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FOREWORD

Thank you for using BL3-B series elevator controller. BL3 series elevator integrated controller is the next generation elevator control system developed by Shenyang Bluelight Automatic Technology CO. LTD. It combines elevator intellectual logic control and high-performance VVVF drive control. With user friendly interface and advanced technology integrated together, the system not only has outstanding performance, but also shows strong reliability in practice.

The system combines intellectual logic control and high-performance VVVF drive control.
Adopts advanced vector control technology, demodulates motor with high precision, takes full advantage of motor capacity, improves elevator performance and comfort feel.
Adopts advanced space vector PWM calculation method, compare with traditional sine/cosine PWM method, it improves elevator operation efficiency and saves more energy.
Adopts full function of BL2000/3000 system, maximize the performance of elevator in different application.
When using Bluelight Synchronous machine, controller could pre-define the machine type with the most optimized model, save machine parameter input and auto-tuning process, improves the commissioning efficiency and maximize the machine performance.
Fuzzy logic control with non-load-compensation start-up. Excellent comfort feels without lift weighing device.
Rotating or stopping auto-tuning to get motor parameters and initial angle.
Suitable for both gearless PM Synchronous traction machine and asynchronous induction machine.
Brake units are built in for the whole BL3-B series to reduce external component cost.
Internal encoder and frequency dividing interface to match different PG signal.
Advanced double 32 bit CPU and FPGA for complete elevator control, with high reliability on elevator safety.
Redundancy design and full software-hardware protection to achieve elevator safety and reliability.
Passed professional EMC test, suitable for complicated job site.
Monitor the cutting current from controller to main motor every time elevator stops.
Generate optimized speed curve based on target floor to enable lift stop directly with high efficiency.
Adopts wireless/LAN remote control interface, convenient for long distance commissioning, maintenance and elevator monitoring.
Equips upper monitoring and software, convenient for parameter setting, commissioning and debugging.
Data recorder to save integrated controller operation data, help for onsite maintenance /trouble shooting.
Parameter upload, download and copy to help onsite maintenance.
Support ARD function with only UPS unit.
Match GB7588-2003 (equivalent to EN-81) safety standard.

This user guide has introduced on how to use BL3-B series elevator controller.

Trial Operation

危险	[redacted]

Check to be sure that the front cover is attached before turning ON the power supply.

Otherwise, an electric shock may occur.

Do not get close to machine and related objects when choosing the error auto reset function, as the drive will automatically restart after warning reset.

Otherwise, an injury may occur.

Provide a separate fast stop switch; the Digital Operator STOP Key is valid only when its function is set.

Otherwise, an Injury may occur.

Reset alarms only after confirming that the RUN signal is OFF.

Otherwise, an Injury may occur.

Do not perform fault operation and signal checking while the drive is running.

Otherwise an injury may occur and the drive may get damaged.

[redacted]	[redacted]

Do not touch the radiation fins (heat sink), braking resistor, or Braking Resistor Unit. These can become very hot.

Otherwise, a burn injury may occur.

Be sure that the motor and machine is within the applicable ranges before starting operation.

Otherwise, an injury may occur.

Provide a separate holding brake if necessary. Always construct the external sequence to confirm that the holding brake is activated in the event of an emergency, a power failure, or an abnormality in the Inverter.

Failure to observe this caution can result in injury.

If using an Inverter with a elevator, take safety measures on the elevator to prevent the elevator from dropping.

Failure to observe this caution can result in injury.

Do not check signals while the Inverter is running.

Otherwise, the equipment may be damaged.

Be careful when changing Inverter settings. The Inverter is factory set to suitable settings.

Otherwise, the equipment may be damaged.

1.3. Warning Labels on the Inverter

Be sure to read and follow all warning labels on the Inverter before installation.

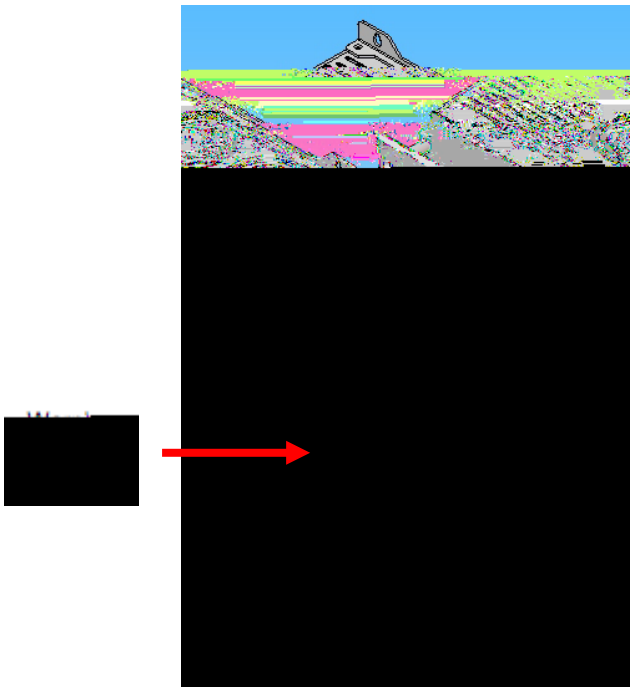


FIGURE 1.1 OPEN TYPE



FIGURE 1.2 CLOSE TYPE

Text on Warning Labels

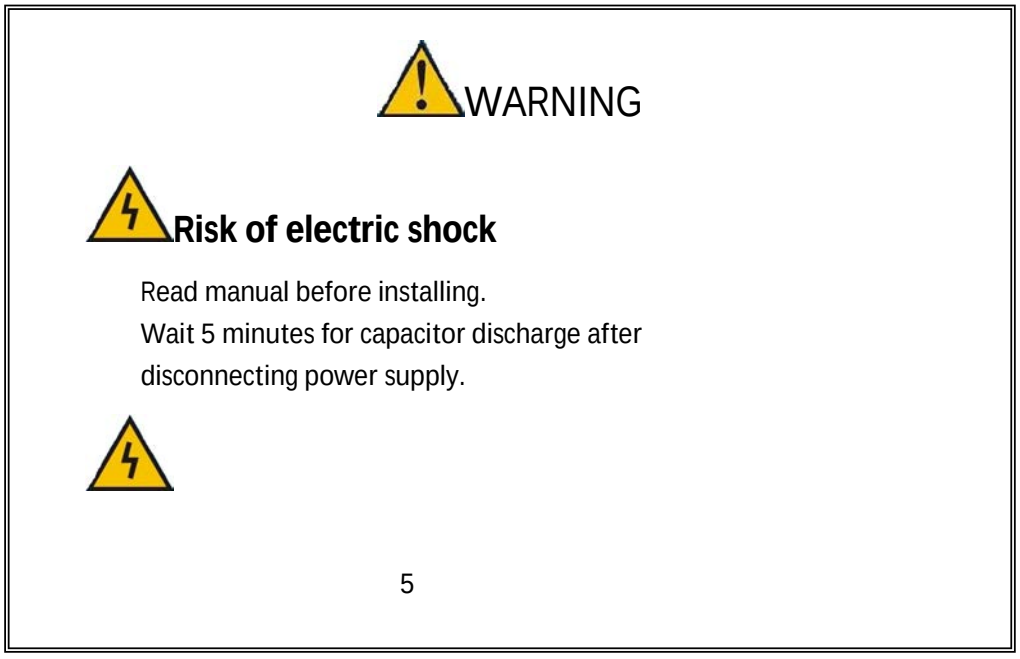


FIGURE 1.3 WARNING LABEL CONTENT

Chapter 2: Introduction and Installation

This chapter describes the checks required upon receiving or installing an Inverter.

2.1. Inverter Model Numbers

The model number of the Inverter on the nameplate indicates the specification, voltage class, and maximum motor capacity of the Inverter in alphanumeric codes. Please see below figure 2.1 for example (22kw

BL3 B C 4 022

Controller Series — Maximum machine power

Controller Type m

2.3. Inverter Specifications

BL3 U series elevator integrated controller specifications are listed in the following tables.

TABLE 2.1 STANDARD SPECIFICATIONS

MODEL BL3 BĬ 40Ĭ Ĭ	4005	4007	4011	4015	4018	4022	4030	4037	4045
MAX MOTOR POWER KW	5.5	7.5	11	15	18.5	22	30	37	45

RATED OUTPUT

TABLE 2.1 STANDARD SPECIFICATION CONT'D

DRIVE FEATURES	TORQUE ACCURACY	±5%
	FREQUENCY CONTROL RANGE	0 120Hz
	FREQUENCY ACCURACY	Digital given: ±0.01 10 40
	FREQ GIVEN RESOLUTION	Digital given: 0.01Hz
	FREQ OUTPUT RESOLUTION	0.01Hz
	OVERLOAD CAPACITY	150% rated current 60S 180% rated current 10S
	START UP TORQUE	180% rated current 0Hz
	ACCEL/DECEL TIME	0.001 600s
	MAIN CONTROL FUNCTION	Non-load-compensation start up; Battery-driven running; Auto-tuning; load compensation; cooling fan control; basic blocking; torque control; CAN communication reference; Normal Acc/Dec; s-curve speed; monitor of main machine for which electric current can be effectively interdict or not when the car stops; interior brake unit; PG dividing frequency output, automatic retrying after fault; automatic resetting after fault; parameter copying.
CONTROL INPUT/OUTPUT	OC CONTROL POWER SUPPLY	Isolated external DC24V
	RELAY OUTPUT POWER	Isolated external DC24V
	LOW VOLTAGE OC INPUT	26 outputs rated load: 7mA DC24V,100HZ max
	HIGH VOLTAGE OC INPUT	6 outputs rated load: 8mA AC110V,100HZ max
	PLC RELAY OUTPUT	12 outputs 1NO, contactor rated: 5A 30VDC 5A 250VAC
	CAN BUS	2 ports: Duplex; group control; HOP; COP; Wireless monitoring
	SERIAL COM	1 port: Hand operator
	RS232 COM	2 ports: Monitor/Program
DISP	HAND OPERATOR	Chinese/English LCD display
	MONITOR INTERFACE	Display parameters, elevator running status, digital wave
MAIN PROTECTION	OVER CURRENT	Stop when current exceed 200% rated output current
	FUSE	Stop at fuse brake at main circuit
	O	

Front Cover

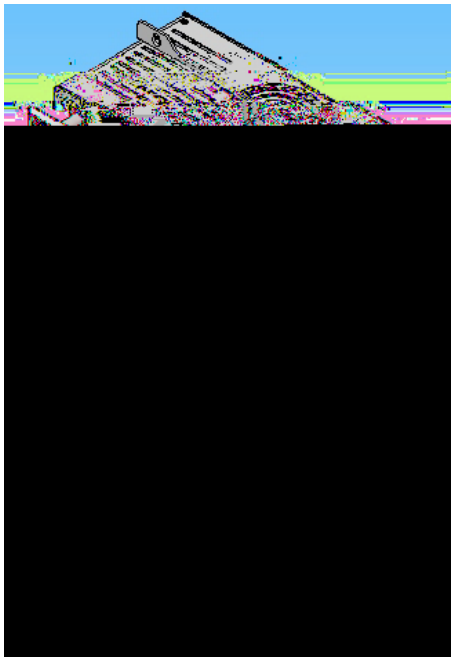


FIGURE 2.4 OPEN TYPE INSERTED INSTALL



FIGURE 2.3 OPEN TYPE WALL-MOUNT

2.5. Exterior Dimension

BL3 U series elevator drive has open type and close type and the open type has wall-mounted installation and inserted installation type.

2.5.1. Open Type Inverters

2.5.1.1 OPEN TYPE WALL MOUNTED



FIGURE 2.6 OPEN TYPE WALL-MOUNT DIMENSION

FIGURE 2.7 EXTERIOR DIAGRAMS

2.5.1.2 OPEN TYPE INSERTED

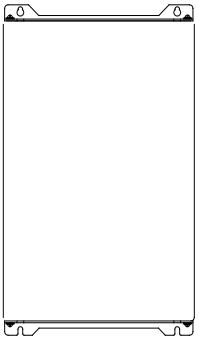


FIGURE2.8 OPEN TYPE INSERTED DIMENSION

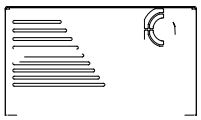


FIGURE 2.9 OPEN TYPE INSERTED EXTERIOR

FIGURE 2.10 OPEN TYPE INSERTED DIMENSION

FIGURE 2.11 OPEN TYPE INSERTED EXTERIOR

TABLE 2.2 OPEN TYPE INVERTER EXTERIOR DIMENSION

Voltage	Installation	Max Motor Power (KW)	Inverter Model	Figure	Exterior Dimension			Weight
					[redacted] W			

2.5.2. Close Type

FIGURE 2.12 CLOSE TYPE DIMENSION

FIGURE 2.13 CLOSE T

INSTALL FRONT COVER

After all the wiring procedures, follow the opposite method of removing terminal cover to tighten the front cover.



