit9 of F11.01 (bit 1 of LED hundreds digit: current loop PI parameter tuning calculation enable) enable, parameter of current loop will automatically write into F06.11~F06.14.

3: Same as above item 2

4: action (asynchronous motor in static state 3)

Before auto tuning, please make sure to correctly enter the nameplate parameters of the controlled motor (F01.00~F01.04).

During auto static tuning, the motor is in static state, and %R1, %X, %R2, %Xm & Io will be automatically measured and then input into F01.05~F01.09. Parameter of current loop will automatically write into F06.11~F06.14.

The auto tuning of synchronous motor is location identification, and the operation is as follows:

0: no action

1: action (synchronous motor in rotary state)

The synchronous motor is in static state before being in rotary state.

Alter the value of F01.16 to non-zero and give run command, the synchronous motor will start parameters self-tuning. After that, the value of F01.16 will be automatically restored to 0, and motor parameters will be automatically writen in F01.10~F01.13, the location angle of encoder will be automatically written in F01.14, with the location angle of Z pulse be written in F01.15 (valid for rotation identification of synchronous motor), encoder direction is entered F08.02 automatically. If bit9 of F11.01 (bit 1 of LED hundreds digit: current loop PI parameter tuning calculation enable) enable, parameter of current loop will automatically write into F06.11~F06.14.

2: action (synchronous motor in static state 1)

Choose static identification if the motor cannot be unloaded. When the synchronous motor is in static state, the sound of electricity current can be heard, after that motor parameters will be automatically written in F01.10~F01.13, the location angle of encoder will be automatically written in F01.14, check the value of F01.14 (the initial pole angle of synchronous motor); If bit9 of F11.01 (bit 1 of LED hundreds digit: current loop PI parameter tuning calculation enable) enable, parameter of current loop will automatically write into F06.11~F06.14.

Put the inverter in inspection state and start running upward/downward after learning initial angle. If error is reported immediately, or the elevator is running abnormally, the probable cause is that the encoder is in reverse direction, then the function code F08.02 should be modified. After that, restart static identification. If the control direction is in reverse with the actual running direction, then modify F00.05 (running direction setting). When done, put the inverter in inspection state again to observe whether the current is normal, the motor running is stable, and the running direction complies with given direction. Record the angle displayed by F01.14 and the running current if all these are correct and normal. Repeat the procedure for three times and record the angle

Function Code	Name	Setting Range	Factory Default Value

identified each time. If the deviation is within ±30 degree every time, it's defined normal. The deviation is supposed to be better at its smallest value. Take the initial pole angle when the running current of the motor is the lowest.

3: action (synchronous motor in static state 2)

Difference of asynchronous motor tuning between static state 2 and 1: add encoder direction identification on 2, after completing synchronous motor identification, encoder direction automatically write in F08.02. At later stage of tuning, this mode will open the brake to learn encoder direction (learning with load is available).

4: action (synchronous motor in static state 3)

Difference of asynchronous motor tuning between static state 3 and 1: 3 could automatically calculate current loop parameters and write them in F06.11~F06.14.

Steps for auto tuning:

1) It is recommended to set F00.08 (motor torque boost) to 0.1% (valid for auto tuning of asynchronous motor).
2) Correctly set these parameters: F01.00 (rated power), F01.01 (rated voltage), F01.02 (rated current), F01.03 (rated frequency), F01.04 (pole # of motor) and F01.05 (rated speed).
3) Correctly set F00.07 (upper limit frequency). The set value of F00.07 cannot be lower than the rated frequency.
4) When F01.16=1, please detach the load from the motor and carefully ensure its safety. It is forbidden for the motor auto tuning with load in rotary state.
5) When F01.16 is set to non-zero, first press ENTER button, and then press RUN button to start auto tuning.
6) When the operating indication light on the operation panel is off, auto tuning is completed (under operation panel control).

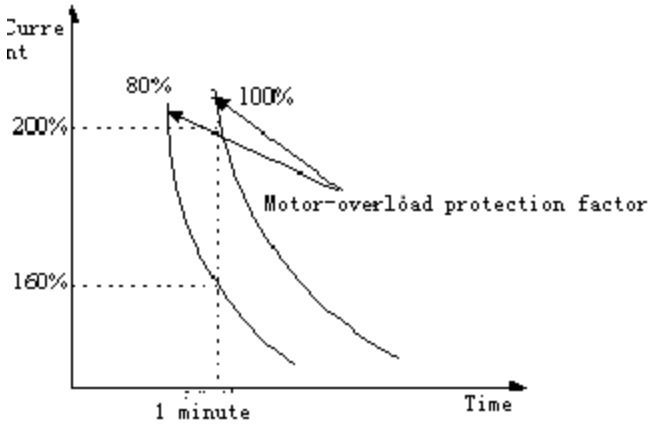
Attentions:

When set F01.16=1 to start auto tuning in rotary state, the load must be detached from the motor. It is forbidden for the motor auto tuning with load in rotary state.

Before starting auto tuning, ensure the motor is in stopping state, otherwise auto tuning cannot go on properly.

Under some circumstances (e.g. the load cannot be detached from the motor), it is not convenient for auto tuning in rotary state, or users do not have very high requirements on controlling the motor, tuning in static state or no tuning is suggested(synchronous motor must conduct auto tuning). If without auto tuning, the nameplate parameters of the motor must be entered correctly.

For asynchronous motor, if no auto tuning is processed, and users already know the exact motor parameters, users should correctly enter the nameplate parameters （F01.00～F01.04）of the motor first,

Function Code	Name	Setting Range	Factory Default Value
and then enter the calculated values （F01.05～F01.09）by following previous formulas of resistance and inductance. Please ensure all the parameters are accurately set. **Since the no-load current of asynchronous motor identified in static state is not as accurate as that in rotary state, F01.09 (no-load current)could be manually modified to a smaller value, for example 1-2A, if the elevator causes a feeling of falling when starting and stopping during operation. The value to be decreased could be bigger if the no-load current is higher.** **1. If auto tuning is unsuccessful, error E024 will be reported.**			
F01.17	Motor-overload protection factor setting	20.0～110.0%	100.0
For effective overload protection for different motor models, it is necessary to adjust the permitted max. output current of the inverter, as shown in Figure 2-3:  Figure 2-3 Motor-overload protection factor setting The adjusted value can be set by users. Under same circumstances, if quick overload protection for motor is required, F01.17 should be set smaller, and vice versa. 注意 **Attentions:** **When the rated current of the motor does not match with that of the controller, overload protection for the motor can be realized by setting F01.17.**			
F01.18	Oscillation inhibition factor	0～100	20
Under V/F control, this function can be adjusted to prevent motor oscillation.			
F01.19	Gain compensation coefficient of SVC slip frequency	50.0%~250.0%	100.0%
Applied to gain compensation of SVC slip frequency.			
F01.20	Tuning coefficient of synchronous motor	50%~100%	80%
Applied to parameters tuning of synchronous motor. This parameter can be increased when magnetic pole			

Function Code	Name	Setting Range	Factory Default Value
location couldn't be identified correctly, also this parameter can be lessened when occure overcurrent error during identifying.			

6.3 Start & Stop Control Parameters (Group F02)

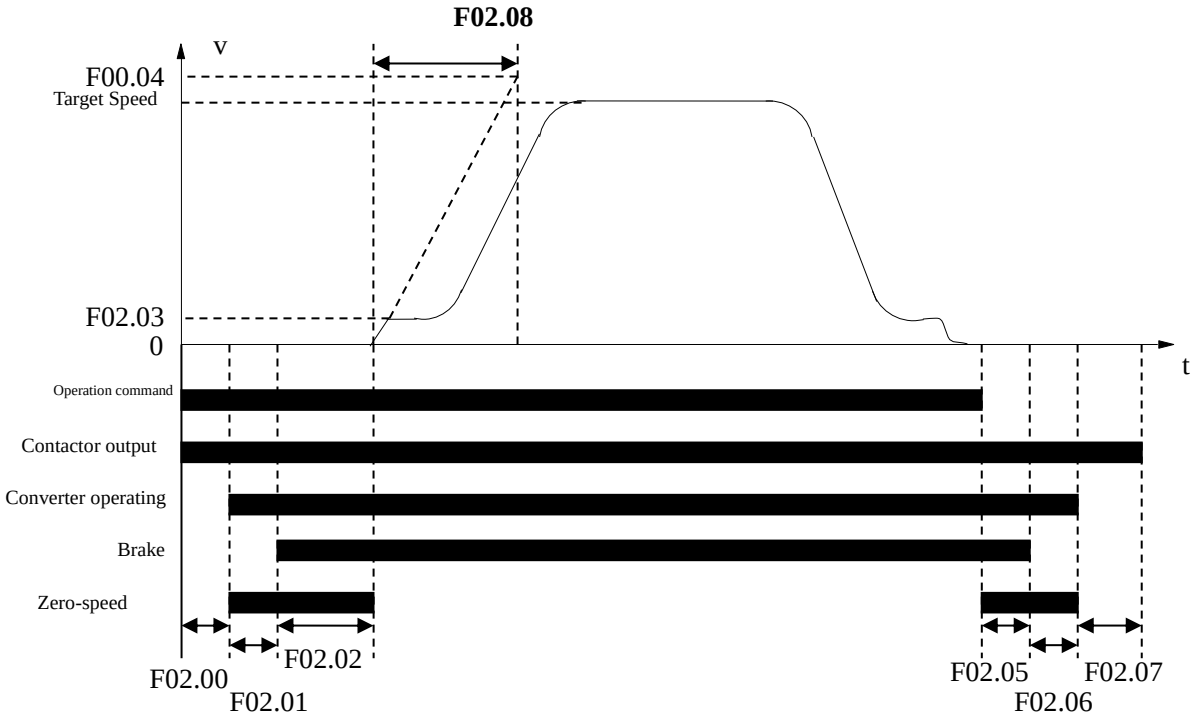


Diagram 6-4 Elevator Start & Stop Timing Diagram

Function Code	Parameter Name	Setting Range	Factory Default Value
F02.00	Delay time of starting	0.00～2.00s	0.50
This parameter defines the delay time from the inverter receiving run commands to be in operation.			
F02.01	Delay time of brake release when starts	0.00～2.00s	0.50
This parameter defines the time from the inverter operating at zero-speed to outputting brake release command.			
F02.02	Maintaining time of zero-speed starting	0.00～4.00s	0.80
This parameter defines the time from brake release of the inverter to outputting speed. The maintaining time should be set to 0.5s at least, in order to prevent slipping when the elevator starts.			
F02.03	Starting speed	0.000~0.200m/s	0.00
This parameter defines the inverter's initial speed at starting.			
F02.04	Maintaining time of starting speed	0.00～2.00s	0.00
This parameter defines the maintaining time of inverter's starting speed (F02.03).			
F02.05	Delay time of braking when stops	0.00～2.00s	0.50

Function Code	Parameter Name	Setting Range	Factory Default Value
This parameter defines the time from the inverter operating at zero-speed to outputting brake commands.			
F02.06	Maintaining time of zero-speed when stops	0.00～4.00s	0.50
This parameter defines the maintaining time of zero-speed operation when the elevator stops and brake is on, while still outputting torque. It is to improve the comfort level at stopping.			
F02.07	Release delay of operating contactor	0.00～2.00s	0.50
This parameter defines the delay time of operation contactor release when operation signals are gone.			
F02.08	Time of starting slope	0.00～2.00s	0.00
This parameter defines the needing time of elevator running from zero-speed to starting speed (F00.04).			
F02.09	Delay time of torque revocation when stops	0~800ms	10
This parameter defines the time interval from elevator running at zero-speed to cutting off the main output when stops. It is to improve the comfort level in braking.			
F02.10	Detection time of contactor error	0.00～2.00s	0.50
This parameter defines time of operating contractor and testing brake errors. When multi-function input terminal has not defined operating contractor feedback input (CSM) and brake feedback input (BSM), this function is not available.			
F02.11	Delay of operation permission revocation	0~6999ms	0ms
When the activeness of inverter operation permission terminals becomes inactive, after a delay time set by F02.11, the inverter is prohibited to operate. It is used for improving comfort level when brakes. If operation permission terminals of the inverter and the elevator controller are connected, the operation permission and run commands of up/down operation of the elevator are removed accordingly. Then it can debug F02.09 coordinately to improve comfort level when brakes. Normally the value of F02.11 is set slightly bigger than that of F02.09. If inverter operation permission terminals connect with elevator safety circuit, then set F02.11 to 0ms.			
F02.12	Reserved		
F02.13	Brake opening frequency under non-close-loop control	0.00~10.00Hz	0.00
When elevator adopts open-loop control, this parameter definited output frequency while the motor is opening the brake.			
F02.14	Braking frequency under non-close-loop control	0.00~10.00Hz	0.00
When elevator adopts open-loop control, this parameter definited output frequency while the motor is braking.			
F02.15	Brake opening frequency under non-close-loop control (UPS operation)	0.00~10.00Hz	0.00
When open loop control is used, this parameter definites output frequency while motor UPS operation braking open.			
F02.16	Braking frequency under non-close-loop control (UPS operation)	0.00~10.00Hz	0.00
When open loop control is used, this parameter definites output frequency while motor UPS operation braking.			

6.4 Speed Parameters (Group F03)

Function Code	Parameter Name	Setting Range	Factory Default Value
F03.00	Multi-speed 0	0～F0.04	0.000
F03.01	Multi-speed 1	0～F0.04	0.000
F03.02	Multi-speed 2	0～F0.04	0.000
F03.03	Multi-speed 3	0～F0.04	0.000
F03.04	Multi-speed 4	0～F0.04	0.000
F03.05	Multi-speed 5	0～F0.04	0.000
F03.06	Multi-speed 6	0～F0.04	0.000
F03.07	Multi-speed 7	0～F0.04	0.000
F03.00～F03.07 defines the multi-section operation speed, which is used in multi-speed operation mode. Pleases refer to terminal functions of multi-speed operation “3”、“4”、“5” in F07.00～F07.08.			
F03.08	Inspection speed	0.000~0.630 m/s	0.2
This parameter defines the elevator operation speed under inspection operation (Terminal mode available).			
F03.09	Emergency speed	0.020~0.150 m/s	0.1
This parameter defines the elevator operation speed under emergency operation (Speed mode and floor distance mode are available).			
F03.10	Speed detection of up forced deceleration	0～100.0% （F00.04）	97.0%
This parameter defines the speed detection value when up forced deceleration switch is on. When up forced deceleration switch is on, and the operation speed exceeds the set value, the system will reduce the elevator speed to crawling speed (F03.16) by F05.13 (deceleration under abnormal condition). Reasonable setting of this parameter can prevent the elevator from hitting the top when going up.			
F03.11	Speed detection of down forced deceleration	0～100.0% （F00.04）	97.0%
This parameter defines the speed detection value when down forced deceleration switch is on. When down forced deceleration switch is on, and the operation speed exceeds the set value, the system will reduce the elevator speed to crawling speed (F03.16) by F05.13 (deceleration under abnormal condition). Reasonable setting of this parameter can prevent the elevator from hitting the bottom when going down.			
F03.12	Overspeed setting	80.0%～130.0% （F00.04）	120.0%
F03.13	Detection time of overspeed	0：Prohibited 0.01~2.00s：Detection time	0.30
When the elevator is running at a speed faster than the set value of F03.12 for a time longer than the set value			

Function Code	Parameter Name	Setting Range	Factory Default Value
of F03.13, the inverter reports E035 error (overspeed error). Set F03.13 = 0, and the system does not detect overspeed error.			
F03.14	Speed deviation range	0: Prohibited 1.0%~50.0%(F00.04)：Speed deviation range	20%
F03.15	Detection time of speed deviation	0: Prohibited 0.1~5.0 s：Detection time	1.0
When the deviation between given-speed (after acceleration/deceleration) and elevator's actual operation speed exceeds the set value of F03.14, and the maintaining time of deviation exceeds the set value of F03.15, the inverter reports error E034 (overlarge speed deviation error). When set F03.14 or F03.15 to 0, the system does not inspect speed deviation error.			
F03.16	Crawling speed	0.020~0.500 m/s	0.050
This parameter is to define elevator speed when forced deceleration is valid.			
F03.17	Multi-speed inspection&Maintenance selection	0～7	0
This parameter is to define that when digital input terminals are not enough, inspection&maintenance operation can be realized through the combination of multi-speed terminals (MS1～MS3). 0: Invalid 1～7：the corresponding multi-speed is 1～7（F03.01～F03.07）when none of the digital input terminals is set as inspection operation terminal INS. When the value of multi-speed terminal is set as that of F03.17, the elevator enters into inspection&maintenance operation mode. Note: this function is invalid when any digital input terminal is set as inspection operation terminal INS, and the inspection speed is set by F03.08.			

6.5 Analog input curve (Group F04) (Reserved)

6.6 Acceleration and Deceleration Parameters (Group F05)

Function Code	Parameter Name	Setting Range	Factory Default Value
F05.00	Rapid deceleration when stops	0.020~9.999 m/s^3	0.350
This parameter defines the variation rate of deceleration speed from non zero-speed to zero-speed. It is for adjusting the smoothness when elevator stops and improving comfort degree.			
F05.01	Acceleration speed	0.020~9.999 m/s^2	0.550
F05.02	Rapid acceleration at the beginning	0.020~9.999 m/s^3	0.350
F05.03	Rapid acceleration near the end	0.020~9.999 m/s^3	0.600
F05.04	Deceleration	0.020~9.999 m/s^2	0.550
F05.05	Rapid deceleration at the beginning	0.020~9.999 m/s^3	0.600

Function Code	Parameter Name	Setting Range	Factory Default Value
F05.06	Rapid deceleration near the end	0.020~9.999 m/s^3	0.350

Parameters F05.01～F05.06 are to set word *S* of the curve. Word *S* can prevent vibration when the elevator starts/stops, thus to improve comfort degree.

Setting of word *S* includes acceleration, rapid acceleration (acceleration plus speed) and deceleration, rapid deceleration (variation rate of deceleration speed), as shown in Figure 2-9:

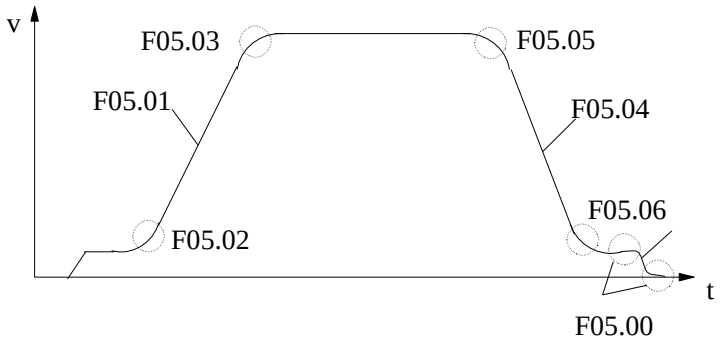


Figure 6-9 S curve parameters sketch

F05.07	Acceleration under inspection operation	0.020~9.999 m/s^2	1.000
This parameter defines elevator's acceleration in Inspection&Maintenance operation mode (Speed mode available).			
F05.08	Deceleration under inspection operation	0.020~9.999 m/s^2	1.000
This parameter defines elevator's deceleration in Inspection&Maintenance operation mode (Speed mode available).			
F05.09	Acceleration under emergency operation	0.020~9.999 m/s^2	1.000
This parameter defines elevator's acceleration speed in emergency operation mode.			
F05.10	Deceleration under emergency operation	0.020~9.999 m/s^2	1.000
This parameter defines elevator's deceleration speed in emergency operation mode.			
F05.11	Acceleration under auto tuning operation (Reserved)	0.020~9.999 m/s^2	0.150
This parameter defines motor's acceleration speed during parameter auto tuning.			
F05.12	Deceleration under auto tuning operation (Reserved)	0.020~9.999 m/s^2	0.150
This parameter defines motor's deceleration speed during parameter auto tuning.			
F05.13	Deceleration under abnormal condition	0.020~9.999 m/s^2	1.000
This parameter defines deceleration speed when forced deceleration is valid.			
F05.14	Deceleration when stops	0.020~9.999 m/s^2	0.550
This parameter defines deceleration speed from non-zero to zero.			

6.7 Control Performance Parameters (Group F06)

Function Code	Parameter Name	Setting Range	Factory Default Value
F06.00	zero-speed starting P	1～2000	200
F06.01	zero-speed starting I	0～9999	100
F06.02	ASR1-P	1～200.0	20.0
F06.03	ASR1-I	0～9.999	0.200
F06.04	ASR1 output filter	0～8 (corresponding to 0～2^8/10ms)	0
F06.05	ASR2-P	1～200.0	20.0
F06.06	ASR2-I	0～9.999	0.200
F06.07	ASR2 output filter	0～8 (corresponding to 0～2^8/10ms)	0
F06.08	ASR1/2 switching frequency	0.0～100.0％（F00.07）	10.0％

Parameters F06.01～F06.08 are effective under vector control. And F06.00 & F06.01 only work within the maintaining time of zero speed starting (F02.02) under closed loop vector control.

Under vector control, speed response features of vector control can be changed by setting proportional gain P and integral constant I of the speed regulator.

1、 The composition of speed regulator (ASR) is as shown in Figure 2-10. K_P stands for the proportional gain P, T_I stands for the integration constant I.

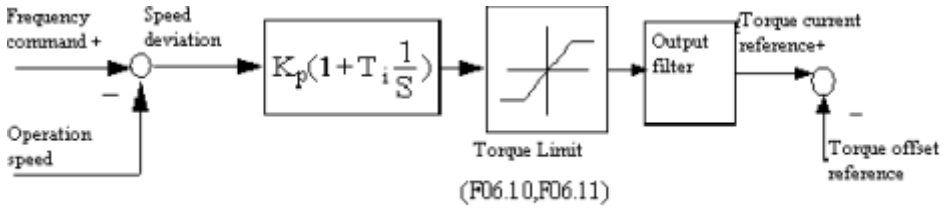


Fig. 6-10 Sketch of speed regulator

When integral constant is set to 0 (i.e. F06.01=0, F06.03=0, F06.06=0), there is no integral action, and speed loop is a simple proportional regulator.

2、 Adjustment of proportional gain P and integral constant I of speed regulator (ASR):

Function Code	Parameter Name	Setting Range	Factory Default Value

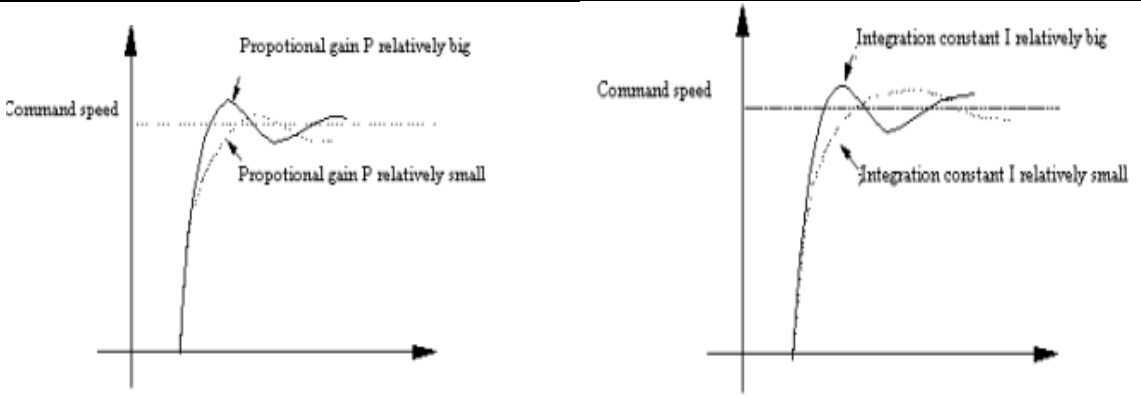


Figure 6-11 Relation between ASR step response and P/I

An increase of proportional gain P or integral constant I can accelerate dynamic response of the system. However, overlarge P or I would cause system oscillation.

