AS380 Series Elevator Integrated Controller Operation Manual

Publication Status: Standard
Product Edition: V3.0

Menu

Chapter 1 Preface

AS380 series integrated elevator drive controller is a device designed by Shanghai Step Electric Corporation for new generation elevators. It is reliable, safe, functional and easy to operate along with excellent speed control performance. This manual is a brief instruction of the product and can be used as a reference for technicians in model selection, design, commissioning and Ispection. You can visit the company website: www.stepelectric.com to download more detailed user guide or contact related department to request the text version user guide or CD.

Chapter 2 Model Technical Indicators & Specifications of Integrated Drive Controller

See table 2.1 for all models of AS380 series integraed drive controller.

Table 2.1 Models of AS380 Series Integrated Drive Controller

Model AS380-	Nominal Capacity (kVA)	Nominal Output Current (A)	Applicable Motor (kW)
2S01P1	2.3	6.0	1.1
2S02P2	4.6	12	2.2
2S03P7	6.9	18	3.7
2T05P5	9.5	25	5.5
2T07P5	12.6	33	7.5
2T0011	17.9	47	11
2T0015	23	60	15
2T18P5	29	75	18.5
2T0022	32	80	22
4T02P2	4.7	6.2	2.2
4T03P7	6.9	9	3.7
4T05P5	8.5	13	5.5
4T07P5	14	18	7.5
4T0011	18	27	11
4T0015	24	34	15
4T18P5	29	41	18.5
4T0022	34	48	22
4T0030	50	65	30
4T0037	61	80	37
4T0045	74	97	45
4T0055	98	128	55
4T0075	130	165	75

See table 2.2 for technical indicators and specifications of AS380 series integraed drive controller.

Table 2.2 Technical Indicators/Specifications of AS380 Series Integrated Drive Controller

		2S01P5	2S02P2	2S03P7	2T05P5	2T07P5	2T0011	2T0015	2T18P5	2T0022	4T02P2	4T03P7	4T05P5	4T07P5	4T0011	4T0015	4T0018	4T0022	4T0030	4T0037	4T0045	4T0055	4T0075
Max. applicable motor capacity (kW)		1.1	2.2	3.7	5.5	7.5	11	15	18.5	22	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Nominal output	**Nominal capacity (kVA)**	2.3	4.6	6.9	9.5	12.6	17.9	23	29	32	4.7	6.9	8.5	14	18	24	29	34	50	61	74	98	130
	Nominal current (A)	6.0	12	18	25	33	47	60	75	80	6.2	9	13	18	27	34	41	48	65	80	97	128	165
	Max. output voltage (V)	200V: three-phase 220～240 (matching input voltage) 400V: three-phase 380/400/415/440/460V (matching input voltage)																					
Input Power	**Number of phase, voltage and frequency**	200V: ≤3.7kW, single or three phase; >3.7kW, three phase, the range of input voltage: 200～240V, 50/60Hz; 400V: three-phase 380/400/415/440/460V、50/60Hz																					
	Admissible voltage fluctuation range	-15%～+10%																					
	Admissible frequency fluctuation range	-5%～+5%																					
Basic Feature	**Max. floors**	2～64 for single elevator																					
	Elevator speed	≤4.00m/s																					
	Group control number	≤8																					
	Communication mode	CAN bus serial communication																					
	Functions	See 3.1 for product functions																					
Drive Features	**Control mode**	With PG card vector control																					
	Startup moment	150% 0Hz (with PG card vector control)																					
	Speed control range	1:1000 (with PG card vector control)																					
	Speed control precision	±0.02% (with PG card vector control 25±10℃)																					
	Moment limit	Yes (setup by parameters)																					
	Moment precision	±5%																					
	Frequency control range	0～120Hz																					
	Frequency precision (Temp. fluctuation)	±0.1%																					
	Frequency setup resolution	±0.06Hz/120Hz																					
	Output frequency resolution (Calculate resolution)	0.01Hz																					
	Non-load startup compensation	When lift load is unknown, impose suitable torque to the motor according to its operation direction to start it up smoothly and minimize the slipping and increase comfortable sensation during start-up.																					
	Overload capacity	Zero =150% , < 3Hz =160%, > 3Hz =200%																					
	Brake moment	150% (external braking resistor), internal braking units																					
	Acceleration/deceleration time	0.01～600s																					
	Carrier frequency	2～11kHz																					
	Battery operation	Elevator powered by battery runs in low speed to the closest floor when power cuts.																					
PG Interface signal	**PG card output power**	5V、12V, 300mA																					
	Type of PG cards	Integrated/decoupled, push-pull, difference, SIN/COS, Endat absolute value model																					
	PG card signal frequency division output	OA, OB in quadrature, frequency division factor 1～128																					
Control input/output signals	**OC input control power**	Insulation 24V DC																					
	Relay output control power	Insulation 24V DC																					
	Low voltage OC insulation input	20 ways. Switching value. OC control signal: insulation 24VDC power input signal.																					
	High voltage OC insulation input	3 ways. Switching value.																					
	Relay output 1	4 ways. normally open contact, SPST, contact capacity: resistive, 3A 250VAC or 3A 30VDC																					
	Relay output 2	3 ways. normally open contact, SPST, contact capacity: resistive, 6A 250VAC																					

		2S01P5	2S02P2	2S03P7	2T05P5	2T07P5	2T0011	2T0015	2T18P5	2T0022	4T02P2	4T03P7	4T05P5	4T07P5	4T0011	4T0015	4T0018	4T0022	4T0030	4T0037	4T0045	4T0055	4T0075
	CAN communication interface	3 ways (parallel connection or group control, lift car and outcall communication, community monitor)																					
	Analog signal input	1 way single end or difference input, input voltage range: -10V～+10V, precision 0.1%																					
Protection Functions	**Motor overload protection**	Use parameters to set up motor protection curve																					
	Transducer overload	< 3Hz = 160%, 5 sec, > 3Hz=185%, 10 sec.																					
	Short circuit protection	If overcurrent is caused by short circuit in any two phases at output side, protect drive controller.																					
	Input open-phase protection in operation	If input open phase during operation, shut down output to protect drive controller.																					
	Output open-phase protection in operation	If input open phase during operation, shut down output to protect drive controller.																					
	Overvoltage threshold	Bus voltage 410V(200V series) and 810V(400Vseries)																					
	Undervoltage threshold	Bus voltage 180V(200Vseries) and 380V(400Vseries)																					
	Instantaneous power cut compensation	Protect above 15ms																					
	Cooling plate overheat	Pass thermistor protection																					
	Prevent speed loss	Protection against speed loss (30% over rated speed) during operation.																					
	Impulse Encoder fault	PG disconnection																					
	Brake unit protection	Self check the brake unit fault for protection																					
	Module protection	Overcurrent, short circuit and overheat protection																					
	Current sensor protection	Self-check while power on																					
	Speed reversion protection	Pass encoder inspection																					
	I ²t protection	Pass three phase current inspection																					
	Protection against high input voltage	400V: >725V, 200V: >360V, inspection after stop																					
	Output earthing protection	When any one pair of earthing is short during operation, shut down output to protect inverter.																					
	Unbalance output protection	When three-phase current is measured unbalance, shut down output to protect inverter.																					
	Brake resistance short circuit protection	Inspection while braking																					
	Encoder interference	Evaluate encoder interference degree and alarm																					
	Overspeed protection	100% protection against overspeed.																					
	Low speed protection	Protection against low speed caused by fault.																					
	Operation time limiter protection	Protection against overtime passing each floor during operation																					
	Leveling switch fault protection	Protection caused by leveling switch fault																					
	EEPROM fault	Self-check while power on																					
Display	**LCD (Chinese and English)**	All menus																					
Environment	**Ambient temp.**	-10～+45℃																					
	Humidity	Below 95%RH (without condensation)																					
	Storage temp.	-20～+60℃ (short-term temp. in transport)																					
	Place to use	Indoor (without corrosive gas and dust)																					
	Elevation	<1000m																					
Structure	**Protection grade**	IP20																					
	Cooling mode	Forced wind cooling																					
Installation mode		Cabinet																					

Chapter 3 Installation Dimensions & Mass of AS380

See fig. 3.1 and table 3.1 for installation dimensions and mass of integrated drive controllers.

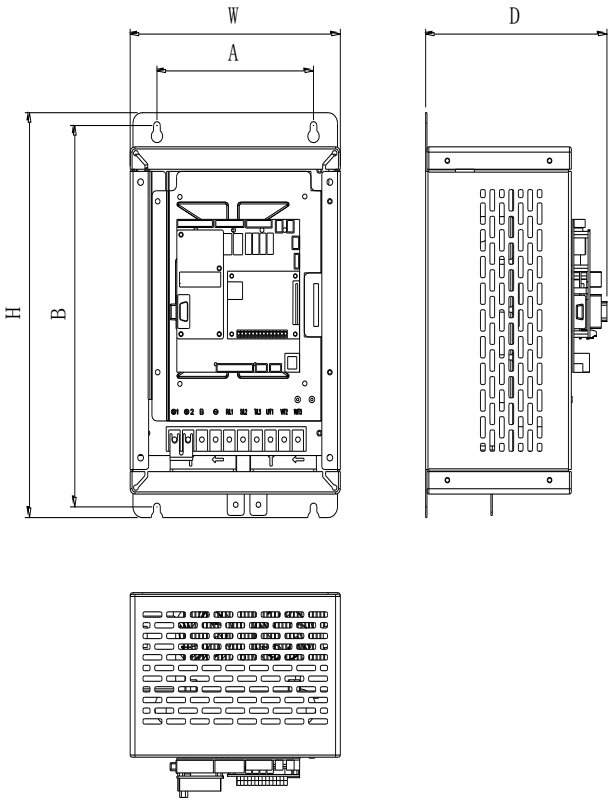


Fig. 3.1 Installation Dimensions of Integrated Drive Controller

Table 3.1 Mass Specifications of Integrated Drive Controller

Model AS380-	A (mm)	B (mm)	H (mm)	W (mm)	D (mm)	Installation hole diameter Φ(mm)	Installation			Tightening torque (Nm)	Mass (kg)
							Bolt	Nut	Washer		
2S01P1	100	253	265	151	166	5.0	4M4	4M4	4Φ4	2	4.5
2S02P2											
2S03P7											
2T05P5	165.5	357	379	222	185	7.0	4M6	4M6	4Φ6	3	8.2
2T07P5											
2T0011											
2T0015	165	440	465	254	261	7.0					10.3
2T18P5											
2T0022											
4T02P2	100	253	265	151	166	5.0	4M4	4M4	4Φ4	2	4.5
4T03P7											
4T05P5											
4T07P5	165.5	357	379	222	192	7.0	4M6	4M6	4Φ6	3	8.2
4T0011											
4T0015	165.5	392	414	232	192						10.3
4T18P5											
4T0022											
4T0030	200	512	530	330	290	9.0	4M8	4M8	4Φ8	6	30

Model AS380-	A (mm)	B (mm)	H (mm)	W (mm)	D (mm)	Installation hole diameter Φ(mm)	Installation			Tightening torque (Nm)	Mass (kg)
							Bolt	Nut	Washer		
4T0037	200	587	610	330	310	10.0	4M10	4M10	4Φ10	9	42
4T0045											
4T0055										14	
4T0075	260	707	730	430	330	10.0					50

Chapter 4 Connecting Terminals of AS380

4.1 Description of major loop terminals

See fig. 4.1 for the major loop connecting terminals of AS380 series integrated drive controller.

Fig. 4.1 Major loop connecting terminals

See table 4.1 for main loop terminals function description of AS380 series integrated drive controller.

Table 4.1. Function Description of Main Loop Terminals

Terminal Label	Function Description
⊕1	Connect DC reactor externally, short connected in factory
⊕2	
⊕2	External braking resistor connection
B	
⊖	DC bus negative output terminal
R/L1	Major loop AC power input; connect three-phase input power.
S/L2	
T/L3	
U/T1	Inverter output; connect three-phase synchronous/asynchronous motor
V/T2	
W/T3	

4.2 Description of Control Loop Terminals

See Fig. 4.2 for control loop terminal of AS380 series integrated drive controller

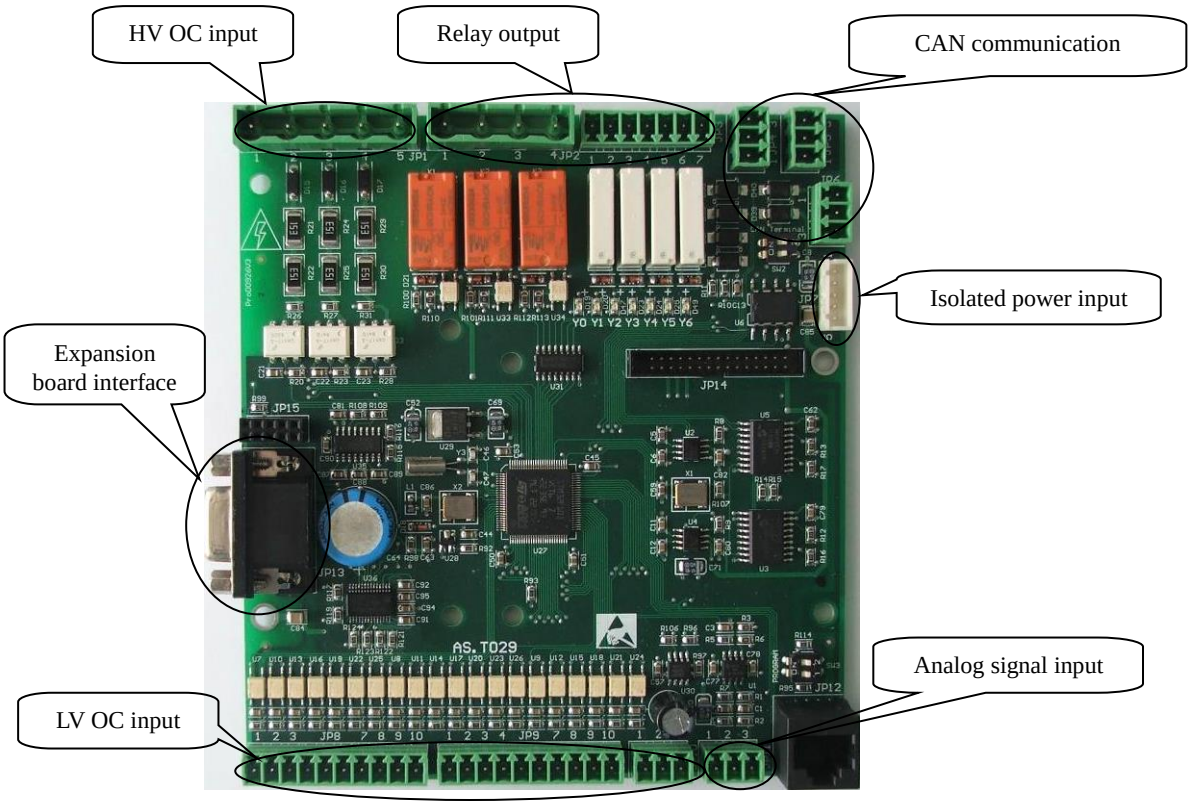


Fig. 4.2 Control Loop Terminals

See table 4.2 for control loop terminals function description of AS380 series integrated drive controller.