Figure 2.14 Remove terminal cover on close type

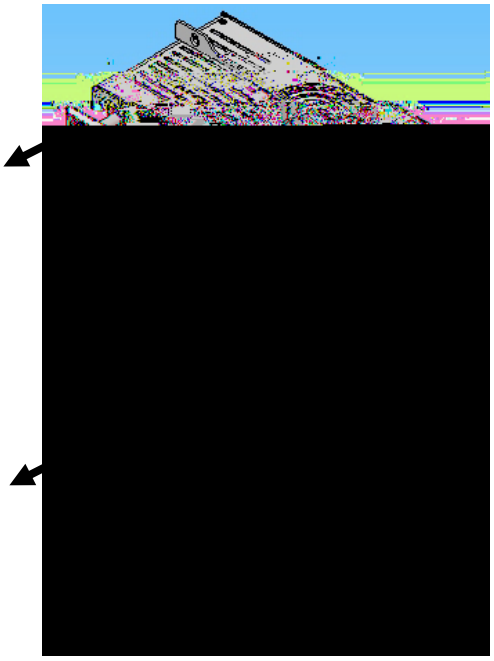


Figure 2.15 Remove Terminal cover on open type

2.7.5. Remove/Attach Hand operator

Follow Figure 2.16.

Remove the hand operator

Push side of hand operator on arrow 1 to unlock the operator from the frond cover, pull the operator up on the direction of arrow 2.

Install Hand operator

Opposite with remove procedures



2.7.6. Installation Orientation and Space

Install the Inverter vertically so as not to reduce the cooling effect. When installing the Inverter, always provide the following installation space to allow normal heat dissipation.

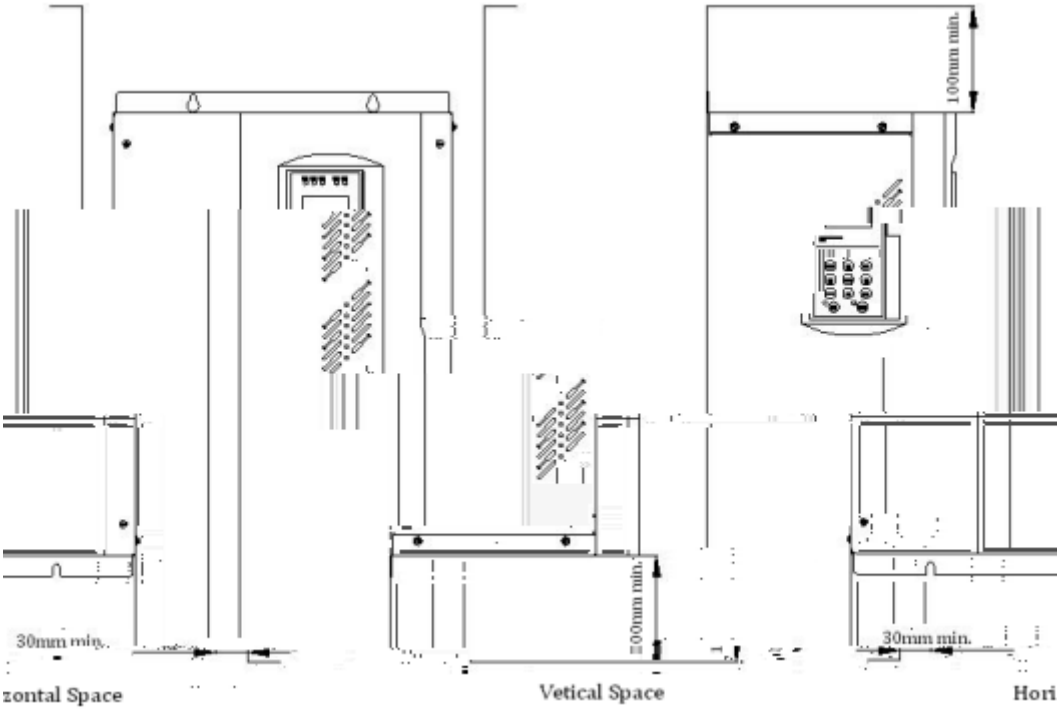


Figure 2.17 Driver Installation Orientations and Space

IMPORTANT

1. The same space is required horizontally and vertically for both open type and close type wall-fixd inverter.
2. Always remove the protection covers before installing inverter with an output terminal in a pane l. Always provide enough space for suspension bolts and the main circuit lines when installing invert er with an output terminal in a panel.

Table 2.7 Basic Function List (Cont'd)

No.	Name	Purpose	Description	Note
16	Duplex Control	Two elevator optimized control	1. At landing call, both elevator answers based on their running state and location, and only one elevator respond to increase the running frequency. 2. When both elevators at waiting state, one return to waiting floor (normally G floor), the other one stays at current location.	To achieve duplex, connect two integrated controllers with the cable provided and set duplex parameter accordingly.
17	Group Control	Multi-Elevator	Control up to 8 elevators together	

Table 2.8 Special Function List

No.	Name	Purpose	Description	Note
1	Hoistway Learning	Measure, store hoistway data.	In **inspection** mode, from **bottom terminal switch** to **top terminal switch**, measure and store the **landing zone** and **hoistway switch** position. operator means hoistway learning success.	Hoistway learning may be terminated in unusual condition and system will give error code accordingly. Please follow **Table 8.2** for detail error codes. **Note** When hoistway learning stops, only when "is displayed on the
2	Double press Cancellation	Cancel car call	Press car call button again could cancel such call. (Button answer light off)	Such function is also achievable when

I2(e)1(p)-12(r >>B5DCT0

Table 2.8 Special Function List (Cont'd)

No.	Name	Purpose	Description	Note
8	Non-Stop Floor		User can set any floor not to stop	
9	Homing floor set	Wait at homing floor	In auto mode, with no landing/car call for certain time, car goes to homing floor.	Can only set one homing floor.
10	Display character set	Change display of certain floor	Display character on any floor can be set through hand operator. (Character or figure)	
11	Attendant Direction Set	VIP Mode	Choose elevator direction through up/down button before running	Only available in Attendant mode.
12	Auto Start/Stop Elevator Service	Automatic start/stop elevator service	User may set elevator on/off time by practical requirement.	1. Time is set by 24hrs 2. Cancel this function by setting both on/off time to 00.

Table 2.8 Special Function List Cont'd

No.	Name	Purpose	Description	Note
17	Interference evaluation	Inspect site interference condition	Evaluate the site shielding condition, cone(c)-9(t)-3(i)-3(o)-11(e t)-3(o)-11( )]TJ0.005 Tw[(gc)-1(r)-3(o)-11und rence(t)-2oEinerference	

Table 2.8 Special Function List Cont'd

No.	Name	Purpose	Description	Note
21	Elevator for handicapped	Special COP/HOP for handicapped	1. start elevator for handicapped function through parameter setting; 2. COP: Car call function & door open/close button. 3. HOP: Recognize for handicapped calling through different floor; 4. Principle: When leveling, opening time will keep longer if handicapped is on this floor (the opening time can be changed); When press cop opening button, opening time will keep longer.	**Set HOP address:** When use elevator for the handicapped (FU14=ON HOP set as below: **1** **32** for normal floor,**1** for bottom floor, **2** for second floor, with total 32 floors. **33** **64** for handicapped floor. **33** for bottom floor, **34** for second floor, up to **64**, with total **32** floors. If building has 64HOP,hPs336432e pen-0.002

Chapter 3: Wiring

This chapter explains the terminals and wiring specifications for main circuit, control circuit and PG card of integrated controller.

Terminal Symbol	Function Instruction
R	

3.2.4. Wire specification for main circuit wiring

Table 3.2 Wire size and clamping torque for main circuit wiring

3.2.5. Main circuit wiring

3.2.5.1 WIRING MAIN CIRCUIT INPUT

Observe the following precautions when wiring the main circuit.

1. Installing a Molded-case Circuit Breaker (MCCB).

Connect the power input terminals(R S T)and power supply via a molded-case circuit breaker(MCCB) suitable for the controller. Choose an MCCB with a capacity of1.8 to 2 times of the controller's rated current. For MCCB's timing characteristics, be sure to consider the controller's overload protection (60S at 150% of the rated output current, 10S at 180% of the rated output current).

2. Installing a Earthling Fault Interrupter

Controller outputs use high-speed switching, so high-frequency leakage current is generated. Therefore, at the controller input side, use an GND fault interrupter to detect only the leakage current in the frequency range that is hazardous to humans and exclude high-frequency leakage current. For a special-purpose GND fault interrupt, choose an GND fault interrupter with sensitivity amperage of at least 30mA per controller. When using a general GND fault interrupts, choose an GND fault interrupter with sensitivity amperage of 200mA or more per controller and with an operating time of 0.1s or more.

3. Installing a Magnetic Contactor.

Power input terminals(R S T) and power can be connected or be shut off through magnetic contactor KMC . Choose of magnetic contactor is according with the rated current of the controller. Make sure the contact capacity of magnetic contactor is greater than the rated current of the controller.

4. Wiring the terminals

If there is no phase sequence requirements, the input power supply can be connected with any one terminal R S T, the phase sequence of input power supply is irrelevant to the phase sequence.

5. Installing a DC reactor

If necessary, take out the jumper in P1 terminal of the controller, install the DC reactor. Never touch the P1 terminal or the jumper with bare hand directly.

6. Installing Surge Absorber

Make sure using a surge absorber for inductive loads near the controller. These inductive loads include magnetic contactor, electromagnetic relays and magnetic brakes, and so on.

3.2.5.2 WIRING THE OUTPUT SIDE OF MAIN CIRCUIT

1. Connect the controller and Motor

Please connect the motor(input) wires to the output terminals U V W. Check that the motor rotates anticlockwise with the forward run command while running, otherwise, exchange the output terminal V and W.

2. Never connect a power supply to output terminals

3.3.2. Terminal Connection for Control Circuit (Figure 3.1)

3.3.3. Control Circuit Port definition and Function

Table 3.3 Control Circuit Port definition and function list

Port Name	Port Number	Location	Definition	Usage	Interface Tech Spec

Table 3.3 Control Circuit Port definition and function list (Cont'd)

Port Name	Port Number	Location	Definition	Usage	Interface Tech Spec			
					Type	Rated Capacity	On/Off time	Max Speed
	I0	J5_1	SKYC Door open delay					
J5				Input Output	Input: Opto-Coupler Output: Open Collector	Input DC24V 7mA Output 300MA	Input 10mS	Input 100Hz

Table 3.3 Control Circuit Port definition and function list (Cont'd)

Port Name	Port Number	Location	Definition	Usage	Interface Tech Spec			
					Type	Rated Capacity	On/Off time	Max Speed
J7	X0	J7_6	SJX Inspect/Auto	Input	Opto-Coupler	DC24V 7mA	10mS	100Hz
	X1	J7_7	SSXW Up limit					
	X2	J7_8	SXXW Down Limit					
	X3	J7_9	SSMQ Up Leveling					
	X4	J7_10	SXMQ Down Leveling					
	X5	J8_1	SKDY Assist Contactor Feedback					
	X6	J8_2	KBC Braking Contactor Fi0(r)-3(a)-6(k)-3(i)-3(ng)-1f490.8 635.76 0.72 13.2 ref3(F)1(i0(r)-3(a)-.8c 0 Tw183.rref) Tm					
J8				Input	Opto-Coupler	DC24V 7mA	10mS	100Hz

3.3.4. Wire size for Control Circuit Terminals

600V plastic insulated wire should be used. Choose suitable wire size based on Table 3.4

Table 3.4 Wire size for Control circuit terminals

Terminal Function	Acceptable Wire size ($mm^{2)}$	Recommended wire size ($mm^{2)}$	Clamping Torque N.m	Special Requirement
Input/ Output	0. 5~1	0.75	0.5 0.6	
PG Car I/O	0.15~0. 5	0.3	0.5 0.6	Twisted pair shield
CAN COMM	0.75~1.5	0.75 ≤10 floors 1.5 >10 floors	0.5 0.6	Twisted pair shield

3.3.5. Control Circuit I/O interface and wiring

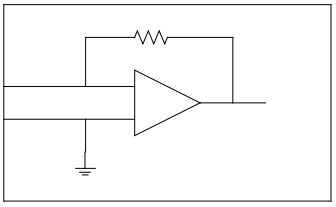
3.3.5.1 DIGITAL VALUE INPUT INTERFACE

The common terminal of board for digital value input interface is +24V so it should be contactor input or common emitter

The controller, COP and HOP are connected through CAN bus. The reliability of CAN BUS communication is directly related to cable wiring. It is specifically required that shaft cable and traveling cable should be **twisted-pair shield cable.** The twisted-pair can stop the differential mode interference of the long wire while shield can isolate the electromagnetic interference caused during elevator running. The function and connection of the CAN communication interface is shown in the Fig 3.7.