Normally, proportional gain P is adjusted first and increased without causing any oscillation, and then constant I is adjusted to make the system response quick with little overstrike.

Figure 2-12 shows the step response curve when P and I are properly adjusted (speed response curve can be observed through analog output terminals AO1 and AO2. Please refer to group F07 parameters.)

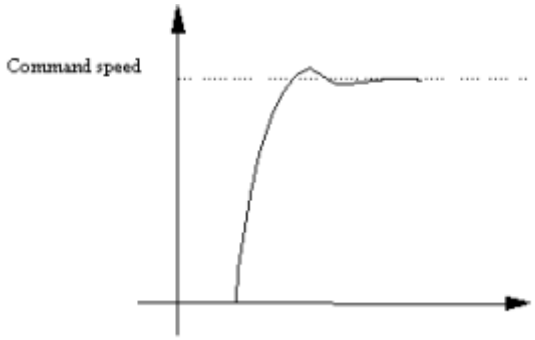


Figure 6-12 Step response with good dynamic performance

注意 Attentions:

If P and I are not properly adjusted, overvoltage error might occur after the system quickly starts to reach high speed (if there is no connection to external braking resistor or braking unit). Such error is caused by the system's regenerative braking energy feedback when the speed drops after overshooting. The error can be avoided by adjusting P and I properly.

3、 If quick system response is required for operating with load at both high and low speed, ASR switching frequency (F06.08) can be set. Normally when the system operates at low frequency,

Function Code	Parameter Name	Setting Range	Factory Default Value
quick dynamic response is required and can be improved by increasing P and I. The steps for adjusting parameters of the speed regulator are as follows: 1) Choose proper switching frequency, F06.08; 2) Adjust F06.02 and F06.03, proportional gain and integral constant at high speed, to realize good dynamic response without system oscillation. 3) Adjust F06.05 and F06.06, proportional gain and integral constant at low speed, to realize good dynamic response without system oscillation. 4、Adjustment of zero-speed starting PI: If car slippage occurs when elevator starts going down, it needs to increase zero-speed starting P until car slippage gone. If zero-speed starting P is too large, it will cause elevator vibration while going up/down. Zero-speed starting I refers to integration constant. When adjusting parameter P to critical state, it can make comfort level to the best by adjusting I. 5、ASR output gives the torque current after passing through the delay filter. F06.04 and F06.07 are the time constant of ASR 1 and ASR 2 output filter.			
F06.09	Non-zero speed torque limit	0.0～+200.0%	180.0
F06.10	Non-zero speed torque limit	0.0～+200.0%	180.0
Non-zero speed torque limit refers to the torque limit when the motor is under non-zero speed state; Zero speed torque limit refers to the torque limit when the motor is under zero speed state; When the parameter is set to 100%, it corresponds to the rated current of the inverter.			
F06.11	ACR-P(No-start current loop P)	1～5000	1000
F06.12	ACR-I(No-start current loop I)	0～8000	640
F06.13	ACR-P0(Start current loop P)	1～5000	2000
F06.14	ACR-I0(Start current loop I)	0～8000	640
Vector control controls output current of the motor to track the current command. F06.11 and F06.12 are P/I regulator parameters of no-starting current loop. F06.13 and F06.14 are P/I regulator parameters of starting current loop(Which mutually corresponding tune with parameters of F06.00/F06.01). Increase of P or I can accelerate dynamic response of the system torque; while decrease of P or I can enhance the system stability.  Attentions: **As for most circumstances, there is no need for adjusting P/I parameters of current loop. It is**			

Function Code	Parameter Name	Setting Range	Factory Default Value
recommended modifications on these parameters by users with cautions.			
F06.15	Anti-vibration factor for the elevator	-1000～1000	0
When some mechanical reasons, such as large friction of guide shoes, over large/small elastic coefficient of the steel wire rope, cause car shaking at normal speed, parameter F06.13 （anti-vibration factor of the elevator）can be adjusted to decrease the discomfort.			
F06.16	Pre-torque selection	0~3	0
0: auto-torque compensation 1 1: auto-torque compensation 2 2: analog value reference of weighing-sensor (reserved) 3: pre-torque digital setting(reserved)			
F06.17	Vibration depression mode selection of torque automatical compensation 2.	0~3	0
0: Vibration depression mode 1 1: Vibration depression mode 2 2: Vibration depression mode 3 3: Vibration depression mode 4			
F06.18	Zero-speed torque limit selection	0~1	0
0: Utilize set torque to limit 1: Utilize default torque to limit			
F06.19～F06.25	Reserved		
F06.19～F06.25 are reserved functions.			
F06.26～F06.35	Manufacturer debugging parameters		
F06.26～F06.35 are manufacturer debugging parameters.			
F06.36	Switch frequency of mode 1	0~100%	15%
This function code used to set switching frequency between IF control and VF control, which is the percentage of motor rated frequency. If appear vibration nearby this frequency point during elevator operation process, this parameter value could be increased a little.			
F06.37	Low-frequency current given of mode 1	0~2000	1200
This function code is utilized to set max. given exciting current value when IF control (namely: exciting current while zero-frequency operation). This value is based on the rated current of inverter, 1200 represents 120.0% of the rated current of inverter. Value of this function code could be adjusted appropriately in view of slip inverse situation of elevator start. It will cause inverter over-load even over-current error if this value is adjusted too large. This value should be adjusted smaller under the precondition of ensuring acceptable slip inverse of elevator because too large value may cause shock during elevator starting or vibration during elevator decelerate to creep.			
F06.38~ F06.39	Manufacturer debugging parameters		
F06.38~ F06.39 are manufacturer debugging parameters.			
F06.40	Low-frequency current given of mode 1	0~2000	800

Function Code	Parameter Name	Setting Range	Factory Default Value
	(UPS operation)		
This function code is utilized to set max. given exciting current value of UPS operation when under IF control. This value is based on the rated current of inverter, 800 represents 80.0% of the rated current of inverter.			

6.8 Input & Output Terminal Setting (Group F07)

Function Code	Parameter Name	Setting Range	Factory Default Value
F07.00	Function selection of input terminal X1	0～50	0
F07.01	Function selection of input terminal X2	0～50	0
F07.02	Function selection of input terminal X3	0～50	0
F07.03	Function selection of input terminal X4	0～50	0
F07.04	Function selection of input terminal X5	0～50	0
F07.05	Function selection of input terminal X6	0～50	0
F07.06	Function selection of input terminal X7	0～50	0
F07.07	Function selection of input terminal X8	0～50	0
F07.08	Function selection of input terminal X9 (Reserved)	0～50	0
F07.09	Function selection of input terminal X10 (Reserved)	0～50	0

Multifunctional input terminals, X1～X9, carry rich functions, which can be defined through setting F07.00～F07.09 to satisfy various needs. Please refer to Table 6-1 for the parameter value and function:

Table 6-1 Multifunctional input functions list

Value	Corresponding function	Value	Corresponding function
0	Non Functional	1	Upward (UP-forward)
2	Downward (Reverse)	3	Multi-speed selection 1(MS1)
4	Multi-speed selection 2(MS2)	5	Multi-speed selection 3(MS3)
6	External reset input	7	External error input
8	Inspection input (INS)	9	Operation permission of the inverter
10	Emergency operation input	11	Operating contactor feedback input (CSM)
12	Braking feedback input (BSM)	13	Up forced deceleration speed input (UPF)
14	Down forced deceleration speed input (DNF)	15	Upward leveling input
16	Downward leveling input	17~50	Reserved

Function Code	Parameter Name	Setting Range	Factory Default Value

The functions listed in above table will be explained as follows:

1: Forward 2: Reverse

These parameters are for operating control under control terminal mode. Please refer to table 6-2 as shown below.

Table 6-2 Up/Down terminal description

Up Terminal	Down Terminal	Elevator State
OFF	OFF	Stop
OFF	ON	Going down
ON	OFF	Going up
ON	ON	Stop

3~5: Multi-speed terminals (MS1~MS3)

By arranging the ON/OFF combination of these terminals, we can define the operation curve of 8-section speed at most.

Table 2-3 Multi-speed operation selection list

multi-speed terminal 3	terminal 2	multi-speed terminal 1	multi-speed setting	Function Code
OFF	OFF	OFF	Multi-speed0	F03.00
OFF	OFF	ON	Multi-speed1	F03.01
OFF	ON	OFF	Multi-speed2	F03.02
OFF	ON	ON	Multi-speed3	F03.03
ON	OFF	OFF	Multi-speed4	F03.04
ON	OFF	ON	Multi-speed5	F03.05
ON	ON	OFF	Multi-speed6	F03.06
ON	ON	ON	Multi-speed7	F03.07

6: External reset input

This terminal can reset the error when the inverter is in failure and warns about it. It has the same effect as that of the key RESET on the operation panel.

7: External error input

Error signal from external devices can be input through this terminal to facilitate the error monitoring of them. When the inverter receives error signals of external devices, it will display”E015” to warm about it.

8: Inspection input (INS)

When this terminal is effective, the elevator starts inspection operation and the upward & downward running of the elevator are jointly controlled by the terminal and the keys UP (upward) & DN (downward).

9: Operation enable of the inverter

If this function is effective, the inverter can operate normally.

If this function is ineffective, the inverter will halt during operation after delay F02.11, or be prohibited to start when standing by.

If no terminal is set to have this function, the inverter is defaulted to have operation permission.

10: Emergency operation input

If effective, the inverter starts emergency operation.

11：Operating contactor feedback input (CSM)

12：Braking feedback input (BSM)

13：Up forced deceleration speed input (UPF)

14：Down forced deceleration speed input (DNF)

15: Upward leveling input

16: Downward leveling input

When set F00.02=4 (CAN communication distance control), If set quantity of leveling switches are 2 (F20.16=1), upward leveing signal and downward leveling signal must be used simultaneously. If set quantity of leveling switches are 1 (F20.16=0), only need use upward leveling signal, don't need use downward leveling signal.

F07.10	Terminal filtering time	0～500ms	10

This function is to set the filtering time for input terminal detection. If the state of input terminal changes, the terminal state change is regarded valid only when its state maintains the same after passing the set filtering time. Otherwise, the prior state keeps valid. In this way, false operation caused by interference can be effectively reduced.

F07.11	Input terminal activeness setting	000～3FFH	000

This parameter defines positive and negative logic of input terminals.

Positive logic: when terminal Xi is connected with corresponding common port, the terminal is active; when they are disconnected, the terminal is inactive.

Negative logic: when terminal Xi is connected with corresponding common port, the terminal is inactive; when they are disconnected, the terminal is active.

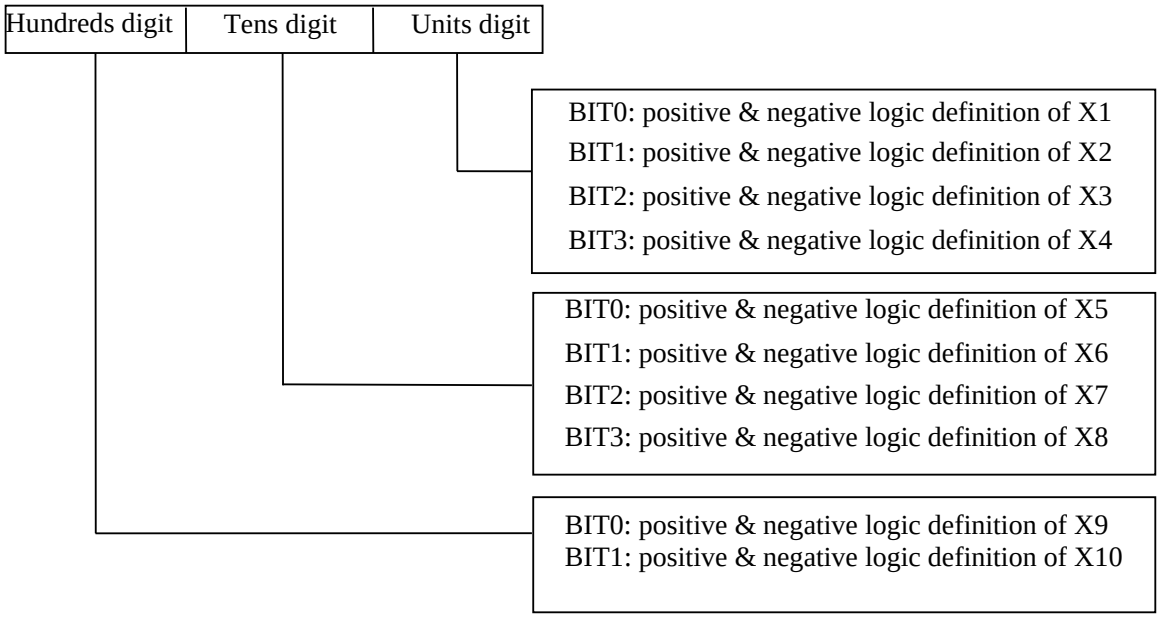


Figure 6-5 Input terminal activeness setting

When BIT is set to 0, it refers to positive logic; when it is set to 1, it refers to negative logic.

For example: if X1～X4 and X9 need positive logic, X5～X8 need negative logic, settings are as follows:

The logic state of X1～X4 is 0000, which corresponds to 0 in hexadecimal code, and LED units digit displays 0; The logic state of X5～X8 is 1111, which corresponds to F in hexadecimal code, and LED tens digit displays F; The logic state of X9 is 0, which corresponds to 0 in hexadecimal code, and LED hundreds digit displays 0. Meanwhile F07.15 should be set to 0F0. How to set the parameter follows the below Table 2-4:

Table 6-4 The corresponding relation between binary setting and LED digit display

Binary setting				Hexadecimal
BIT3	BIT2	BIT1	BIT0	
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	A
1	0	1	1	B
1	1	0	0	C
1	1	0	1	D
1	1	1	0	E
1	1	1	1	F

LED digit refers to the units digit, tens digit, and hundreds digit of LED displayed on the operation panel.

Attentions:

The factory default settings for all the terminals are positive logic.

F07.12	Open collector output Y1	0～20	0
F07.13	Open collector output Y2	0～20	0
F07.14	Relay 1 output	0～20	0
F07.15	Relay 2 output	0～20	0
F07.16	Relay 3 output	0～20	0

Open collector output Y1, Y2 and relay 1～3 can be defined for multifunction. Please refer to Table 2-5 for output functions:

Table 6-5 Output terminal functions list

Value	Corresponding function	Value	Corresponding function
0	Non functional	1	Inverter running signal (RUN)
2	Frequency arrival signal (FAR)	3	Frequency level detection signal (FDT1)
4	Frequency level detection signal (FDT2)	5	Inverter ready to operate (RDY)
6	Stopping the inverter c used by under-voltage (LU)	7	Inverter failure
8	Up signal output	9	Down signal output
10	Inverter operating at zero speed	11	Braking control output
12	Operating contactor control output	13	Signal of Motor enables to open the brake.
14	Direction signal with light-load	15	Pre-open door output
16	Braking power output	17	Output of basic pole block error (E030)
18	Inverter is ready (no relationship with enable signal of Inverter)		

1: Inverter running signal (RUN)

The terminal outputs signal indicating that the inverter is in operation.

2: Frequency arrival signal (FAR)

Please refer to F07.19 for function explanation.

3: Frequency level detection signal (FDT1)

Please refer to F07.20～F07.21 for function explanation.

4: Frequency detection signal (FDT2)

Please refer to F07.22～F07.23 for function explanation.

5: Inverter ready to operate (RDY)

When this output signal is effective, it means the inverter has no errors, bus voltage is normal and inverter operation enable ineffective. So the inverter is ready to receive starting command.

6: Stopping the inverter caused by under-voltage (LU)

When DC bus voltage is lower than undervoltage limit, the terminal outputs indicating signal and LED displays “P.oFF”.

7: Inverter failure

When the inverter is in failure, the terminal outputs indicating signal.

8: Up signal output

When the elevator is going up, the terminal outputs indicating signal.

9: Down signal output

When the elevator is going down, the terminal outputs indicating signal.

10: Inverter operating at zero speed

When the inverter is operating at zero speed, the terminal outputs indicating signal. To be specific, under V/F control, when output frequency is 0, it outputs indicating signal; under non V/F control, when feedback frequency is smaller than the corresponding frequency of F11.10, it outputs indicating signal.

11: Braking control output

This terminal is for controlling the on/off of braking.

12: Operating contactor control output

This terminal is for controlling the on/off of operating contactor.

13: Signal of Motor enables to open the brake.

When this signal is available, inform microcontrol board enable to open the brake.

14: Direction signal with light-load

0: Upward direction is light-load; 1: Downward direction is light-load.

15: Pre-open door signal

When this signal output is available during operation, inform microcontrol board enable to pre-open the door.

16: Braking power output

To control the controlling force of the braking power.

17: Output of basic pole block error (E030)

It will output for indication if inverter appears basic pole block error (E030).

18: Inverter is ready (no relationship with enable signal of Inverter)

19~20: Reserved

F07.17	Reserved		
F07.18	Output terminal activeness setting	00～1FH	00

This parameter defines positive and negative logic of output terminal.

Positive logic: when output terminal is connected with corresponding common port, the terminal is active; when they are

disconnected, the terminal is inactive.

Negative logic: when output terminal is connected with corresponding common port, the terminal is inactive; when they are disconnected, the terminal is active.

When BIT digit is set to 0, it refers to positive logic, when it is set to 1, it is negative logic.

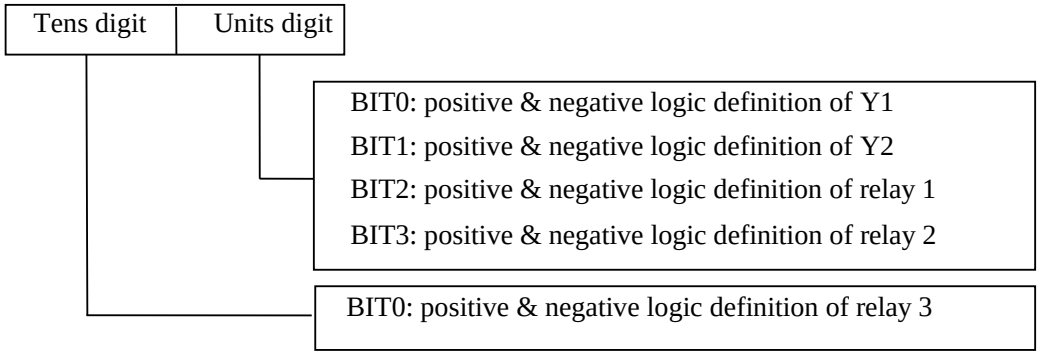


Figure 6-6 Output terminal activeness setting

F07.19	Frequency arrival (FAR) detected width	0.00～100.0Hz	2.50

This parameter is a complementary definition to function 2 in Table 6-5, as shown in Figure 6-7. When the inverter output frequency falls within the detected positive & negative width of the set frequency, the terminal outputs pulse signal.

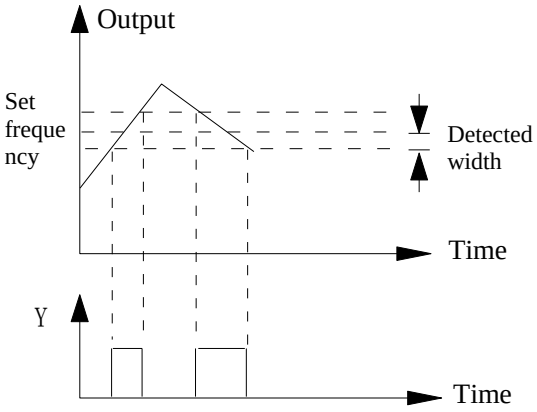


Figure 6-7 Frequency arrival signal output sketch

F07.21	FDT1 level	0.00～100.0Hz	50.00
F07.22	FDT1 delay	0.00～100.0Hz	1.00
F07.23	FDT2 level	0.00～100.0Hz	25.00
F07.24	FDT2 delay	0.00～100.0Hz	1.00

F07.21～F07.22 are complementary definitions to function 3 in Table 6-5. F07.23～F07.24 are complementary definitions to function 4 in Table 6-5. F07.21～F07.22 are for same use as F07.21～F07.22. Take F07.21～F07.22 use as an example:

When output frequency exceeds the set frequency (FDT1 level), the terminal outputs indicating signal until output frequency drops lower than FDT1 level (within FDT1 level ~ FDT1 delay), as shown in Figure 6-8.

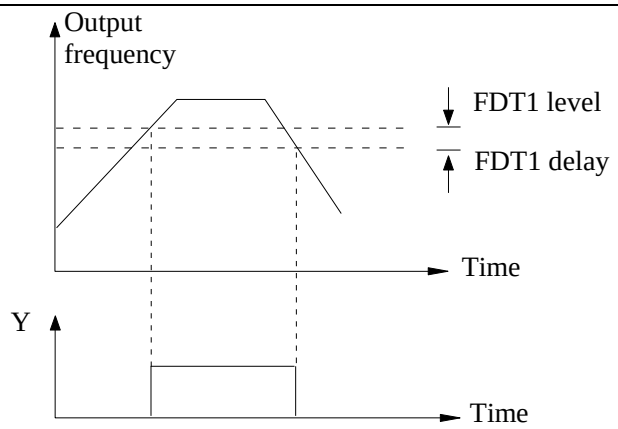


Figure 6-8 Frequency level detection sketch

F07.24~F07.37	Reserved		

6.9 Encoder Parameters (Group F08)

Function Code	Name	Setting Range	Factory Default Value
F08.00	PG type	0～3	1
This parameter is for selecting encoder type. 0: ABZ incremental 1: SIN/COS 2：Endata Absolute Value－Heidenhain ECN1313/ECN413(reserved) 3：UVW incremental (reserved) Note: 0 is for asynchronous motor and 1~3 are for synchronous motor			
F08.01	PG pulses per revolution	1～10000	2048
This parameter is for setting pulse per revolution (PPR) for selected pulse encoder. 注意 **Attentions:** **When speed sensor is operating, this parameter must be set correctly, otherwise the motor cannot operate normally.**			
F08.02	PG rotating direction	0～1	0
0: A ahead of B 1: B ahead of A When the motor is operating forward, A is ahead of B; when the motor is operating in reverse, B is ahead of A. If the indicating directions of the command of wiring between inverter interface board and PG match with that of wiring between the inverter and the motor, please set this parameter to 0 (forward); otherwise set to 1 (reverse). By modifying this parameter, the corresponding relation between wiring directions can be easily adjusted without needs to rewiring.			

Function Code	Name	Setting Range	Factory Default Value
F08.03	Speed measurement filtering constant of the encoder	0000～2999H	1011H

This parameter is for setting the filtering times of feedback speed.

Units digit: high-speed filtering times

Hundreds digit: zero-speed filtering times

At low speed, when there is current vibration sound, low-speed filtering times can be increased, otherwise low-speed filtering times should be decreased to enhance system response.

Thousands digit is for selection of the speed measurement method

0：speed measurement method1

1: speed measurement method 2

2:reserved

F08.04	PG thread break detection time	0.0～10.0s	2.0

This parameter is to set the continuous detection time for thread break error of the encoder. When F08.04 = 0, there would be no detection when PG thread break happens, which could shield error E.025.