Table 4.2 Function Description of Control Loop Terminals

No.	Position	Name	Definition	Type	Remark
JP1	JP1.1	XCOM	X20-X22 input signal common port 0V		
	JP1.2	X20	Positive voltage position in safety loop, 110V/220V input	Input	
	JP1.3	X21	Positive voltage position in door lock loop, 110V/220V input	Input	
	JP1.4	X22	Positive voltage position in hall door lock, 110V/220V input	Input	
	JP1.5	XCOM	X20-X22 input signal common port 0V, connect with JP1.1 internally		
JP2	JP2.1	Y0	Brake contactor output	Output	
	JP2.2	Y1	Brake excitation contactor output	Output	
	JP2.3	Y2	Main contactor output	Output	
	JP2.4	COM1	Common port of output relay Y0-Y3		
JP3	JP3.1	Y3	Pre-opening relay	Output	

No.	Position	Name	Definition	Type	Remark
	JP3.2	Y4	ALP signal output	Output	
	JP3.3	COM2	Common port of output relayY3-Y4		
	JP3.4	Y5	Firefighting signal output	Output	
	JP3.5	COM3	Common port of output relayY5		
	JP3.6	Y6	Reserved for spare	Output	
	JP3.7	COM4	Common port of output relayY6		
JP4	JP4.1	0V	0V DC		
	JP4.2	CAN0H	Call serial communication signal end (TXA0+)		
	JP4.3	CAN0L	Call serial communication signal end (TXA0-)		
JP5	JP5.1	0V	0V DC		
	JP5.2	CAN1H	Parallel connection serial communication signal end (TXA1+)		
	JP5.3	CAN1L	Parallel connection serial communication signal end (TXA1-)		
JP6	JP6.1	0V	Isolated OV DC		
	JP6.2	CAN2H	Community monitor (TXA2+)		
	JP6.3	CAN2L	Community monitor (TXA2-)		
JP7	JP7.1	G5VIO	Isolated power 0V		
	JP7.2	+5VIO	Isolated power +5V		
	JP7.3		NC, undefined		
	JP7.4	G24VIO	OC output isolated power 0V		
	JP7.5	+24VIO	OC input isolated power+24V		
JP8	JP8.1	X0	Ispection signals 1, disconnection indicates Ispection, X0 and X1 all connection indicate automatic.	Input	N/C
	JP8.2	X1	Ispection signals 2, disconnection indicates Ispection, X0 and X1 all connection indicate automatic.	Input	N/C
	JP8.3	X2	Up signal, Ispection: inching upward; attendant: Upward diversion.	Input	
	JP8.4	X3	Down signal, Ispection: inching downward; attendant: downward diversion.	Input	
	JP8.5	X4	First upward slow down switch.	Input	N/C
	JP8.6	X5	First downward slow down switch.	Input	N/C
	JP8.7	X6	Up-leveling switch	Input	
	JP8.8	X7	Down-leveling switch	Input	
	JP8.9	X8	Motor power contactor detection	Input	N/C
	JP8.10	X9	Brake contactor detection	Input	N/C
JP9	JP9.1	X10	Left band-type brake switch detection	Input	
	JP9.2	X11	Right band-type brake switch detection	Input	
	JP9.3	X12	Motor temperature examination signal	Input	
	JP9.4	X13	Advanced door opening relay detection	Input	
	JP9.5	X14	Door signal detection	Input	
	JP9.6	X15	fireman return/ fireman's switch (parameter selection)	Input	
	JP9.7	X16	Emergency leveling input for power cut/earthquake/backup power (parameter selection)	Input	

No.	Position	Name	Definition	Type	Remark
	JP9.8	X17	Input point of overload	Input	N/C
	JP9.9	X18	Second upward slow down switch	Input	
	JP9.10	X19	Second downward slow down switch	Input	
JP10	JP10.1	+24VIO	Input isolated power+24V, connect with P7.5 internally		
	JP10.2	VSIO	Connect with JP10.1 externally, it is valid if input is low power, JP10.3 is input common port; When connect with JP10.3 externally, it is valid if input is high power, JP10.1is input common port.		
	JP10.3	G24VIO	Input isolated power 0V, connect with JP7.4 internally.		
JP11	JP11.1	0V	Analog signal output 0V		
	JP11.2	AIN-	Difference analog signal input－		
	JP11.3	AIN+	Difference analog signal input＋		
SW2	ON		Monitor CAN terminal resistance valid state	Factory setup is OFF for SW2	
	OFF		Monitor CAN terminal resistance null state		
SW3	ON		Program burning state	Factory setup is OFF (Maintain OFF during operation)	
	OFF		Normal working state		

4.3 Main Extension Board SM.09IO/C Introduction

4.3.1 Outside View and Installation Dimension

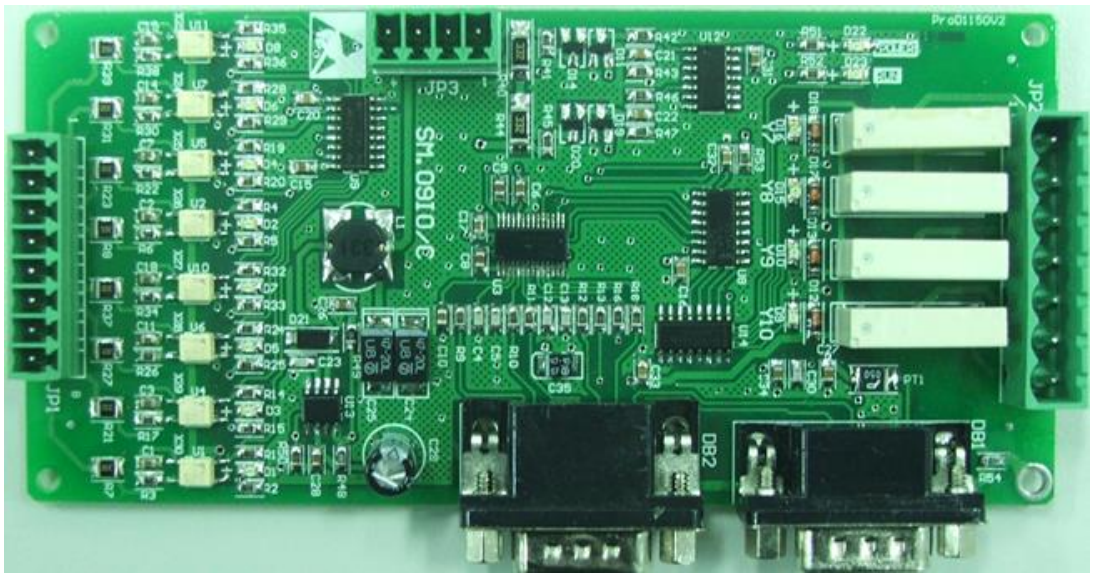


Table 4.3 Main Extension Board SM.09IO/C

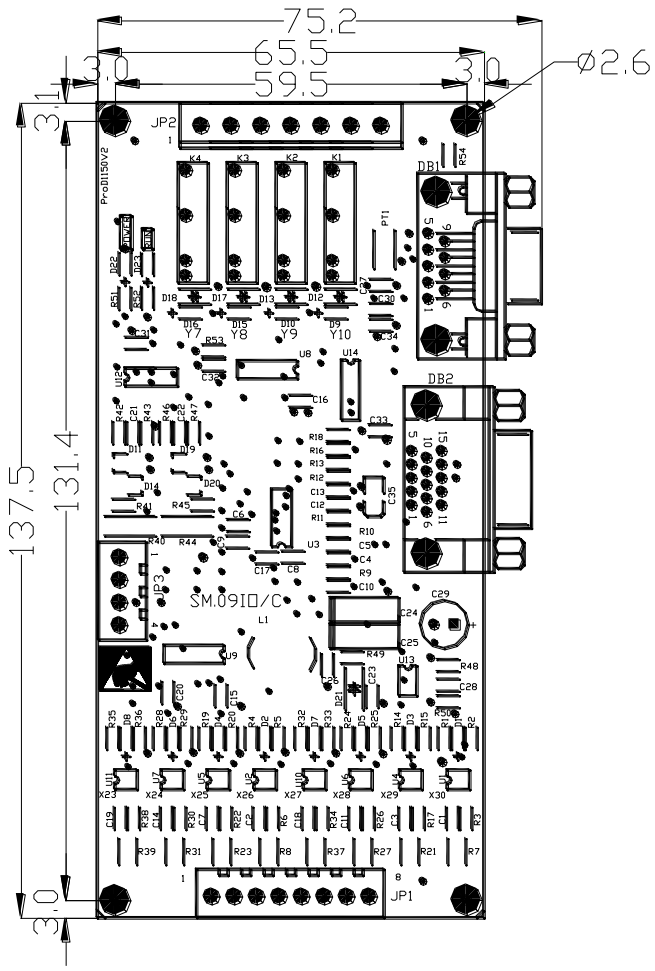


Fig. 4.4 The installation dimension of main extension board SM.09IO/C

4.3.2 Main Extension Board SM.09IO/C Connector and Configurable Content Introduction

Table 4.3 IO extension board SM.09IO/C port definition and the connector specification

No.	Position	Definition	Connector Specification
JP1	JP1.1	X23	OQ/180D-3.81-8P, green
	JP1.2	X24	
	JP1.3	X25	
	JP1.4	X26	
	JP1.5	X27	
	JP1.6	X28	
	JP1.7	X29	
	JP1.8	X30	
JP2	JP2.1	Y7Y8 COM	OQ-C/180D-5.08-7P, green
	JP2.2	Y7	

No.	Position	Definition	Connector Specification
	JP2.3	Y8	
	JP2.4	Y9 COM	
	JP2.5	Y9	
	JP2.6	Y10 COM	
	JP2.7	Y10	
JP3	JP3.1	Encoder phase B	OQ/180D-3.81-4P, green
	JP3.2	Encoder phase A	
	JP3.3	0V	
	JP3.4	+12V	

Table 4.4 IO main extension board SM.09IO/C Configurable content

JP1 input			
0	Emergency Levelling	1	earthquake
2	Back-up power	3	Overload
4	Full load	5	Light-load
6	Fireman	7	Elevator Lock-out
8	Self-tuning of Shaft Information	9	sealing star Detect
10	Back-up	11	Fire return
12	upward No 3 terminal deceleration	13	downward No 3 terminal deceleration
14	upward No 4 terminal deceleration	15	downward No 4 terminal deceleration
16	up limit	17	down limit
JP2 output			
0	pre door-opening slowdown output（V<0.3m/s）	1	Fan output
2	Up	3	Down
4	Door lock	5	Door-zone
6	Front door open	7	Front door close
8	Rear door open	9	Rear door close
10	Not stop at door-zone	11	Fault
12	Run	13	Emergency Level state output

Note 1: Input and output functional description can be set by the program, same function cannot be set at two ports;

Note 2: COM is the COM on the main board.

4.4 The wiring of PG card terminals

To adopt different kind encoder, 4 types of PG cards are available. See table 4.5:

Table 4.5 The types of PG card

PG Card Type	Motor Type	Model	Input signal	Remarks
incremental ABZ 12V	Async/Sync	AS.T025	Open collector, push-pull	Encoder voltage: 12V

PG Card Type	Motor Type	Model	Input signal	Remarks
SIN/COS	Sync	AS.T024	SIN/COS differential	
incremental ABZ 5V	Async/Sync	AS.T041	Open collector, push-pull, differential	Encoder voltage: 5V
Endat absolute value	Sync	AS.L06/L	Endat output	

4.4.1 PG card – Incremental ABZ 12V

Incremental ABZ 12V PG card (AS.T025) can receive two kinds encoder signal. It can talk to the encoder with open collector signal and push-pull signal.

4.4.1.1 Line-up terminal for incremental ABZ 12V PG card

Terminal line up for incremental ABZ 12V PG card (AT.T025), see Fig. 4.5.