3.3.5.3 ANALOG INPUT INTERFACE

The voltage range of analog input interface is -10 +10V for selecting the load information provided by weighing device. As analog signal is easy to get interference, the wire of analog input terminal should be TWISTED-PAIR SHIELD CABLE. Its input and connection is shown in Fig 3.8.



3.4. PG Card Installation & Wiring

3.4.1. PG_V31 Interface Card

PG-V31 interface card can be used for both synchronous/asynchronous motors, with the function of pulse encoder speed feedback and frequency output.

The card is compatible for 12V OC output, push-pull output and 5V long wire drive pulse encode output, It can used with both synchronous machine encoder(A/B) and asynchronous machine encoder (A/B/Z/U/V/W). Please see Fig 3.11 below for detail.

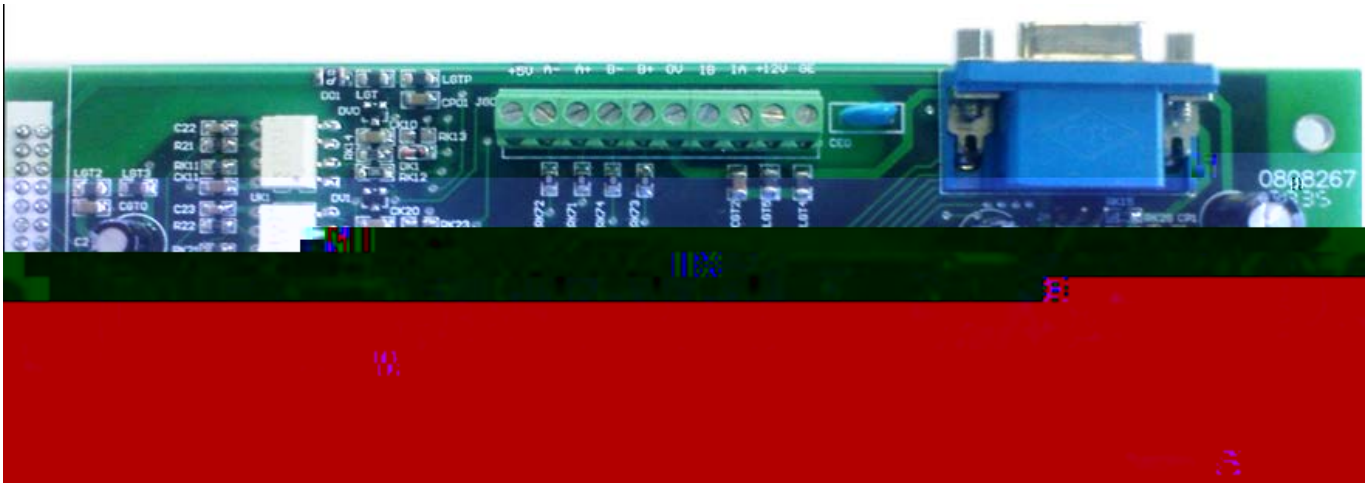


Figure 3.11 PG_V31 Card

3.4.2. Installation and Remove PG_V31

When installing PG-V31 card, first cut off the controller power supply, make sure that charge indicator LED on the controller is off. Then remov

3.4.4. PG_V31 Connection for 12V push-pull/OC output encoder (for Asynchronous Machine)

Connection of PG-V31 card and 12V push-pull/OC output encoder (for asynchronous machine) is shown in Fig 3.12

Jumper JA and JB should be shorted, connect the12V/B/A/0V on the encoder to the PG card terminal +12V/IB/IA/0V (the terminal 7/8/9/10 of JG0) one-by-one.

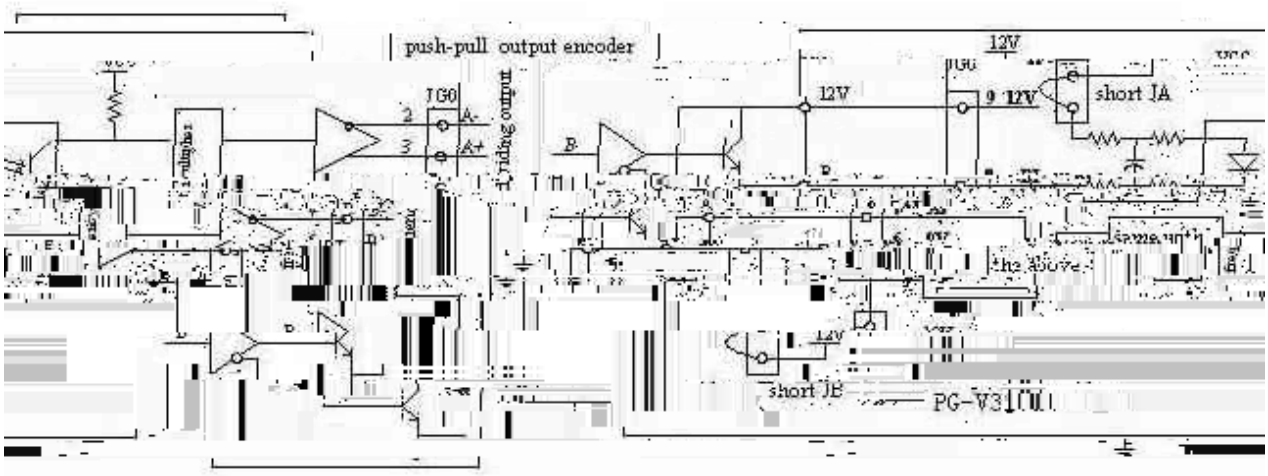


Figure 3.12 PG_V31 card connections with 12V push-pull/OC output encoder

3.4.5. PG_V31 card connection with 5V long cable drive output encoder (for Asynchronous Machine)

The connection of PG-V31 card and 5V long cable drive output encoder for asynchronous machine is shown in Fig 3.13.

Jumper JA and JB should be shorted (Factory setting for JA and JB

3.4.6. PG_V31 card connection with 5V long cable drive output encoder (for Synchronous Machine)

The connection of PG-V31 card and 5V long cable drive output encoder for synchronous machine is shown in Fig 3.14

Jumper JA and JB should be disconnected(Factory setting for JA and JB wire jumper is off) then connect the 5V/0V/A+/A-/B+/B-/Z+/Z-/U+/U-/V+/V-/W+/W- of encoder to the +5V/GND/A+/A-/B+/B-/Z+/Z-/U+/U-/V+/V-/W+/W- of the D-type connection on terminal JG1 (the related pin of 1/6/5/10/4/9/3/8/2/7/12/13/14/15 of JG1 for D-type connection part). Make sure the wiring connection

3.4.8. SPG_V33 Interface Card

SPG-V33 interface card is shown in the Fig 3.15



Figure 3.15 SPG_V33 Card

3.4.9. SPG_V33

3.4.10. SPG_V33 Interface Card Circuit

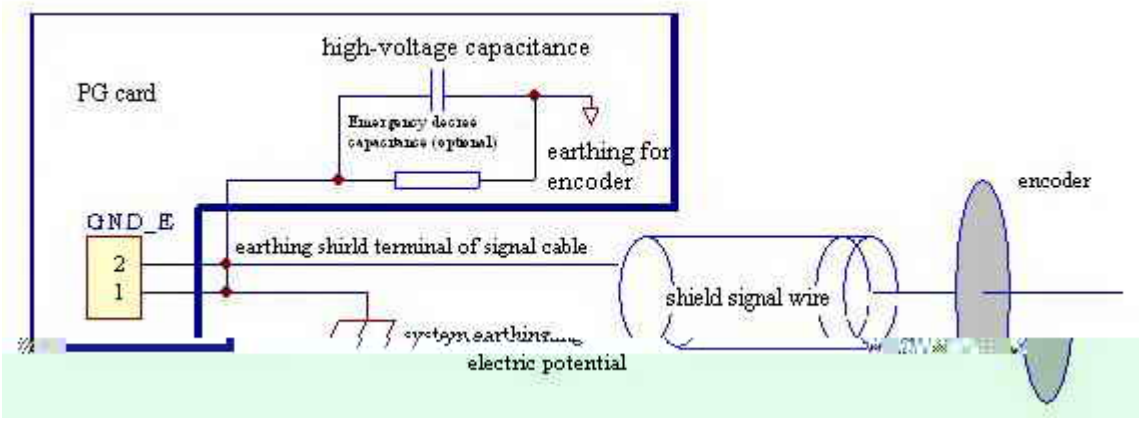


Figure 3.16 SPG_V33 Card

The resistor for ground terminal GND_E is not essential component. There might be different requirement between different versions.

3.4.11. Precautions for using SPG_V33

1. Sine/cosine PG card can provide power output of 5V±2.5%/500mA for encoder. If the current required exceeds the PG card rated value, it may damage the PG card or encoder.
2. The cut-off frequency of the analog input signal is requested to be lower than 40KHz. This is decided by filter circuit. If the input signal bandwidth exceeds this range, PG card cannot guarantee to analyze the signal correctly and the driver may not work properly.
3. If use the frequency output function that PG card provided, make sure that the current in frequency dividing interface is within rated level to avoid any unwanted circuit protection mechanism. Also, the maximum frequency dividing output rate is 250KB/S; beyond such limit of the speed rate may cause frequency dividing signal not output properly.
4. PG card can set two different gains for A, B, C, D signal. A and B signal

6. Older version SPG_V33 has the function of locate [(t)1tion of

Chapter 4: Operator

BL3 U series elevator integrated controller is equipped with LCD digital operator OP-V6. It is a special tool for commissioning and maintenance of control system. It provides a nice and easy human-machine interface with both Chinese and English on display.

4.1. Key, display and function of Operator

The digital operator OP-V6 has the main LCD screen with resolution of 128×64 LCD, 5 LED and 11 function buttons. Please see figure 4.1 below for detail.