F08.05	SIN/COS encoder zero-offset correction	0～1	0
F08.06	SIN/COS encoder zero-offset of A phase	0~4096	2048
F08.07	SIN/COS encoder zero-offset of B phase	0~4096	2048
F08.08	SIN/COS encoder zero-offset of C phase	0~4096	2048
F08.09	SIN/COS encoder zero-offset of D phase	0~4096	2048

For synchronous motor, if the operation effect is not good after several times of tuning, try to take zero-offset correction. F08.05 is for zero-offset correction, and F08.06~F08.09 refer to the value after zero-offset correction.

Procedure of zero-offset correction: disconnect the encoder with mainboard when the power is cut off, then repower the inverter and put it under inspection operation. After that, set F08.04=1 to start zero-offset correction, after which the parameter will be reset to 0. Cut off the power of inverter before connecting the encoder, and then repower the system.

Attentions:

1. Zero-offset correction is only needed when the synchronous motor is using SIN/COS absolute encoder（Heidenhain ECN1313/ECN413）and when its A phase & B phase are both SIN/COS signals. The absolute encoder only corrects the zero-offset of A phase and B phase.

2. Please do not use encoder with hot plug.

6.10 Protection Parameters Setting (Group F09)

Function Code	Name	Setting Range	Factory Default Value
F09.00	Relay output action selection when in errors	000～111H	000

LED units digit: undervoltage error action selection, i.e. selection for whether the error indication is to act when in undervoltage situation like powering on or powering off.

0: no action

1: action (undervoltage regarded as an error)

LED tens digit: action selection for auto reset interval error, i.e. selection for whether the error indication is to act during auto-reset interval while the error has not been truly reported. Please refer to the description of F09.05 and F09.06.

0: no action

1: action

LED hundreds digit: reserved

F09.01	Error screening selection 1	0000～2222H	0000

LED units digit: SCI communication error screening selection (Reserved)

LED tens digit: contactor error screening selection

LED hundreds digit: EEPROM error screening selection

LED thousands digit: reserved

0: not screeninged. Error reported and shutdown.

1: not screeninged. Error alert and continues operation.

2: screeninged

F09.02	Error screening selection 2	00～22H	00

LED units digit: input phase loss error screening selection

LED tens digit: output phase loss error screening selection

0: not screeninged. Error reported and shutdown.

1: not screeninged. Error alert and continues operation.

2: screeninged

Attentions:

Please be careful in choosing the error screening function. It must be correctly set after the error cause is confirmed; otherwise wrong selection might cause expanded accidents, injuries or property damages.

F09.03	Optimization mode selection	0~1111H	0

LED units digit:Prohibit to select the optimization protection of encoder wire-broken.
0: Start the optimization protection of encoder wire-broken.
1: Forbid the optimization protection of encoder wire-broken.

Function Code	Name	Setting Range	Factory Default Value
LED tens digit: Power on and Auto-tuning selection of synchronous motor. 0:Start power on and auto-tuning of synchronous motor. 1:Forbid power on and auto-tuning of synchronous motor. LED hundreds digit: Power-on and tuning selection of larger deviation CD angle 0: Turn on tuning 1: Prohibit tuning LED thousands digit: Cancel mode selection of torque slope when stopping. 0: No PI mode 1: PI mode			
F09.04	Motor overload protection selection	0～2	2
0: no action There would be no overload protection for the motor (select with caution!). 1: general motor (with low-speed compensation) The heat dissipation effect of general motor is weakened when the motor operates at low speed, so the corresponding electronic thermal protection value needs to be adjusted accordingly. The low speed compensation refers to decrease of overload protection threshold for the motor whose operating frequency is lower than 30Hz. 2: variable-frequency motor (without low-speed compensation) Because the heat dissipation of variable-frequency motor is not affected by speed, there is no need to adjust the protection value at low speed.			
F09.05	Selection 1 of special error screening.	0～1111H	0
LED units digit: CD error screening selection of sincos Encoder. LED tens digit: AB low-speed error screening selection of sincos Encoder. LED hundreds digit: Z pulse error screening selection of Encoder. LED thousands digit: Car uncontrolled error screening selection 0: unshielded, warn error and stopping. 1: shielded			
F09.06	Selection 2 of special error screening.	0～1111H	0
LED units digit: Basic pole sealing error screening selection LED tens digit: CAN communication error screening selection LED hundreds digit: Magnetic pole tuning error shielding selection LED thousands digit: Reserved 0: unshielded, warn error and stopping. 1: shielded			
F09.07	Error locking selection	0～1	0
0: error locking prohibited 1: error locking permitted, which means it can redisplay the error that exits when the last time the system is powered off, and the error must be reset before resuming normal operation. Note:Undervoltage couldn't be as an error to lock when inverter power-on next time.			
F09.08	Manufacturer debugging parameter		
F09.08 are manufacturer debugging parameters			

Function Code	Name	Setting Range	Factory Default Value
F09.09	Special protection disposition selection	0～1111H	0

LED units digit: Distance of car uncontrolled protection derating judgment disposition.

0: prohibit

1: Enable

LED tens digit: one-key slip enable

0: prohibit

1: Enable

LED hundreds: poweron handling mode of terminal operation command

0: operation terminal is available at the undervoltage state, need trigger operation terminal to enable runing command after bus-voltage normal.

1: operation terminal is available at the undervoltage state, only need keep operation terminal as the state of electric level available, runing command can be enabled after bus-voltage normal.

LED thousands: Auto-reset enable for basic pole sealing error

0: Forbidden

1: Enable

6.11 V/F Control Parameters (Group F10)

Function Code	Name	Setting Range	Factory Default Value
F10.00	V/F curve setting	0～3	0
F10.01	V/F frequency 3	F10.03～F01.03	0.00Hz
F10.02	V/F voltage 3	F10.04～100%	0.0%
F10.03	V/F frequency 2	F10.05～F10.01	0.00Hz
F10.04	V/F voltage 2	F10.06～F10.02	0.0%
F10.05	V/F frequency 1	0.00～F10.03	0.00Hz
F10.06	V/F voltage 1	0～F10.04	0.0%

This group of parameters defines V/F setting modes of S610M to satisfy different load needs. According to F10.00 definition, 3 fixed curves and 1 user-defined curve are available for choice.

When F10.00 = 1, it is 2.0 power reduced torque, shown as curve 1 in Figure 6-9;

When F10.00 = 2, it is 1.7 power reduced torque, shown as curve 2 in Figure 6-9;

When F10.00 = 3, it is 1.2 power reduced torque, shown as curve 3 in Figure 6-9.

The above mentioned curves are applicable to fan or pump type variable-torque load. Users may adjust the curve setting according to the load characteristics to realize optimal energy saving results.

Function Code	Name	Setting Range	Factory Default Value

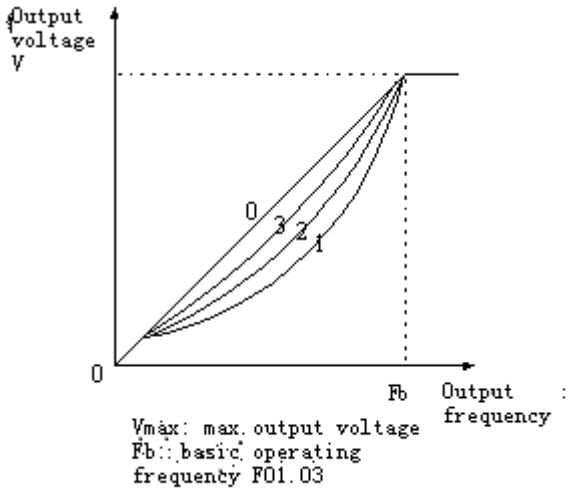
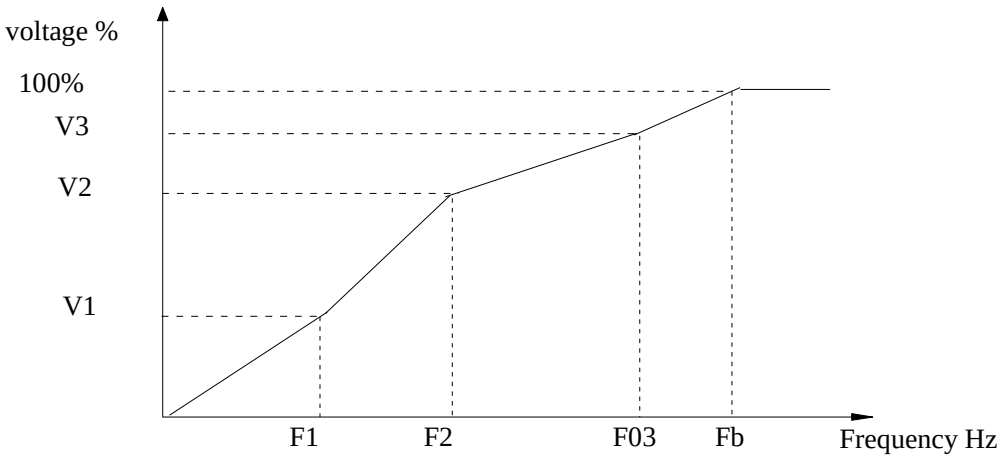


Figure 6-9 Reduced torque curves

When F10.00 = 0, users may self-define V/F curve through F10.01～F10.06, as shown in Figure 6-9. Define V/F curve by increasing three points (V1, F1), (V2, F2), (V3, F03) line so as to work for special loading characteristics.

The factory default user-defined V/F curve is a linear line, shown as curve 0 in Figure 6-10.



V1～V3: Voltage percentage of section 1~3 in multi-section VF

F1～F3: Frequency point of section 1~3 in multi-section VF

Fb：Basic running frequency F01.03

Figure 6-10 User-defined V/F curve

F10.07	Torque boost cut-off point	0.0%～50.0%	10.0

Function Code	Name	Setting Range	Factory Default Value
This parameter defines the cut-off frequency of manual torque boost as a percentage of basic operating frequency (F01.03), shown as fz in Figure 6-1. The cut-off frequency is applicable to any V/F curve set by F10.00.			
F10.08	AVR function	0～2	1
AVR refers to automatic voltage regulation. 0: no action 1: keeps acting 2: no action only when decelerating When the input voltage deviates from rated value, the output voltage can be maintained constant by setting this parameter. Therefore, AVR should be set acting under normal circumstances, especially when input voltage is higher than rated value. During the process of decelerating to stop, if AVR is set to no action, the motor would operate with larger current but with shorter deceleration time; if AVR is set to always acting, the motor would operate with smaller current and decelerate steadily with longer deceleration time.			
F10.09	IF control min. given value of exciting current	0~150%Io (no-load current of motor)	0
The function defines the minimum value of the excitation current given in the IF control function l function. The value is the percentage of the motor no-load current. When the elevator happen vibration in the vicinity of the switching frequency set by F06.36, it can try to adjust the value of the function code, for example, to 100%.			
F10.10	IF controls step length of excitation current	0~100	5
This function defines max. step length of the given excitation current changes at in the IF control. The value is the nominal value (4096 corresponds to the motor rated current). When the elevator has an uneven phenomenon in the acceleration below the switching frequency set by F06.36, try to adjust the value of the function code, for example, to 10.			
F10.11	VF slip compensation gain	0~200%	100%
This parameter is for the slip compensation of VF control. When this parameter is 0, it disenable VF slip compensation. Slip compensation can effectively solve the problem of leveling consistency under VF control. When the elevator is over-leveling, need to reduce the value;. this value should be increased when the elevator has an underlevel.			
F10.12	Filter time of VF slip compensation gain	0～1000ms	200
This parameter is aimed at the slip compensation filtering time of VF control. When F10.11 is not 0, the parameter will filter the offset slip value. When F10.11 is not 0, it can increase the value of this parameter appropriately when the elevator starts to have a sense of vibration.			
F10.13	Reserved		

6.12 Performance Parameters (Group F11)

Function Code	Name	Setting Range	Factory Default Value
F11.00	Carrier frequency	1.0～15.0kHz	Model confirmed

Table 6-6 Set carrier frequency of the inverter output PWM wave

Inverter Model	Factory default carrier frequency
Rated output current 71A and below	8.0 kHz
Rated output current 90A	7.0 kHz
Rated output current 176A and below	4.0 kHz

Attentions:

1. Carrier frequency would affect noise intensity. Under normal circumstances, carrier frequency could be set to 3～5kHz, while it should be set to 6～8kHz if quieter operation is required.
2. When the inverter operates at the frequency which is above factory default carrier frequency, the inverter needs derating use by 5% for each additional 1 kHz.

F11.01	Voltage regulation selection	000～FFFFH	0

LED units:
BIT0: over-debugging enable
0: Disenable
1: Enable
BIT1: Disposition method of over-debugging area
0: Method 0
1: Method 1
BIT2: Mode of wave-making
0: 7-segment mode
1: 7-segent cut over 5-segment mode
BIT3: Dead-zone compensation mode
0: Dead-zone compensation
1: none dead-zone compensation
LED tens:
BIT0: Narrow pulse control
0: don’t control
1: Control
BIT1: PWM selection
0: Normal PWM
1: Random PWM
BIT2: Over-voltage stalling selection (Reserved)
0: Prohibit (when the braking resister is installed)
1:Permit
BIT3: Selection of prohibit to decrease carrier wave
0: Permit to decrease carrier wave
1: Prohibit to decrease carrier wave
LED hundreds:
BIT0: Random sampling selection

Function Code	Name	Setting Range	Factory Default Value
0: Prohibit 1: Permit BIT1: PI parameter of current loop tuning calculation enable 0: disenable 1: enable BIT2: mixed sampling selection 0: prohibit 1: permit BIT3: reduce carrier wave selection under special working condition of elevator. 0: permit reduce carrier wave 1: prohibit reduce carrier wave LED thousands digit: reserved			
F11.02	Stalling over-voltage point (reserved)	120.0%～150.0%（Udce）	140.0

When the inverter decelerates, the actual speed decrease rate might be lower than the decrease rate of output frequency due to load inertia, so the motor would feedback electricity to the inverter causing DC bus voltage increase. Overvoltage tripping would occur if no measures are taken for it.

Overvoltage stalling protection during the inverter deceleration works as shown in Figure 6-11: by inspecting and comparing the bus voltage to the stalling overvoltage point F11.02 (relative to standard bus voltage), the inverter stops output frequency decrease if stalling overvoltage point is passed, and starts decelerated operation again when the inspected bus voltage is lower than the stalling overvoltage point.

The LED units digit of the parameter F11.01 is for overmodulation enabling (effective under both V/F and vector control). Overmodulation refers to the inverter would improve the utilization rate of bus voltage so as to increase output voltage, when the grid voltage is chronically low (below 15% of rated voltage) or it works with heavy load chronically.

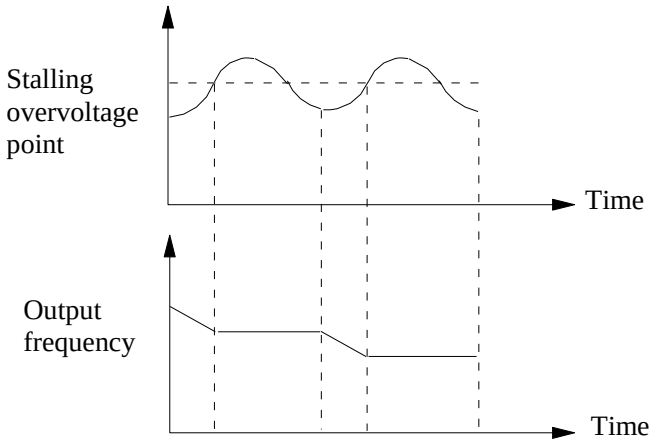


Figure 6-11 Overvoltage stalling protection

Function Code	Name	Setting Range	Factory Default Value
F11.03	Auto current-limit level	20.0%～200.0％（Ie）	180.0
F11.04	Frequency decrease rate during current limiting (reserved)	0.00～99.99Hz/s	10.00
F11.05	Auto current-limit action selection (reserved)	0～1	1

By real-time control over the load current, it is automatically set that the current does not exceed the set auto current limit level (F11.03) to avoid tripping caused by current overshoot. This function is particularly applicable to larger load inertia or abrupt load change.

Auto current-limit level (F11.03) defines current threshold of auto current-limit action, as a percentage of rated current of the inverter.

Frequency decrease rate during current limiting (F11.04) defines the adjustment rate of output frequency when auto current limit acts.

When auto current limit acts, if the frequency decrease rate (F11.04) is too small, auto current limit cannot be avoided, thus eventually causing overload; if the rate (F11.04) is too large, frequency adjustment would be aggravated, so that the inverter might be in power generating state for a long time which leads to overvoltage protection.

Auto current limit function is valid under both acceleration and deceleration states. Whether auto current limit works during constant operation is determined by auto current-limit action selection (F11.07).

When F11.07 = 0, it means the function is invalid during constant operation.

When F11.07 = 1, it means the function is valid during constant operation.

When auto current limit acts, output frequency may vary, therefore, this function is not applicable to where stable output frequency during constant operation is required.

When auto current limit is valid, overload capacity of the inverter may be affected by lower set value of the current-limit level.

F11.06	Reserved		
F11.07	Selection of dynamic braking	0～1	1

0: not using dynamic braking 1: using dynamic braking

F11.08	Usage rate of dynamic braking	0.0～100.0％	100.0％

Only valid for the model with a built-in brake unit.

Attentions：

The resistance value and power of the brake resistor should be considered when setting this function.

Function Code	Name	Setting Range	Factory Default Value
F11.09	Fan control	0～1	0
0: Auto operation The inverter will automatically start internal temperature inspection during operation, determining start or stop of the fan based on the temperature of modules. If the fan is running before the inverter shutdowns, the fan continues to run for 3 more minutes after the inverter shutdowns, and then the internal temperature inspection will be started. 1: Fan keeps running when powered on Fan keeps running after the inverter is powered on.			
F11.10	Zero velocity threshold	0.001~0.010m/s	0.003m/s
Use this function code with the 10th function code of switch output terminal.			
F11.11~F11.13	Manufacturer debugging parameter		
F11.11~F11.13 are manufacturer debugging parameters.			

6.13 Communication Parameters (Group F12)

Function Code	Name	Setting Range	Factory Default Value
F12.00～F12.03	Reserved	0~4	0
F12.04	Type of CAN communication extension card	0～1	0
0: CANlink 1: Reserved			
F12.05	Baud rate of CAN communication	0～5	1
0：20 Kbps 1：50 Kbps 2：100 Kbps 3: 125 Kbps 4: 250 Kbps 5: 500 Kbps			
F12.06	CAN local machine address	1～127	1
Local machine CAN node ID.			
F12.07	CAN slave machine address	0～127	0

Function Code	Name	Setting Range	Factory Default Value
0: No slave machine 1~127: slave machine CAN node ID			
F12.08	Detection time of CAN communication overtime (under CAN mode)	0.1~10.0s	2.0
Available under CAN communication mode (F00.02=3 or 4). Detection time of CAN abnormal communication.			
F12.09	Detection time of CAN communication overtime (under none-CAN mode)	0~10.0s	0
Available under none-CAN communication mode (F00.02<3). Detection time of CAN abnormal communication. 0 doesn't detect CAN communication error.			
F12.10~F12.12	Reserved	0~3	0

6.14 System Management Parameters (Group F13)

Function Code	Name	Setting Range	Factory Default Value
F13.00~F13.01	Reserved	0~4	0
F13.02	Parameters protection setting	0～2	0
0: Modification on all parameters permitted 1: except main digital frequency reference (F00.03) and this parameter (F13.02), modification on other parameters prohibited 2: except this parameter (F13.02), modification on all other parameters prohibited			
F13.03	Parameter initialization	0～2	0
0: parameter modification status 1: delete error records 2: reset to factory default setting			
F13.04	Parameters copy	0～3	0
0: no action 1: upload parameters 2: download parameters 3: download parameters (except motor parameters)  **Attentions:** Don't upload/download the inverter parameters. After download parameters, CAN communication distance control must re-learn the hoistway!			
F13.05	Parameters display selection	0000～7FFFH	1C07H
Binary setting: 0：no display；1：displayed			

Function Code	Name	Setting Range	Factory Default Value

LED units digit：

BIT0：output frequency (no display when shutdown)

BIT1：the set frequency (flashing)

BIT2：output current (no display when shutdown)

BIT3：output voltage (no display when shutdown)

LED tens digit：

BIT0：AI1

BIT1：AI2

BIT2：reserved

BIT3：DI (terminal status setting). The lower 10 bits display X1～X10，while higher bits (thousands digit) display output terminals D1, D2 and relay A, relay B.

LED hundreds digit：

BIT0：output power (no display when shutdown)

BIT1：output torque (no display when shutdown)

BIT2: feedback speed (m/s)

BIT3: given speed (flashing)

LED thousands digit：

BIT0：Bus voltage

BIT1：Operating speed (R/MIN)

BIT2：The set speed (R/MIN) (flashing)

Attentions:

Set frequency is displayed by default when the inverter is shutdown, while output frequency is displayed by default during operation, if the above are all set to zero.

6.15 CAN Communication Distance Control Parameters 1 (Group F20)

F20.00	Quantity of floors	2~64	2
Set total floors of elevator.			

Total floors mean all floors from the bottom floor to the highest one, including floors of underground.

For example: a building with 10 ground floors and 2 unerground floors, so, F20.00=12

注意

Before auto-tuning floor-height operation, must firstly to set correct quantity of floors.

F20.01	Current floor setting	0~F20.00	0

0: No action
1~F20.00: Change current floor to this value, via this parameter to correct floors when display wrong floor. Should be used with caution!

F20.02	Operating speed	0.100~F00.04	1.500m/s

Operating speed means the largest speed reached by elevator during its automatical operation.

注意

After revising operatiing speed and rated speed, must do hoistway auto-tuning again.

For example:

One elevator with rated speed 3m/s (F00.04), set F00.04=3.00. If set F20.02=2.50, the highest actual speed of this elevator will be less than rated speed, the highest speed is 2.5m/s. After revise opeating speed F20.02, must do hoistway auto-tuning again.

F20.03	Start frequency of car fast operation	0.00~5.00Hz	0
F20.04	Start terrace of car fast operation	0.00~Min (1.00, F20.02)	0
F20.05	Start terrace delay	0~10（unit: 5ms）	2

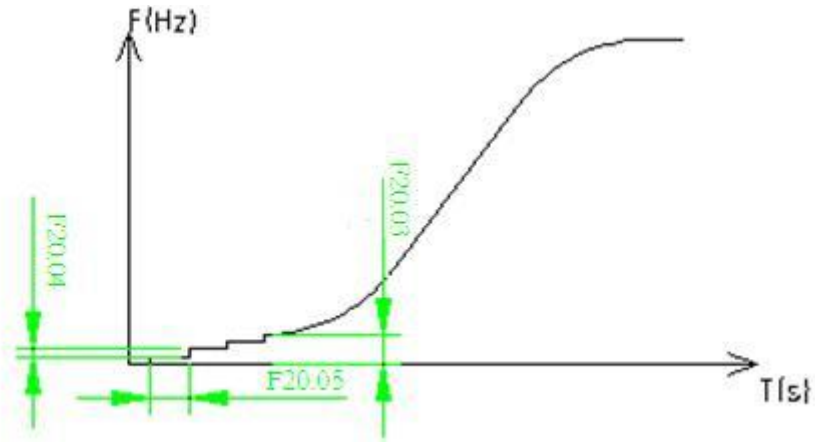


Figure 6-12 Curve of Start terrace of car fast operation

When the static friction of the elevator is very large, the starting comfort of the elevator will get worse, and then the step start mode can be selected. Before running the normal acceleration curve, walk a few steps so that the elevator can overcome the starting static friction and then run the acceleration curve automatically.