Fig. 4.5 Terminal line up for incremental ABZ 12V PG card

4.4.1.2 Incremental ABZ 12V PG card terminal label

Terminal label for incremental ABZ 12V PG card is as follows:
JP3 divided frequency output terminal:

FA	V0	FB	V0

Fig. 4.6 The connection JP3 terminal lables of the incremental ABZ 12V PG card

JP2 input terminal:

A+	A-	B+	B-	Z+	Z-	V+	V-	PE

Fig. 4.7 The connection JP2 terminal lables of the incremental ABZ 12V PG card

4.4.1.3 Incremental ABZ 12V PG card terminal function specification

Incremental ABZ 12V PG card terminal function specification, see table 4.6.

Table 4.6 Incremental ABZ 12V PG card terminal function specification

Name	Pin No	Label	Function	Specification
Divided frequency output	JP3.1	FA	Divided frequency output, phase A	Triode open collector (max. output frequency 100kHz)
	JP3.2	0V	24V GND	
	JP3.3	FB	Divided frequency output, phase B	
	JP3.4	0V	24V GND	
Encoder input	JP2.1	A+	Phase A signal +	Open collector/push-puff, max input frequency 100kHz
	JP2.2	A-	Phase A signal -	
	JP2.3	B+	Phase B signal +	
	JP2.4	B-	Phase B signal -	
	JP2.5	Z+	Phase Z signal +	
	JP2.6	Z-	Phase Z signal -	
	JP2.7	V＋	Anode of encoder power	Voltage: 12VDC, Max output current: 500mA
	JP2.8	V-	Cathode of encoder power	
	JP2.9	PE	Shielded ground	Grounding terminal for shielded cable

4.4.1.4 Wire requirement for incremental ABZ 12V PG card input terminal and encoder output

Incremental ABZ 12V PG card (AS.T025) can receive two kinds encoder signals: open collector signal and push-pull signal.

Encoder wiring by open collector signal, see Fig. 4.8.

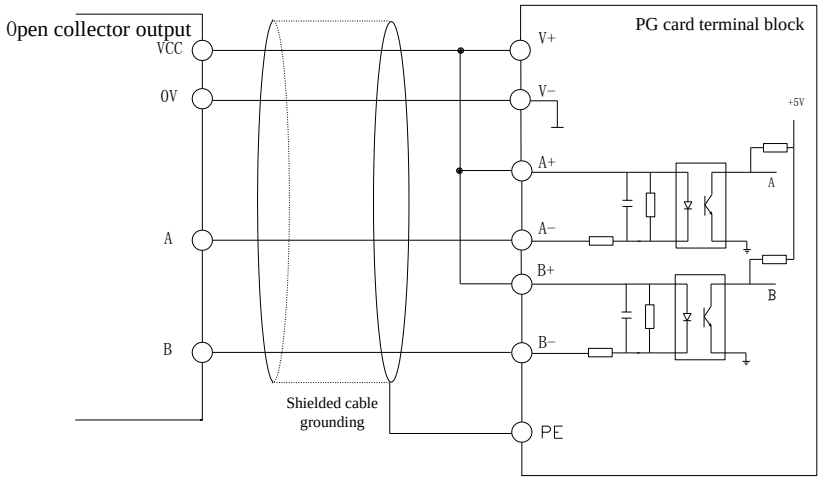


Fig. 4.8 Wiring with encoder open collector signal

Encoder wiring by push-pull signal, see Fig. 4.9.

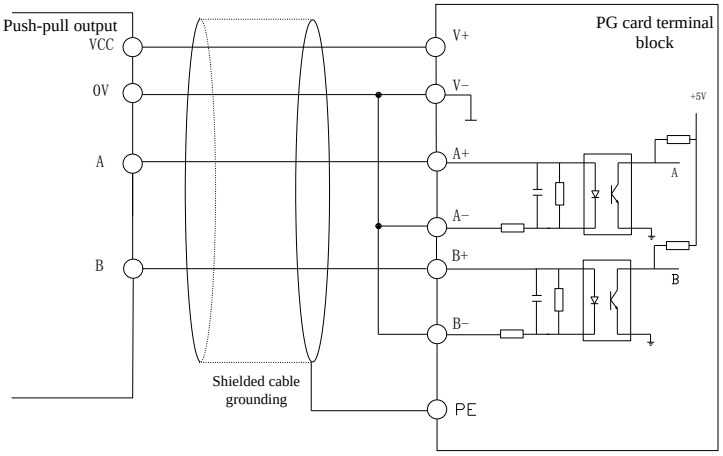


Fig. 4.9 Wiring with encoder push-pull signal

4.4.2 PG card – SIN/COS

SIN/COS PG card (AS.T024) can receive SIN/COS differential signal from encoder. It adopts encoders with SIN/COS differential output signal.

4.4.2.1 Line-up SIN/COS PG card terminal

Line-up SIN/COS PG card terminal, see Fig. 4.10.

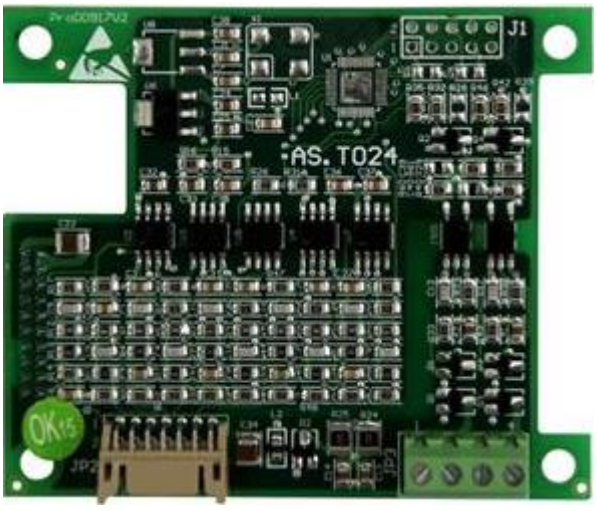


Fig. 4.10 SIN/COS PG card (AS.T024) terminal line up

4.4.2.2 SIN/COS PG card terminal label

Terminal label for SIN/COS PG card (AS.T024) is as follows:

JP3 terminal label:

FA	V0	FB	V0

Fig. 4.11 The connection terminal JP3 lables of the SIN/COS PG card

JP2 terminal label: (14 pin socket):

1	2	3	4	5	6	7	8	9	10	11	12	13	14
NC	NC	R-	R+	B-	B+	A-	A+	D-	D+	C-	C+	0V	V+

Fig. 4.12 The connection terminal JP2 lables of the SIN/COS PG card

4.4.2.3 SIN/COS PG card terminal function specification

SIN/COS PG card (AS.T024) terminal function specification, see table 4.7.

Table 4.7 SIN/COS PG card terminal function specification

Name	Label	Function	Specification
Open collector output	FA	Divided frequency output, phase A	Triode open collector (max. frequency 100kHz)
	0V	24V GND	
	FB	Divided frequency output, phase B	
	0V	24V GND	
Encoder input	A+,A-	Phase A signal	Differential signal, max input frequency: 100kHz；
	B+,B-	Phase B signal	
	R+,R-	Phase Z signal	
	C+,C-	SIN signal	
	D+,D-	COS signal	
	V+	+5V	
	0V	+5V GND	

4.4.2.4 The wiring between SIN/COS PG card and encoder

SIN/COS PG can receive SIN/COS differential signal from encoder.

Wiring diagram for encoder, see Fig. 4.13.

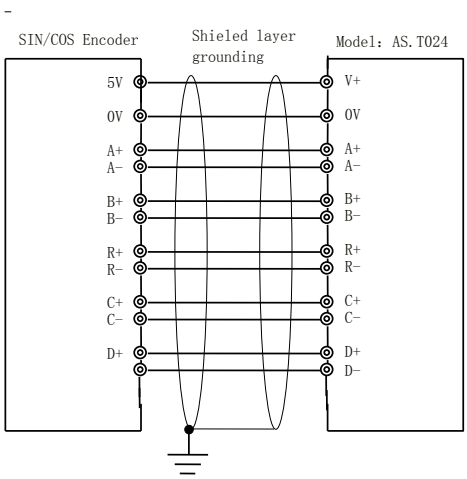
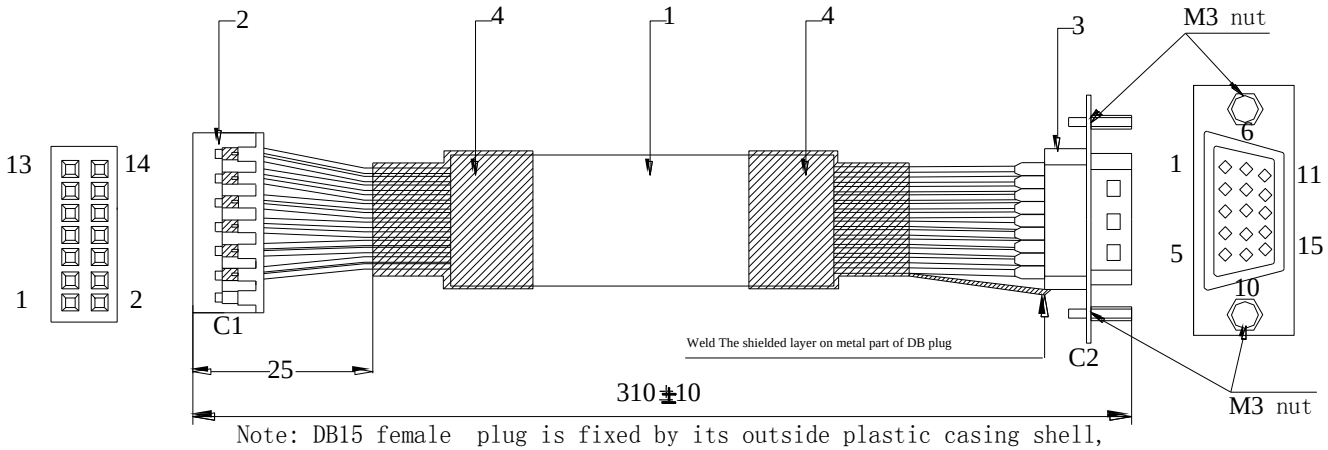


Fig. 4.13 Wiring diagram for encoder with SIN/COS differential signal output

4.4.2.5 SIN/COS PG card encoder signal transformation cable

In order to simplified on-site wiring, SIN/COS PG card equips an encoder signal cable with them from factory. It transfers encoder signal to a type D plug with 15 pins. Detail specifications show in Fig. 4.14.



Note: DB15 female plug is fixed by its outside plastic casing shell, and is fasten locked by the M3 nuts at the both ens of the plasitic casing shell.

C1 Plastic shell2*7	C2 DB15 female	Maching cloor
PIN3	PIN 4	Red
PIN4	PIN 3	Red/white
PIN5	PIN 1	Orange
PIN6	PIN 8	Orange/ black
PIN7	PIN 6	Yellow
PIN8	PIN 5	Yellow/ black
PIN9	PIN 13	Green
PIN 10	PIN 12	Green/ black
PIN 11	PIN 10	Blue
PIN 12	PIN 11	Blue/ black
PIN 13	PIN 7	Black
PIN 14	PIN 9	Black/ white

Fig. 4.14 Specification for SIN/COS PG card encoder signal transformation cable

4.4.3 PG card – Incremental ABZ 5V

Incremental ABZ 5V PG card (AS.T041) can receive three kinds encoder signals. It can talk to the encoder with open collector signal, push-pull signal and differential signal.

4.4.3.1 Line-up terminal for incremental ABZ 5V PG card

Terminal line up for incremental ABZ 5V PG card (AT.T041), see Fig. 4.15.

Fig. 4.15 Terminal line up for incremental ABZ 5V PG card

4.4.3.2 Incremental ABZ 5V PG card terminal label

Terminal label for incremental ABZ 5V PG card is as follows:
JP3 divided frequency output terminal:

FA	V0	FB	V0

Fig. 4.16 The connection terminal JP3 lables of the Incremental ABZ 5V PG card

JP2 input terminal:

A+	A-	B+	B-	Z+	Z-	V+	V-	PE

Fig. 4.17 The connection terminal JP2 lables of the Incremental ABZ 5V PG card

4.4.3.3 Incremental ABZ 5V PG card terminal function specification

Incremental ABZ 5V PG card terminal function specification, see table 4.8.

Table 4.8 Incremental ABZ 5V PG card terminal function specification

Name	Pin No.	Label	Function	Specification
Divided frequency output	JP3.1	FA	Divided frequency output, phase A	Triode open collector (max. output frequency 100kHz)
	JP3.2	0V	24V GND	
	JP3.3	FB	Divided frequency output, phase B	
	JP3.4	0V	24V GND	
Encoder input	JP2.1	A+	Phase A signal + of encoder power	Open collector/push-puff/differential, max input frequency 100kHz
	JP2.2	A-	Phase A signal - of encoder power	
	JP2.3	B+	Phase B signal + of encoder power	
	JP2.4	B-	Phase B signal - of encoder power	
	JP2.5	Z+	Phase Z signal + of encoder power	

Name	Pin No.	Label	Function	Specification
	JP2.6	Z-	Phase Z signal - of encoder power	
	JP2.7	V＋	Positive pole of encoder power	Voltage: 5VDC, Max output current: 500mA
	JP2.8	V-	Negative pole of encoder power	
	JP2.9	PE	Shielded ground	Grounding terminal for shielded cable

4.4.4 PG card – Endat with absolute value

Endat absolute card (AS.L06/L) can receive Endat signals from encoder. It can talk to Endat Absolute Encoder, like Heidenhain encoder model 1313, or 413.