4.1.1. Operator LED Display

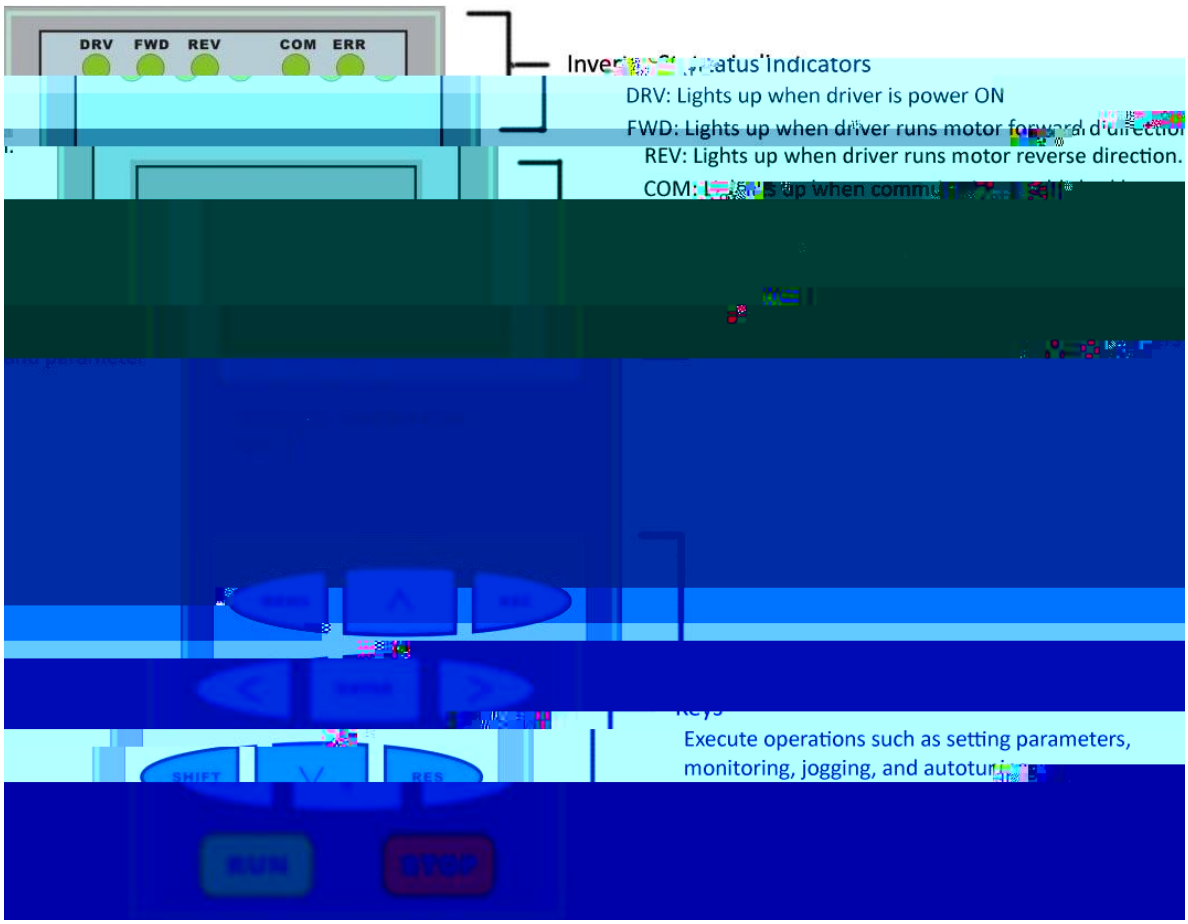


Figure 4.1 Digital Operator Display and button

4.1.2. Operator Keys

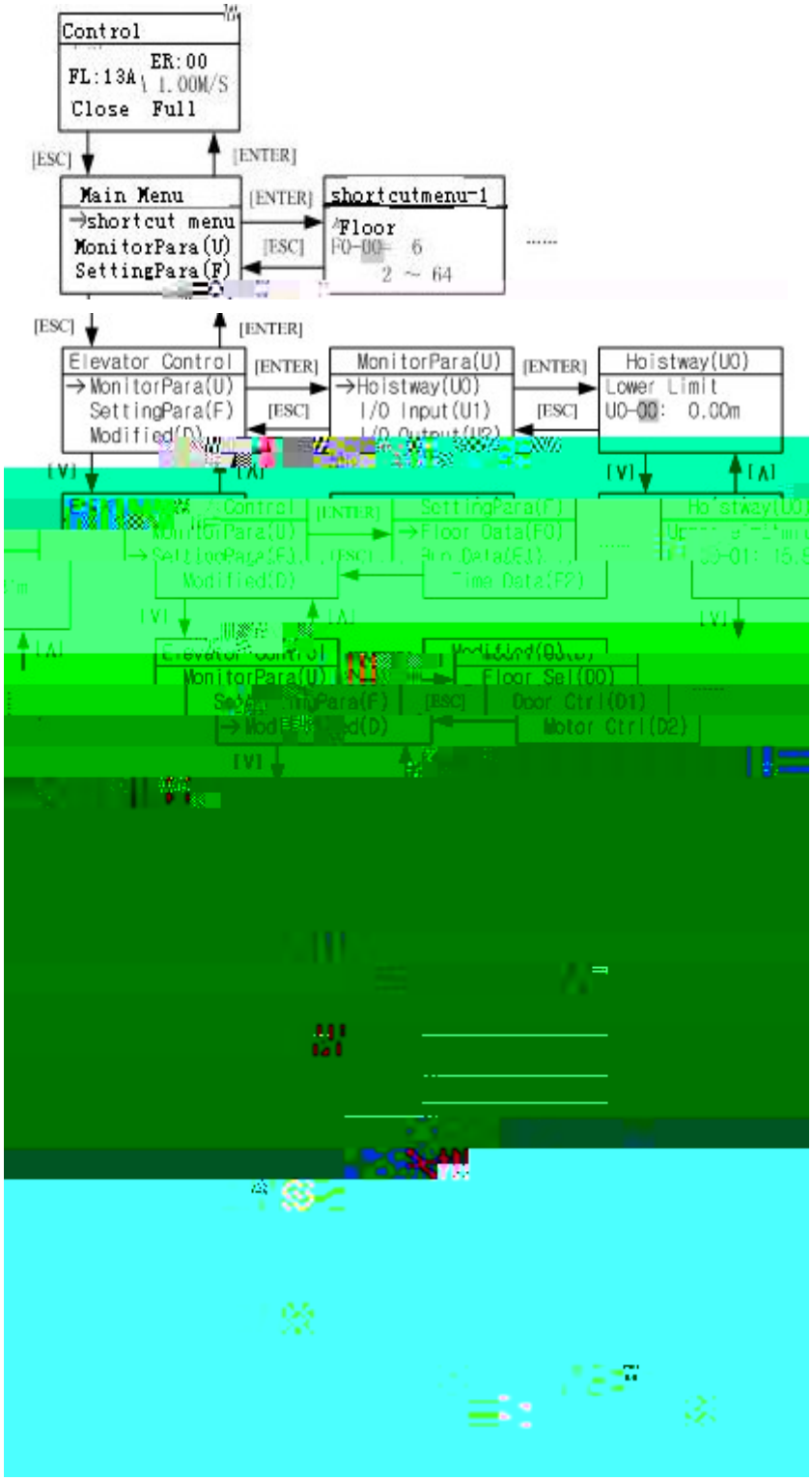
Table 4.2 Operator Keys names and functions

Keys	Name	Function Description
	[RUN] Key	Run the controller in keypad control mode; button is disabled in program control mode. Enable/disable is set through parameters.

4.1.3. LCD Display

Controller enters the main interface after power on. The main interface is shown in Fig 4.2
The main interface displays the main information of the elevator in present status, including floor number,

4.2. Structure flowchart of Operator menu


Control
FL:13A
ER:00
1.00M/S
Close Full
[ESC]
[ENTER]
Main Menu
→shortcut menu
MonitorPara(U)
SettingPara(F)
[ENTER]
[ESC]
shortcutmenu-1
Floor
F0-00= 6
2 ~ 64
.....
[ESC]
[ENTER]
Elevator Control
→MonitorPara(U)
SettingPara(F)
Modified(D)
[ENTER]
[ESC]
MonitorPara(U)
→Hoistway(U0)
I/O Input(U1)
[ENTER]
[ESC]
Hoistway(U0)
Lower Limit
U0-00: 0.00m
[V]
[A]
[V]
[A]
[V]
[A]

The display of the Car Control Communication is as follows:

OK communication good

ER Controller receiving data error (please check communication connection & car control board), when there appears a figure, it refers to the times of error on car control board communication.

System communication display

OK communication good

ET the controller sending data error (please check landing 6(0)d(0)m(0)37:11:841-1:47)t(41)8(418()-1(a(o)2(ntd[(7

4.7. Motor Auto-tuning

Motor Auto-tuning includes two parts: Motor angle tuning and motor parameter tuning. In the interface of Motor Tune: Press [UP] or [DOWN] key to move the arrow to select related tuning information; Press [ENTER] key to enter the pointed tuningi to Td[11(n)-7[(NyieW o)-1(to)-1(r)-8T 39.6 4.44 re41 0 T63yt-1(n)-1(g]TJ-0.00-tto8004 Tw -39.04Int)34(he1(r) in)03

Mototo -

,ey th4 0 Td[(r)-8E(fa)-4(OT-

4.9. Time Setting

In the interface of time setting, the last two digit of “Year”, “month”, “day”, “hour”, “Minute” and “second” are editable, press [LEFT] or [RIGHT] to move the arrow to the right place. Press [UP] or [DOWN] key

4.11. Environment Initialization

In environment initialization interface, the display language, the parameter visit grade, input password and the shortcut menu of the operator can be set.

The flowchart for environment initialization is shown in the Fig 4.17.

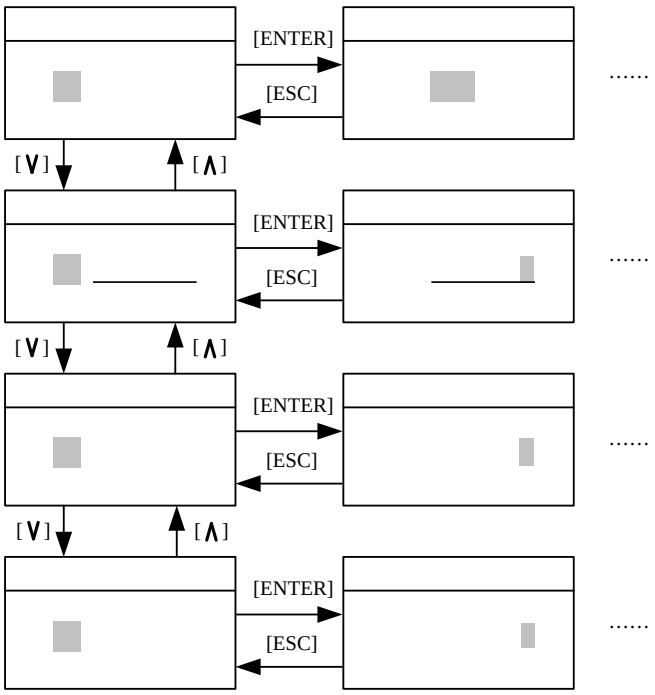


Figure 4.17 Environment Initialization

Language Selection

The flowchart for the language selection is shown in the Fig 4.18.

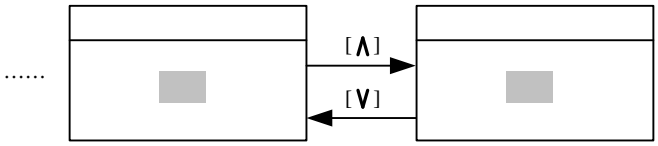


Figure 4.18 Language Selection

Press [UP] or [DOWN] to select language, and press [ENTER] key to save the selection.

User password input and setting

In the interface of password, press the [LEFT] or [RIGHT] key to move the arrow to the pointed position, press [UP] or [DOWN] key to increase or decrease the pointed value, press the [ENTER] key to input the password. When password input is incorrect, “invalid password” will be displayed, and the password cannot be changed at this time. When the password input is correct, “Password OK” will be displayed, next press [ENTER] first then press [RES] key to enter the password setting interface and reset the password. Resetting password is similar to input password. Finally press the [ENTER] key to save the new password.

The flowchart of the password input and change is shown in the Fig 4.19.

4.12. Parameter Copy

The function parameter copy is to simplify the parameter setting and commissioning process, especially for multiple elevators with same configurations. After finishing the parameter setting and commissioning of one elevator, this function can copy all the parameters (Saved in the digital operator memory), take the digital operator and connect to other elevators, copy all the parameters to the controller, check parameters, and the elevator can run normally.

In the interface of parameter copy: Press [UP] or [DOWN] key to move the arrow to carry on the necessary operation, press the [ENTER] key to start operation.

The flowchart of parameter copy is shown in Fig 4.21.