F20.06	Delay time of low-speed starting	0.00~5.00s	0

This parameter is used to delay the setting time after the steps start and then send the normal curve frequency.

F20.07	Average acceleration and deceleration	0.10~2.00 m/s2	0.30

It refers to the average acceleration and deceleration of the elevator during acceleration and deceleration.			
F20.08	Inspection Speed	(F20.11) ~0.63 m/s	0.30
F20.09	Acceleration time of inspection	0.1~3.0s	1.0
F20.10	Deceleration time of inspection	0.1~2.0s	0.3
F20.11	Runing speed of none car fast termination	0.05~Min (0.20, F20.08) m/s	0.10

Inspection Speed refers to elevator running speed under inspection status.

Acceleration time of inspection refers to the time when elevator accelerates from 0-speed to F20.09 under inspection status.

Deceleration time of inspection refers to the time when elevator decelerates from F20.0 to 0-speed under inspection status.

Runing speed of none car fast termination refers to the running speed of the elevator when it meets the first level forced deceleration switch at the end station under inspection or termination correction status.

Curve is showed as below:

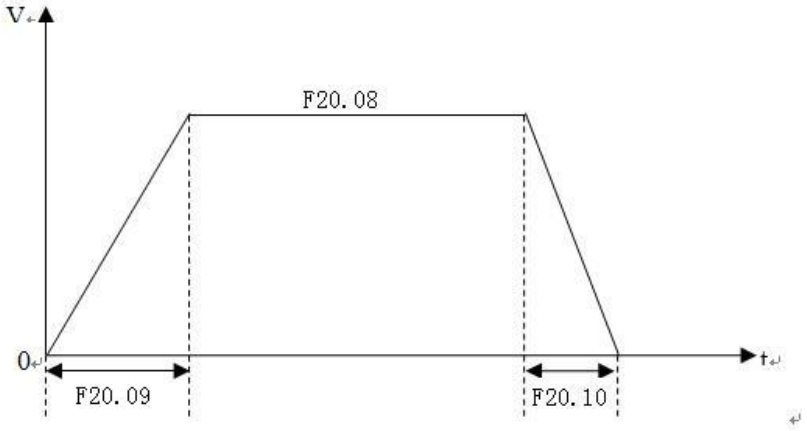


Figure 6-13 Curve of inspection operation don't meet terminal station

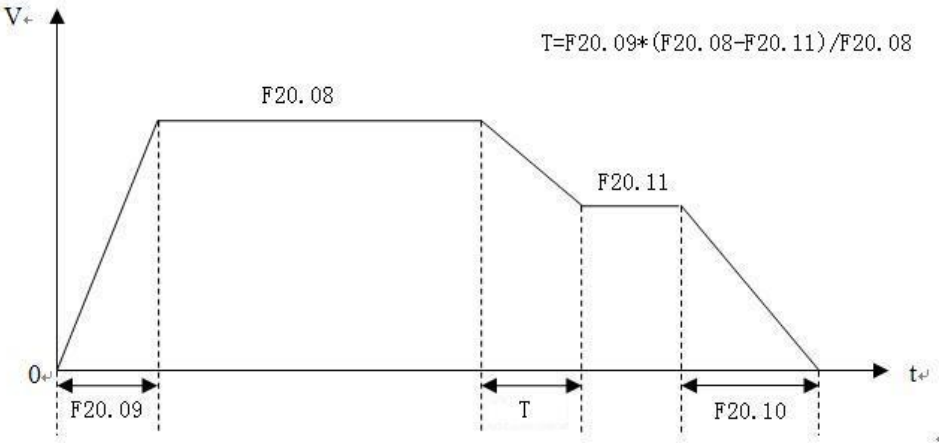


Figure 6-14 Curve of inspection operation meet terminal station

F20.12	Find leveling speed of none terminal station	0.05~0.30 m/s	0.20

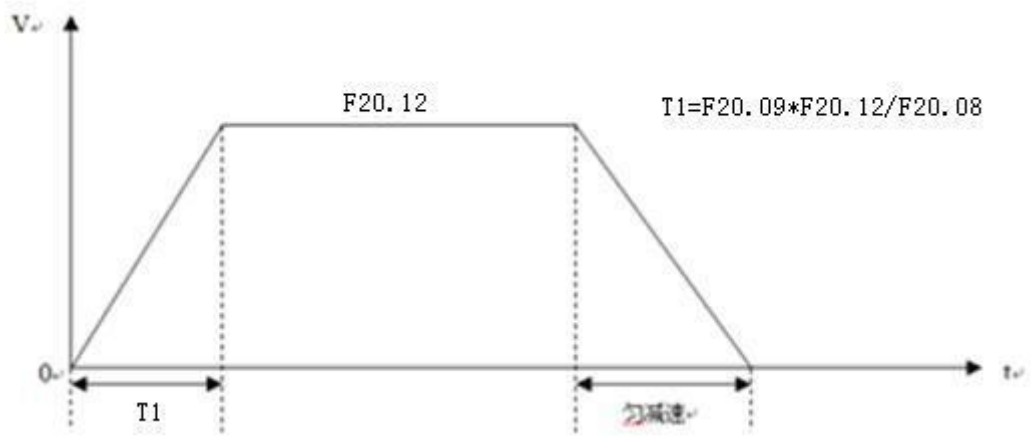


Figure 6-15 Curve of find leveling of none terminal station

When the elevator is returned to the automatic operating state from the maintenance, or after the fault is reset, if the car is in the non-gate area, the elevator will level to the open area. In the process of automatic leveling, the running speed of the elevator is F20.12 before the leveling signal is received during automatic leveling process; After receiving the leveling signal, evenly reduce the speed to zero, the car stops at the level location and stop running.

F20.13	Hoistway auto-tuning speed	0.10~0.50 m/s	0.30

The elevator needs to conduct hoistway data auto-tuning before normal automatic operation. The controller can record length of the leveling screen panel, the position of each forced switch and the leveling position of each floor, etc. With 20.13 setting value to do the hoistway auto-tuning. The data of the hoistway auto-tuning obtained is calculated and evaluated. If the data is accurate, the relevant data is saved. If the data is not reasonable, the error is reported and the reason is given.

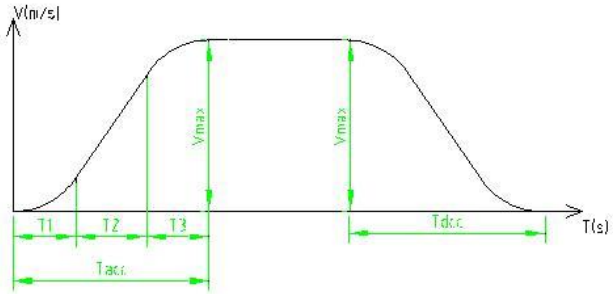
F20.14	Elevator Security Diagnosis	0: Prohinit 1: Start the security diagnosis	0

If F20.07 and F20.17 are changed, the elevator safety diagnosis must be re-conducted. Set F20.14=1 to start safe diagnosis. If the diagnosis is wrong, the system will report a failure and give the reason for the failure.

F20.15	Classes of Forced Deceleration Switch	1~3	1

The forced deceleration switch is one of the necessary guarantees for the safe operation of the elevator. Generally speaking, the higher the rated speed of the elevator, the more classes of forced deceleration switches. The relationship between the rated speed of elevator and the classes of forced deceleration switch is shown in the following table: **Rated Speed**	**Classes of Forced Deceleration Switch**
≤1.75m/s	1
≤2.5m/s	2
≤4m/s	3

F20.16	Install quantity of leveling switch	0:1 piece 1:2 pieces	0
The S610M control system supports the use of one or two leveling switch. If only one level switch is used, it is necessary to set its input point to the upper leveling.If two leveling switches are used, the input points of the two level switches are set to the upper level and the lower level respectively.			
F20.17	Time Adjustment of Curve S	0~90%	56%
This parameter is used to adjust the proportion of variable acceleration time during the whole acceleration and deceleration process, so as to adjust the time of the two inflection points in the acceleration and deceleration process.			
F20.18	Mode of Leveling Switch	0~1	1



F20.17	small→big
T1/Tacc=T3/Tacc	small→big
T2/Tacc	big→small

0: China Mode (utilize magnetic screen plate) 1: Iran Mode (utilize magnetic bean) Note: Using the China model, the compensation of leveling can only be compensated with the F22 group parameters. The Iran model, the compensation for leveling should be compensated with F22 and F23 groups.			
F20.19	Slight Motion Leveling Speed	0.03~0.10 m/s	0.05
When the elevator at the leveling site with door opening, due to the changes of load in the car, change the wire rope elongation, leading to the maximum vertical distance between car sill and hall sill, i.e. the accuracy of leveling happen change. Slight Motion Leveling is an action of the car stop position correction during the loading or unloading. The running speed of Slight Motion Leveling is set by F20.19.			
F20.20	Door Pre-open Speed	0.00~0.50 m/s	0.30
This function code is used with the 15th function of the switch output terminal.			

6.16 CAN Communication Distance Control Parameters 2 (Group F21)

Function Code	Name	Setting Range	Factory Default Value
F21.00	Length of Leveling Plugin Board	10～800mm	300

For more than two layers of the elevator, before elevator auto-tuning, can be first manually input the rough length of light screen plate in F21.00, also can use the default value, after success of the hoistway study, the length of ligh creen plate will be automatically corrected; ;The two-floor elevator need to accurately input the length of the screen and use this length as the basis for the accurate leveling. Different speed should use different length of leveling plugin board. Please refer to "table 2-8 screen length recommended value and rated speed comparison table" for installation.

table 6-7 screen length recommended value and rated speed comparison table

Rated Speed (m/s)	Recommaned Value of Mounting Length of light-screen board（mm）
≤2	200~300
2＜Rated Speed≤3	300~400
3.5≤Rated Speed≤4	350~400

F21.01	Delay starting of Bottom floor interval of hoistway tuning.	1.0~20.0	2.0
This parameter is for the downtime at the bottom of the shaft of shaft study from down to up to operate the elevator. This parameter is aimed at Iran customer’s needs of the elevator running to the bottom of the shaft need open the door during the shaft learning process.			
F21.02	Height difference of upward first class forced deceleration switch.	-10.000~10.000 m	0
F21.03	Height difference of upward second class forced deceleration switch.	-10.000~10.000 m	0
F21.04	Height difference of upward third class forced deceleration switch.	-10.000~10.000 m	0
F21.05	Height difference of downward first class forced deceleration switch.	-10.000~10.000 m	2
F21.06	Height difference of downward second class forced deceleration switch.	-10.000~10.000 m	0
F21.07	Height difference of downward third class forced deceleration switch.	-10.000~10.000 m	0

In During the process of shaft self-learning, the system will alarm the shaft self-learning failure when it detects the position deviation of the forced exchange switch between installation position and the system designed position.It can be seen from F21.02~F21.07 that the distance of each forced exchange switch needs to be adjusted.If F21.02~F21.07 is negative value, it indicates that distance of the forced deceleration switch is shorter and needs to be adjusted opposite the direction of the end station, or increase the average acceleration and deceleration rate (F20.07).If F21.02~F21.07 is positive, it indicates that the distance of the forced deceleration switch is longer, so it needs to be adjusted to the direction of the end station, or reduce the average acceleration and deceleration rate (F20.07).			
F21.08	Switch-on time of leveling switch	0~200ms	2
When the elevator leads the leveling of every floor is not precise due to certain factors, and also every time is over-leveling, , namely the sill of car door is higher than hall door during upward-running, or the sill of car door is lower than hall door during downward-running, can increase this parameter to realize precise leveling.			
F21.09	Disposition method of the first-class forced exchange	0~1	0
0: normal disposition, installation distance of the first-level forced exchange switch does not allow to lower than the minimum value required; 1: No warning when height of the first-level forced exchange switch is too low during shaft learning. Emergency stop when according to the learning height to calculate forced exchange speed limit and motion. This function is mainly to solve the problem of forced exchange cross-floors of high-speed elevator.			
F21.10	Interval of double-leveling photo-switch	0~600mm	300
When the double-level photoelectric switch is adopted, this parameter is used to record the distance between the photoelectric switches of the upper and lower levels after the successful learning of the shaft.			
F21.11	Height of upward forced deceleration switch 1	00.000~60.000m	0
F21.12	Height of upward forced deceleration switch 2	00.000~60.000m	0
F21.13	Height of upward forced deceleration switch 3	00.000~60.000m	0
F21.14	Height of downward forced deceleration switch 1	00.000~60.000m	0
F21.15	Height of downward forced deceleration switch 2	00.000~60.000m	0
F21.16	Height of downward forced deceleration switch 3	00.000~60.000m	0
F21.11~F21.13 respectively represents the distance from upward first-class ~ third-class forced deceleration switch to leveling location of up end station. F21.14~F21.16 respectively represents the distance from downward first-class ~ third-class forced deceleration switch to leveling location of down end station.			
F21.17	Decelerate of upward forced deceleration switch 1	0.020~2.000 m/s^2	1.200
F21.18	Decelerate of upward forced deceleration switch 2	0.020~2.000 m/s^2	1.000
F21.19	Decelerate of upward forced deceleration switch 3	0.020~2.000 m/s^2	0.900
F21.20	Decelerate of downward forced deceleration switch 1	0.020~2.000 m/s^2	1.200
F21.21	Decelerate of downward forced deceleration switch 2	0.020~2.000 m/s^2	1.000
F21.22	Decelerate of downward forced deceleration switch 3	0.020~2.000 m/s^2	0.900
F21.17~F21.19, F21.20~F21.22 respectively indicate the maximum deceleration speed when the elevator meets difreent classes upper and lower forced deceleration switches, and perform forced deceleration. The above parameters are automatically generated by the program after shaft self-learning.			

F21.23	Speed limit of upward forced deceleration switch 1	0.00~6.00 m/s	0
F21.24	Speed limit of upward forced deceleration switch 2	0.00~6.00 m/s	0
F21.25	Speed limit of upward forced deceleration switch 3	0.00~6.00 m/s	0
F21.26	Speed limit of downward forced deceleration switch 1	0.00~6.00 m/s	0
F21.27	Speed limit of downward forced deceleration switch 2	0.00~6.00 m/s	0
F21.28	Speed limit of downward forced deceleration switch 3	0.00~6.00 m/s	0
When the elevator completes the shaft parameter self-learning, it will automatically calculate the maximum speed allowed by the elevator operation while passing each class of forced deceleration switch.F21.23~F21.25 saves the maximum operating speed allowed when the elevator passes upward first-class ~ third-class forced deceleration switch.F21.26~F21.28 saves the maximum operating speed allowed by the elevator when the elevator passes downward first-class ~ third-class forced deceleration switch. If the elevator operates at this point of forced deceleration switch, the elevator will perform forced deceleration if the speed of the elevator is higher than this limited speed.			
F21.29~F21.91	Height of floors 1…63	00.000~60.000 m	0
Floor height refers to the height of a certain floor, which is the height difference of leveling switch position between the upper layer and this layer. The parameters of this group are automatically written by the system after hoistway auto-tuning. For example, F21.29 refers to the height of the leveling switch in the 2nd floor minus the1st floor.			

6.17 Upward Running Leveling Distance Compensation (Group F22)

F22.00~F22.63	Leveling distance compensation of upward running floor 1… floor 64	-200～200 mm	0
When the elevator leveling is not correct on every floor due to certain factors, can adjust this parameter, set deviation value to adjust slightly. When F20.18=0 (the leveling switch is set to China mode), the leveling compensation parameter of the upper floor and the lower floor is a set of parameter.If every time it is an underlevel layer, namely, the sill of the car door is lower than the sill of the hall door during upward running, or the sill of the car door is higher than the sill of the hall door during downward running, should increase the parameter value. If each time is overlevel, namely, the sill of the car door is higher than the sill of the hall door during upward running, or the sill of the car door is lower than the sill of the hall door during downward running, should decrease the parameter value. When F20.18=1 (the leveling switch is set to Iran mode), this set of parameter is compensation for ascending floor leveling. If every time it is an underlevel layer, namely, the sill of the car door is lower than the sill of the hall door during upward running, should increase the parameter value. If each time is overlevel, namely, the sill of the car door is higher than the sill of the hall door during upward running, should decrease the parameter value.			

6.18 Downward Running Leveling Distance Compensation (Group F23)

F23.00~F23.63	Leveling distance compensation of downward running floor 1… floor 64	-200～200 mm	0
When the elevator leveling is not correct on every floor due to certain factors, can adjust this parameter, set deviation value to adjust slightly. When F20.18=0 (the leveling switch is set to China mode), this set of parameter is unavailable. When F20.18=1 (the leveling switch is set to Iran mode), this set of parameter is compensation for downward runing floors. If every time it is an underlevel layer, namely, the sill of the car door is higher than the sill of the hall door during upward			

running, should increase the parameter value. If each time is overlevel, namely, the sill of the car door is lower than the sill of the hall door during upward running, should decrease the parameter value.

6.19 Parameters of Errors Recording (Group 90)

Function Code	Parameter Name	Setting Range	Factory Setting Value
F90.00	Error record 1	0～99	0
F90.01	Sub-code of Error record 1	0～65535	0
F90.02	Bus voltage when error occurs	0～999V	0
F90.03	Output voltage when error occurs	0～480V	0
F90.04	Actual current when error occurs	0.0～999.9A	0.0
F90.05	Set frequency when error occurs	0.00～100.00Hz	0.00
F90.06	Operating frequency when error occurs	0.00～100.00Hz	0.00
F90.07	Operating status of the inverter when error occurs	0～FFFFH	0000
F90.08	Error record 2	0～99	0
F90.09	Sub-code of Error record 2	0～65535	0
F90.10	Error record 3	0～99	0
F90.11	Sub-code of Error record 3	0～65535	0
F90.12	Error record 4	0～99	0
F90.13	Sub-code of Error record 4	0～65535	0
F90.14	Error record 5	0～99	0
F90.15	Sub-code of Error record 5	0～65535	0

S610M can record the latest 5 errors (F90.00、F90.08、F90.10 F90.12 and P90.14), bus voltage (F90.02) when the latest error occurred, output voltage (F90.03)output current (F90.04), set frequency(F90.05), operating frequency (F90.06) and the operating status of the inverter (F90.07) for user reference. The latest error record is Error record 1.

Table 6-8 Error Record Table

Error Code	Error Name
E001	over current when the inverter accelerates
E002	over current when the inverter decelerates
E003	over current when the inverter operates at constant speed
E004	over voltage when the inverter accelerates
E005	over voltage when the inverter decelerates
E006	over voltage when the inverter operates at constant speed
E007	Abnormal bus capacitance and voltage
E008	Input phase loss

	E009	Output phase loss	
	E010	Fast over current protection	
	E011	Radiator 1 overheat	
	E012	Radiator 2 overheat	
	E013	Inverter overload	
	E014	Motor overload	
	E015	External error	
	E016	EEPROM read-write error	
	E017	Abnormal serial port communication	
	E018	Abnormal contactor	
	E019	Abnormal circuit by current detection	
	E020	CAN communication abnormal	
	E023	Parameter copy error in the operation panel	
	E024	Poor auto tuning	
	E025	PG failure	
	E026	Vector current loss error	
	E027	Brake unit failure	
	E028	Hardware wave-sealing OE loss eoor	
	E029	Over-current eror led by disconnecting of the door lock	
	E030	Security circuit disconnection during operation	
	E031	Output contactor failure	
	E032	Brake failure	
	E034	Overlarge speed deviation	
	E035	Overspeed (OS) failure	
	E036	Elevator maintenance failure	
	E037	Elevator operation command failure	
	E042	Hoistway Self-learning switch dislocation error	
	E043	Impulse Z loss error	
	E044	Sin encoder zero-bias error	
	E049	Stalling error of tuning 3	
	E071	Error of time of One-key slid adjacent 2 times is too short	
	E073	Error of forced exchange speed calculation uncorrect while curve formation.	
	E074	Error of curve calculation overflow	
	E075	Error of the leveling switch	
	E077	Error of auto-tuning forced exchange height.	
	E080	Slight motion leveling error	

Others	Reserved

Attentions:

1. **E007 is not detected by inverters of 380V and below 176A, but can be detected by other models.**
2. **E010 can only be reset 10 seconds after it occurred.**
3. **If overcurrent occurs, it needs 6 seconds delay to reset.**
4. **Axxx will be displayed on the keyboard when error alert starts (e.g. when contactor error occurs, E018 will be displayed on the keyboard if error protection acts, while A018 will be displayed if operation continues with warning.**

6.20 Inverter Parameters (Group F91)

Function Code	Name	Setting Range	Factory Default Value
F91.00	Serial number	0000～FFFF	7109
F91.01	Software version No.	0.00～99.99	2.01.06
F91.02	Customized version No.	0～99.99	1.00
F91.03	Temporary Version No.	00.000～64.999	Factory setting
F91.04	Rated capacity	0.0～999.9KVA	Factory setting
F91.05	Rated voltage	0～999V	Factory setting
F91.06	Rated current	0.0～299.9A	Factory setting
Parameters in this group are inherent parameters of the inverter, which cannot be modified by users.			