4.4.4.1 Line-up terminal for Endat absolute PG card

Terminal line up for Endat absolute PG card (AS.L06/L), see Fig. 4.18.

Fig. 4.18 Terminal line up for Endat absolute PG card

4.4.4.2 Endat absolute PG card terminal label

Terminal label for Endat absolute PG card is as follows:
JP3 terminal:

FA	V0	FB	V0	12V

Fig. 4.19 The connection terminal JP3 lables of the endat absolute PG card

JP2 terminal (14 pin socket):

1	2	3	4	5	6	7	8	9	10	11	12	13	14
NC	NC	NC	NC	B-	B+	A-	A+	D-	D+	C-	C+	0V	V+

Fig. 4.20 The connection terminal JP2 lables of the endat absolute PG card

4.4.4.3 Endat absolute PG card terminal function specification

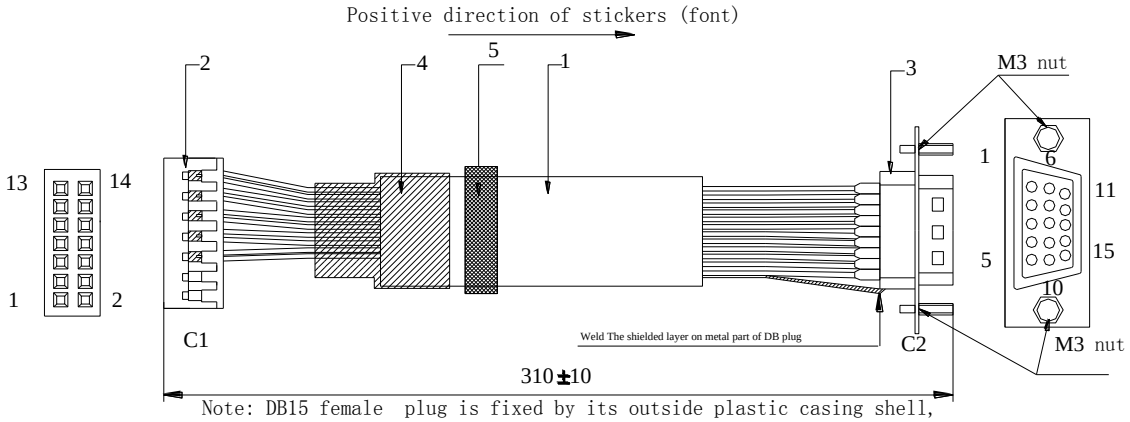
Endat absolute PG card terminal function specification, see table 4.9.

Table 4.9 Endat absolute PG card terminal function specification

Name	Label	Function	Specification
Open collector output	FA	Fractional frequency output, phase A	Triode open collector (max. frequency 100kHz, max output. current 50mA)
	0V	GND	
	FB	Fractional frequency output, phase B	
	0V	GND	
	+12V	12V power output	
Encoder input	A+,A-	Phase A signal of encoder	Differential signal, max input frequency: 100kHz;
	B+,B-	Phase B signal of encoder	
	C+,C-	Clock signal of encoder	
	D+,D-	Data signal of encoder	
	V+	+5V	
	0V	+5V GND	

4.4.4.4 Endat absolute PG card and encoder wiring

In order to simplified on-site connection, Endat absolute PG card equips an encoder signal cable with them from factory. It transfers encoder signal to a type D plug with 15 pins. Detail specifications show in Fig. 4.21.



Note: DB15 female plug is fixed by its outside plastic casing shell, and is fasten locked by the M3 nuts at the both ens of the plasitic casing shell.

C1 Plastic shell2*7	C2 DB15 female	Signal	Maching cloor
PIN 5	PIN 4	cos-	Red
PIN 6	PIN 3	cos+	Red/white
PIN 7	PIN 2	sin-	Yellow
PIN 8	PIN 1	sin+	Yellow/ black
PIN 14	PIN 13	v+	Orange
PIN 13	PIN 14	GND	Orange/ black
PIN 9	PIN 6	dat-	Blue
PIN 10	PIN 5	dat+	Blue/ black
PIN 11	PIN 12	clk-	Green
PIN 12	PIN 11	clk+	Green/ black

Fig. 4.21 Specification for Endat absolute cable

4.4.5 Precaution for PG card terminal wiring

Important **Encoder signal cable must be separated from main circuit and other power lines. Never running those two cables in parallel in short distance. Shielded cable should be used for encoder, and shielded layer needs to be grounded to the grounding PE of the outer case.**

Chapter 5 Main Supporting Control Board of Integrated Drive Controller

5.1 Car Roof Control Board SM.02/H

5.1.1 Outline and Installation Dimensions of SM.02/H

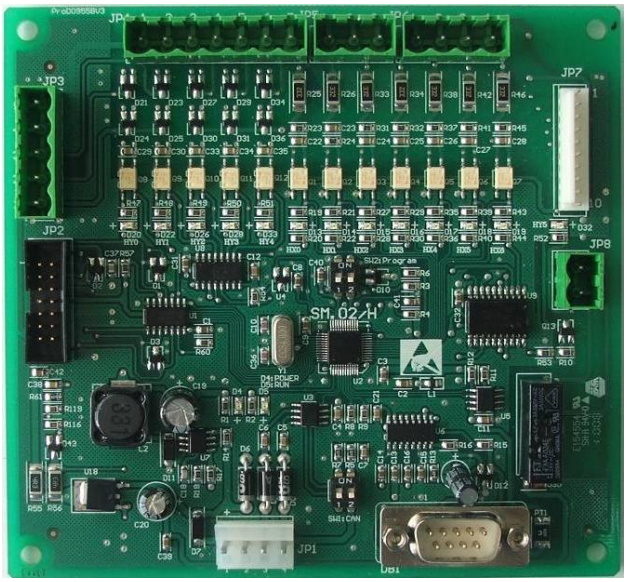


Fig. 5.1 Outline of car roof control board

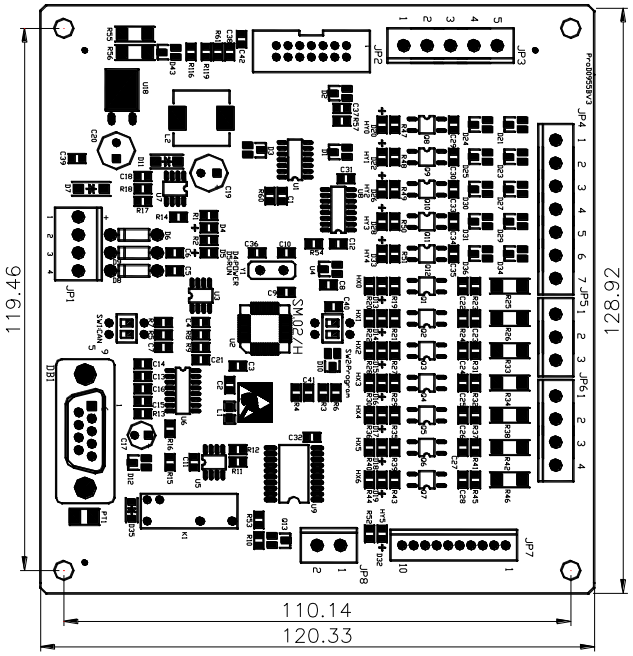


Fig. 5.2 Installation dimensions of car roof control board SM.02/H

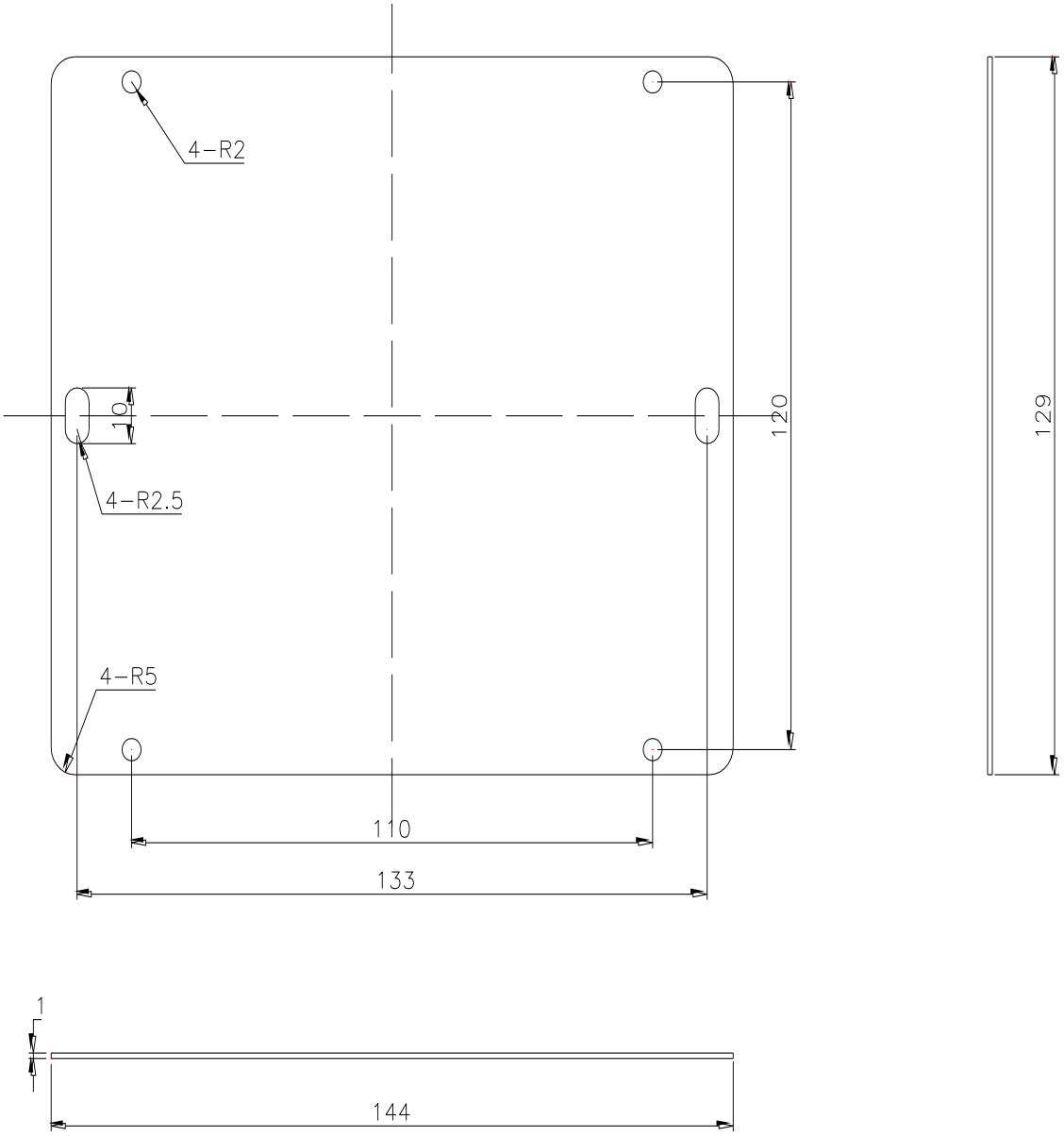


Fig. 5.3 Installation dimensions of the mounting plate of car roof control board SM.02/H

5.1.2 Definition of plug and port for car roof control panel SM.02/H

Table 5.1 Definition of input/output port for car roof control panel SM.02/H

No.	Position	Definition	Remarks
JP1	JP1.1	24V red	
	JP1.2	GND yellow	
	JP1.3	CANH green	
	JP1.4	CANL blue	
JP2		Car roof connecting extension board	

No.	Position	Definition	Remarks
JP3	JP3.1	Output JP3.2-JP3.3 common port	
	JP3.2	Output HY0, down arrival chime	
	JP3.3	Output HY1, up arrival chime	
	JP3.4	Output 0V	
	JP3.5	Output 24V	
JP4	JP4.1	Input JP4.2-JP4.3 common port	
	JP4.2	Input HX0, front door closed limit	N/C (default)
	JP4.3	Input HX1, front door opened limit	N/C (default)
	JP4.4	Output JP4.5-JP4.7 common port	
	JP4.5	Output HY2, forced front door closing output	
	JP4.6	Output HY3, front door closing signal output	
	JP4.7	Output HY4, front door opening signal output	
JP5	JP5.1	Input JP5.2-JP5.3common port ,0V	
	JP5.2	Input HX2, TCI	N/O (default)
	JP5.3	Input HX3, front door beam screen	N/O (default)
JP6	JP6.1	Input JP6.2-JP6.4 common port, 0V	
	JP6.2	Input HX4, light load	N/O (default)
	JP6.3	Input HX5, full load	N/O (default)
	JP6.4	Input HX6, overload	N/O (default)
JP7	JP7.1	Parallel voice interface D0, LSB	
	JP7.2	Parallel voice interface D1	
	JP7.3	Parallel voice interface D2	
	JP7.4	Parallel voice interface D3	
	JP7.5	Parallel voice interface D4	
	JP7.6	Parallel voice interface D5	
	JP7.7	Parallel voice interface D6	
	JP7.8	Parallel voice interface D7, MSB	
	JP7.9	common port 0V	
	JP7.10	common port ＋24V	
JP8	JP8.1	JP8.2 common port	
	JP8.2	Output HY5, lighting fan relay	
DB1		Program burning port	
SW1	SW1.1	If collective plug-out is ON, then close CAN terminal resistance, if collective plug-out is OFF, then open terminal resistance.	
	SW1.2		
SW2	SW2.1	If collective plug-out is ON, then it is program buring state, if collective plug-out is OFF, then it is normal operation state.	
	SW2.2		