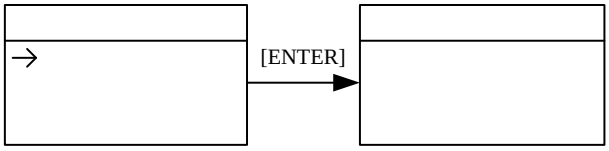


Figure 4.21

4.14. Blue-Light Traction machine Parameter Input

When using Blue-Light Integrated Controller, if the traction machine is also made by Blue-Light, you only need to input the machine model number and encoder information on the machine name plate to finish the parau3 Tc 0.7(p)(e)-7(4-8(a)-

Chapter 5: Parameters

5.1. Parameters Function Classifications

Table 5.1 Parameter Functions List

Function Symbol	U	F	A	D
Function Name	Monitoring Parameters	Setup Parameters	Environment Initialization	Commissioning Parameters

5.2. Parameters Hierarchical Structure



Figure 5.1 Controller Parameters Hierarchical Structure

5.3. Monitoring Parameters

5.3.1. Hoistway Location (U0)

Hoistway location parameters refer to the hoistway

5.3.2. Monitoring Parameter for I/O Status, Cabin Signal & Interference Appraisal (U1-U5)

Table 5.3 U1 U5 Monitoring Parameters List (Cont'd)

Para No.	Display (In Chinese) Display (In English)	Content	Range	Unit	Ref Page
U4-09	Lock Timer	The current elevator stop timer	--	--	--
U5-00		Show the elevator control software information. Provide the current software version for factory maintenance and software upgrading.	--	--	--

5.3.3. Drive Monitoring Parameters

Table 5.5 U6 Drive Monitoring Parameters List

5.4.2. Parameters for Running Setup (F1)

Table 5.7 Running Setup Parameters List

Para No.	Display (In Chinese) / Display (In English)	Content	Range	Factory Setting	Unit	Live Chang	Ref Page
F1-00		Elevator speed at motor rated speed. Calculate through motor rated rev, traction ratio, deceleratiy734.75(435(a)72-ef0051scn351.12 734.64 43.8 0.12 ref395.64 734.64 3. Tw 3.8104[					

Table 5.8 Running Setup Parameters List (Cont'd)

Para No.	Display (In Chinese) Display (In English)	Content	Range	Factory Setting	Unit	Live Chang	Ref Page
F1-10	B1 Acceleration B1	B1 refers to the acceleration speed curve changing rate, smaller value means elevator start with smooth and gentle increase of speed.	0.1~1.0	0.7	m/s^2	N	6-2
F1-11	B2 Deceleration B2	B2 refers to the deceleration speed curve changing rate, smaller value means elevator brake with smooth and gentle decrease of speed.	0.1~1.0	0.7	m/s^2	N	6-2
F1-12	S P1 S Curve P1	P1: Acceleration speed increase rate at beginning of elevator start; smaller value means beginning of elevator start with slow and steady movement.	0.1~1.0	0.6	m/s^3	N	6-2
F1-13	S P2 S Curve P2	P2: Acceleration speed decrease rate at end of elevator start; smaller value means end of elevator start with slow and steady movement.	0.1~1.0	0.6	m/s^3	N	6-2
F1-14	S P3 S Curve P3	P3: Deceleration speed increase rate at beginning of elevator brake; smaller value means beginning of elevator brake with slow and steady movement.	0.1~1.0	0.6	m/s^3	N	6-2
F1-15	S P4 S Curve P4	P4: Deceleration speed decrease rate at end of elevator brake; smaller value means end of elevator brake with slow and steady movement.	0.1~1.0	0.6	m/s^3	N	6-2
F1-16	 Zero Speed	Motor speed less than set value, system considers elevator speed as zero and output brake signal.	0~10	1	RPM	Y	6-4
F1-17	 Leveling Adj	Adjust differences of up/down leveling	0~100	50	mm	N	6-13
F1-18	 Load Adj	Normally used in synchronous machine system, compensate elevator load based on steel rope weight difference on each floor.	0~20	0	--	Y	6-12

Acceleration B1, deceleration B2, S curve P1, P2, P3, P4 work together to determine the final speed curve and its trend.

Table 5.9 Running Setup Parameters List (Cont'd)

Para No.	Display (In Chinese) Display (In English)	Content	Range	Factory Setting	Unit	Live Chang	Ref Page
F1-21		Selection of driving mode ,when setting "1",					

5.4.4. Input type setup Parameters (F3)

Table 5.11 Input Type Setup Parameters List

Para No.	Display (In Chinese) Display (In English)	Content	Range	Factory Setting	Live Chang	Ref Page
F3-00	Input Type	Setting the input type on main control panel. Each bit corresponds to one terminal. Set default level of main board input port. **ON:** Close enable, **OFF**: Open enable.	0 4294967295	3974102631	N	6-10 6-11
F3-01	Car Input Type	Setting the input type of cabin. Each bit corresponds to one terminal. **ON**: Close enable, **OFF**: Open enable. Point correspond to X32-X35, I0-I19.	0 4294967295	4294573839	N	6-10 6-11
F3-02	1 Input select 1	X12 Input Function Selection	0~32	12	N	
F3-03	2 Input select 2	X18 Input Function Selection	0~32	18	N	
F3-04	3 Input select 3	X27 Input Function Selection	0~32	27	N	
F3-05	4 Input select 4	NO SUCH FUNCTION	0~32	24	N	
F3-06	5 Input select 5	NO SUCH FUNCTION	0~32	25	N	
F3-07	1 output select 1	NO SUCH FUNCTION	0~32	0	N	
F3-08	2 output select 2	NO SUCH FUNCTION	0~32	11	N	
F3-09	3 output select 3	NO SUCH FUNCTION	0~32	12	N	

IMPORTANT

When using X22 and X23 as multifunctional input port, please make sure the re-leveling device is NOT used.

5.4.5. Service Setup Parameters (F4)

Table 5.12 Service Setup Parameters List

Para No.

5.4.6. Motor Setup Parameters (F5-F6)

Table 5.13 Motor Setup Parameters List

Para No.	Display (In Chinese) / Display (In English)	Content	Range	Factory Setting	Unit	Live Chang	Ref Page
F5-00	Motor Type	Set motor type (0:sync- outer rotor, 1:async machine, 2:sync-inner rotor)	0 2	0	--	N	6-14
F5-01	Poles	Moto poles (Nameplate)	1~99	20	--	N	6-14
F5-02	Sync Freq	Motor synchronous frequency (Nameplate)	0.001~99.999	16	Hz	N	6-14
F5-03	Rated Power	Motor rated power (Nameplate)	1~50	6.7	kW	N	6-14
F5-04	Rated Speed	Motor rated speed (Nameplate)	1~1999	96	RPM	N	6-14
F5-05	V IN	Motor counter-EMF (Nameplate)	1~380	280	V	N	6-14
F5-06	L_phase	Motor phase inductance set. (Auto-tuning/ manual input)	Auto-tuning /Nameplate		mH	N	6-14
F5-07	R_phase	Motor phase resistance set. (Auto-tuning/ manual input)	Auto-tuning /Nameplate		Ω	N	6-14
F5-08	Rated FLA	Motor rated current. (Nameplate)	0 99.999		A	N	6-14
F5-09	NO-Load Current	For asynchronous machine, no-load excitation current.	0.1~50	0	A	N	6-14
F5-10	Rated Slip	For asynchronous machine rated slip. (Nameplate)	0.1~10	1.3	HZ	N	6-14
F6-00	Carrier Freq	Set controller carrier frequency.	6~15	8	kHz	N	--
F6-02	=						

5.4.7. Multiple PI Setup Parameters (F7)

Table 5.14 Multiple PI Setup Parameters List

Para No.	Display (In Chinese)	Content	Range	Factory Setting	Unit	Live Chang	Ref Page

5.4.8. Encoder Setup Parameters (F8)

Table 5.15 Encoder Setup Parameters List

5.4.9. Control Setup Parameters (F9)

Table 5.16 Control Setup Parameters List

Para No.	Display (In Chinese) / Display (In English)	Content	Range	Factory Setting	Unit	Live Chang	Ref Page
F9-00	Max Torq Comp	Maximum torque compensation (torque required to compensate at no load, 100% correspond to machine rated torque.)	0~100%	0	%	N	6-17
F9-01	SPDSourceSel	Speed given source selection: 0: Simulation; 1: Multi-segment 2: Internal; 3: Operator	0~3	2		N	6-14
F9-03	Spderr Set	Speed Deviation Set (100% correspond to machine rated speed.)	0~100	5	%	Y	--
F9-11	Load Comp Enable	Load Compensation: 1 enable; 0 Unable	0/1	1	--	N	6-17
F9-13	Load Source Sel	Weighing source (0:SJT weighing, 1:-10-10V weighing, 2:0-10V weighing)	0/1/2	0	--	N	6-17
F9-19	UP Comp Bias	Up direction (clockwise) Compensation Bias	100 100	0	--	Y	--
F9-20	DOWN Comp Bias	Down direction (anti- clockwise) Compensation Bias	100 100	0	--	Y	--
F9-21	FULL Comp Pro	Full load compensation proportion	0 200	100	--	Y	--

5.4.10. No-load Compensation Setup Parameters (FA)

Table 5.17 No-load Compensation Setup Parameters List

Para No.	Display (In Chinese) / Display (In English)	Content	Range	Factory Setting	Unit	Live Chang	Ref Page
FA-00		Start-up pr.515.1 Tf-0.004 Tc 0.004 0.72 re1 >B.72 r004 0ti1 >B.72 rn1 >Ba1 >Bl.004 ga1 >B					

Chapter 6: Parameters Setup

6.1. Elevator Running Speed Setup

6.1.1. Elevator Rated Speed, Motor Rated Speed, Encoder pulses Setup

1. Elevator rated speed (F1-00) can be calculated through motor RPM, traction ratio, reduction ratio and traction sheave diameter.



Elevator rated speed is used for calculating the ratio between motor rated speed and elevator speed, modifying this parameter cannot change the actual running speed of elevator; if need to change elevator running speed, please modify parameter F6-02 (Speed Zoom)

2. Motor rated speed (F1-01) is the speed of traction machine (RPM) under elevator rated speed.

3. Encoder Pulse (F1-02) is the pulse number of encoder for hoistway counting at elevator running.

4 .Motor rated speed and elevator rated speed much follow the condition below:

$$\text{Elevator rated speed} = \frac{\text{Motor RPM} \times \text{traction sheave diameter} \times 3.14 \times \text{speed reduction ratio}}{60 \times 1000 \times \text{traction ratio}}$$

For example: Motor rated speed is 1370 rev/min., traction sheave diameter 590mm, speed reduction ratio: 2/53, traction ratio 1/1, then:

After setting elevator rated speed, motor rated speed, encoder pulse number, system record the relationships between traction ratio, speed reduction ratio, traction sheave diameter and relationships between shaft counting pulse and running distance. If the setting is incorrect, the following problems may happen:

1. The elevator running speed on digital operator or software is different with the elevator actual running speed.

For example, if encoder pulse or motor rated speed is set to a smaller value, speed indicated on the display will be higher than actual speed, after hoistway learning, floor height learned by the system will be larger than actual height.

2. As the floor height learned by the system is higher, the elevator deceleration curve will be steeper than the setting. This could result elevator cannot leveling sometimes (running out of leveling zone with sudden brake).

6.1.2. Inspection Run Speed

In inspection mode, elevator runs in slow inspection speed (F1-03), based on international standard, such speed should be no more than 0.6m/s. After elevator reaches top or bottom terminal, the running speed will be reduced to half of the inspection speed.

If bottom/top terminal (X8/X7) is valid, elevator slow down to 1/2 inspection speed to prevent exceeding the limit.

When up/down jogging is removed, speed given will be instantly 0 without deceleration curves.

6.1.3. Rescue Speed

Under two conditions will elevator run in rescue speed (F1-05):

1. Due to fault or other reasons, elevator stops outside leveling zone, after elevator restores, it runs in rescue speed to the nearest floor and open door to release passengers;

2.When there is a hoistway counting error (ER14, Er18), elevator will run at rescue speed to the bottom floor for recalibration; After elevator reaches the bottom terminal, elevator will run at 1/2 of rescue speed to the bottom leveling position.

6.1.4. Least Speed

Least speed curve (F1-06) limits the lowest speed generated in the system. System will choose the elevator speed based on running distance, but the lowest speed is limited here. For certain site with very small floor distance, reduce this value could achieve normal running on this floor. Otherwise

Elevator running comfort level can be set through the above 6 parameters. (Comfort level is also related to the drive control parameters.)

The relationship between **b1, b2, P1, P2, P3, P4** and running curve are shown in Fig. 6.2.

Increase parameters value, the corresponded curve will be steeper. While decreasing value will smooth the corresponded curve. Adjusting the above six parameters properly can reach good comfort level at elevator running, and meet the related standard.

6.3. Elevator Running Timing Diagram

6.3.1. Timing Diagram for Normal Running

The timing diagram for normal running is shown below in Fig. 6.3

If smooth start running speed (F1-04) is set to "0", smooth start running function will be disabled; smooth start time (F2-13) will be disabled too.