6.21 Status Display Parameters (Group F92)

Function Code	Name	Setting Range	Factory Default Value
F92.00	Given speed	-10.000~10.000m/s	0.000
This parameter is for monitoring the given speed of the inverter, including speed direction.			
F92.01	Instruction speed (after integrator)	-10.000~10.000m/s	0.000
This parameter is for monitoring the output speed of the inverter, including speed direction, after acceleration/deceleration process.			
F92.02	Feedback speed	-10.000~10.000m/s	0.000
This is the actual elevator speed acquired by the encoder under closed-loop vector control.			
F92.03	The set frequency	-100.00～100.00Hz	0.00
This parameter is for monitoring the set frequency of the inverter. If the frequency is positive, the motor is operating forward; if it is negative, the motor is operating in reverse.			
F92.04	Instruction frequency (after integrator)	-100.00～100.00Hz	0.0

Function Code	Name	Setting Range	Factory Default Value
This parameter is for monitoring the output frequency of the inverter, including frequency direction, after acceleration/deceleration process.			
F92.05	Output frequency	-100.0～100.0Hz	0.00
This parameter is for monitoring the output frequency including its direction.			
F92.06	Output voltage	0～800V	0
This parameter is for monitoring the output voltage of the inverter.			
F92.07	Output current	0.0～3Ie	0.0
This parameter is for monitoring the output current of the inverter.			
F92.08	Torque current	-300.0%～300.0%	0.0
This parameter is the torque current of the inverter as a percentage of the rated current of the motor.			
F92.09	Flux current	0.0%～100.0%	0.0
This parameter is the flux current as a percentage of the rated current of the motor.			
F92.10	Power of the motor	0.0%～200.0%	0.0
This parameter is the output power of the inverter as a percentage of the rated power of the motor.			
F92.11	Estimated frequency of the motor	-100.0～100.0Hz	0.00
This is an estimated frequency of the rotor under open-loop vector control.			
F92.12	Actual frequency of the motor	-100.0～100.0Hz	0.00
This is the actual frequency of the rotor acquired by the encoder under closed-loop vector control.			
F92.13	Bus voltage	0～800V	0
This parameter is for monitoring bus voltage of the inverter.			
F92.14	Operating status of the inverter	0000～FFFFH	0000

Function Code	Name	Setting Range	Factory Default Value

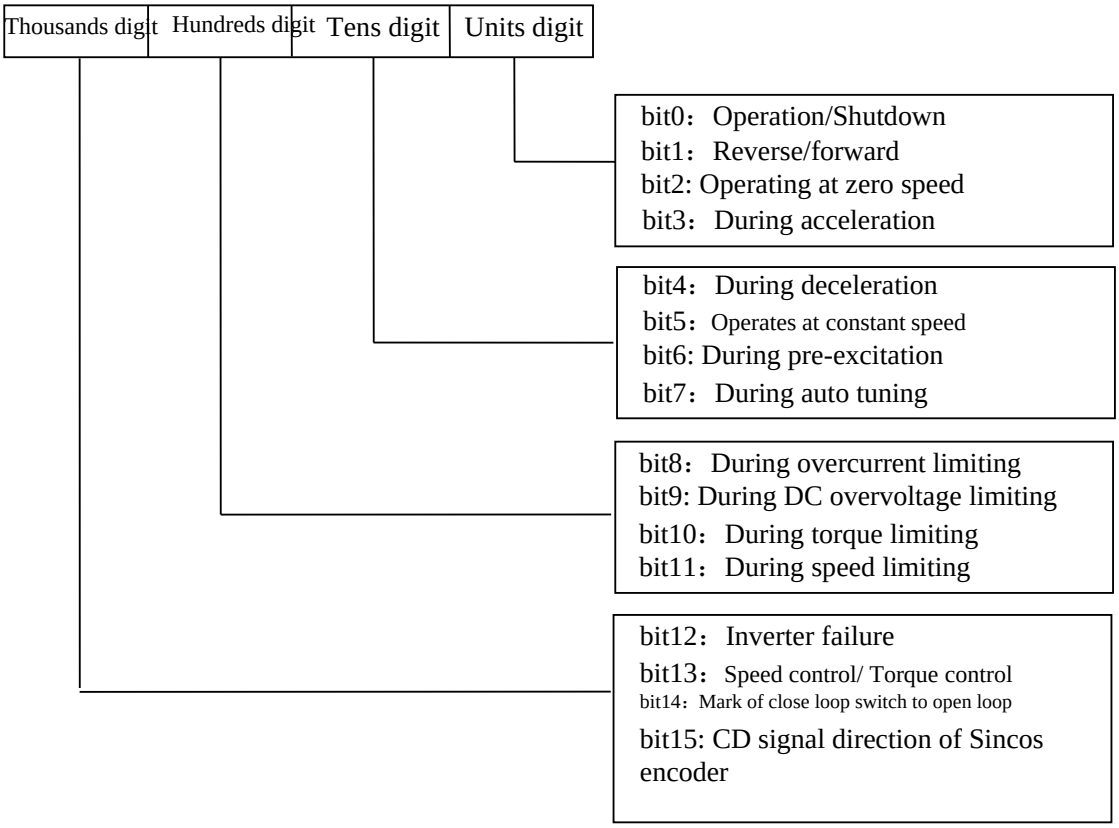


Figure 6-16 Operating status of the inverter

LED units digit BIT0: operation/shutdown. When the controller is in shutdown state, BIT0 = 0, otherwise BIT0 = 1.

LED units digit BIT1: reverse/ forward. When the controller is operating forward, BIT1= 0, otherwise BIT1= 1.

Other digits would be set to 1 when conditions are satisfied.

F92.15	Digital input terminal status	000～7FFH	000

Function Code	Name	Setting Range	Factory Default Value

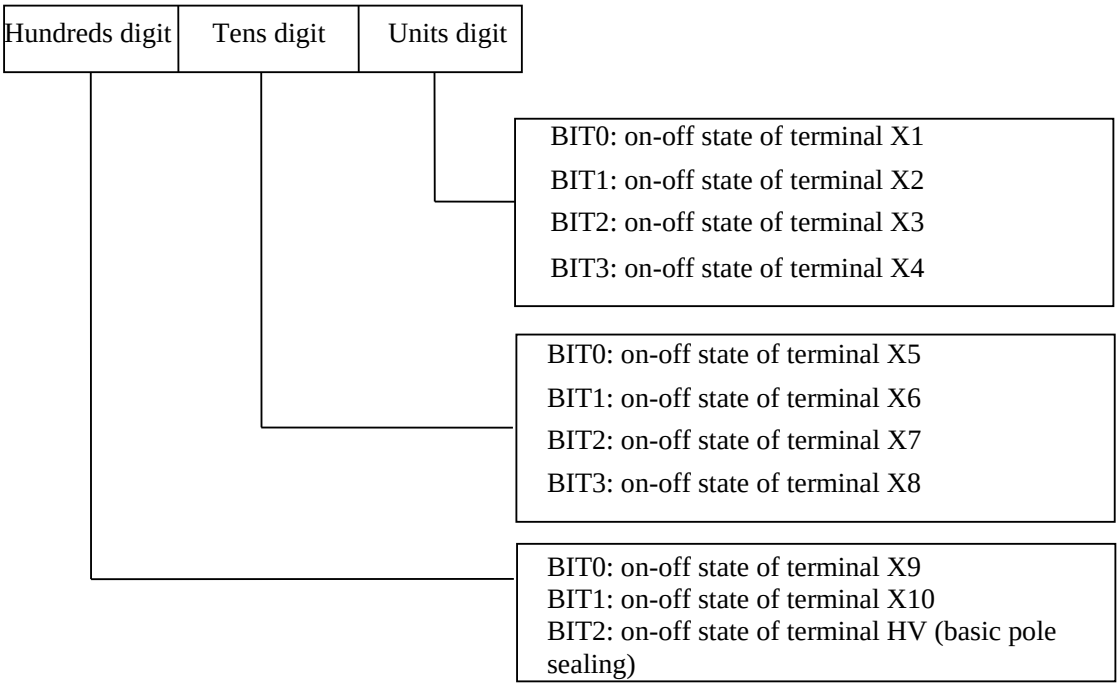


Figure 6-17 Digital input status

This parameter is to display the on-off state of 10 terminals, X1~X10. “0” stands for the terminal in “Off” state, while “1” stands for the terminal in “On” state.

F92.16	Digital output terminal status	000～1FH	00

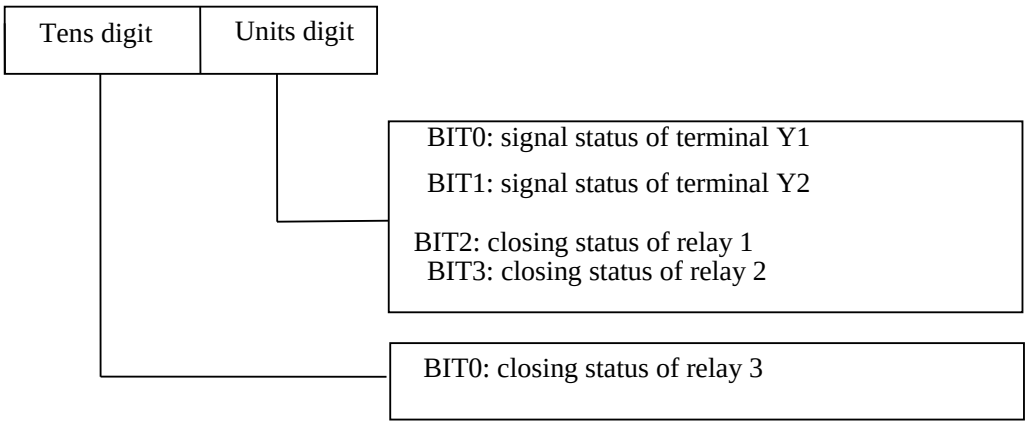
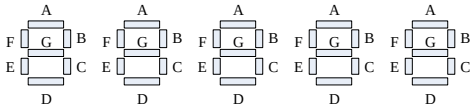


Figure 6-18 Digital output status

This parameter displays the output status of switch terminal Y1 & Y2 and Relay 1 ~ 3. When there is a signal output, the corresponding digits of F92.16 would be set to 1.

Function Code	Name	Setting Range	Factory Default Value
F92.17~ F92.24	Resereved		
F92.25	Temperature of radiator 1	0.0～150.0℃	0.0
F92.26	Temperature of radiator 2	0.0～150.0℃	0.0
Temperature of radiator 1 shows the temperature of inverter module. Over-temperature protection values of the inverter module of different models might be different. Temperature of radiator 2 shows the temperature of rectifier module. The rectifier bridge temperature is only detected by models of 380V with power code 15 and above. Displayed temperature range: 0～150℃; Precision: 5%.			
F92.27	Accumulative power-on time	0～65535 小时	0
F92.28	Accumulative operating time	0～65535 小时	0
F92.29	Accumulative operating time of the fun	0～65535 小时	0
F92.27～F92.29 display accumulative power-on time, accumulative operating time of the inverter and the fan since the inverter leaves the factory, respectively.			
F92.30	ASR controller output	-300.0%～300.0%	0.0
This parameter is the ASR controller output as a percentage of rated torque of the motor.			
F92.31	Higher bits of accumulative power consumption	0~65535*10000kWh	0
F92.32	Lower bits of accumulative power consumption	0~9999kWh	0
This parameter is for monitoring the output work.			
F92.33	Operating efficiency of motor	0~100.0%	0
It is used to monitor the proportional relation between running time and pown-on time.			
F92.34	Segment display of the inverter running status	0～FFFFH (segment display)	0

The status of the nixie tubes in the operation panel shows current inverter status. In order to describe clearly, we arranged the command of the nixie tubes in the operation panel in terms of the sequence of 5，4，3，2，1 from left to right. Every section of nixie tubes is defined as follows:



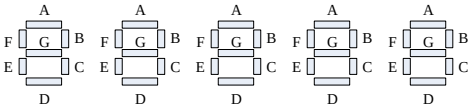
sequence	marker of	meaning of “shining” of	meaning of “not-shining”

Function Code	Name	Setting Range	Factory Default Value

No. of nixie tube	nixie tube segment	nixie tube segment	of nixie tube segment
1	A	operation	stop
	B	reverse rotation	forward rotation
	C	zero-speed operation	non-zero speed operation
	D	during acceleration	not during acceleration
	E	during deceleration	not during deceleration
	F	operating at constant speed	not operating at constant speed
	G	during pre-excitation	not during pre-excitation
2	A	during auto tuning	not in auto tuning
	B	during over-current limiting	not during over-current limiting
	C	during DC overvoltage limiting	not during DC overvoltage limiting
	D	during torque limiting	not during torque limiting
	E	during speed limiting	not during speed limiting
	F	inverter failure	non-inverter failure
	G	torque control	speed control
3	A	Close loop switch to open loop is available	Close loop switch to open loop is unavailable
	B	CD signal reverse of Sincos encoder	CD signal forward of Sincos encoder

F92.35	Segment display of digital input status	0～1FFH（segment display）	0

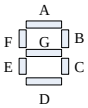
The status of the nixie tubes in the operation panel shows input status of digital value. In order to describe clearly, we arranged the command of the nixie tubes in the operation panel in terms of the sequence of 5，4，3，2，1 from left to right. Every section of nixie tubes is defined as follows:



sequence No. of nixie tube	marker of nixie tube segment	meaning of “shining” of nixie tube segment	meaning of “not-shining” of nixie tube segment
1	A	Terminal X1 is on	Terminal X1 is off
	B	Terminal X2 is on	Terminal X2 is off
	C	Terminal X3 is on	Terminal X3 is off
	D	Terminal X4 is on	Terminal X4 is off
	E	Terminal X5 is on	Terminal X5 is off
	F	Terminal X6 is on	Terminal X6 is off
	G	Terminal X7 is on	Terminal X7 is off
2	A	Terminal X8 is on	Terminal X8 is off
	B	Terminal X9 is on	Terminal X9 is off
	C	Terminal X10 is on	Terminal X10 is off
	D	HV (basic pole sealing)	HV (basic pole sealing)

Function Code	Name	Setting Range	Factory Default Value
		available / unavailable	
F92.36	Segment display of digital output status	0～1FH (segment display)	0

The status of the nixie tube in right end of the operation panel shows the output status of digital value. In order to describe clearly, we defined each section of nixie tube in the operation panel as follows:



marker of nixie tube segment	meaning of "shining" of nixie tube segment	meaning of "not-shining" of nixie tube segment
A	Signal output of terminal Y1	No signal output of terminal Y1
B	Signal output of terminal Y2	No signal output of terminal Y2
C	Relay 1 is on	Relay 1 is off
D	Relay 2 is on	Relay 2 is off
E	Relay 3 is on	Relay 3 is off

F92.37	Present Floor	0～F20.00	1
This parameter Can view the current floor of the car (Can range control mode).			
F92.38	High-byte of present location	0～255 (unit:65.535m)	0
F92.39	Low-byte of present location	0～65.535m	0
This parameter Can view the current floor of the car (Can range control mode). Current position = current position high *65.535+ current position low (m).			
F92.40	Mark of shaft self-learning successfully.	0: no learning 1: lerning successfully 2: learning failed	0
This parameter can be used to see whether the current elevator has been shaft self-learning and whether self-learning successfully.			

6.22 Factory Parameters (Group F99)

Function Code	Name	Setting Range	Factory Default Value
F99.00	Factory password input	00000～65535	Factory setting
The rest parameters in this group will be shown only after the correct password is entered.			

Chapter 7 Application Guide of Elevator

This chapter introduces in detail the basic steps of system design and setting method of function codes when using S610M series inverter as part of elevator application system.

7.1 Basic debugging steps

7.1.1 System wiring and analysis

It is highly recommended that users comprehensively and symmetrically analyze practical application requirements before designing the electrical schematic diagram of elevator system.

Basic configuration of elevator application when using S610M inverter is as shown in figure 7-1:

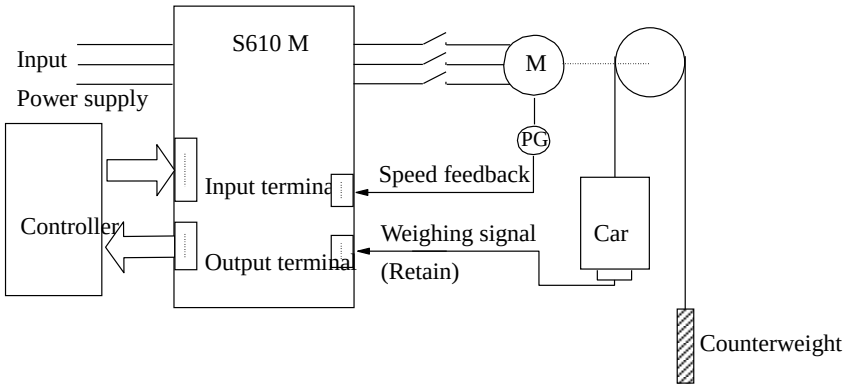


Figure 7-1 Basic configuration of elevator application

7.1.2 Setting of basic system parameters

1. Correctly set the model of traction machine and control mode (F00.01).
2. Correctly set relevant parameters of traction machine (Group F01).
3. Correctly set rated elevator speed (F00.04) and mechanical parameters of the motor (F00.06) according to elevator demands and motor parameters.
4. Correctly set encoder parameters (Group F08) according to encoder of the traction machine.
5. Set input/output terminal parameters (Group F07) according to actual wiring conditions.
6. Set parameters according to actual operation mode.

- **Multi-speed operation mode of terminals:** Please set speed parameters (Group F03) and start & stop parameters (Group F02) according to elevator's actual demand and elevator controller. And set acceleration/deceleration parameters (Group F05) according to elevator speed.
- **Operation mode of terminal analog value (Reserved):** Please set analog input curve (Group F04) and analog input parameters (Group F07) according to elevator's actual demand and elevator controller. Set the acceleration/deceleration parameters in Group F05 to the maximum value. In this way, S610M inverter can follow elevator controller's speed commands at the fastest speed.
- **Multi-speed operation mode of CAN Communication:** Please set speed parameters (Group F03) and start & stop parameters (Group F02) according to elevator's actual demand and elevator controller. And set acceleration/deceleration parameters (Group F05) according to elevator speed.

- **Operation mode of CAN Communication Distance Control:** Please set speed parameters (Group F03), can communication distance control parameter 1 (Group F20), can communication distance control parameter 2 (Group F21) and up/down leveling distance compensation (Group F23) according to elevator's actual demand and elevator controller.

7.1.3 Auto tuning of motor parameters

Auto tuning for asynchronous motor is shown as below:

F01.16 = 0： No action

F01.16 = 1: action (asynchronous motor in rotary state)

Before auto tuning, please make sure to correctly enter the nameplate parameters of the controlled motor (F01.00~F01.04).

During auto rotary tuning, the motor is in static state at first, and %R1, %X, %R2 will be automatically measured; then the motor enters into rotary state, %Xm & Io will be automatically measured. All the measured values will be auto input into F01.05~F01.09. If bit9 of F11.01 (bit 1 of LED hundreds digit: current loop PI parameter tuning calculation enable) enable, parameter of current loop will automatically write into F06.11~F06.14.

After auto tuning is completed, F01.16 will be set to 0 automatically.

F01.16 = 2: action (asynchronous motor in static state 1)

Before auto tuning, please make sure to correctly enter the nameplate parameters of the controlled motor (F01.00~F01.04).

During auto static tuning, the motor is in static state, and $\%R_1$, %X, $\%R_2$, %Xm & Io will be automatically measured and then input into F01.05~F01.09. If bit9 of F11.01 (bit 1 of LED hundreds digit: current loop PI parameter tuning calculation enable) enable, parameter of current loop will automatically write into F06.11~F06.14.

F01.16 = 3: Same as above item 2

F01.16 = 4: action (asynchronous motor in static state 3)

Before auto tuning, please make sure to correctly enter the nameplate parameters of the controlled motor (F01.00~F01.04).

During auto static tuning, the motor is in static state, and $\%R_1$, %X, $\%R_2$, %Xm & Io will be automatically measured and then input into F01.05~F01.09. Parameter of current loop will automatically write into F06.11~F06.14.

F01.16 = 1：Action（Asynchronous motor in static state）

Before auto tuning, please make sure to enter the nameplate parameters of the controlled motor correctly (F01.00~F01.04).

During auto static tuning, the motor is in static state, and $\%R_1$, %X, $\%R_2$, %Xm & Io will be automatically measured and then input into F01.05~F01.09.

F01.16 = 2: Action (Asynchronous motor in rotary state)

Before auto tuning, please make sure the nameplate parameters of the controlled motor are correctly entered (F01.00~F01.05).

During auto rotary tuning, the motor is in static state at first, and %R1, %X, %R2 will be automatically measured; then the motor enters into rotary state, %Xm & Io will be automatically measured. All the measured values will be auto input into F01.05~F01.09.

After auto tuning is completed, F01.16 will be set to 0 automatically.

Synchronous motor parameters auto tuning is identified by position, operation are shown below:

F01.16 = 0：No action

F01.16 = 1: action (synchronous motor in rotary state)

The synchronous motor is in static state before being in rotary state.

Alter the value of F01.16 to non-zero and give run command, the synchronous motor will start parameters self-tuning. After that, the value of F01.16 will be automatically restored to 0, and motor parameters will be automatically writen in F01.10~F01.13, the location angle of encoder will be automatically written in F01.14, with the location angle of Z pulse be written in F01.15 (valid for rotation identification of synchronous motor), encoder direction is entered F08.02 automatically. If bit9 of F11.01 (bit 1 of LED hundreds digit: current loop PI parameter tuning calculation enable) enable, parameter of current loop will automatically write into F06.11~F06.14.

F01.16 = 2: action (synchronous motor in static state 1)

Choose static identification if the motor cannot be unloaded. When the synchronous motor is in static state, the sound of electricity current can be heard, after that motor parameters will be automatically written in F01.10~F01.13, the location angle of encoder will be automatically written in F01.14, check the value of F01.14 (the initial pole angle of synchronous motor); If bit9 of F11.01 (bit 1 of LED hundreds digit: current loop PI parameter tuning calculation enable) enable, parameter of current loop will automatically write into F06.11~F06.14.

Put the inverter in inspection state and start running upward/downward after learning initial angle. If error is reported immediately, or the elevator is running abnormally, the probable cause is that the encoder is in reverse direction, then the function code F08.02 should be modified. After that, restart static identification. If the control direction is in reverse with the actual running direction, then modify F00.05 (running direction setting). When done, put the inverter in inspection state again to observe whether the current is normal, the motor running is stable, and the running direction complies with given direction. Record the angle displayed by F01.14 and the running current if all these are correct and normal. Repeat the procedure for three times and record the angle identified each time. If the deviation is within ±30 degree every time, it's defined normal. The deviation is supposed to be better at its smallest value. Take the initial pole angle when the running current of the motor is the lowest.

F01.16 = 3: action (synchronous motor in static state 2)

Difference of asynchronous motor tuning between static state 2 and 1: add encoder direction identification on 2, after completing synchronous motor identification, encoder direction automatically write in F08.02. At later stage of tuning, this mode will open the brake to learn encoder direction (learning with load is available).

F01.16 = 4: action (synchronous motor in static state 3)

Difference of asynchronous motor tuning between static state 3 and 1: 3 could automatically calculate current loop parameters and write them in F06.11~F06.14.

Steps for auto tuning:

1）Set F00.02=0 (under operation panel control).

2) Make sure inverter operation permission terminal is valid.

3) It is recommended to set F00.08 (motor torque boost) to 0.1% (valid for auto tuning of asynchronous motor)

4) Correctly set parameters F01.00 (rated power), F01.01 (rated voltage), F01.02 (rated current), F01.03 (rated frequency) and F01.04 rated speed. If it is synchronous motor, encoder parameters F08.00 and F08.01 also need to be set correctly.

5) Correctly set F00.07 (maximum output frequency). Set value of F00.07 must be bigger than rated frequency. Normally it is set to rated frequency.

6) When F01.16=1, please detach the load from the motor shaft and make sure its safety. It is forbidden for the motor auto tuning with load in rotary state.

7) When F01.16 is set to none-zero, first press ENTER button, and then press RUN button to start auto tuning (under operation panel control).

8) When the operating indicator light on the operation panel is off, auto tuning is completed. And then set F00.02 to the control method that users require (=4: CAN communication speed given mode, =2: terminal multi-speed operation mode, =1 terminal analog operation mode).

Attentions:

1. Auto tuning in static state does not need to hoist the car, while auto tuning in rotary state does.

2. During auto tuning, if operation contactor is controlled by controller, then it needs to manually switch on the operation contactor (do not need to manually switch on the operational contractor if it is controlled by the inverter). If it is rotary auto tuning, then it also needs to switch on the brake contactor.

3. When F01.16=1, the load must be detached from the motor during rotation tuning. It is forbidden for the motor auto tuning with load in rotary state.

4. Before starting auto tuning, ensure the motor is in stopping state, otherwise auto tuning cannot go on properly.

5. Under some circumstances (e.g. the load cannot be detached from the motor), it is not convenient for auto tuning in rotary state, or users do not have very high requirements on controlling the motor, tuning in static state or no tuning is suggested(synchronous motor must conduct auto tuning). If without auto tuning, the nameplate parameters of the motor must be entered correctly.

6. For asynchronous motor, if no auto tuning is processed, and users already know the exact motor parameters, users should correctly enter the nameplate parameters （F01.00～F01.04）of the motor first, and then enter the calculated values （F01.05～F01.09）by following previous formulas of resistance and inductance. Please ensure all the parameters are accurately set.

7. Since the no-load current of asynchronous motor identified in static state is not as accurate as that in rotary state, F01.09 (no-load current)could be manually modified to a smaller value, for example 1-2A, if the elevator causes a feeling of falling when starting and stopping during operation. The value to be decreased could be bigger if the no-load current is higher.