5.2 Description of Car Roof Extension Board SM.09IO/B

5.2.1 Outline and Installation Dimensions of Car Roof Extension Board SM.09IO/B

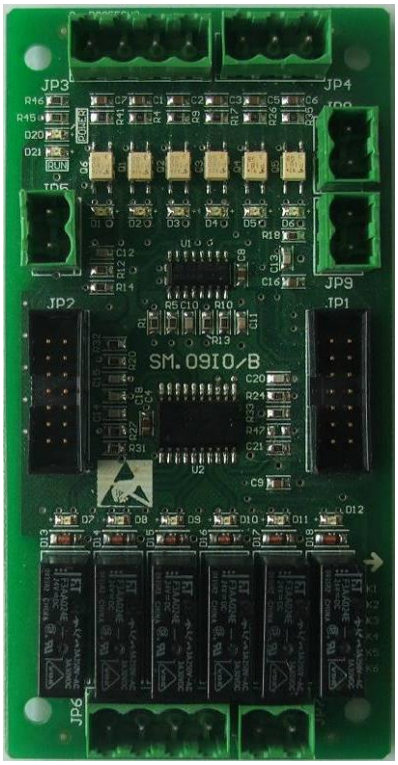


Fig. 5.4 Outline of Car roof Extension Board SM.09IO/B

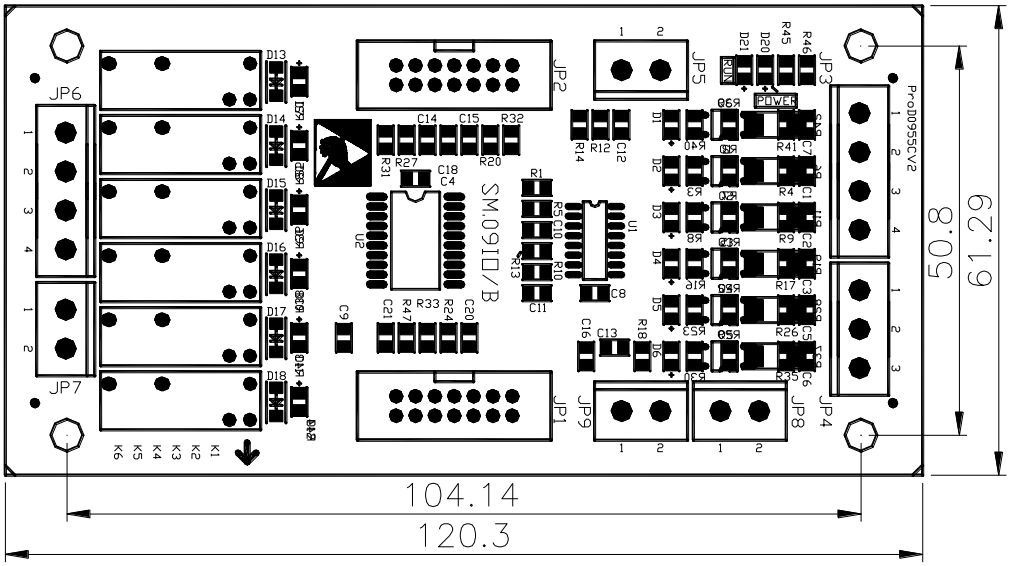


Fig. 5.5 Installation Dimension of Car roof Entension Board

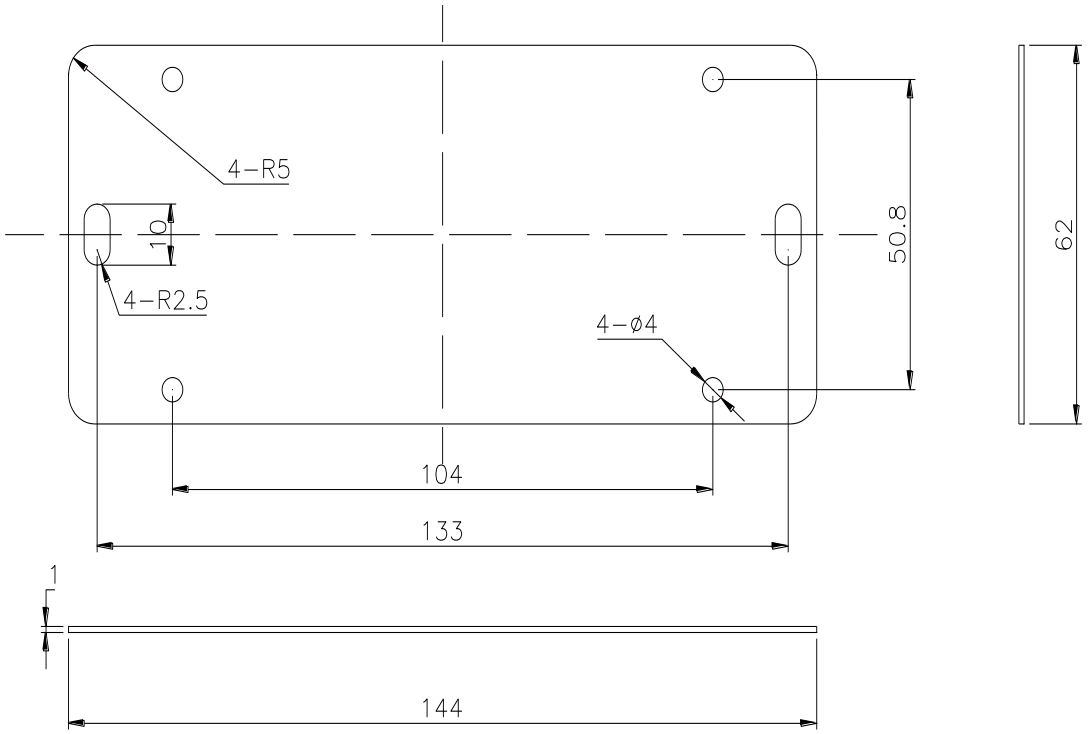


Fig. 5.6 Installation dimensions of the mounting plate of Car roof Entension Board SM.09IO/B

5.2.2 Introduction of car roof entension board SM.09IO/B plug-ins and port definition

Table 5.2 Plug-in specifications of elevator extension board SM.09IO/B

Socket No.	Model	Socket No.	Model
JP1/JP2	IDC-14P	JP4	5.08-3P-V-green
JP3/JP6	5.08-4P-V-green	JP5/JP7/JP8/JP9	5.08-2P-V-green

Table 5.3 SM.09IO/B input/output port definition for car roof extension board

No.	Position	Definition	Remarks
JP1		Connect car roof board SM.02/H	
JP2		Connect car roof extension board	
JP3	JP3.1	Input HX7, rear door opening limit	N/C(default)
	JP3.2	Input HX8, rear door closing limit	N/C (default)
	JP3.3	Input HX9, rear door screen	N/O (default)
	JP3.4	Input power, need to connect switching power +24V	
JP4	JP4.1	Input HX10, rear door safety edge	N/O (default)
	JP4.2	Input HX11, spare	
	JP4.3	JP4.1-JP4.2 input common port, 0V	
JP5	JP5.1	Input HX12, front door safety edge	
	JP5.2	JP5.1 input common port, 0V	
JP6	JP6.1	OutputHY6, rear door opening signal output	
	JP6.2	Output HY7, rear door closing signal output	
	JP6.3	Output HY8, forced rear door closing output	
	JP6.4	Output JP6.1-JP6.3 common port	
JP7	JP7.1	Output HY9, door open signal output	
	JP7.2	Output JP7.1 common port	

No.	Position	Definition	Remarks
JP8	JP8.1	Output HY10, door close signal output	
	JP8.2	Output JP8.1 common port	
JP9	JP9.1	Output HY11, door nudging output	
	JP9.2	Output JP9.1 common port	

Note: Thouth the same definitions for front door output of JP7, JP8, JP8 on SM.09IO/B board can be found in that of the SM.02/H board, the related front door definitions (optocoupler output) on SM.02/H board is not the relay output, which might not drive the DC door machine. In this case, the output points of JP7, JP8, JP8 of SM.09IO/B board should be used to realize it.

5.3 Description of Elevator Car Control Panel SM.02/G

5.3.1 Outline and Intallation Dimensions of Elevator Car Control Board SM.02/G

Fig. 5.7 Outline of elevator car control panel SM.02/G

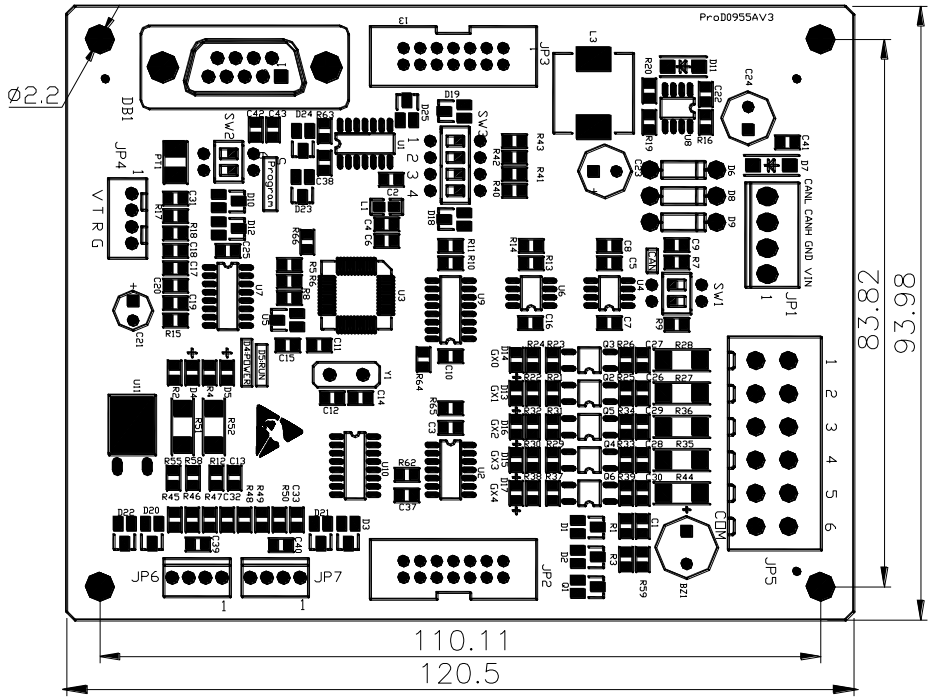


Fig. 5.8 Installation dimensions of elevator car control board SM.02/G

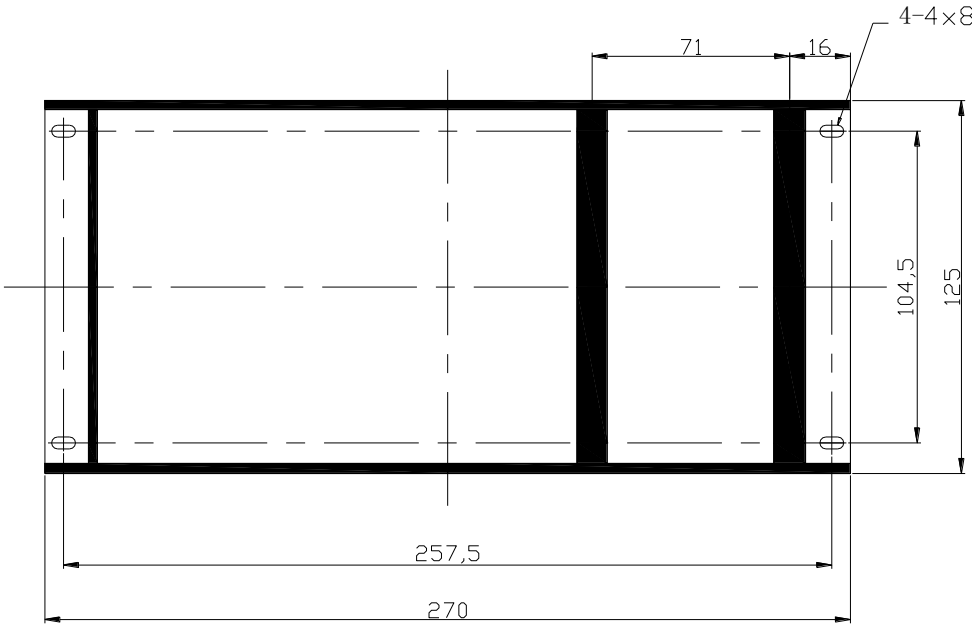


Fig. 5.9 The dimension figure of combined mounting plate (on which the instruction board SM.03D can be installed side by side) which is standard configurated of the car control board