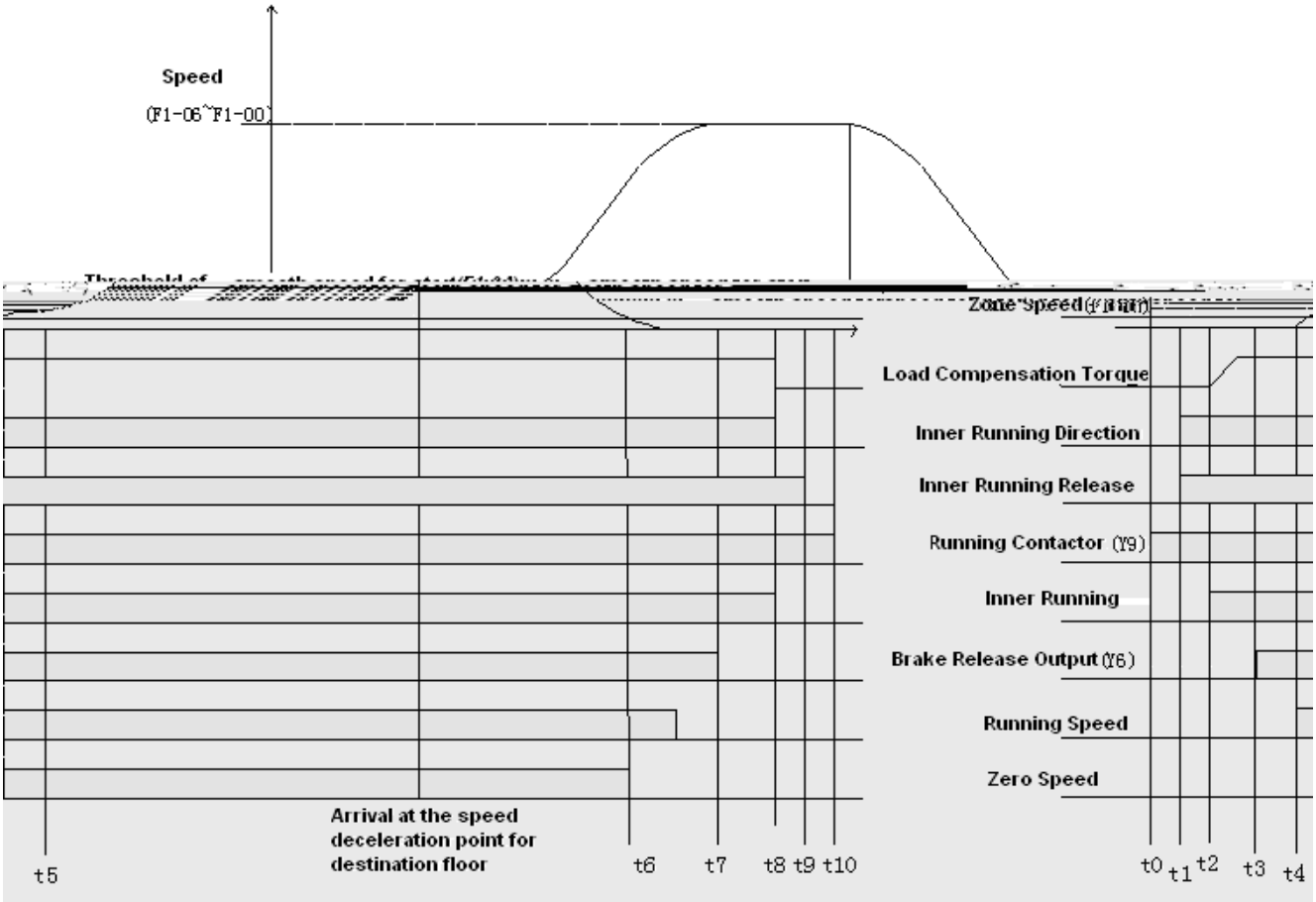


Figure 6.3 Elevator Timing Diagram for Normal Running

Detail explanation of timing diagram for elevator normal running is explained below in Table 6.1

Table 6.1 Timing definition for Elevator Normal Running

Time	Definition and Setup Instruction
t0~t1	

6.3.2. Timing Diagram for Inspection Running

Timing diagram for elevator inspection running can be seen below in Figure 6.4

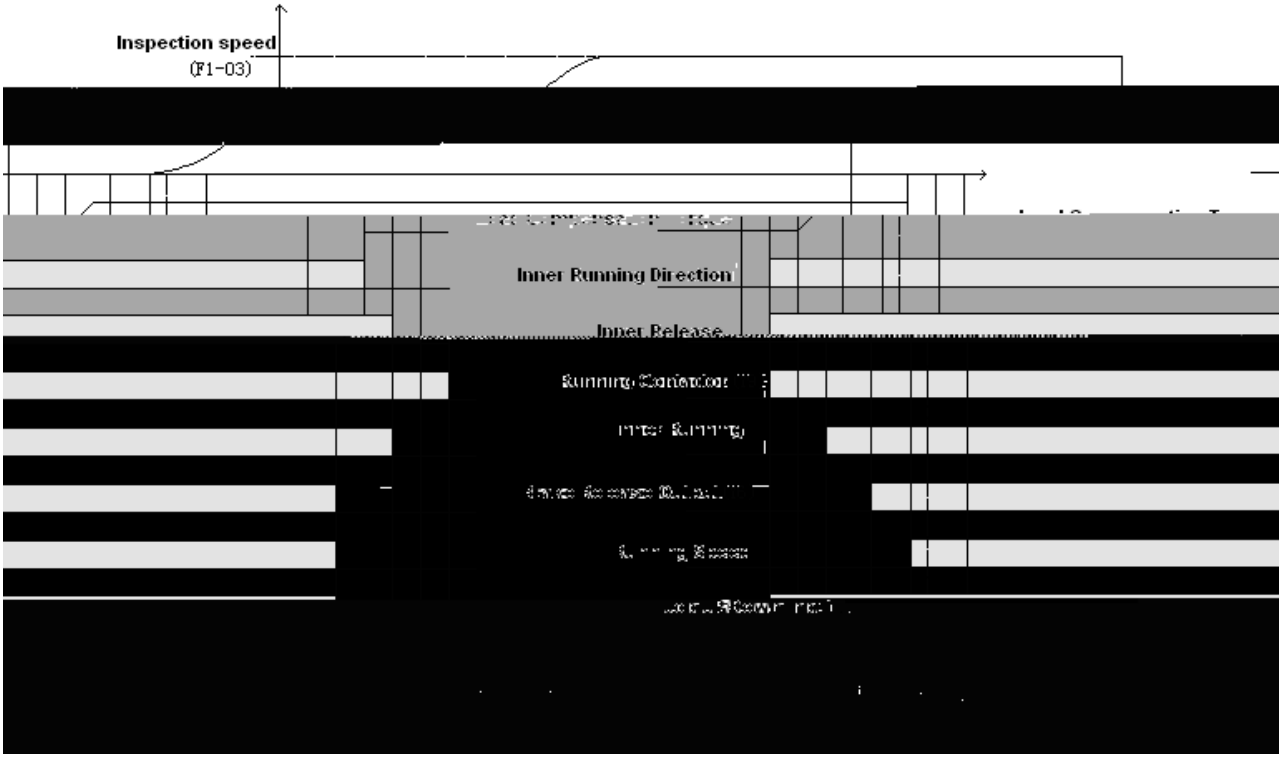


Figure 6.4 Timing Diagram for Elevator Inspection Running

Definitions and instructions for timing diagram above are shown below in table 6.2

Table 6.2 Timing Definition for Elevator Inspection Running

Time	Definition and Setup Instruction
t0~t9	Definition for t0~t9 are the same with elevator normal running Inspection braking time (F2-02): At inspection running stop, system will not wait for elevator zero speed to close brake. WImp, -3(to)-1(c)-2(l)[(Ti)12(me)]TJ0 57 0 Tw 0.909 0 Td
ta~t8	

6.3.3. Timing Diagrams for Rescue Running

Figure 6.5 Timing Diagrams for Rescue Running (Same definition & setting with Normal Running)

6.3.4. Timing Diagram for Recalibration Running

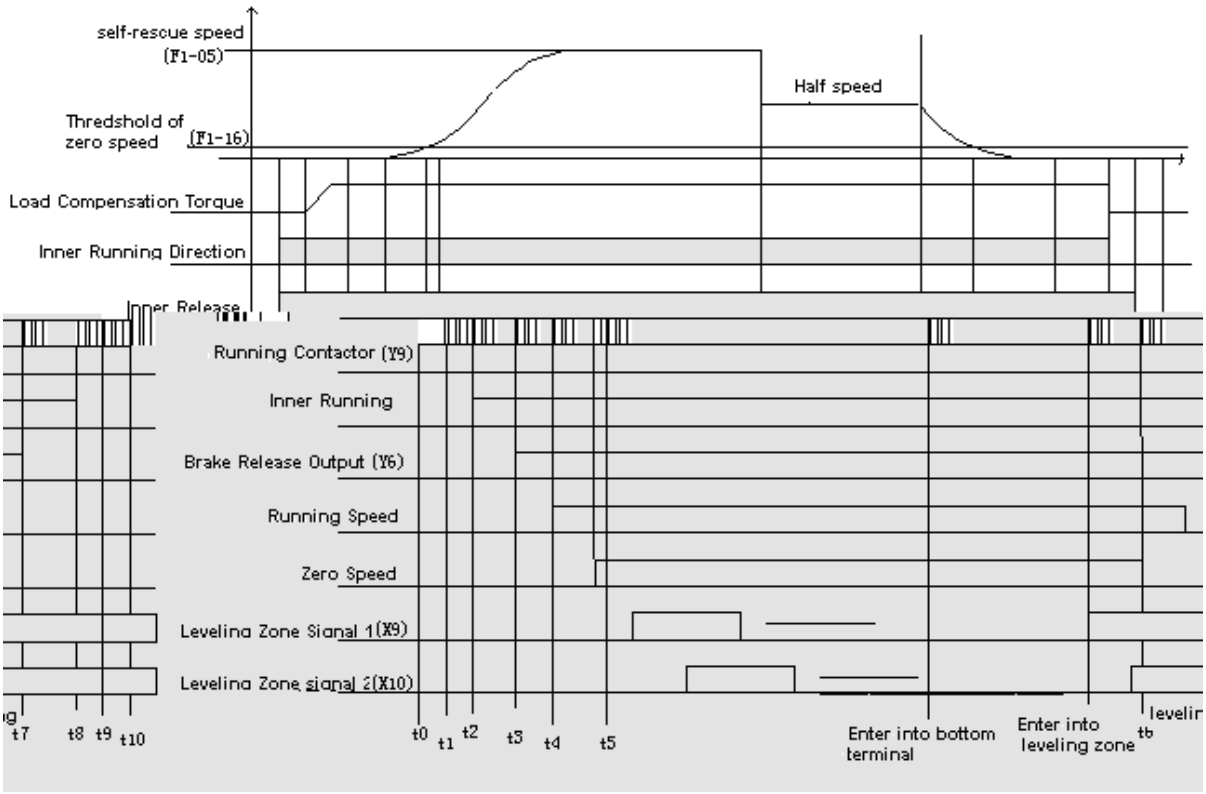


Figure 6.6 Timing Diagrams for Recalibration Running (Same definition & setting with Normal Running)

6.4. Door Control

6.4.1. Door Open/Close Control

For door control, door open and close time is the related parameter; door limit is the related signal. Timing diagram for door open and close can be seen below in Figure 6.7 and Figure 6.8.

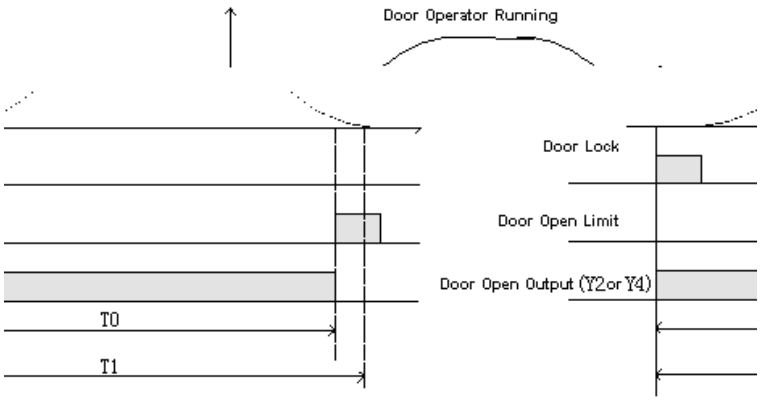


Figure 6.7 Timing Diagram for Door Open

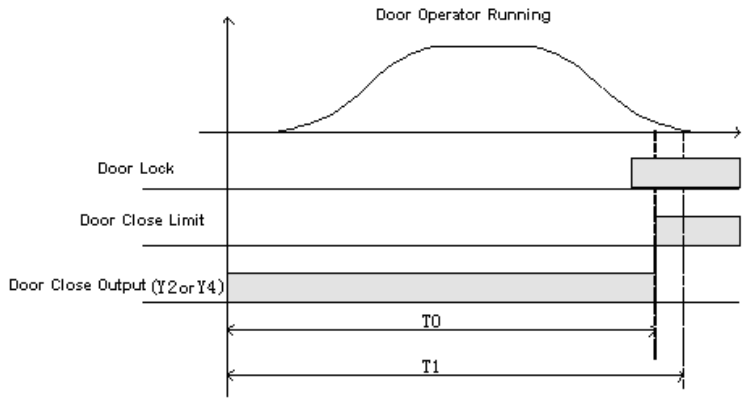


Figure 6.8 Timing Diagram for Door Close

T0: The actual door-drive running time for door to open or close completely;

T1: Door open or close time (F2-08).