8. If auto tuning is unsuccessful, error E024 will be reported.

7.1.4 Inspection&Maintenance operation

Inspection & Maintenance operation is used for testing whether the elevator system is working normally. If elevator's running direction is different with commanded direction under Inspection operation, reivse function code F00.05 (operation dirrecting setting) to correct operating dirrection.

Normal speed operation can be performed after confirming the Inspection & Maintenance operation and signals from brake, safety circuit etc. are normal.

Taking the inspection operation in the machine room as an example, detailed description as shown below:

After motor auto tuning is finished, make sure that the inspection switch in the controller cabinet is on "inspection" position, inspection switch on the car top on "normal" position, safety circuit and door lock circuit in conducting state. When inspection operation conditions are satisfied, press up/down button in the control cabinet, and the elevator will go up/down according to the speed command that the controller transmits to the inverter. If the inverter is under multi-speed operation mode, its inspection speed should be set according to the corresponding relationship between controller and multi-speed terminals. Please see the detailed introduction to application of terminal multi-speed operation mode in Chapter 7.2.

(1) Detection of operation direction： Firstly check whether up/down signal lines under inspection operation are correctly connected. Put the elevator at non-end station, and run the elevator by jog control before checking whether the actual running direction and the control direction are the same under inspection operation.

(2) Detection of output signals: Carefully observe whether the definition of each output point of S610M control board is correct, whether the control board is working properly, and the signals & contactors controlled by it are normal.

(3) Detection of input signals: Carefully observe whether the action of each digital signal given by the controller to the inverter is normal. The normality of input signals can be detected through parameter F92.15 (digital input terminal status) or F92.35 (segment code display of digital input terminal status).

If inspection operation cannot be conducted, please check whether the inverter receives operation command and operation permission command given by the controller.

7.1.5 Normal Speed operation

1. Give normal run commands to make the elevator operate normally. Then set start & stop control parameters in group F02 to arrange the time sequence of braking when starts & stops and motor operation, in order to improve the comfort level when the elevator starts or stops.

- Because S610M has a no weighing torque compensation start, parameter F02.02 (maintaining time of zero-speed starting) should be set to 0.5s at least, and parameters F06.00~F06.01 (zero-speed start PI) should be modified coordinately in order to achieve a smooth start of the elevator.

2. If elevator has slight vibration while running, comfort level can be improved by adjusting relevant parameters in group F06.

3. Adjusting of leveling precision (None-distance control): when leveling error of every floor is different, adjusting locations of every shield plate to make leveling errors of every floor the same. When leveling error of every floor is the same, crawling speed should be modified (modify the crawling speed corresponding to the multispeed terminals in group F03 when under multi-speed operation control; modify the analog speed reference when under analog value operation control) and so does parameter F05.00 (rapid deceleration when stops) and F05.14 (deceleration speed when stops), in order to adjust leveling precision.
4. Adjusting of leveling precision (distance control)
when leveling error of every floor is different, change parameters of Group F22 (up-leveling distance compensation) and F23(down-leveling distance compensation) to adjust leveling precision.

7.2 Application of terminal multi-speed operation mode

The elevator controller calculates traction machine's current running direction and speed according to elevator control logic, and then it sends to S610M inverter in the form of digital value. After S610M receives target speed in the form of multi-section speed, it controls the elevator operation according to the setting of S curve parameters.

For example: An elevator has a rated speed of 1.5m/s, and has terminal multi-speed operation mode (F00.02=2) as part of elevator control system. The elevator controller controls brake and output signals of operation contactor. When the controller receives running signals from the inverter, the brake releases; when the controller receives zero-speed operating signals from the inverter, the brake closes. Under inspection operation, the elevator controller outputs multi-speed command of inspection operation, and the operation speed is given by combination of multi-speed terminals.

If a Synchronous motor is configured with SinCos encoder, the S610M inverter a SinCos encoder card with frequency dividing output. The S610M inverter receives SinCos signals from the encoder card as speed signals and output pulse signals of same frequency to the controller without weighing compensation signals.

7.2.1 Basic wiring diagram

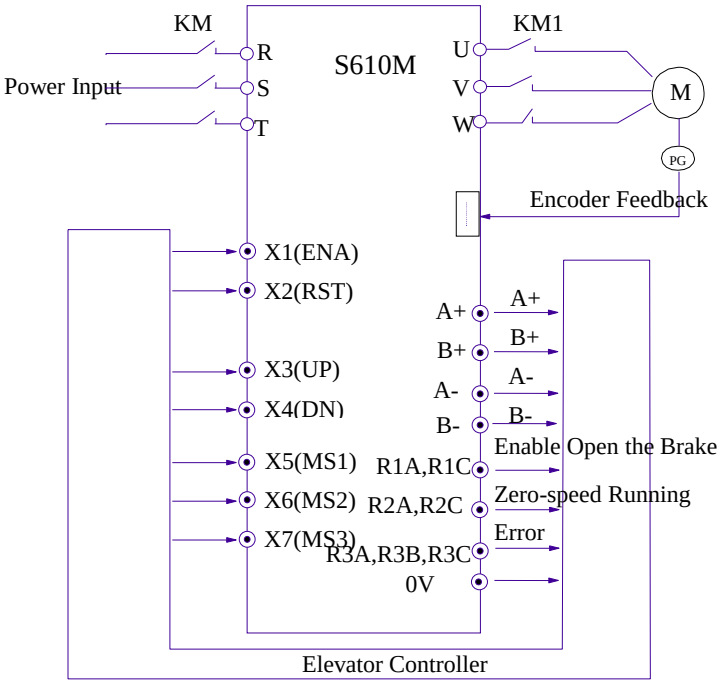


Figure 7-2 Multi-speed operation operating wiring diagram

In figure 7-2, "()" is for setting of programmable terminals. Meanings of terminals are shown in table 7-1:

Figure 7-1 Meanings of Mmulti-speed operation terminal

Terminal symbol	Meaning
X1	Input terminal (X1) signal: Enabled (can be connected to safety circuit)
X2	Input terminal (X2) signal: Fault resetting command
X3	Input terminal (X3): Upward command
X4	Input terminal (X4): Downward command
X5	Input terminal (X5) signal: Multi-speed command 1
X6	Input terminal (X6) signal: Multi-speed command 2
X7	Input terminal (X7) signal: Multi-speed command 3
R1A-R1C	Relay output signal: during operation
R2A-R2C	Relay output signal: during zero-speed operation
R3A-R3C R3A-R3B	Relay output signal: Error output (R3A-R3C refers to normal open output, R3A-R3B refers to normal close output)
A+	Encoder differential frequency dividing output A+/OC output phase A
B+	Encoder differential frequency dividing output B+/OC output phase B

Terminal symbol	Meaning
A-	Encoder differential frequency dividing output A-
B-	Encoder differential frequency dividing output B-
GND	Common port of frequency dividing output

7.2.2 Parameters setting

General function code setting of terminal multi-speed operation mode is shown below as table 7-2.

Table 7-2 Common function code of terminal multi-speed operation setting table

Function Code	Name	Recommend set value	Remarks
F00.01	Control mode selection	Set according to actual situation	
F00.04	Elevator rated speed	Set according to actual situation	
F00.07	Maximum output frequency	Set according to actual situation	
F01.00	Motor rated power	Set according to actual situation	Motor nameplate parameters
F01.01	Motor rated voltage	Set according to actual situation	
F01.02	Motor rated current	Set according to actual situation	
F01.03	Motor rated frequency	Set according to actual situation	
F01.04	Motor rated speed	Set according to actual situation	
F06.00	zero-speed start P	200	Adjusting according to the actual operational aspect, normally use factory settings.
F06.01	zero-speed start I	100	
F06.02	ASR1-P	20.0	
F06.03	ASR1-I	0.200	
F06.04	ASR1 output filter	0	
F06.05	ASR2-P	20.0	
F06.06	ASR2-I	0.200	
F06.07	ASR2 output filter	0	
F06.08	ASR1/2 switching frequency	10%	
F06.09	None-zero speed torque limit value	180%	
F06.10	Zero-speed torque limit value	180%	
F06.11	ACR-P(No-start current loop P)	1000	

Function Code	Name	Recommend set value	Remarks
F06.12	ACR-I(No-start current loop I)	640	
F06.13	ACR-P0(Start current loop P)	2000	
F06.14	ACR-I0(Start current loop I)	640	
F08.00	PG type	Set according to actual situation	
F08.01	PG the number of pulses per revolution	Set according to actual situation	
F08.02	PG direction of rotation	Set according to actual situation	

Table 7-3 Terminal multi-speed operation's special function code setting table

Function code	Name	Recommend set value	Remarks
F00.02	Operating mode selection	2	Terminal multi-speed operation mode
F02.02	Maintaining time of start zero-speed	1.00s	Adjust based on comfort level when elevator starts
F03.00	Multi-speed 0	0	Decide based on design
F03.01	Multi-speed 1	Re-leveling speed	
F03.02	Multi-speed 2	Creeping speed	
F03.03	Multi-speed 3	Emergency speed	
F03.04	Multi-speed 4	Inspection speed	
F03.05	Multi-speed 5	Normal low speed (speed of single level)	
F03.06	Multi-speed 6	Normal medium speed (speed of double level)	
F03.07	Multi-speed 7	Normal high speed (speed of multi-level)	
F03.17	Multi-speed selection	4	Multi-speed ins&maintenance operation
F05.00	Rapid deceleration when stops	0.35 m/s^3	Adjust according to practical operation effect
F05.01	Acceleration speed	0.55 m/s^2	
F05.02	Rapid acceleration at the beginning	0.35 m/s^3	
F05.03	Rapid acceleration	0.6 m/s^3	

Function code	Name	Recommend set value	Remarks
	near the end		
F05.04	Deceleration speed	0.55 m/s^2	
F05.05	Rapid deceleration at the beginning	0.6 m/s^3	
F05.06	Rapid deceleration near the end	0.35 m/s^3	
F05.07	Inspection acceleration	1.0 m/s^2	
F05.08	Inspection deceleration	1.0 m/s^2	
F05.14	Deceleration when stops	0.55 m/s^2	
F07.00	Function selection of input terminal X1	9	Inverter operation enabled
F07.01	Function selection of input terminal X2	6	External reset input
F07.02	Function selection of input terminal X3	1	UP
F07.03	Function selection of input terminal X4	2	DOWN
F07.04	Function selection of input terminal X5	3	Multi-speed selection
F07.05	Function selection of input terminal X6	4	Multi-speed selection
F07.06	Function selection of input terminal X7	5	Multi-speed selection
F07.11	Input terminal effective status setting	Set according to actual situation	Input terminal Normal Open/Normal Close selection
F07.14	Output function of Relay 1	13	Signal of enabling open the brake of the motor
F07.15	Output function of Relay 2	10	Inverter zero-speed operating
F07.16	Output function of Relay 3	7	Inverter error
F07.18	Output terminal effective status setting	Set according to actual situation	Output terminal Normal Open/Normal Close selecting

7.3 Application of terminal analog operation mode (Reserved)

According to elevator control logic, the controller calculates running direction and running speed of the motor, and then sends to S610M in the form of digital value and analog value. So the S610M inverter can control the operation of elevator under the command of the controller.

For example: An elevator has a rated speed of 1.5m/s, and has terminal multi-speed operation mode (F00.02=1) as part of elevator control system. The elevator controller controls brake and output signals of

operation contactor. So the controller outputs direction signals to S610M in the form of digital signal and operation speed to S610M in the form of analog value.

Al2 is used for analog value reference.

7.3.1 Basic wiring diagram

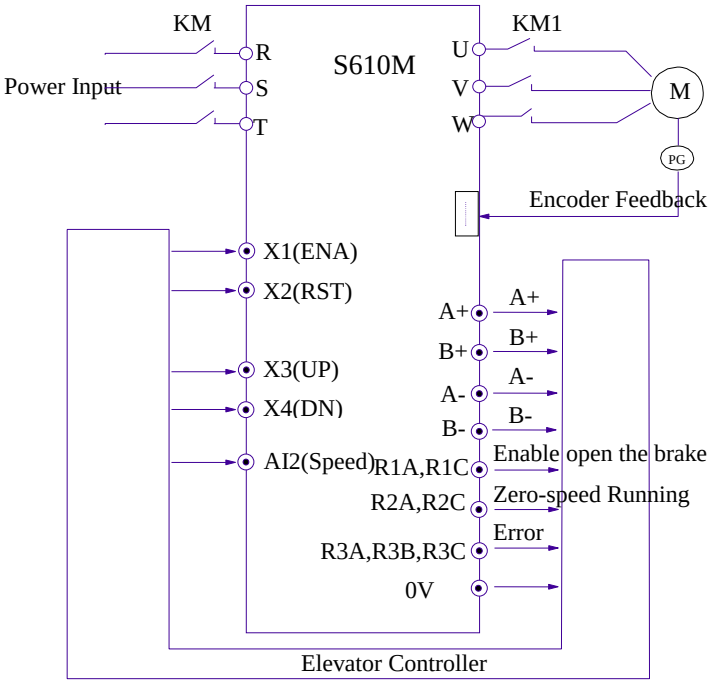


Diagram 7-3 Analog value operation mode wiring diagram

In figure 7-3 "()" is for setting of programmable terminal. Meanings of terminals are shown in the following table 7-4:

Table 7-4 Meanings of analog value operation terminals

Terminal Symbol T	Meaning
X1	Input terminal (X1) signal: Enabled (Can connect safe circuit)
X2	Input terminal (X2) signal: Fault resetting command
X3	Input terminal (X3): Up going command
X4	Input terminal (X4): Down going command
AI2	Analog value AI2 input signal: Speed command
R1A-R1C	Relay output signal: Operating
R2A-R2C	Relay output signal: zero-speed operating
R3A-R3C R3A-R3B	Relay output signal: Error output (R3A-R3C is Normal Open output, R3A-R3B is Normal Close output)
A+	Encoder differential frequency dividing output A+/OC output phase A

Terminal Symbol T	Meaning
B+	Encoder differential frequency dividing output B+/OC output phase B
A-	Encoder differential frequency dividing output A-
B-	Encoder differential frequency dividing output B-
GND	Common port of frequency dividing output

7.3.2 Parameters setting

The setting of common function codes under terminal analog operation mode is shown in table 7-5, while setting of special function codes is shown in table 7-6.

Table 7-5 Setting of common function codes under terminal analog operation mode

Function code	Name	Recommend set value	Remarks
F00.01	Control mode selection	Set according to the actual situation	
F00.04	Rated speed of elevator	Set according to the actual situation	
F00.07	Maximum output frequency	Set according to the actual situation	
F01.00	Rated power of the motor	Set according to the actual situation	Motor nameplate parameter
F01.01	Rated voltage of the motor	Set according to the actual situation	
F01.02	Rated current of the motor	Set according to the actual situation	
F01.03	Rated frequency of the motor	Set according to the actual situation	
F01.04	Rated speed of the motor	Set according to the actual situation	
F06.00	zero-speed start P	200	Adjust according to practical operation effect
F06.01	zero-speed start I	100	
F06.02	ASR1-P	20.0	
F06.03	ASR1-I	0.200	
F06.04	ASR1 output filter	0	
F06.05	ASR2-P	20.0	
F06.06	ASR2-I	0.200	
F06.07	ASR2 output filter	0	
F06.08	ASR1/2 switch frequency	10%	
F06.09	None-zero speed torque limit value	180%	

Function code	Name	Recommend set value	Remarks
F06.10	Zero-speed torque limit value	180%	
F06.11	ACR-P(No-start current loop P)	1000	
F06.12	ACR-I(No-start current loop I)	640	
F06.13	ACR-P0(Start current loop P)	2000	
F06.14	ACR-I0(Start current loop I)	640	
F08.00	PG type	Set according to the actual situation	
F08.01	PG the number of pulses per revolution	Set according to the actual situation	
F08.02	PG direction of rotation	Set according to the actual situation	

Table 7-6 Setting of special function codes

Function Code	Name	Recommend set value	Remarks
F00.02	Operating mode selection	1	Terminal analog value operation mode
F02.02	Maintaining time of zero-speed starting	1.00s	Adjusting according to comfort level when elevator starts
F04.00	Curve selection	0	AI2 select curve 1
F04.01	Curve 1 max. analog reference	100.00%	Adjust according to the actual situation, normally using factory parameters.
F04.02	The corresponding given frequency of curve 1 max. analog reference	100.00%	
F04.03	Curve 1 min. analog reference	0.00%	
F04.04	The corresponding given frequency of curve 1 min. analog reference	0.00%	
F05.00	Rapid deceleration when stops	9.999m/s^3	Set acceleration to maximum, then inverter can follow elevator controller’s speed command.
F05.01	Acceleration	9.999m/s^2	
F05.02	Rapid acceleration at the beginning	9.999m/s^3	

Function Code	Name	Recommend set value	Remarks
F05.03	Rapid acceleration near the end	9.999m/s^3	
F05.04	Deceleration	9.999 m/s^2	
F05.05	Rapid deceleration at the beginning	9.999m/s^3	
F05.06	Rapid deceleration near the end	9.999m/s^3	
F05.07	Inspection acceleration	9.999m/s^2	
F05.08	Inspection deceleration	9.999m/s^2	
F05.14	Deceleration when stops	9.999m/s^2	
F07.00	Function selection of input terminal X1	9	Inverter operation enable
F07.01	Function selection of input terminal X2	6	External reset input
F07.02	Function selection of input terminal X3	1	UP
F07.03	Function selection of input terminal X4	2	DOWN
F07.11	Input terminal activeness setting	Set according to the actual situation	Input terminal Normal Open/Normal Close selection
F07.14	Output function of relay 1	13	Signal of enable open the brake of the motor
F07.15	Output function of relay 2	10	Inverter zero-speed operating
F07.16	Output function of relay 3	7	Inverter error
F07.18	Output terminal activeness setting	Set according to the actual situation	Output terminal Normal Open/Normal Close selection
F07.33	AI2 function selection	1	Speed reference
F07.36	AI2 zero off-set adjustment	0.00%	Adjust according to actual situation
F07.37	AI filtrate	0.05s	

7.4 CAN Communication Distance Control

Operation commands are given by CAN communication of elevator controller. Running speed is based on set target floor to directly arrival and automatically calculate by distance principle.

For example: an elevator with rated speed of 1.5m/s and adopt Can communication distance control mode (F00.02=4) to constitute elevator control system. S610M controls braking and output operation contactor. The controller uses the communication output the running command and set the target floor to S610M, and S610M automatically calculates the running speed according to the target floor.

7.4.1 Basic wiring diagram (Take "Differential Frequency Dividing Output PG Card" as an example)

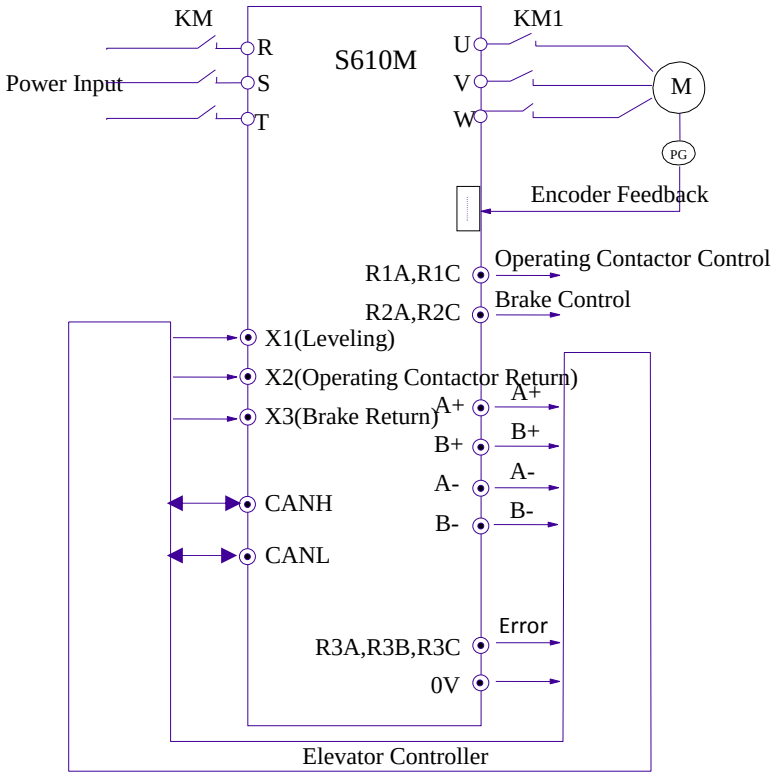


Diagram 7-4 Basic wiring diagram of Operation Mode of CAN Communication Distance Control

"( )" of diagram 7-4 is programing terminals setting. Meaning of every terminal is as shown in table 7-7:

Table 7-7 Operating Terminals Definition of CAN Communication Distance Control

Terminal No.	Meaning
X1	Input terminal (X1) signal: leveling input signal
X2	Input terminal (X2) signal: return signal of output contactor
X3	Input terminal (X3): return signal of braking contactor
CANH	CAN communication
CANL	
R1A-R1C	Relay ouput signal: running

Terminal No.	Meaning
R2A-R2C	Relay ouput signal: running at zero-speed
A+	Encoder differential frequency dividing output A+/OC output phase A
B+	Encoder differential frequency dividing output B+/OC output phase B
A-	Encoder differential frequency dividing output A-
B-	Encoder differential frequency dividing output B-
GND	Common port of frequency dividing output

7.4.2 Parameters Set

For CAN communication distance control mode, set of general function codes are showed as table 7-8 and special function codes are showed as table 7-9.