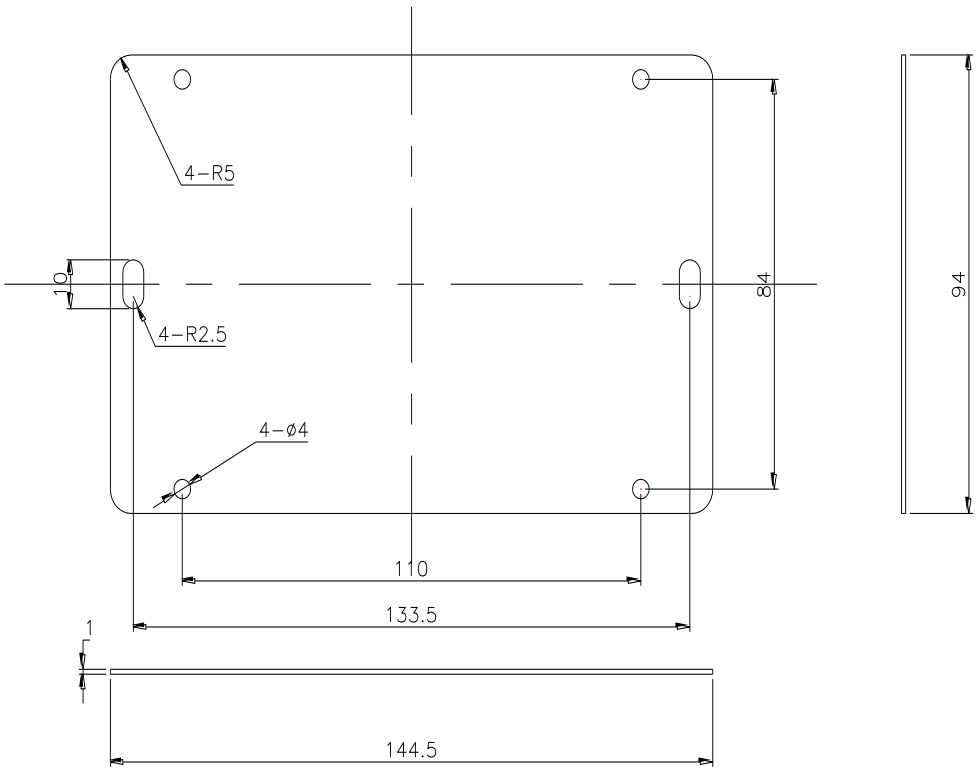


Fig. 5.10 the dimension figure of the galvanized mounting plate of the car control board

5.3.2 Introduction of elevator car control panel SM.02/G plug-ins and port definition

Table 5.4 Port definition of elevator car control board SM.02/G

No.	Position	Definition	Remarks
JP1	JP1.1	24V red	
	JP1.2	GND yellow	
	JP1.3	CANH green	
	JP1.4	CANL blue	
JP2		Connect instruction plate	
JP3		Connect car extension board	
JP4		Elevator car interface test	
JP5	JP5.1	InputGX0, attendant bypass	N/O (default)
	JP5.2	Input GX1, attendant	N/O (default)
	JP5.3	Input GX2, independent	N/O (default)
	JP5.4	Input GX3, attendant drives directly	N/O (default)
	JP5.5	Input GX4, fireman	N/O (default)
	JP5.6	Input JP5.1-JP5.5 signal common port	N/O (default)
JP6	JP6.1	Door opening indicator power−	
	JP6.2	Door opening indicator power+	
	JP6.3	Door opening button (GX5) (one teminal)	
	JP6.4	Door opening button (another teminal)	
JP7	JP7.1	Door closing indicator power−	
	JP7.2	Door closing indicator power+	
	JP7.3	Door closing button (GX6) (one teminal)	
	JP7.4	Door opening button (another teminal)	

No.	Position	Definition				Remarks
DB1		Program burning port				
SW1	SW1.1	If collective plug-out is ON, then close CAN terminal resistance, if collective plug-out is OFF, then open terminal resistance.				
	SW1.2					
SW2	SW2.1	If collective plug-out is ON, then it is program buring state, if collective plug-out is OFF, then it is normal operation state.				
	SW2.2					
SW3	SW3.1	SW3.2	SW3.3	SW3.4	Type of operation box	
	ON	OFF	OFF	OFF	Main COP	
	OFF	ON	OFF	OFF	Rear COP	
	OFF	OFF	ON	OFF	Handicapped COP	
	OFF	OFF	OFF	ON	Aux COP	

Table 5.5 The input/output port definition of SM.09IO/B when used as car extension board

No.	Position	Definition	Remark
JP1		Connect elevator car board SM.02/G	
JP2		Connect the second elevator car extension board	
JP3	JP3.1	Input GX7, spare	
	JP3.2	Input GX8, spare	
	JP3.3	Input GX9, spare	
	JP3.4	Input power, needs to connect switching power +24V	
JP4	JP4.1	Input GX10, hold button input	NO (default)
	JP4.2	Input GX11, NS-SW	NO (default)
	JP4.3	JP4.1-JP4.2 input common port ,0V	
JP5	JP5.1	Input GX12, spare	
	JP5.2	input power, necessary to connect switching power +24V	
JP6	JP6.1	Output GY0,hold button indicator output	
	JP6.2	Output GY1, spare	
	JP6.3	Output GY2, spare	
	JP6.4	Output JP6.1-JP6.3common port	
JP7	JP7.1	Output GY3, spare	
	JP7.2	Output JP7.1common port	
JP8	JP7.1	Output GY4, spare	
	JP7.2	Output JP8.1common port	
JP9	JP9.1	Output GY5, spare	
	JP9.2	Output JP9.1common port	

5.4 Instruction of Group Control Board (SM.GC/C)

5.4.1 Outside View and Installation Dimension Figure

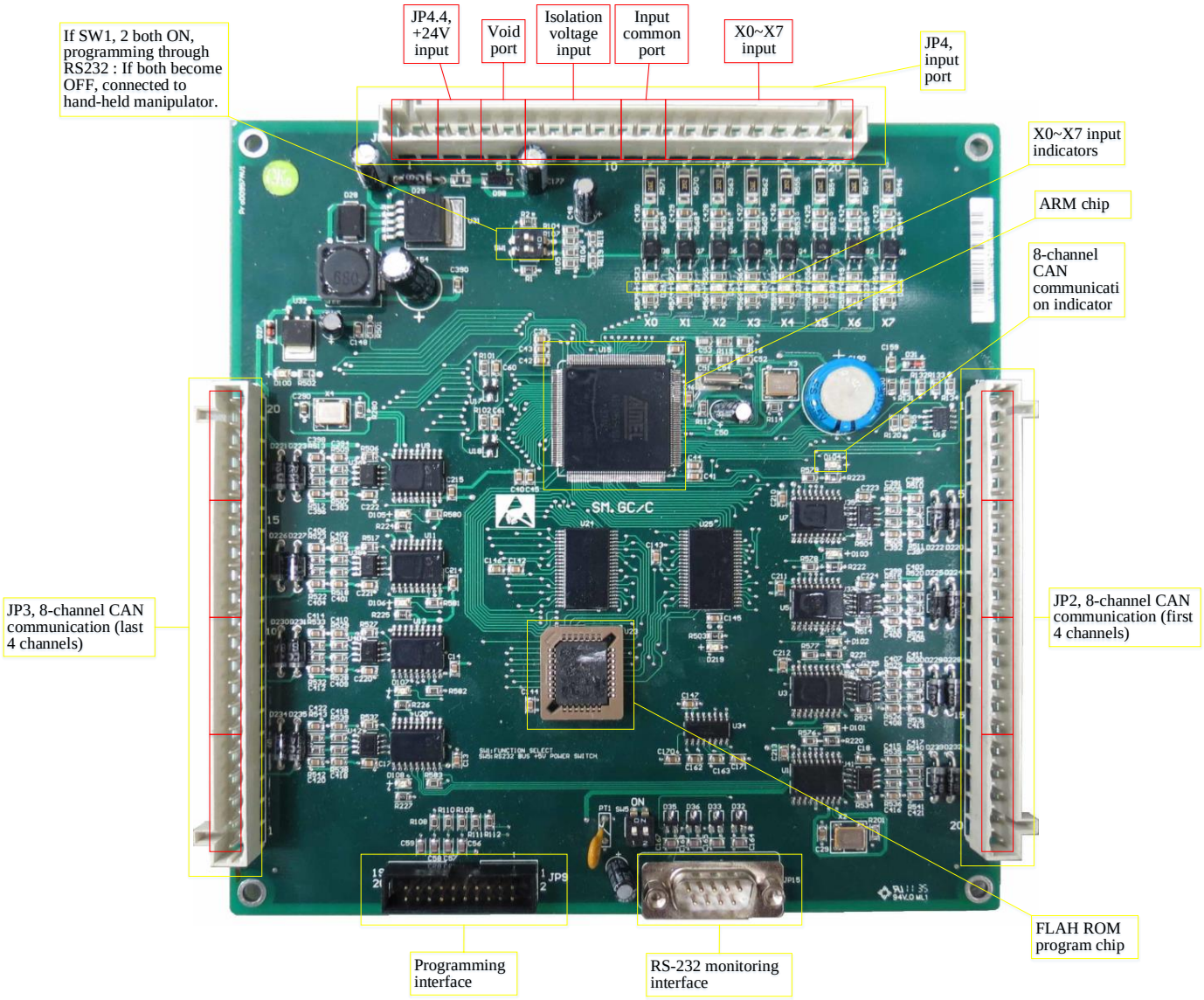


Fig. 5.11 Outline view of group control board

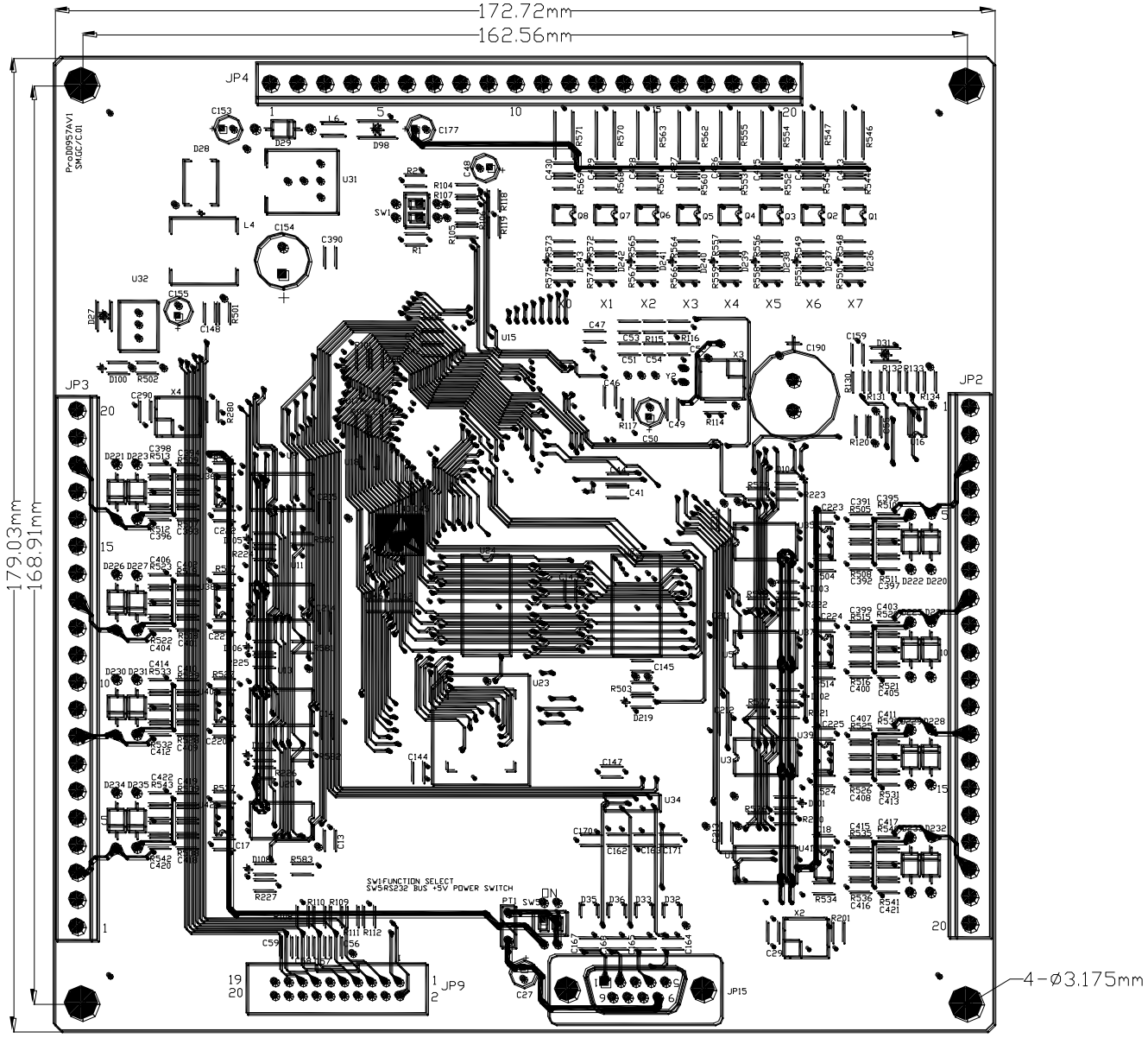


Fig. 5.12 Dimensional figure of the elevator group control board (SM.GC/C)

5.4.2 Definitions of Input and Output Interfaces of SM.GC/C

Table 5.6 The definitions of the JP2 and JP3 port

No.	Position	Port No.	Port definition	Corresponding LED
JP2	JP2.1		Void	D104
	JP2.2	TXA4-	Communication signal negative port of No. 4 elevator in group control system	
	JP2.3	TXA4+	Communication signal positive port of No. 4 elevator in group control system	
	JP2.4	TXV4-	Communication power negative port of No. 4 elevator in group control system	
	JP2.5	TXV4+	Communication power positive port of No. 4 elevator in group control system	