T1 should be 1s more than T0 to ensure the do.d m0 Td( )Tj-0..01l(a)-1(r)-6(a)-1(m)1(e)-5(t) Tw 1.08 0 Tdn(1)]TJ(0)-7nand

6.4.2. Door Open Holding Time

Elevator run in auto mode, after landing, door open, and door will hold for following time:

1. After landing, door open, if elevator has t ari aeingai(e)- t4e

Electric lock input (X20) valid, set auto parking (F1-28) as 1, automatic start time (F2-14), automatic stop time (F2-15) to correspond value to enable this function.

Electric lock input (X20) invalid, elevator will enter parking state; cannot set auto start/stop function.

In elevator auto stop time and elevator need to run temporarily, turn the electric lock to invalid and restore to valid, elevator will run. After the running, operate the electric lock in same procedures, elevator will re-enter lock mode, until reach auto-start time, then it starts running again.

6.7. Fireman Operation Function Setup

Controller has three kinds of fireman operation mode; fireman mode (F1-23) can be set as “0, 1, and 2”:

0: Normal fireman mode: When fireman input is valid, elevator lands to the nearest floor but doesn’t open door, then it returns to the fireman floor(F0-02), it opens door and stops, meanwhile it enters into the fireman mode, elevator can run in fireman standard.

1: Fire emergency stop mode: When fireman input is valid, elevator lands to the nearest floor but doesn’t open door, then it return to the fireman floor (F0-02), it opens door and stops. Meanwhile elevator stops running, until fireman input is eliminated.

2: Fireman control mode:

It includes two steps, step 1 is fire emergency return, and step 2 is fireman operation. Only after elevator returns to the fireman floor could step 2 be operated.

1. Fireman input switch

6.8.2. Rear Door Condition Setup

Front door setting parameter (F4-04) and rear door setting parameter (F4-05) are required to set front or rear door open on certain floors. In single door mode, these two parameters are invalid. In rear door mode, if set F4-04 to "ON" for some floors, front door can open on these floors, if set F4-04 to "OFF", front door cannot open on these floors. This is same for rear door setup. Please set both doors condition based on actual situation to avoid door open mistake.

6.9. Input Type Setup

Input type on main control board (F3-00) and COP board (F3-01) can be changed based on actual ON/OFF state.and

Table 6.3 Input Type Setup (Cont'd)

Name	Port	Position	Definition	Parameters	Default Input Level	Output Switch Default State	Indicator Default State
Main Control Board F3-00	X29+	J6-3	Emergency Stop Input +	F3-00-29	ON	OPEN	OFF
	X29-	J6-4	Emergency Stop Input -				
	X30+	J6-5	Door Interlock Input +	F3-00-30	ON	OPEN	OFF
	X30-	J6-6	Door Interlock Input -				
	X31+	J6-7	Spare +	F3-00-31	ON	OPEN	OFF
	X31-	J6-8	Spare -				
oard F3-01	KMV1	J9-2	Door open limit 1 Input	F3-01-07	OFF	CLOSE	
	GMV1	J9-3	Door close limit 1 Input	F3-01-06	OFF	CLOSE	
	KMV2	J10-5	Door open limit 2 Input	F3-01-05	OFF	CLOSE	
	GMV2	J10-6	Door close limit 2 Input	F3-01-04	OFF	CLOSE	
	KAB1	J9-4	Safety Plate 1 Input	F3-01-18	OFF	CLOSE	
	KAB2	J9-7	Safety Plate 2 Input	F3-01-17	OFF	CLOSE	
	CZ	J9-5	Over load Input	F3-01-15	ON	OPEN	
						OPEN	

b) Move the empty elevator to bottom floor, increase load compensation adjustment parameter until elevator runs up from bottom floor with no sliding;

c) The adjustment range for this parameter should be 0-12.

6.12. Duplex Control Setup

Controller has internal integrated duplex module, two elevators are connected through CAN1 in parallel, co-1(l)-7d [(c)sTd [(C)-3(A)-2(26[)-6(in pa)11(r)-5c -0.004 Tw 2.682 0 Td [(r)(u)9(gh)]c 0 Tw 15.4r,bm227 0 -3(m)-</MC

6.16. Special Function Selection

To meet certain special requirements from customers, this control system has included some customized functions (F4-06).

Table 6.4 Special Function List

Number	Instruction
F4-06-00	After elevator stops, based on current floor, if there is no landing/car call ahead of the current floor in previous running direction, system will cancel all the car calls.
F4-06-06	ON: For 7-segment display, Y25 is inspection mode output (must ensure the highest digit is not used). For other display mode, inspection mode output do not require to set Y25.
F4-06-07	ON: At elevator running, direction arrow output with flash.

6.17. Motor Parameters Setup

First, please set the motor parameters based on actual machine.

F5-00: motor type. 0: synchronous outer rotor machine; 1: asynchronous machine, 2: synchronous inner rotor machine.

Please make sure the machine type is set correctly, as system will perform motor auto-tuning and vector control based on motor type.

Also, please input following motor parameters based on the machine nameplate or user manual to ensure the accuracy of system generated motor digital model and vector control coupling.

1. F5-01: Motor poles
2. F5-02: Motor rated frequency
3. F5-03: Motor rated power
4. F5-04: Motor rated speed (RPM)
5. F5-05: Motor back-EMF

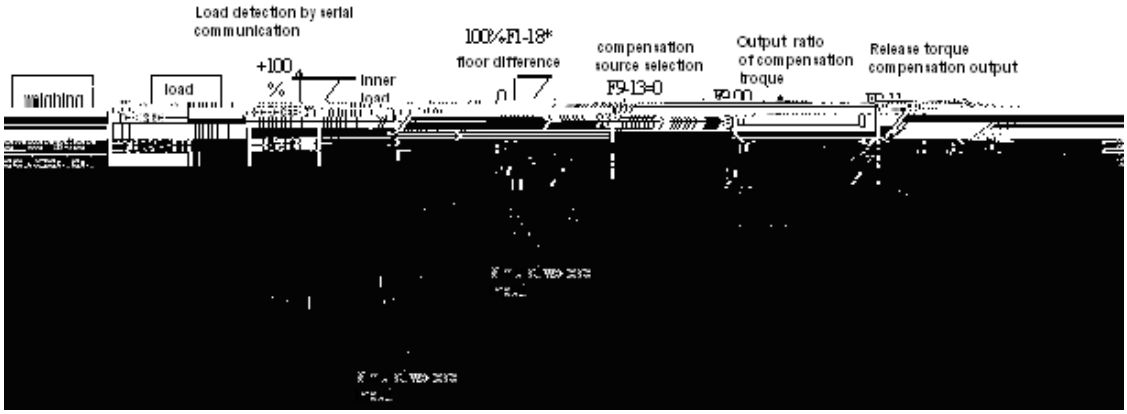


Figure 6.14 Load Compensation Torque Output Control

2) Weighing compensation invalid, confirms F9-11 is set to "0" to disable weighing compensation and enable FA group parameters.

3) Drive software version, confirm version is 0005 or above.

2 Adjustment method for elevator starting without load compensation:

1) Principles: As can be seen in figure 6.16 below, when brake open, based on the position feedback from Sine/Cosine PG card, system can calculates the necessary torque required for motor to remain the steady position under current load, and it gives corresponded torque at once to minimize the traction sheave movement and to achieve comfortable start.

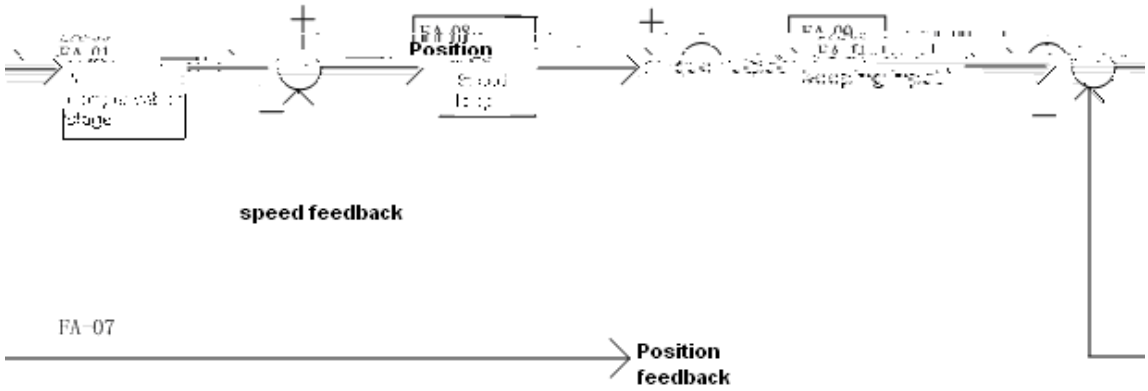


Figure 6.16: Flowchart for elevator starting without load compensation

2) Parameters Parameters related to function can be seen below in table 6.5.

Table 6.5 Elevator start without load compensation parameters list

Parameters No.	Display in Chinese Display in English	Factory Setting	Fast Brake Recommendation	Slow Brake Recommendation
FA-00	StratKP	30	KEEP	KEEP
FA -01	StratKI	750	KEEP	KEEP
FA -08	1 PLKP1	3600	4800	3600
FA -09	PLTime	900	700	KEEP
FA -11	1 PLKP2	800	KEEP	KEEP
FA -12	PLKPMOD	125	KEEP	KEEP
F2-00	Brake ON Time	0.5	0.9	1
F9-00	Max Torq Comp	0	KEEP	KEEP
F9-11	Load Comp Enable	1	0	0

3) Adjustment method: Main parameters used are FA-08, FA-09 and FA-11.

FA-09

This parameter is the working time for starting without load compensation after brake opens, it must be set according to the actual brake opening time, if the time is too short, elevator will slip as this action will be over before brake fully opened; Also the value of F2-00 (brake opening time before running) must be 100ms longer than the value of FA-09, so that this action can finish before speed curve start.

FA-08 and FA-11

Two gain parameters for the starting without load compensation action, these two parameters can be adjusted according to the elevator slipping condition and comfort level, if the slipping is too much please increase the value of FA-08; if the traction machine gets vibration, please reduce this value; during the period of torque keeping, if there is slight slipping or small back-and-forth movement on traction sheave, please increase the value of FA-11, if there is vibration, please reduce this value.



1. During commissioning, besides the mentioned 3 parameters, other FA group parameters can be kept with factory setting.



2. For different versions of program, the name of FA group parameters might be different, but their positions remain the same. As a result, only adjust FA-08, FA-09, FA-11 despite the operator version.



3. The setting value of above parameters is just for reference, as the PG card is not same in different job side; please adjust above parameters based on site condition.



4. F9-00 is the pre-set torque when the starting without load compensation function is enabled. Generally there is no need to change its value, please keep it with factory setting (0)

Chapter 7: Commissioning

7.1. Important Reminder

1. Thanks for purchasing our product, please read this manual and related instruction thoroughly before processing with installation, connection (wiring), operation, maintenance and inspection. To avoid any damage/loss of the products or accident to people, please make sure you have sound knowledge of the device and familiar with all safety information/precautions before processing to operate the control system.
2. Before commissioning and running the product, please read the manual carefully and refer to this manual during commissioning and running.
3. Make sure that all the mechanical devices are installed properly beforehand, especially the devices in hoistway (the devices that should be set in the machine room1(r)-6(bp1(r)-6(b1(n)-1(d)-s(g)2(o)1(n)-1(2)3(h)-1(e)-52(s)2(i)-(2)1(u)

7.6.1. Tuning Procedures for Machine with Incremental Encoder

1. Synchronous motor (traction machine) must not have any load (don't hang on steel ropes);

2. Short circuit running contactor output Y 9 (J4-7) and COM3 (J4-6) to make it close;

3. Short circuit brake contactor output Y6 (J4-10) and COM3 (J4-6) to make it close and open brake;

On digital operator, tuning initial angle is as follows:

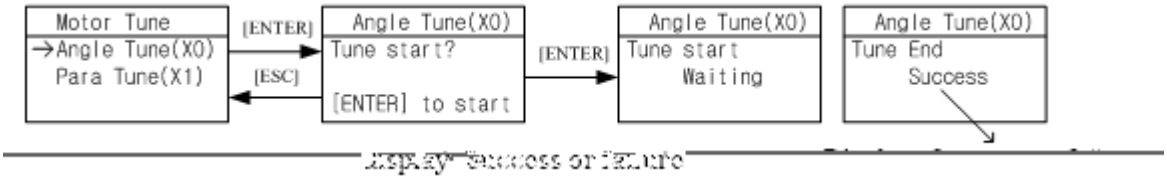


Figure 7.3 Motor Initial Angle Tuning flowchart

After pressing "Enter", tuning starts. Motor vibrate at beginning or runs forward / reverse a little, then it accelerates forward to a certain speed facing to traction sheave, anticlockwise rotation is forward direction , after 20s of constant speed running, motor stops; Then it accelerates forward to a certain speed, and after 20s running in constant speed, it stops again; Then it accelerate forward to a certain speed in third time, and after 20s running in constant speed, it stops and indicates "Success". The whole tuning procedure lasts around 80s.