Table 7-8 general function codes set of CAN communication distance control

Function Code	Name	Recommend set value	Remarks
F00.01	Control mode selection	Set according to the actual situation	
F00.04	Rated speed of elevator	Set according to the actual situation	
F00.06	Mechanical parameters of the motor	Set according to the actual situation	
F00.07	Maximum output frequency	Set according to the actual situation	
F01.00	Rated power of the motor	Set according to the actual situation	Motor nameplate parameter
F01.01	Rated voltage of the motor	Set according to the actual situation	
F01.02	Rated current of the motor	Set according to the actual situation	
F01.03	Rated frequency of the motor	Set according to the actual situation	
F01.04	Rated speed of the motor	Set according to the actual situation	
F06.00	zero-speed start P	200	Adjusting according to the actual operational aspect, normally use factory settings.
F06.01	zero-speed start I	100	
F06.02	ASR1-P	20.0	
F06.03	ASR1-I	0.200	
F06.04	ASR1 output filter	0	
F06.05	ASR2-P	20.0	
F06.06	ASR2-I	0.200	

Function Code	Name	Recommend set value	Remarks
F06.07	ASR2 output filter	0	
F06.08	ASR1/2 switch frequency	10%	
F06.09	None-zero speed torque limit value	180%	
F06.10	Zero-speed torque limit value	180%	
F06.11	ACR-P (No-start current loop P)	1000	
F06.12	ACR-I (No-start current loop I)	640	
F06.13	ACR-P0(Start current loop P)	2000	
F06.14	ACR-I0(Start current loop I)	640	
F08.00	PG type	Set according to the actual situation	
F08.01	PG pulses per revolution	Set according to the actual situation	
F08.02	PG direction of rotation	Set according to the actual situation	

Table 7-9 special function codes set of CAN communication distance control

Function Code	Name	Recommend set value	Remarks
F00.02	Operating mode selection	4	Distance control operation mode of CAN communication
F02.00	Delay time of starting	0.50s	
F02.01	Delay time of brake release when starts	0.50s	
F02.02	Maintaining time of zero-speed starting	0.80s	Adjust based on comfort level when elevator starts
F02.05	Daley time of braking when stops	0.50s	
F02.06	Maintaining time of zero-speed when stops	0.50s	
F02.07	Release delay of operating contactor	0.50s	
F07.00	Function selection of input terminal X1	15	Up leveling input
F07.01	Function selection	11	Operating brake feedback input

Function Code	Name	Recommend set value	Remarks
	of input terminal X2		
F07.02	Function selection of input terminal X3	12	Brake feedback input
F07.11	Input terminal activeness setting	Set according to the actual situation	Input terminal Normal Open/Normal Close selection
F07.14	Output function of relay 1	12	Operation contactor control output
F07.15	Output function of relay 2	11	Brake control output
F07.16	Output function of relay 3	7	Inverter error
F07.18	Output terminal activeness setting	Set according to the actual situation	Output terminal Normal Open/Normal Close selection
F12.05	Baud rate of CAN communication	Set according to the actual situation	
F12.08	Detection time of Can communication overtime (under CAN mode)	2.0s	Adjust according to the actual situation
F20.00	Quantity of floors	Set according to the actual situation	Adjust according to the actual situation
F20.02	Run speed	Set according to the actual situation	Adjust according to the actual situation
F20.07	Average acceleration and deceleration	Set according to the actual situation	Adjust according to the actual situation
F20.08	Inspection Speed	0.30m/s	
F20.09	Inspection acceleration time	1.0s	
F20.10	Inspection deceleration time	0.3s	
F20.11	Operation speed of non fast running terminal station.	0.10m/s	
F20.12	leveling speed of non terminal station.	0.20m/s	
F20.13	Speed of hoistway self-tuning	0.30m/s	
F20.14	Security diagnosis of elevator	0	If F20.07 and F20.17 are changed, the elevator safety diagnosis must be re-conducted. Set F20.14=1 to start safe diagnosis. If the diagnosis is

Function Code	Name	Recommend set value	Remarks
			wrong, the system will report a failure and give the reason for the failure.
F20.15	Class of forced deceleration switch	Set according to the actual situation	
F20.16	Instal quantity of leveling switch	Set according to the actual situation	
F20.17	Time adjustment of S curve	56%	
F20.18	Leveling switch mode	Set according to the actual situation	
F20.19	Speed of slight motion leveling	0.05m/s	
F21.01	Start delay of hoistway learn bottom floor interval.	Set according to the actual situation	Adjust according to the actual situation
F22.00~F22.63	Leveling distance compensation of upward running floor 1… floor 64	Set according to the actual situation	Adjust according to the actual situation
F23.00~F23.63	Leveling distance compensation of downward running floor 1… floor 64	Set according to the actual situation	Adjust according to the actual situation

7.5 CAN Communication Speed Control

Elevator controller based on the current elevator control logic to calculate running direction and target speed of motor, in the form of Can communication send to S610M, S610M receives multi-speed type target speed to control the operation of the elevator according to set parameter of S curve.

For example, the rated speed of an elevator is 1.5m/s, and the operating mode of Can communication speed control (F00.02=3) is adopted to constitute the elevator control system. S610M controls the brake and output operation contactor. The maintenance operation is carried out by the elevator controller with multi-section speed command, and the running speed is given by the combination of multi-section speed instruction.

7.5.1 Basic wiring diagram (Take “Differential Frequency Dividing Output PG Card” as an example)

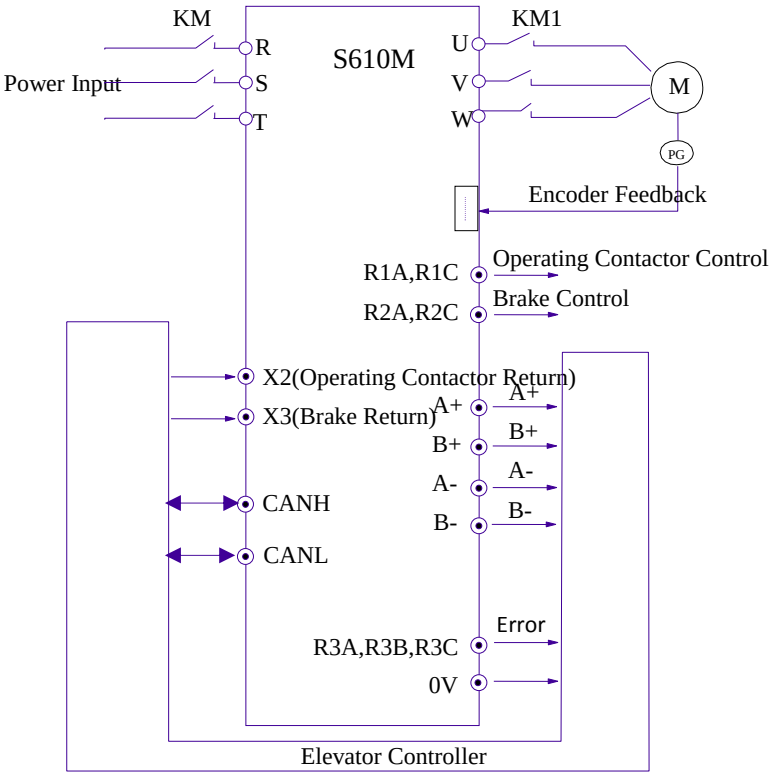


Diagram 7-5 Basic wiring diagram of CAN communication speed control mode

"( )" of diagram 7-5 is programing terminals setting. Meaning of every terminal is as shown in table 7-10:

Table 7-10 Terminals Definition of Can communication speed control

Terminal No.	Meaning
X2	Input terminal (X2) signal: return signal of output contactor
X3	Input terminal (X3): return signal of braking contactor
CANH	CAN communication
CANL	
R1A-R1C	Relay ouput signal: run Contactor control
R2A-R2C	Relay ouput signal: brake control
R3A-R3C R3A-R3B	Relay ouput signal: error output (R3A-R3C are normal open output, R3A-R3B are normal close output)
A+	Encoder differential frequency dividing output A+/OC output phase A
B+	Encoder differential frequency dividing output B+/OC output phase B
A-	Encoder differential frequency dividing output A-
B-	Encoder differential frequency dividing output B-
GND	Common port of frequency dividing output

7.5.2 Parameters Set

For CAN communication speed control mode, set of general function codes are showed as table 7-11 and special function codes are showed as table 7-12.

Table 7-11 general function codes set of CAN communication speed control

Function Code	Name	Recommend set value	Remarks
F00.01	Control mode selection	Set according to the actual situation	
F00.04	Rated speed of elevator	Set according to the actual situation	
F00.07	Maximum output frequency	Set according to the actual situation	
F01.00	Rated power of the motor	Set according to the actual situation	Motor nameplate parameter
F01.01	Rated voltage of the motor	Set according to the actual situation	
F01.02	Rated current of the motor	Set according to the actual situation	
F01.03	Rated frequency of the motor	Set according to the actual situation	
F01.04	Rated speed of the motor	Set according to the actual situation	
F06.00	zero-speed start P	200	Adjusting according to the actual operational aspect, normally use factory settings.
F06.01	zero-speed start I	100	
F06.02	ASR1-P	20.0	
F06.03	ASR1-I	0.200	
F06.04	ASR1 output filter	0	
F06.05	ASR2-P	20.0	
F06.06	ASR2-I	0.200	
F06.07	ASR2 output filter	0	
F06.08	ASR1/2 switch frequency	10%	
F06.09	None-zero speed torque limit value	180%	
F06.10	Zero-speed torque limit value	180%	
F06.11	ACR-P(No-start current loop P)	1000	
F06.12	ACR-I(No-start current loop I)	640	
F06.13	ACR-P0(Start current loop P)	2000	
F06.14	ACR-I0(Start current loop I)	640	

Function Code	Name	Recommend set value	Remarks
F08.00	PG type	Set according to the actual situation	
F08.01	PG pulses per revolution	Set according to the actual situation	
F08.02	PG direction of rotation	Set according to the actual situation	

Table 7-12 special function codes set of CAN communication speed control

Function Code	Name	Recommend set value	Remarks
F00.02	Operating mode selection	2	Speed control operation mode of CAN communication
F02.00	Delay time of starting	0.50s	
F02.01	Delay time of brake release when starts	0.50s	
F02.02	Maintaining time of zero-speed starting	0.80s	Adjust based on comfort level when elevator starts
F02.05	Daley time of braking when stops	0.50s	
F02.06	Maintaining time of zero-speed when stops	0.50s	
F02.07	Release delay of operating contactor	0.50s	
F03.00	Multi-speed 0	0	Decide based on design
F03.01	Multi-speed 1	Re-leveling speed	
F03.02	Multi-speed 2	Creeping speed	
F03.03	Multi-speed 3	Emergency speed	
F03.04	Multi-speed 4	Inspection speed	
F03.05	Multi-speed 5	Normal low speed (speed of single level)	
F03.06	Multi-speed 6	Normal medium speed (speed of double level)	
F03.07	Multi-speed 7	Normal high speed (speed of multi-level)	
F03.17	Multi-speed inspection&Maintenance selection	4	Multi-speed ins&maintenance operation
F05.00	Rapid deceleration when stops	0.35 m/s^3	Decide based on design
F05.01	Acceleration	0.55 m/s^2	
F05.02	Rapid acceleration at the	0.35 m/s^3	

Function Code	Name	Recommend set value	Remarks
	beginning		
F05.03	Rapid acceleration near the end	0.6 m/s^3	
F05.04	Deceleration	0.55 m/s^2	
F05.05	Rapid deceleration at the beginning	0.6 m/s^3	
F05.06	Rapid deceleration near the end	0.35 m/s^3	
F05.07	Inspection acceleration	1.0 m/s^2	
F05.08	Inspection deceleration	1.0 m/s^2	
F05.14	Deceleration when stops	0.55 m/s^2	
F07.01	Function selection of input terminal X2	11	Operation contactor feedback input
F07.02	Function selection of input terminal X3	12	Brake feedback input
F07.11	Input terminal activeness setting	Set according to the actual situation	Input terminal Normal Open/Normal Close selection
F07.14	Output function of Relay 1	12	Operation contactor control output
F07.15	Output function of Relay 2	11	Brake control output
F07.16	Output function of Relay 3	7	Inverter error
F07.18	Output terminal activeness setting	Set according to the actual situation	Output terminal Normal Open/Normal Close selection
F12.05	Baud rate of CAN communication	Set according to the actual situation	
F12.08	Detection time of Can communication overtime (under CAN mode)	2.0s	Adjust according to practical operation effect

7.6 Emergency operation mode during power outage

If power supply of the system is suddenly cut off during operation of the elevator, passengers may be locked in the car. S610M inverter special for elevator has emergency operation mode in case of such situation.

7.6.1 Basic wiring diagram

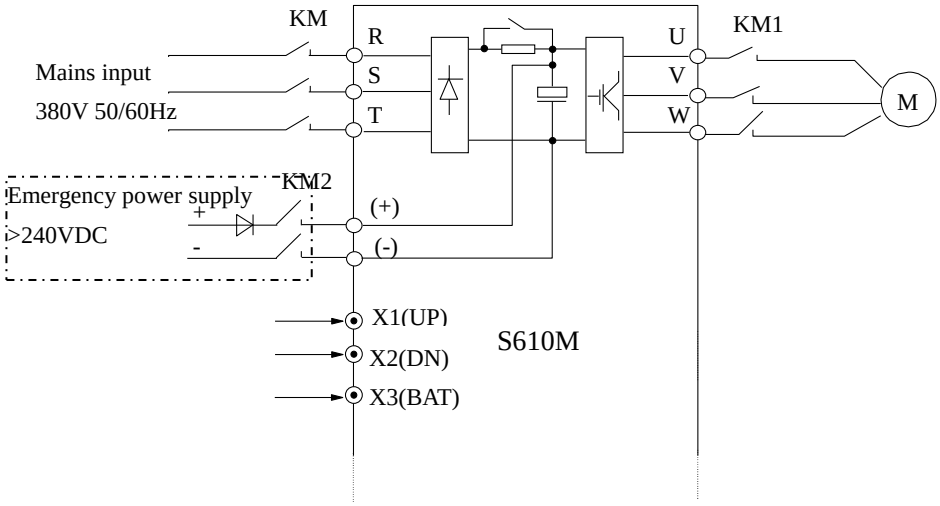


Diagram 7-6 Basic wiring diagram of emergency operation

Meaning of every terminal is as shown in table 7-13:

Table 7-13 Meanings of emergency operation terminals

Terminal No.	Meaning
X1	Input terminal (X1): Upward command
X2	Input terminal (X2): Downward command
X3	Input terminal (X3): Emergency operation command
（+）、（-）	DC bus voltage connection terminal of inverter
KM	Main power contactor
KM1	Output operation contactor
KM2	Control contactor of UPS

7.6.2 Time sequence of emergency operation

1. When main power supply blacks out, the main power contactor (KM) is disconnected, then control switch (KW2) of UPS closes and outputs emergency operation command (BAT) after a period of delay time;

2. After another a period of delay time, the controller outputs operation command (X1/X2). When the inverter receives operation commands, it closes the operation contactor and releases the brake, then accelerates from a speed set by F05.09 (acceleration/deceleration speed during emergency operation) to a speed set by F03.08 (Emergency operation speed);

3. When the elevator runs to leveling position, the controller cancels emergency operation commands (BAT), so the inverter decelerates to stop at F05.10 (Deceleration speed during emergency operation);

4. When the speed of the elevator decelerates to 0, the inverter closes the brake. Then the controller cancels operation command (X1/X2) after a delay time, and the inverter will release the contactor. So the emergency operation is ended.

Note:

1. The voltage of UPS should be higher than 240Vdc to make sure that the inverter's control power supply works normally.
2. Under emergency operation mode, the inverter will not detect phase-loss in the input side.

7.7 Adjustment of comfort level

7.7.1 Relevant factors that influence comfort level

The comfort level of an elevator can be influenced by many factors, such as under-adjustment of mechanical parts or inappropriate setting of parameters. And match of all mechanical parts is the essential factor in determining the comfort level. By appropriate adjustment of electric parameters, we can improve the comfort level even if the mechanical system is undesirable.

(1) Mechanical factors: guide rail's perpendicularity and surface flatness, flatness of its connection, deviation of horizontal spacing, tightness of guide shoes, tension of steel wire rope of the traction machine, tightness and gaps of the brake, balance of the car, and tautness and tightness of installation.

(2) Electric factors: motor parameters, pulse number of encoder, acceleration/deceleration speed, acceleration/deceleration time, delay time of starting brake release, delay time of braking when stops, speed loop and current loop PI etc.

7.7.2 Adjustment of car comfort level

7.7.2.1 Adjustment of relevant mechanical factors

⑴ Checking the Guide Rail

If the deviation of the Guide Rail Verticality and Surface Flatness is overlarge, the elevator may vibrate even shake during operation, or the car may sway in certain position, causing the elevator uncomfortable to take. What's more, if the connector of guide rail is not handled well, there will be a feeling of stepping movement.

⑵ Checking the Guide Shoes

Over-tightened Guide Shoes arouse a feeling of stepping movement when the elevator starts, and a feeling of braking when the elevator stops. However, over-loose Guide Shoes arouse a feeling of shaking. This problem can be resolved by standing on the car top and swaying the car with feet to a degree that the car move to the left and right slightly when commissioning.

⑶ Checking the Tension of Traction Ropes

When the tension of the traction ropes is uneven, for example, some of the ropes are tight while some are loose and joggling, the elevator will be affected in starting, running or stopping. Please stop the elevator in the middle floor, and pull each Rope with hands by the same force on the Car Top. To check the tension of traction ropes, stand on the car top and pull each rope with same force. If the distance pulled away is roughly the same every time, the tension is even. However, if the distance is in big difference, the traction ropes need to be adjusted.

⑷ Checking the Brake

Improper Brake tightness or gaps may also affect the comfort level when the elevator starts or stops. Too tightened braking gap may cause vibration, while too loose gap may cause running in reverse or even severe accidents. Another main reason for poor braking is the brake Voltage. Low stroke voltage or Hold Voltage may cause Brake release. The manifestation of poor condition of Brake Coil or Electromagnetic Circuit is mainly as below: Brake Release in cold state is good, while the tension of Brake release in heat state is not enough.

⑸ Checking the Car

The whole car bears heavy pressure when the elevator operates in high speed, so any loose parts in the Car would lead to malposition and cause vibration. Wind resonance sounds may arise if the Car is imperfectly fixed or sealed. Also, the Car would incline to one side due to poor design or installation, resulting in the Guide shoes sticking to the Guide Rail, and causing vibration during elevator operation.

7.7.2.2 Adjustment of relevant electric factors

⑴ Motor Parameters Verifying

Please verify motor parameters of F01.00~F01.04. Incorrect Parameter setting leads to imprecise Tuning, which may cause vibration or noises and thus reduce the comfort level. It may also result in abnormal output torque of the motor, even overlarge speed deviation or other severe troubles like that.

(2) Encoder Parameters Verifying

If the set value of F08.01, the encoder pulse number, does not match the actual pulse number, the current speed or position cannot be identified by controller, which then causes Motor vibration or noises. Thus the comfort level will be reduced.

⑶Brake opening time adjustment for the comfort of car-starting

Elevator is still not in zero-speed braking state when stops, it will cause brake off. If braking control is controlled by the elevator controller, then adjust relevant parameters of controller. If braking control is controlled by S610M, then delay time of braking when stops (F02.05) need to be increased. If maintaining time of zero-speed is too long, it will decrease efficiency of stopping the car. Thus, the maintaining time of zero-speed needs to be decreased.

(4) Adjusting delay time of zero-speed stop

If the elevator still slides after braking, the command of zero-speed operation is canceled too early. If braking control is controlled by elevator controller, then adjust relevant parameters of controller. If braking control is controlled by S610M, then delay time of zero-speed when stops (F02.06) need to be increased.

(4) Adjusting delay time of torque revocation when stops and operation permission revocation

If elevator vibrates after it stops, vibration can be eliminated by prolonging the delay time of torque revocation (F02.09) when stops. If the operation permission terminals of the inverter and the controller are connected, the operation permission command and up/down command of the controller are revoked at the same time, then the vibration is to be eliminated by prolonging the delay time of both permission revocation (F02.11) and torque revocation (F02.09).

Note: If the inverter operation permission terminal is connected with safety circuit of the elevator, set the value of F02.11 (delay time of operation permission revocation) to 0ms.

(6) Adjusting Parameter PI

The Dynamic Response Speed and Speed Stability Precision of Inverter could be adjusted effectively by adjusting parameter PI, so as to improve the comfort level during starting, stopping and stable operation of the elevator.

F06.00 and F06.01 refer to proportion (P) and integral (I) of Zero Velocity of Speed Loop. F06.05 and F06.06 refer to proportion (P) and integral (I) of Low Velocity of Speed Loop. F06.02 and F06.03 refer to proportion (P) and integral (I) of High Velocity of Speed Loop. F06.08 refers to the switching frequency between high and low velocity. F06.07 and F06.04 refer to low-speed and high-speed torque filter.

The speed response of vector control could be changed by adjusting proportional constant P & integration constant I of Speed Loop. Properly increased P can improve the dynamic tracking ability of the system, but too large P tends to cause over-modulation and vibration. Adjusting I could eliminate the steady-state error but affect the dynamic response time. Too large I would cause vibration as well. Normally adjust P first, and increase its value as large as possible under the premises of no system vibration, and then adjust the value of I to make the system respond quickly with little overshoot.

Steps for adjustment of zero-speed starting: if pulling-back happens when the elevator starts going down with zero load, the zero-velocity starting value P should be increased until no more pulling-back is felt. Too large P would cause vibration when the elevator starts, so decrease the value of P to reduce vibration. When P is set to the critical value, the optimal comfort level of starting can be reached by adjusting the value of I. F06.11 and F06.12 refer to Proportion (P) and Integral (I) of No-start Current Loop, which should be adjusted properly to avoid high-frequency vibration. The adjustment steps are the same as for PI of Speed Loop. F06.13 and F06.14 refer to Proportion (P) and Integral (I) of Start Current Loop, which can adjust the comfort during elevator starting together with PI adjustment. Increase F06.13 value to eliminate vibration of the motor caused by increasing PI.

（7）Adjusting Anti- vibration Factor

When some mechanical reasons, such as large friction of guide shoes, over large/small elastic coefficient of the steel wire rope, cause car shaking at normal speed, parameter F06.13 (anti-vibration factor of the elevator) can be adjusted to decrease the discomfort.

（8）Adjusting the Encoder Filtering Mode

The high-frequency vibration could be resolved by adjusting the speed of filtering. Adjust the units digit of F08.03 if noises arise when the elevator is operating at high speed; Adjust the tens digit of F08.03 when the elevator is operating at low speed; adjust hundreds digit of F08.03 when the elevator is operating at zero speed.

（9）Adjusting the Acceleration Speed and Time of S Curve

The elevator Comfort level would be directly influenced by the shape of Operation Curve. The elevator should operate according to the following S Curve to improve the comfort level and the operation efficiency:

1. Under speed control mode, the operating curve of the elevator complies with the curve as shown below in figure 7-7. F05.01 and F05.04 represent tuning parameters of acceleration and deceleration respectively. F05.02, F05.04, F05.05 and F06.06 represents the tuning parameters of 4 corners of the S curve. When the elevator operates at normal-speed, passengers will feel uncomfortable during rapid acceleration/deceleration. Then parameter value of 4 corners can be decreased properly. The smaller the values of these parameters are, the steadier the car would be in acceleration/deceleration. However, small value means low efficiency of the elevator. Modify F05.00 (rapid deceleration when stops) and F05.14 (deceleration speed when stops) to improve comfort level when the elevator stops.

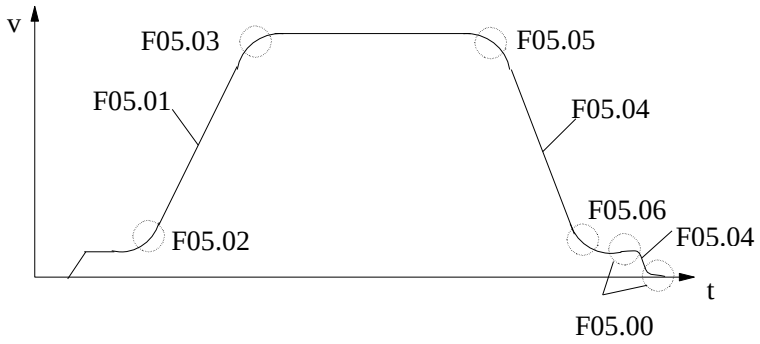
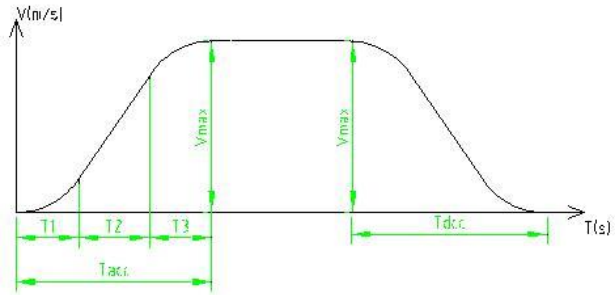


Figure 7-7 Sketch of S curve parameters under speed control mode

2. Under distance control mode, the operating curve of the elevator complies with the curve as shown below in figure 7-8. The S curve is a symmetric curve. F20.07 represents tuning parameters of average acceleration and deceleration and the percentage of S curve. If the acceleration and deceleration are too rapid in the normal running, user will feel uncomfortable, and the F20.17 can be increased appropriately to make it more confortable.