No.	Position	Port No.	Port definition	Corresponding LED
	JP2.6		Void	D103
	JP2.7	TXA3-	Communication signal negative port of No. 3 elevator in group control system	
	JP2.8	TXA3+	Communication signal positive port of No. 3 elevator in group control system	
	JP2.9	TXV3-	Communication power negative port of No. 3 elevator in group control system	
	JP2.10	TXV3+	Communication power positive port of No. 3 elevator in group control system	
	JP2.11		Void	D102
	JP2.12	TXA2-	Communication signal negative port of No. 2 elevator in group control system	
	JP2.13	TXA2+	Communication signal positive port of No. 2 elevator in group control system	
	JP2.14	TXV2-	Communication power negative port of No. 2 elevator in group control system	
	JP2.15	TXV2+	Communication power positive port of No. 2 elevator in group control system	
	JP2.16		Void	D101
	JP2.17	TXA1-	Communication signal negative port of No. 1 elevator in group control system	
	JP2.18	TXA1+	Communication signal positive port of No. 1 elevator in group control system	
	JP2.19	TXV1-	Communication power negative port of No. 1 elevator in group control system	
	JP2.20	TXV1+	Communication power positive port of No. 1 elevator in group control system	
JP3	JP3.1		Void	D108
	JP3.2	TXA4-	Communication signal negative port of No. 8 elevator in group control system	
	JP3.3	TXA4+	Communication signal positive port of No. 8 elevator in group control system	
	JP3.4	TXV4-	Communication power negative port of No. 8 elevator in group control system	
	JP3.5	TXV4+	Communication power positive port of No. 8 elevator in group control system	
	JP3.6		Void	D107
	JP3.7	TXA3-	Communication signal negative port of No. 7 elevator in group control system	
	JP3.8	TXA3+	Communication signal positive port of No. 7 elevator in group control system	
	JP3.9	TXV3-	Communication power negative port of No. 7 elevator in group control system	
	JP3.10	TXV3+	Communication power positive port of No. 7 elevator in group control system	
	JP3.11		Void	D106
	JP3.12	TXA2-	Communication signal negative port of No. 6 elevator in group control system	
	JP3.13	TXA2+	Communication signal positive port of No. 6 elevator in group control system	
	JP3.14	TXV2-	Communication power negative port of No. 6 elevator in group control system	
	JP3.15	TXV2+	Communication power positive port of No. 6 elevator in group control system	
	JP3.16		Void	D105
	JP3.17	TXA1-	Communication signal negative port of No. 5 elevator in group control system	
	JP3.18	TXA1+	Communication signal positive port of	

No.	Position	Port No.	Port definition	Corresponding LED
			No. 5 elevator in group control system	
	JP3.19	TXV1-	Communication power negative port of No. 5 elevator in group control system	
	JP3-20	TXV1+	Communication power positive port of No. 5 elevator in group control system	

Note: The corresponding flashing LED indicates good communication.

Table 5.7 The definitions of the JP4 port(switching value input definitions: JP4.7~JP4.20)

No.	Position	Code	Port definition	Corresponding LED
JP4	JP4.1			None
	JP4.2			
	JP4.3	0V	Negative port 0V of +24V power supply	D100
	JP4.4	+24V	+24V power input	
	JP4.5		Void	None
	JP4.6		Void	
	JP4.7	+24V	VISO+, isolated positive power input	
	JP4.8	+24V	VISO+, isolated positive power input	
	JP4.9	+24V	VISO+, isolated positive power input	
	JP4.10		VISO-, isolated negative power input	
	JP4.11	Common port	Input common port, interior connected to JP4.10	
	JP4.12	Common port	Input common port, interior connected to JP4.10	
	JP4.13	X7	Reserved	D243
	JP4.14	X6	Reserved	D242
	JP4.15	X5	Up peak service switch	D241
	JP4.16	X4	Service floor switching scheme II switch	D240
	JP4.17	X3	Service floor switching scheme I switch	D239
	JP4.18	X2	Down peak service switch	D238
	JP4.19	X1	Group split switch	D237
	JP4.20	X0	Abnormal power supply detection	D236

Supplementary Specification of Other Interfaces is show as below. P1: RS232 monitoring interface, used for connection with a laptop.

Fig.5.13 The connection schematic diagram between RS232 monitoring interface and computer

Table5.8 The definitions of the RS232 port

SM.GC/C（P1）	Computer (RS232)	Remarks
2	3	RXD
3	2	TXD
5	5	SGND

Chapter 6 Parameter List of AS380

Table 6.1 F Parameter List

No.	Name	Factory Setup	Scope	Unit	Remarks
F00	Accelerating slope	0.550	0.200～1.500	m/s^2	
F01	Decelerating slope	0.550	0.200～1.500	m/s^2	
F02	S curve T0 (initial S angle time T0)	1.300	0.300～3.000	s	
F03	S curve T1 (S angle T1 at end of acceleration)	1.100	0.300～3.000	s	
F04	S curve T2 (S angle time T2 at the beginning of deceleration)	1.100	0.300～3.000	s	
F05	S curve T3 (S angle time T3 at the end of deceleration)	1.300	0.300～3.000	s	
F06	Elevator rated speed	1.750	0.100～10.000	m/s	
F09	Locking elevator base floor	1	1～64	×	
F10	Offset floor number	0	0～64	×	
F11	Pre-set floor number	18	2～64	×	
F12	Maintenance speed	0.250	0～0.630	m/s	
F13	Return to leveling speed	0.060	0.010～0.150	m/s	
F14	Closing door delay 1 (repsonseing to hall call)	3.0	0～30.0	s	
F15	Closing delay 2 (repsonse to car call)	3.0	0～30.0	s	
F16	Openning brake delay	0.2	0～2.0	s	
F17	Operation signal release time when automatic	0.6	0.2～3.0	s	
F18	Firefighting base landing	1	1～64	×	
F20	The delay time of returnning to base landing	300	0～65535	s	0 represents not open; other numbers represents open
F21	Leveling switch motion delay distance (full-speed)	6	0～40	mm	
F22	The base landing which the SIMPLEX and DUPLEX elevator return to	1	1～64	×	
F23	Group control mode	0	0～3	×	
F25	Input type 1 (NO/NC setup for X0～X15 input points)	819	0～65535	×	
F26	Input type 2 (NO/NC setup for X16～X25 input points)	2	0～65535	×	
F27	Elevator car board input type (NO/NC setup for GX0～GX15 input points)	0	0～65535	×	
F28	Car roof board input type (NO/NC setup for HX0～HX15 input points)	323	0～65535	×	
F29	Service floor 1 (Set up whether 1～16 floors can be docked)	65535	0～65535	×	
F30	Service floor 2 (Set up whether 17～32 floors can be docked)	65535	0～65535	×	
F31	Service floor 3 (Set up whether 33～48 floors can be docked)	65535	0～65535	×	
F190	Service floor 4 (Set up whether 49～64 floors can be docked)	65535	0～65535	×	
F33	Auomatic operation interval for test running	5	0～60	s	

No.	Name	Factory Setup	Scope	Unit	Remarks
F34	Automatic operation times for test running	0	0～65535		
F35	Firefighting switch input port definition and firefighting mode selection	0	0～65535	×	Bit0: 0: ordinary firefighting, 1: Schindler firefighting mode Bit1: reserved. Bit2: 0: standard firefighting indicatoir indication signal output; 1: Shandong firefighting indication signal output: 1) after the firefighting base landing door opening and arriving the position, the firefighting returning back state, output the firefighting indication signal; 2) When under the fireman state, firefighting indication signal output, or when the elevator is leaving the firefighting base landing, the firefighting indication signal will not output. Bit3: 0: Motherboard X15 input point is for firefighting return; 1: Motherboard X15 input point is for fireman switch.
F36	Brake switch detection mode	0	0～2	×	
F40	Weight data bias	48	0～100	%	
F41	Weighter self-study and parameter setup command	0	0/1/2/10/20/30/40/50/60	×	
F43	Buzzing/flashing function selection for attendant status call	3	0～65535	×	.
F44	Serial communication local address (255 for non-monitor)	255	0～255	×	
F49	Emergency leveling orientation mode	0	0～2		
F50	Front door opening permission 1 (opening setup value for floor 1～16)	65535	0～65535	×	
F51	Front door opening permission 2 (opening setup value for floor 17～32)	65535	0～65535	×	
F52	Front door opening permission 3 (opening setup value for floor 33～48)	65535	0～65535	×	
F191	Front door opening permission 4 (opening setup value for floor 49～64)	65535	0～65535	×	
F53	Rear door opening permission 1 (opening setup value for floor 1～16)	0	0～65535	×	
F54	Rear door opening permission 2 (opening setup value for floor 17～32)	0	0～65535	×	
F55	Rear door opening permission 3 (opening setup value for floor 33～48)	0	0～65535	×	
F192	Rear door opening permission 4 (opening setup value for floor 49～64)	0	0～65535	×	

No.	Name	Factory Setup	Scope	Unit	Remarks
F56	Up leveling adjustment (50 to fiducial value)	50	0～240	mm	
F57	Down leveling adjustment (50 to fiducial value)	50	0～240	mm	
F59	Zero speed braking delay	0	0～10.00	0.01s	
F61	Arriving distance for arrival gong	1200	0～4000	mm	
F62	Anti-slipping limit time	32	20～45	s	
F65	Base electrode lock mode	0	0～1	×	0: No base electrode lock, 1: once output contactor off, immediate lock
F66	With or whithout up and down limt	0	0-1		0:no 1:yes
F67	With or whithout entension board	0	0-1		0:no 1:yes
F70	Light load uplink gain	100	0-300	%	
F71	Light load lowlink gain	100	0-300	%	
F72	Heavy load uplink gain	100	0-300	%	
F73	Heavy load lowlink gain	100	0-300	%	
F74	Light load height gain	512	0-1024		
F75	Heavy load height gain	512	0-1024		
F76	The function parameter of X17	0	0~1		0: overload input point; 1: detection point for the door lock loop relay
F77	HAD/TCI pattern	3	0～65535		Bit0: 1: open the HAD pattern; Bit1: 1: open the TCI-Lock pattern
F115	Limit time for opening door overtime	15	3～30	s	
F116	Limit time for closing door overtime	15	3～30	s	
F117	Keeping opening time for forced closing door	60	0～1800	s	
F118	Keeping opening time for the disabled	10	0～1800	s	
F120	Car call number when anti-nuisance function activates.	0	0～30	×	
F121	Activate forced closing function (0 represents not activate)	0	0～1	×	
F122	Operation signal delay release time during inspection	0.3	0～10.0	s	
F123	Call classification	0	0～3	x	
F124	Define the function of X16 input point of the mainboard	0	0～2	×	
F128	Control mode of front and rear doors	0	0/1	×	0: separate control of front and rear doors; 1: joint control of front and back doors
F129	Activate the functions of re-leveling after opening door and/or pre-opening	0	0～3	×	

No.	Name	Factory Setup	Scope	Unit	Remarks
F130	Maintain the opening/closing torque	0	0～7	×	Bit0: 1: maintaining for door opening Bit1: 1: maintaining for door closed Bit2: 1: maintaining for door closed during operation
F131	Set the floor for the time section floor blockade function	0	0-65535		
F132	Set the beginning time for the time section floor blockade function	0	0-65535		
F133	Set the closure time for the time section floor blockade	0	0-65535		
F137	Service floor 1 (Floor 1~ 16) when NS-SW function is set.	65535	0～65535	×	
F138	Service floor 2 (Floor 17~ 32) when NS-SW function is set	65535	0～65535	×	
F139	Service floor 3 (Floor 33~ 48) when NS-SW function is set	65535	0～65535	×	
F199	Service floor 4 (Floor 49~ 64) when NS-SW function is set	65535	0～65535	×	
F140	Select the reverse direction instruction cancellation function	0	0~1		0: disable the function to cancel the reverse direction instruction; 1: enable the function to cancel the reverse direction instruction
F141	Time of delay release of the main contactor (after enabled)	0.50	0.50～10.00	s	Synchronize with F228. If F228<0.5S, F141=0.5S; otherwise F141=F228
F145	Bus voltage gain	100	80～120	%	
F146	Position error distance	180	180～1000	mm	
F147	Protection mode of contact point detection	0	0～1		
F152	Lighting delay (fans turned off automatically, delay lighting)	180	0～65535	S	0: do not turn off the lights
F153	Detection whether with or without hall door lock high-voltage input point	1	0/1	×	0: No 1: Yes
F156	Detection whether with or without door lock relay contact point	1	0/1	×	0: No 1: Yes
F160	Whether activate the function of manual removal off error instruction	1	0/1	×	0: No 1: Yes
F161	The function to set the time section floor blockade mode	0	0～65535	×	Bit0: 1: block instruction Bit1: 1: block upward call Bit2: 1: block downward call

No.	Name	Factory Setup	Scope	Unit	Remarks
F163	Choose whether the back-up power continues running after returning to the base for single elevator or parallel connection	0	0/1	×	0: stop running 1: may continue running
F164	Type of weighing device	99	0～99	×	See the manual for more detailed explanation
F165	Special control of door operation	0	0～65535	×	Bit0: 1: door closed during ispection Bit1: 1: door closed during debug running Bit2: 1: door opened at the base station Bit3: 1: whether open the door by LED operator
F168	Elevator No. with IC card service	0	0～65535	×	
F169	Selection of upward and downward calls by IC card	0	0～65535	×	
F170	When IC card function in the car, the option whether need to swiping IC card corresponding to floor 1～16	0	0～65535	×	
F171	When IC card function in the car, the option whether need to swiping IC card corresponding to floor 17～32	0	0～65535	×	
F172	When IC card function in the car, the option whether need to swiping IC card corresponding to floor 33～48	0	0～65535	×	
F175	Creeping speed at startup	0.006	0～0.100	m/s	
F180	Speed gain	100.0	0～110.0	%	
F181	Elevator No. at mutual parallel connection mode	0	0～1	×	
F182	Slow down switch series	0	0～10	×	0: determine automatically by speed
F183	Hoistway self-learn speed	0.800	0～1.000	m/s	
F186	Creeping time at startup	0.50	0～10.00	s	
F187	Monitor items	0	0～255	×	
F193	Reserved				
F194	Reserved				
F195	Reserved				
F196	Second base station of the paralleleelevator	0	0～64	×	
F200	Inverter software version	Factory setup		×	Read-only
F201	Inverter drive mode	3	3	×	3:Vector control with speed sensor
F202	Motor type	0	0/1	×	0: Asynchronous 1: Synchronous
F203	Motor rated power	By Inverter parameter	0.40～160.00	KW	