After tuning successful, perform a test run according to chapter 4 "4.4 Parameter commissioning in Digital Operator". Make traction machine accelerate forward from zero speed to rated speed, run it in constant speed for a while and observe the running condition; make motor run in opposite direction in same way.

After test run with digital operator, please remove the short circuit on "running contactor output" and "brake control output". Press jog up button on control cabinet to perform inspection running, observe motor running condition; Then press jog down button on control cabinet to perform inspection running, observe motor running condition.

When jog up (down), if the real running direction of cabin is down (up), please set F6-03 to correct it. 0: anticlockwise rotation is down, 1: anticlockwise rotation is up, set based on actual site condition.

After the above test running is finished, attach the steel rope and run motor with load.

For the site already had the steel rope, it can also perform the static initial angle tuning, the processing and notes can be seen in chapter 7.6.2.2.

7.6.2. Tuning Procedures for Motor with Sine/Cosine Encoder

For synchronous motor with Sine/Cosine Encoder, there are two methods for tuning initial angle.

7.6.2.1 Rotation Tuning

For this tuning method, make sure the motor have no load and brake is released.

Procedures required before tuning:

1. Ensure synchronous motor (traction machine) has no load (DO NOT attach steel ropes);

2. Short circuit running contactor output Y9 (J4-7) and COM3 (J4-6) to make it close;

3. Short circuit brake contactor output Y6 (J4-10) and COM3 (J4-6) to make it close and release the brake;

Set tuning method parameter FX-20 to “0” on digital operator (0: rotation tuning, 1: static tuning), after setting motor parameters (F5) and encoder parameters (F8) correctly, perform motor initial angle tuning based on the following procedures shown in Figure 7.3:



Figure 7.3 Motor Rotation Tuning on Initial Angle flowchart

After pressing “Enter”, tuning starts. First, motor rotates to a firm position, then it rotates forward facing to driving shaft, anticlockwise rotation is forward direction in a constant speed, rotation speed and time depends on the pole number and initial position, it stops after maximum one round rotation, then it rotates to one position and remains for 2 s again, motor stops and indicates success. The whole tuning procedure lasts less than 20s.

After tuning successful, perform a test run according to chapter 4 “4.4 Parameter commissioning in Digital Operator”. Make traction machine accelerate forward from zero speed to rated speed, run it in constant speed for a while and observe the running condition; make motor run in opposite direction in same way.

After test run with digital operator, please remove the short circuit on “running contactor output” and “brake control output”. Press jog up button on control cabinet to perform inspection running, observe motor running condition; Then press jog down button on control cabinet to perform inspection running, observe motor running condition.

When jog up (down), if the real running direction of cabin is down (up), please set F6-03 to correct it. 0: anticlockwise rotation is down, 1: anticlockwise rotation is up, set based on actual site condition.

3. Make sure elevator can start, accelerate, decelerate and leveling normally in normal speed running.

4. If running is abnormal, please check for parameters setting.

7.10. Elevator Comfort Level Adjustment

If comfort level and leveling accuracy of elevator running are not perfect, please follow procedures blow. First, check the mechanical system condition (Such as clearance of guide shoes, lubricating, steel rope, position of the rope hitch plate and else.)which might influence the comfort of elevator running. After checking all the mechanical parts, then do adjustment in controller.

As the controller control the motor running according to the given starting/braking speed curve, therefore shape of the given speed curve, motor feedback speed to controller and the timing logic of controller signals directly influence the comfort level of elevator running.

7.10.1. Adjustment for Start/Brake speed curve

Elevator running speed curve is shown below in Figure 7.5.

2. Three parameters adjustment for motor braking S curve:

1) **P3**: Deceleration increase at start of braking section, it means the rate of deceleration change, smaller value means slower at start of braking section is, smoother running period and lower efficiency. On the other hand, faster at brake starting section means higher efficiency for elevator running.

2) **b2**: Deceleration in braking section, it means the rate of elevator speed change. Smaller value means the slower braking section, the smoother running period and the lower efficiency. On the other hand, faster at braking section means higher efficiency for elevator running.

3) **P4**: Deceleration decrease at end of braking section, it means the rate of deceleration change. Smaller value means slower at end of braking section, smoother running period and the lower efficiency. On the other hand, faster at brake ending section means higher efficiency for elevator running.

Commissioning at jobsite need to first guarantee the elevator running efficiency, then adjust the above 6 parameters to achieve optimal elevator running curve.

7.10.2. Follow & Adjust Running Curve

To achieve the maximum level of comfort, integrated controller must control the motor and make feedback speed strictly following the change of running curve.

As the controller establishes the mathematic motor module based on the motor parameters input by the customers, and controller perform decoupling control by this module on motor starting/braking. Therefore, customer

7.11. Leveling Precision Adjustment

Leveling precision adjustment should be performed after comfort level adjustment is satisfied.

7.11.1. Basic Conditions for Elevator Leveling

1. Make sure the leveling switches and leveling inductor plates are installed in the right position.
2. Leveling inductor plates length on every floor must be same.
3. Leveling inductor plates must be installed vertically.
4. The position of leveling inductor plates should be precise. When elevator is at the leveling position, the center of the plate and center of two inductors should match together (refer to appendix), otherwise elevator leveling will have deflection, which means in up or down running, elevator stops higher or lower than leveling position.
5. If magnetic inductors are adopted, please make sure the inductor plates inserting to the inductor sufficiently, otherwise it will influence the reaction time of inductor, in that way elevator will overruns the leveling position.
6. To ensure precise leveling, system require elevator to crawl for a certain distance before stop.
7. In practice, first make adjustment for a middle floor, until leveling is precise. Then, adjust the other floors on the base of these parameters.

After adjusting curve selection, ratio and integral gain in the above con

Table 8.1 Elevator System Fault List (Cont'd)

Error Code	Definition	Possible Solution
Er19	The deceleration distance for target floor is not enough, elevator did not perform hoistway parameter learning after changing terminal	1. Decrease “Least Speed” in user menu; 2. Do hoistway parameter learning again.
Er20	When elevator reaches top/bottom floor and get deceleration instruction, but elevator doesn’t slow down; elevator did not perform hoistway	1. Check the braking resistor specification 2. Increase controller PI gain parameters.

8.2. Hoistway Parameter Self

Table 8.4 Motor Initial Angle Rotation Tuning Fault List 1 (Cont'd)

Error Code	Definition	Possible Causes	Possible Solution

Table 8.7 Motor Initial Angle Static Tuning Fault List (Cont'd)

Error Code	Definition	Possible Causes	Possible Solution
PF237	Motor is not held still	Motor brake is not close or brake is too loose	Check motor brake.
	Tuning results error too large	After tuning 3 times, tuning results have large differences.	Check motor and encoder wiring ground condition.
PF238	Detection current is too small	Motor/Controller connection is incorrect.	ref556.32 657.6 3 5c 6T95m16P54.[(Pw1(F7)3.5

Motor Parameter Static Tuning Faults

Table 8.8 Motor Parameter Static Tuning Fault List

Error Code	Definition	Possible Causes	Possible Solution
PF2	Initial fault	1. Motor parameters input incorrect; 2. Motor/Controller connection error.	1. Input correct motor parameters; 2. Check motor/controller connection.
PF3	Motor resistor tuning result error.	1. Input motor data is incorrect; 2. Wire not secured on terminal block.	1. Check input parameters; 2. Check the motor wiring and secured them on terminal block.
PF4	Motor leakage inductance tuning result error	1. Input motor data is incorrect; 2. Motor/Controller connection error.	1. Check input parameters; 2. Check motor/controller connection.
PF237	Motor is not held still at initial tuning period.	Motor brake is not close or brake is too loose, causing sheave move during initial tuning period	Make sure motor brake is tightly closed.
PF238	Current too small at initial tuning period.	Motor/Controller connection error.	Check motor/controller connection.

Chapter 9: Maintenance

This chapter describes precautions and notes for drive storage and maintenance.

9.1. Safety Precautions for Drive Maintenance & Storage

9.3. Routine Inspection

In order to increase the life time of controller and make sure the safety operation of elevator, it is necessary to check and inspect controller in a routine basis. At routine check, first switch elevator to inspection mode, stop elevator operation and cut system power. Then please perform inspections procedures based on table 9.1, following safety precautions and notes mentioned above.

Table 9.1 Routine Inspection Check List

9.4. Quick Wear parts

Controller is made from many components inside, all these parts have their lifetimes, and they depends on environment and working condition. As a result, in order to increase the life time of controller and make sure the safety operation of elevator, it is necessary to check and inspect some of these parts in a regular basis, replace them if needed. Table 9.2 below is the components change standard.

Table 9.2 Component change standard

Item

5. Power cable should be connected to inverter use RFI filter or output reactor. Motor cable should be connected with output filter (sine/cosine filter) or install output reactor. Another solution is to surround motor cable twice with ferrite magnetic circle.
6. Other device that are easy to get interference should be put far away from the controller and power cable.
7. [illegible]

5. Power cable, motor cable and brake resistor cable (if necessary) shield/armor must be connected to the ground public terminal.
6. The distance from cable shield to ground public terminal should be <50mm.
7. Ground connection wire should have low impedance (large cross sectional area and short in length).
8. Power cable should have 5 core (U,V,W, neutral & ground) with shield, motor cable should have 4 core (U, V, W, ground) with shield. For motor cable ground wire, one terminal should be grounded at controller side, another terminal should be grounded at motor side.

10.3.4. Leakage Current

Leakage current happens between wire and to ground, it depends on wire capacitance and controller carrier frequency. Leakage between wire is related to wire capacitance between controller input (power cable) and output (motor cable), controller carrier frequency, motor/power cable cross sectional area and length, while leakage current to ground is located at ground public terminal, it will get into the system and (in some case) affect other electrical devices through ground connection.

Countermeasure for leakage current:

1. Reduce controller carrier frequency;
2. Keep the power and motor cable as short as possible;
3. Power and motor cable cross sectional area should not be too big;
4. For long motor cable (>50m), controller output should have filter or reactor;
5. Should equip inverter use leakage current circuit break.

10.3.5. Power Line Filter

The power line filter is two-way low pass filter which only permits flowing of DC current or 50HZ operating

10.4. EMC standard satisfied by Integrated Controller

When install integrated controller and EMI filter, if the installation procedures are following EMC installation guide, then the system could meet the standards below:

EN61000-6-4 EMC test in Industrial Environment 1800-3

EN61800-3 EMC Standard (2nd Level Environment)

EN61000-6-3 EMC Standard (Residential Environment)

EN61000-6-4 EMC Standard (Industrial Environment)

Table 11.2 Terminal J4 input signal I11-I12 Definition (assume main board only have 5/6 floor output in full/single collective control)

Terminal Number	Location

Table F1.1 Up/Down Terminal Switches with different elevator speed

Appendix 2: Parameters List

Table F2.1 Controller Parameters & Factory Setting List

Parameter	Name	Default Value	Set Value
U0-00	Lower Limit	0	
U0-01	Upper Limit	0	
U0-02	Lower Slowdown 1	0	

U0-

Table F2.1 Controller Parameters & Factory Setting List (Cont'd)

Parameter	Name	Default Value	Set Value
F0-xx	Xxth floor indicator setting	1~63	
F0-68	64th floor indicator setting	64	
F1-00	Car speed	1.60m/s	

Table F2.1 Controller Parameters & Factory Setting List (Cont'd)

Parameter	Name	Default Value	Set Value