F20.17	small→big

F20.17	small→big
T1/Tacc=T3/Tacc	small→big
T2/Tacc	big→small

Figure 7-8 Sketch of S curve parameters under distance control mode

Chapter 8 Inverter Failure, Warning and Countermeasures

Failures that may happen to S610M are concluded in table 8-1. The display range of error code is E001～E050. When failure occurs, customers can have self-inspection by recording the phenomenon and referring it to the prompting of this table. Please contact the seller if service is needed.

Table 8-1 Error description and solutions

Error Code	Error Description	Possible Causes	Solutions
E001	Over-current when the inverter accelerates	acceleration time is too short	prolong the acceleration time
		motor's parameters are incorrect	parameter auto tuning of the motor
		encoder failure when operating with PG	check the encoder and its wiring
		power of the inverter is too small	choose the inverter with larger rated power
		V/F curve is not suitable	modify the V / F curve setting and value of manual torque boost
		Circuit problems, power line loose or short circuit.	Check whether the fixed screw of power line terminal is loose. Check whether the power line is broken.
E002	Over-current when the inverter decelerates	deceleration time is too short	prolong the deceleration time
		have potential energy of load or the inertia torque of load is overlarge	add appropriate dynamic braking components
		encoder failure when operating with PG	check the encoder and its wiring
		rated power of the inverter is relatively small	choose the inverter with larger rated power
E003	Overcurrent when the inverter operates at constant speed	acceleration or deceleration time is set too short	prolong the acceleration or deceleration time properly
		load changes suddenly or abnormal	check the load
		network voltage is too low	check the input power supply
		encoder failure when operating with PG	check the encoder and its wiring
		rated power of the inverter is relatively small	choose the inverter with larger rated power
E004	Overvoltage when the inverter accelerates	input voltage is abnormal	check the input power supply
		time of acceleration is set too short	prolong the acceleration time properly
E005	Overvoltage when the inverter decelerates	time of deceleration is too short (relative to regenerative energy)	prolong the deceleration time properly
		have potential energy of load or the inertia torque of load is overlarge	choose appropriate dynamic braking components
E006	Overvoltage when the inverter operates at constant speed	inappropriate setting of ASR parameter when operating with vector control	refer to ASR parameter setting in group F06
		acceleration or deceleration time is set too short	prolong the acceleration or deceleration time properly
		input voltage is abnormal	check the input power supply

Error Code	Error Description	Possible Causes	Solutions
		input voltage changes abnormally	install input reactor
		load inertia is overlarge	consider using dynamic braking components
E007	Abnormal bus capacitance and voltage	the input voltage and bus capacitance are both abnormal	check the input power supply or ask for service
E008	Phase-loss on the input side	phase-loss on the input side R.S.T.	check the installation wiring and input voltage
E009	Phase-loss on the output side	p hase-loss on the output side U.V.W.	check the output wiring, the motor and cables
E010	Fast over-current protection	there's short connection among the output three phases or any of them is shorted to ground	rewire after making sure that the insulation of motor is good
		instant overcurrent of the inverter	refer to solutions for overcurrent
		air duct is blocking or the fan is damaged	clear the air duct or replace the fan
		ambient temperature is too high	lower the ambient temperature
		the wiring of control board or the plug-in board is loose	check the connection and reconnect
		the current's wave is abnormal caused by phase-loss on the output side etc.	check the wiring
		auxiliary power supply is damaged, or the driver is undervoltage	ask for service
		bridge arm of the inversion module is directly connected	ask for service
		control board is abnormal	ask for service
E011	Overheat of the inversion module	ambient temperature is too high	lower the ambient temperature
		air duct is blocking	clear the air duct
		fan is damaged	replace the fan
		the inversion module is abnormal	ask for service
E012	Overheat of the rectifier module	ambient temperature is too high	lower the ambient temperature
		air duct is blocking	clear the air duct
		fan is damaged	replace the fan
E013	Inverter overloaded	inaccurate motor parameters	restart auto tuning of motor parameters
		the inverter is overloaded	Choose an inverter with larger rated power
		the DC-braking volume is too large	Decrease the DC-braking current, and prolong the braking time.
		the acceleration time is too short	Prolong the acceleration time.
		the network voltage is too low	check the network voltage
		the V/F curve is inappropriate	modify V/F curve and torque boost value
E014	Motor overloaded	Incorrect setting of motor overload protection coefficient	Set the overload protection coefficient of motor correctly.
		motor stalling or too large fluctuation of motor load	check the load
		general motor running under large load and at low speed for a long time	choose a dedicated motor if it is to run constantly at low speed
		the network voltage is too low	check the network voltage

Error Code	Error Description	Possible Causes	Solutions
		the V/F curve is inappropriate	correctly set the V/F curve and torque boost value
E015	External device error	the emergency stop terminal for external error is effective	release this terminal after the external error is removed
E016	Read-write error of EEPROM	the read-write of control parameters is wrong	press STOP/RESET to reset or ask for service
E017	Reserved		
E018	Abnormal contactor	the network voltage is too low	check the network voltage
		the contactor is damaged	Replace the contactor of main circuit; ask for service.
		the buffer resistor for powering on is damaged	Replace the buffer resistor; ask for service.
		the control circuit is damaged	ask for service
		phase-loss in the input side	Check the connection wiring of input side R.S.T.
E019	Abnormal current detection circuit	Loose wiring of control panel or plug-in board	Check and connect the wiring again.
		Damaged subsidiary power supply	ask for service
		Damaged Hall device	ask for service
		Abnormal amplifying circuit	ask for service
		the read-write of DSP in the mainboard is wrong	press STOP/RESET to reset or ask for service
E020	CAN communication abnormal	Baud rate setting unreasonable	To set suitably
		CAN port communication error	press STOP/RESET to reset or ask for service
		Error parameter setting unsuitable	Modify F12.08 (under CAN mode) or F12.09 (under none CAN mode)
		Master machine didn't work	Check whether master machine is working or not/wiring connection is correct or not.
E021～E022	Reserved		
E023	Parameter copy error in the operation panel	The parameters of operation panel are incomplete or the versions of operation and main control board are inconsistent	Refresh the data and version of operation panel. Set F13.04＝1 to upload parameters then set F13.04＝2or3 to download.
		damaged EEPROM in the operation panel	ask for service
E024	Poor Auto tuning	Incorrect parameter setting of motor nameplate	Set the parameters correctly as shown on the nameplate
		The identified current coefficient of synchronous motor is set too small.	Increase the value of F01.20
		overtime of auto tuning	check connection wiring
			check if the value of F00.07 (upper limit frequency) is lower than rated frequency

Error Code	Error Description	Possible Causes	Solutions
E025	PG failure	Encoder signal is off under PG vector control	check the encoder wiring and rewire
E026	Vector current loss error	U,V,W no output	Check output wires Check motor and cable
E027	Braking unit failure	damaged brake pipe	ask for service
E028	Hareware wave-sealing OE loss error	Control board broken	ask for service
E029	Over current error led by disconnection of the door lock	The door lock appeared flash disconnection phenomenon.	Check door lock problem
E030	Security circuit disconnection during operation	Security circuit disconnection during operation.	Check security circuit problem
E031	Output contactor failure	The contactor is damaged	Replace the contactor
		The connection of feedback contactor is wrong	Check the wiring
E032	Brake failure	The brake is damaged	Check the brake
		The connection of feedback contactor is wrong	Check the wiring
E033	Reserved		
E034	Overlarge speed deviation	improper setting of ASR parameter	modify the function code in Group F06
		the detection value of speed deviation is set rather small	modify the detection value of speed deviation
		violent fluctuation in load	eliminate the load fluctuation
E035	Overspeed failure	The Encoder wiring is off.	check the encoder wiring
		incorrect setting of encoder parameters	reset encoder parameters
		the detection value of overspeed is set too small	modify the setting of detection value
E036	Elevator maintenance failure	The value of F92.28 (inverter operating time)exceeds that of F00.10 (time interval for elevator maintenance)	Prolong the time interval for elevator maintenance or cancel it.
E037	Elevator operation command failure	When terminal controls the opearation, operation command is changed, such as, upward switched to downward, or both upward and downward are effective.	Check the terminal operaiton command reference.

Error Code	Error Description	Possible Causes		Solutions
E042	Error of hoistway auto-tuning switch dislocation	0	The running range is disconnected when doesn't encounter in down forced exchange switch 1 during downward running.	
		1	The running range is disconnected when doesn't encounter in down end-station leveling switch but encounter in down forced exchange switch 1 during downward running.	
		2/11	The running range is disconnected when encounters in down end-station leveling switch during downward running.	
		4	Start running from down end-station to upward, the running range is disconnected when doesn't pass the first leveling switch and down forced excange 1 still doen't close.	
		40	Start running from down end-station to upward, the running range is disconnected when has passed the first leveling switch but down forced excange 1 still doen't close.	
		41	Start running from down end-station to upward, the running range is disconnected when down forced exchange switch 1 has closed but switch 2 still doesn't close (more than 1 pair of switches), or down forced exchange switch 1 has closed but up forced exchange switch 1 still doesn't close (only have 1 pair of switches).	

Error Code	Error Description	Possible Causes		Solutions
		42	Start running from down end-station to upward, the running range is disconnected when down forced exchange switch 2 has closed but switch 3 still doesn't close (3 pair of switches), or down forced exchange switch 2 has closed but up forced exchange switch 2 still doesn't close (have 2 pair of switches).	
		43	Start running from down end-station to upward, the running range is disconnected when down forced exchange switch 3 has closed but doesn't encounter in up forced exchange switch 3.	
		44	Start running from down end-station to upward, the running range is disconnected when has encountered in up forced exchange switch 3 but doesn't encounter in up forced exchange switch 2.	
		45	Start running from down end-station to upward, the running range is disconnected when has encountered in up forced exchange switch 2 but doesn't encounter in up forced exchange switch 1.	
		5	Start running from down end-station to upward, the running range is disconnected when has encountered in up forced exchange switch 1 but doesn't encounter in up end-station leveling switch.	
		6	Start running from down end-station to upward, the running range is disconnected when has encountered in up end-station leveling switch.	
		98	Start running from down end-station to upward, up forced exchange switch 1 close while still doesn't leave down end-station leveling switch.	

Error Code	Error Description	Possible Causes		Solutions
		99	Start running from down end-station to upward, after down forced exchange switch 1 close, down forced exchange switch 1 disconnection again while upward running.	
		100	The number of floor to learn is inconsistent with the set floor.	
		101	Encounter in other forced exchange switches while doesn't leave down forced exchange 1 during upwarding running.	
		102	when doesn't leave down forced exchange 2, encounters in down forced exchange 3 or up forced exchange switch during upward running.	
		103	Encounter in up forced exchange switches while doesn't leave down forced exchange 3 during upwarding running.	
		104	Encounter in other up forced exchanges switches while doesn't encounter in up forced exchange 3 during upwarding running.	
		105	Encounter in up forced exchange switche 1 while doesn't encounter in up forced exchange 2 during upwarding running.	
		107	Cannot read the pulse value of the encoder when learning.	
		0	Running range is disconnected when doesn't encounter in down forced exchange 1 during downwarding running.	
E043	Impulse Z loss error	With PG synchronous vector control, no output of encoder Z signal.		Check encoder wiring, connect wire again.
E044	Sincos encoder zero-biased error	Deviation of Value of F08.06~F08.09 is too large from the designed value.		Revise Sincos encoder zero-biased value via F08.05.
E049	Stalling error of tuning 3	Rated output current of Inverter is too small.		Select the mode with big rated output current.

Error Code	Error Description	Possible Causes		Solutions
E071	Error of the time of One-key slid adjacent 2 times is too short	Time interval of adjacent two times starting operation is short than 15s after enabling one-key slid function.		Wait for more than 15s to start up again.
E073	Error of forced exchange speed calculation uncorrect while curve formation.	Set the average acceleration F20.07 is too small.		Increase F20.07
E074	Error of curve calculation overflow	Overflow of curve calculation		
E075	Error of the leveling switch	0	When the starting operation exceeds (the screen pannel length +300) mm, the leveling signal still doesn't disconnect, nearby stopping.	
		3	After the elevator leveling and stopping, the deviation between the theoretical position and the actual position is over 2000 mm.	

Error Code	Error Description	Possible Causes		Solutions
		100	In the case of two leveling switches, the distance between the upper and lower leveling is longer than the length of the shielding board, or the upper and lower level switch adhesions when elevator upwarding running.	
		101	In the case of two flat switches, the upper and lower leveling switch adhesion when elevator upwarding running.	
		200	In the case of two leveling switches, the distance between the upper and lower leveling is longer than the length of the shielding board, or the upper and lower level switch adhesions when elevator downwarding running.	
		202	In the case of two flat switches, the upper and lower leveling switch adhesion when elevator downwarding running	

Error Code	Error Description	Possible Causes		Solutions
		Initial floor *100+target floor when malfunction.	Have passed full pulse but still doesn't enter leveling while the car fast runing.	
E077	Error of auto-learning forced exchange height.	20+n （n=1~3）	Height of upper forced exchange of the number N is too short.	Increase the height of forced exchange or increase F20.07 (Average acceleration/deceleration)
		40+n （n=1~3）	Height of lower forced exchange of the number N is too short.	
		60+n （n=1~3）	Height of upper forced exchange of the number N is too long.	Decrease the height of forced exchange or decrease F20.07 (Average acceleration/deceleration)
		80+n （n=1~3）	Height of lower forced exchange of the number N is too long.	
		60+n （n=5~7）	Height of upper forced exchange of the number N-4 is too long or forced deceleation is too small.	
		80+n （n=5~7）	Height of lower forced exchange of the number N-4 is too long or forced deceleation is too small.	

Error Code	Error Description	Possible Causes		Solutions
		100	Max. speed of actual operation of elevator can not reach the set value, and the elevator cannot perform the optimal operation condition. Please reduce the running speed (d.004) or increase the acceleration (d.005).	
E080	Slight motion leveling error	Overpass leveling of Slight motion leveling		
Others	Reserved			

📖 Attentions:

Short circuit of brake resistor may damage the brake unit of the inverter.

Warning types that may happen to S610M is listed in table 8-2. For specific information please refer to the setting of function codes in Group F09. If the failure is automatically removed during operation, the inverter will accordingly restore to the condition before warning (except for warning of A017). Please refer to the description of function codes in Group F09 for details.

Table 8-2 Warnings and countermeasures

Warning Code	Warning Type	Possible Causes of Warning	Countermeasures
A013	Inverter overloaded	inaccurate motor parameters	restart auto tuning of motor parameters
		the inverter is overloaded	Choose an inverter with larger rated power
		the DC-braking volume is too large	Decrease the DC-braking current, and prolong the braking time.
		the acceleration time is too short	Prolong the acceleration time.
		the network voltage is too low	check the network voltage
		the V/F curve is inappropriate	modify V/F curve and torque boost value
A014	Motor overloaded	incorrect setting of motor overload protection coefficient	Set the overload protection coefficient of motor correctly.
		motor stalling or too large fluctuation of motor load	check the load

Warning Code	Warning Type	Possible Causes of Warning	Countermeasures
		general motor run under large load and at low speed for a long time	choose a dedicated motor if it is to run constantly at low speed
		the network voltage is too low	check the network voltage
		the V/F curve is inappropriate	correctly set the V/F curve and torque boost value
A016	Read-write error of EEPROM	the read-write of control parameters is wrong	press STOP/RES to reset or ask for service
A017	Reserved		
A018	Abnormal contactor	the network voltage is too low	check the network voltage
		the contactor is damaged	Replace the contactor of main circuit; ask for service.
		the buffer resistor for powering on is damaged	Replace the buffer resistor; ask for service.
		the control circuit is damaged	ask for service
		phase-loss in the input side	Check the connection wiring of input side R.S.T.
		The circuit of interface board is damaged	Replace the interface board; ask for service.

⚠ Attentions:
Please be careful in choosing the function of failure warning; otherwise it may cause expanded accidents, injuries or property damages.

Table 8-3 Abnormal operation and countermeasures

Phenomenon	Situations	Possible Causes	Countermeasures
No response in the operation panel	Several or all of the keys are not responding	Poor contact of the connecting wire in the operation panel	Check the connecting wire and restart hot plugging
		The keys of the operation panel are damaged	Replace the operation panel or ask for service
Function codes are not modifiable	Not modifiable in operating state	The function codes cannot be modified in operating state.	Modify the codes when the inverter is shutdown
	Part of the function codes are not modifiable	Function code F13.02 is set to 1 or 2	Set F13.02 to 0
		This function code is actual detected value	Users are not authorized to modify actual parameter
	No response when pressing PRG	The operation panel is locked or other reason	Refer to the solutions for “No response in the operation panel”
	No access to the	User’s password is set	Correct enter the password

Phenomenon	Situations	Possible Causes	Countermeasures
	function code after pressing PRG and receiving no response. The function code displays 0000		Ask for service
Unexpected inverter shutdown during operation	When no stopping command is given, the inverter stops automatically with the running indicator light off	There's failure warning.	Find the failure cause and reset it.
		Brake off of power supply	Check the state of power supply
		The positive and negative logic of control terminal is reversed	See if the setting of F07.11 is as
	When no stopping command is given, the motor stops automatically, while the inverter runs at zero-frequency, and its running indicator light is on.	Automatic failure reset	Check the setting of automatic failure reset and failure cause
		External interruption	Check the setting of external interruption and failure source
		Operation speed is set to 0	Check the set speed
		The starting speed is faster than set speed	Check the starting speed
The inverter cannot run	The inverter cannot run when pressing the operation key and the running indicator light is off.	The operation permission terminal of inverter is invalid	Check the operation permission terminal of inverter
		There's failure warning	Trouble shooting
		The setting of positive & negative logic of input terminal is inappropriate	Check the setting of F07.11
Report P.oFF immediately when the inverter is powered on	The thyristor/contactor is disconnected and the inverter load is relatively heavy	When the thyristor /contactor is off and the inverter is running with a relative heavy load, the DC bus voltage of main circuit will drop, and the inverter will display P.oFF rather than error code E018.	Operate the inverter after the thyristor/ contactor is completely closed.

Chapter 9 Maintenance & Inspection

Ambient temperature, humidity, dust and vibration etc. may cause the aging of the inverter internal parts, the inverter fault, or reduced service life of the inverter. Therefore, it is necessary to maintain and inspect the inverter regularly.

Please contact our office or Technical Department directly regarding any product damages, faults or other problems:

1) the model of the inverter；

2) lot number of the inverter；

3) Damages or errors.

Cautions for Maintenance and Inspections:

Attentions

When the inverter is powered on, please do not change wiring, connect or detach terminals, otherwise electric shocks might occur.

Dangers:

1. **Be sure that the power is off before maintenance and inspections. There remains high voltage in the filter capacitor after powering off, so please go for maintenance and inspection only under the following conditions:**
   When the LED indicator on the operation panel is off;
   Or when the charging indicator at the bottom right inside the inverter is off;
   Or when the bus-bar voltage measured by the multi-meter is no more than 36V after the power is off for 10 minutes. Otherwise, electric shocks might occur.

2. **Do not modify the inverter by yourself, or there might be risks of electric shocks or injuries.**

3. **It is forbidden to leave any wire threads or metal objects inside the inverter during maintenance & inspections, otherwise a fire can occur.**

9.1 Routine Maintenance

1. Checking:

① Please check if the operating sound of the motor is normal, or if there is any strong vibration;

② Please check if ambient conditions meet the standard requirements;

③ Please check if the inverter is over heated;

④ Please check if the cooling fan works normally.

2. Cleaning

① Keep the inverter clean;

② Clear dust on the surface effectively to prevent dust from entering inside the inverter, especially the metal dust;

② Clear greasy dirt off the cooling fan effectively.

9.2 Periodical Maintenance

User can make a regular check every 3-6 months or by even shorter time according to the operation conditions, to prevent the inverter from breakdown, and to guarantee its high performance for a longer time. Please check the following:

1．Check if the working ambient temperature and humidity meet the standard requirements.

2．Make a thorough clean for the dust on the surface of PCB, wind channel, heat-sink, which is better to be cleaned by dust collector.

3 .Please check if the screws on the wiring terminals are fastened firmly. If they are loose, please fasten them by the screwdriver; check if connectors or flat cables are loose or attached with any foreign matter.

4．Check if power cable and control cable are damaged, especially if there are any cut scratches in the wire jacket which contacts with the metal surface; check if the insulation binder of the power cable nose peels off.

5 .Check if poor connection of the main circuit terminal happens, and if the contact point of the copper platoon is overheated.

6．Check if the controller is damaged, transformed, or corroded.

7．Check if there is any leakage, color change, crack or expansion of electrolytic capacitor.

8．Please check insulation of the main circuit.

Attention：Please detach the main circuit wire from the vector control unit when measuring insulation resistance by megameter (DC, 500V). Never measure control circuit insulation by insulation resistor.

9．Please check insulation of the motor.

Attention：Be sure to inspect the motor alone after the wire between the motor and the inverter is completely disconnected. Otherwise, the inverter may be damaged.

9.3 Wearing Parts Replacement

The wearing parts mainly include cooling fan and electrolytic capacitor. Their service life is closely related with application ambient and maintenance. The common working life is shown as below:

Parts Name	Service life

Cooling Fan	2~3 years
Electrolytic Capacitor	4~5 years

1）Cooling Fan

The probable causes for the damages: bearing wearing, or aging fan blade.

Judging standard: Please check if there is any cracking in the fan blade, and if there is abnormal shaking sound when it starts.

2) Electrolytic Capacitor

The probable causes for the damages: the poor quality of input power, high ambient temperature, frequent abrupt loading change, or aging electrolytic capacitor etc.

Judging standard: Please check if there is any liquid leakage, if the safety valve is extruding, and the measured values of direct capacitance and insulation resistance etc.

9.4 Inverter Storage

The performance of electrolytic capacitor will be degraded by long-term storage, so regular maintenance by powering-on is a must. For the inverter stored for a long time, a powering-on test every half a year for more than half an hour each time is strongly suggested.

Attentions:

For inverters stored for more than two years, users should power them on gradually by using a voltage regulator. Otherwise, there might be risks of electric shocks and explosions.

Requirements for storage conditions are shown as below:

Ambient Characteristics	Requirements	Remarks	
Ambient Temperature	-40～+70℃	The long-term storage temperature should be lower than 30℃ to avoid of reduced capacitance.	It should not be kept in the ambient where condensation or freezing might be induced by abrupt temperature change.
Relative Humidity	5～95%	Plastic film sealing and drying measures are necessary.	
Storage Ambient	No direct sunshine, no dust, no corrosivity, no combustible gas, no oil mist, no vapors, no gas, no water dripping, and no vibration, with less salt.		

9.5 Warranty for the inverter

Our company provides warranty for the inverter pertaining to the below circumstances:

1. The warranty is only for the inverter itself.
2. Under normal circumstances, we offer warranty for any failures or damages for 12 months since the ex-factory date. Extra reasonable fees will be charged for services over 12 months.
3. A certain fees shall be charged for the following circumstances even within the 12-month warranty period:

1) Damages to the inverter were caused by inappropriate operations without following user's manual;
2) Damages were caused by fire, flood or abnormal input voltage etc.;
3) Damages were caused by applying the inverter for abnormal functions.

4. Relevant service fees are charged based on the actual expenses. Prior agreement regarding service charges will be given priority if there is one.