No.	Name	Factory Setup	Scope	Unit	Remarks
F204	Motor rated current	By Inverter parameter	0.0～300.0	A	
F205	Motor rated frequency	50.00	0.00～120.00	Hz	
F206	Motor rated rotation speed	1460	0～3000	rpm	
F207	Motor rated voltage	By Inverter parameter	0～460	V	
F208	Number of poles of motor	4	2～128	×	
F209	Motor rated slip frequency	1.40	0～10.00	Hz	
F210	Encoder type	0	0/1/2	×	0: incremental encoder 1: SIN/COS encoder 2: ENDAT encoder
F211	Encoder pulse number	1024	500～16000	PPr	
F212	Zero speed PID adjustor gain P0	100.00	0.00～655.35	×	
F213	Zero speed PID adjustor integral I0	120.00	0.00～655.35	×	
F214	Zero speed PID adjustor differential D0	0.50	0.00～655.35	×	
F215	Low speed PID adjustor gain P1	70.00	0.00～655.35	×	
F216	Low speed PID adjustor integral I1	30.00	0.00～655.35	×	
F217	Low speed PID adjustor differential D1	0.50	0.00～655.35	×	
F218	Medium speed PID adjustor gain P2	120.00	0.00～655.35	×	
F219	Medium speed PID adjustor integral I2	25.00	0.00～655.35	×	
F220	Medium speed PID adjustor differential D2	0.20	0.00～655.35	×	
F221	High speed PID adjustor incremental P3	140.00	0.00～655.35	×	
F222	High speed PID adjustor integral I3	5.00	0.00～655.35	×	
F223	High speed PID adjustor differential D3	0.10	0.00～655.35	×	
F224	Low speed point switch frequency F0	1.0	0.0～100.0	%	
F225	High speed point switch frequency F0	50.0	0.0～100.0	%	
F226	Zero servo time	0.8	0.0～30.0	s	
F227	Brake release time	0.25	0.00～30.00	s	
F228	Current slow descent time	0.00	0.00～10.00	s	
F229	Torque compensation direction	0	0/1	×	0: positive direction 1: negative direction
F230	Torque compensation gain	100.0	0.0～200.0	%	
F231	Torque compensation bias	0.0	0.0～100.0	%	
F232	Filtering time for feedback signal of encoder	0	1～30	ms	

No.	Name	Factory Setup	Scope	Unit	Remarks
F233	Feedback direction of encoder	1	0/1	×	1:positive sequence; 0:negative sequence. When the AS380 integrated drive controller matching with synchronous motor, or matching with the encoder except for ABZ type, the modification of the F233 encoder direction parameter is prohibited
F234	Motor phase sequence	1	0/1	×	1: positive direction 0: negative direction
F235	Motor no-load current coefficient	32.00	0.00～60.00	%	Unnecessary to set up nomally
F236	PWM carrier frequency	6.000	1.100～11.000	kHz	Do not adjust this parameter under normal circumstances
F237	PWM carrier width	0	0.000～1.000	kHz	Do not adjust this parameter under normal circumstances
F238	Regulator mode	1	0/1/2/3	×	Do not adjust this parameter under normal circumstances
F239	Output torque limit	175	0～200	%	Do not adjust this parameter under normal circumstances
F240	Input voltage of inverter	380	0～460	V	
F241	Rated power of inverter			KW	This is a read-only query data
F242	Phase angle of encoder	0.0	0.0～360.0	Degree	
F243	Zero position correction of encoder	0	0/2	×	Set 2 to rectify zero point
F244	Spare				
F245	Selection of F246~F255 parameter function	0	0～65535	×	Modify this parameter, then F246～F255 will have different meanings
When F245=0, F246~F255 have the following meanings					
F246	Overheating protection time for radiator	50	000～65535	0.01s	Default protect after more than 0.5 second from radiator overheating
F247	Overspeed protection coefficient	12000	0～65535	0.01%	The default overspeed protection threshold is 120%
F248	Overspeed protection time	100	0～65535	0.01s	Default protect after more than 1 second of the speed surpassing F247 value.
F249	Confirmation times for inputting open phase	60	0～65535	Time	Default protect after more than 60 times of inputting open phase in a instant moment
F250	Confirmation times for short circuit of braking resistor	10	0～65535	Time	Default protect after more than 10 times of short circuited of the brake resistor
F251	Confirmation times for SinCos Encoder disconnection	2	0～65535	Time	Default protection in case of SinCos Encoder disconnection confirmed for more than twice
F252	Confirmation time for outputting open phase	2000	0～65535	0.001s	Default protect after more than 2 seconds from output open phase
F253	Confirmation of voltage for charging relay failure	65	0～65535	Volt	Protection after the three-phase in-operation input voltage reduces to 65/1.414=46V, fault 144 reported, the charging relay may be damaged or the grid voltage suddenly desend

No.	Name	Factory Setup	Scope	Unit	Remarks
F254	Confirmation threshold of Encoder phase CD failure	300	0～65535		No 28 failure reported in case that the D-value of the absolute position and computing position of encoder exceed the setting value
F255	Protection threshold of ABZ encoder disconnection	20	0～100		Protection if the synchronous motor speed feedback deviation surpass this value
When F245=1, F246~F255 have the following meanings					
F246	Protection times of IGBT	2	0~65535	Times	Times of instantaneous over current of IGBT
F247	Protection option of I^2t	0	0/1		0: I^2t protective 1: cancel I^2t protection
F248	Standby				Inner parameter, do not modify
F249	Standby				Inner parameter, do not modify
F250	Standby				Inner parameter, do not modify
F251	Standby				Inner parameter, do not modify
F252	Standby				Inner parameter, do not modify
F253	Standby				Inner parameter, do not modify
F254	Standby				Inner parameter, do not modify
F255	Standby				Inner parameter, do not modify
When F245=2, F246~F255 have the following meanings					
F246	Standby				Inner test parameter, do not modify
F247	PWM modulation mode	2	0～2	×	0: 5 segment mode; 1: 7 segment mode; 2: < 40% rpm, 7 segment mode; > 40%, 5 segment mode. At low speed, the intergrated controler has too much interference toward outside. For example, when CAN has a poor communication signal, the change to 0 (5 segment mode) will have significant effect, and it will reduce the emitted heat from the inverter, but may cause too much noise from inverter at low speed
F248	Standby				Internal test parameter, do not modify
F249	Standby				Internal test parameter, do not modify
F250	Three-phase current balance coefficient			×	Read-only, it will automatically change after doing calibration of three-phase current balance coefficient will. If synchronous motor may trigger the self-learning command of the asynchronous motor to pickup output contactor, and carry out the calibration of the three-phase current balance coefficient. Such function will reduce the motor vibration and improve comfort.
F251	Standby				

No.	Name	Factory Setup	Scope	Unit	Remarks
F252	Positive/negtive rotation enabled	0	0~60000	0.1s	0:allow Positive/negtive rotation 1:only allow positive rotation, and forbid the negtive rotation
F253	Position/negtive rotation dead-time	20	0~200	%	The zero-speed keeping time of positive/negative rotation shifting
F254	Accelerating overcurrent threshold of inverter	180	0～200	%	Inverter stop accelerating and maintain the current speed if overcurrent occur during the acceleration course. Continue to accelerate once the current descend
F255	Decelerating overvoltage threshold of inverter	750	0～800	V	Inverter stop decelerating and maintain the current speed if bus voltage is more than this set value during the deceleration course. Continue to decelerate once the voltage descend
When F245=3, F246~F255 have the following meanings					
F246	Current loop P	140	35～280	0.01	Current loop Kp (no need to modify)
F247	Current loop I	100	25～200	0.01	Current loop Ki(no need to modify)
F248	Current loop D	0	0～200	0.01	Current loop Kd(no need to modify)
F249	Standby				Inner parameter, do not modify
F250	Standby				Inner parameter, do not modify
F251	Standby				Inner parameter, do not modify
F252	Standby				Inner parameter, do not modify
F253	Standby				Inner parameter, do not modify
F254	Torque direction	0	0/1		0:positive 1:negtive
F255	Spare				Inner parameter, do not modify
When F245=4, F246~F255 have the following meanings					
F246	Software version			×	Read-only
F247	ID No.: 0			×	Read-only
F248	ID No.: 1			×	Read-only
F249	ID No.: 2			×	Read-only
F250	ID No.: 3			×	Read-only
F251	ID No.: 4			×	Read-only
F252	ID No.: 5			×	Read-only
F253	Inverter rated current			0.1A	Read-only
F254	Rated current of inverter current sensor			A	Read-only
F255	Motor power coefficient	200	50~400	%	Set the max power output of the motor, generally do not need to change
When F245=5, F246~F255 have the following meanings					
F246	Stator resistor			0.001 ohm	Stator resistor of asynchronous motor
F247	Rotor resistor			0.001 ohm	Rotor resistor of asynchronous motor
F248	Stator inductance			0.0001H	Stator inductance of asynchronous motor

No.	Name	Factory Setup	Scope	Unit	Remarks
F249	Rotor inductance			0.0001H	Rotor inductance of asynchronous motor
F250	Mutual inductor			0.0001H	Mutual inductance of asynchronous motor
F251	Motor low-speed overcurrent threshold	1500	0～65535	0.1%	Motor stop and motor low-speed overcurrent fault reported in case that when the motor speed is lower than 20% of rated speed, the current value is greater than F251 and its time duration is longer than F252
F252	Low-speed overcurrent time	600	0～65535	0.1s	Duration time of motor low-speed overcurrent
F253	Motor high-speed overcurrent threshold	1200	0～65535	0.1%	Motor stop and motor high-speed overcurrent fault reported in case that when the motor speed is higher than 80% of rated speed, the current value is greater than F253 and its time duration is longer than F254
F254	High-speed overcurrent time	3000	0～65535	0.1s	Time of duration of motor high-speed overcurrent
F255	Frequency dividing coefficient of encoder (PG card required)	0	0～7		0: (no frequency dividing), 1: (2 frequency dividing), 2: (4 frequency dividing), 3: (8 frequency dividing), 4: (16 frequency dividing), 5 (32 frequency dividing), 6: (64 frequency dividing), 7: (128 frequency dividing) Note: (PG card required)
When F245=6, F246~F255 have the following meanings					
F246	Whether synchronous motor do the angle self-study or not after power on?	1	0/1		Choose whether synchronous motor conduct angle self-study or not after power on . 0: no study, 1: study.
F247	Current gain when self-study	150	0～400	%	Current gain when synchronous motor conduct angle self-study
F248	Command option	2	0/1/2		Running command option
F249	Zero servo process current loop gain	100	48~65535	%	Zero servo process current loop gain
F250	Standby				
F251	Standby				
F252	Anti-slipping parameter	6616	0~65535		6616: activate anti-slipping function
F253	Standby				
F254	Standby				
F255	Standby				
When F245=7/8/9, F246~F255 are all standby					

Chapter 7 Fault Analysis

7.1 Control System Fault

Table 7.1 Control System Fault Code Table

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
02	Door lock disengagement in operation (emergency stop)	01	During operation with safety loop but without door lock high voltage point	
		02	During operation with safety loop but without door lock low voltage point	
03	Elevator overtravels when going upwards	01	In automatic operation, the up and low limit switches are acting at the same time and the elevator is not at the highest landing	
		02	In upward operation, the elevator crosses the top levelling	
04	Elevator overtravels when going downwards	01	In automatic operation, the up and low limit switches are acting at the same time and the elevator is not at the lowest landing	
		02	In downward operation, the elevator crosses the bottom levelling	
05	Door lock will not open	01	Door fails to open in position after the door-open signal outputs for consecutive 15 seconds, and occured for 3 times	After record the landing, front door or rear door for 3 times, it will report the fault 05
06	Door lock will not close	01	Door fails to close in position after the door-close signal outputs for consecutive 15 seconds and reports failure for 8 times The button flickers after the failure protected	Record that the landing, front door or rear door will not close for 3 times
		02	Door-close over time reported for more than 8 times that door lock would not close after door close position-limit for 4 seconds. The button flickers after the failure protected. Door-close keeping parameter(F130) adds the door lock aiti-shake parameter(door torque keeping), and keeping output after door locked in position for 0.5s	
08	CAN communication failure	01	The communication disconnected with lift car board SM-02 for consecutive 4 seconds	
10	Malposition of up deceleration switch 1	03	Check during operation: the sigle level up deceleration switch action position is 100mm lower than the sigle level up deceleration switch from hoistway self-learning result.	
		04	Check during operation: the sigle level up deceleration switch action position is 150mm higher than the sigle level up deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the sigle level up deceleration switch have acted and present position is 100mm lower than the sigle level up deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the sigle level up deceleration switch have not acted and present position is 150mm higher than the sigle level up deceleration switch position from hoistway self-learning result.	
		07	In automatic operation, the up and low deceleration switches are acting at the same time and the elevator is not at the highest landing	

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
		08	The elevator is at the highest landing, but the up deceleration 1 have not acted.	
11	Malposition of down deceleration switch 1	03	Check during operation: the sigle level down deceleration switch action position is 100mm higher than the sigle level down deceleration switch from hoistway self-learning result.	
		04	Check during operation: the sigle level down deceleration switch action position is 150mm lower than the sigle level down deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the sigle level down deceleration switch have acted and present position is 100mm higher than the sigle level down deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the sigle level down deceleration switch have not acted and present position is 150mm lower than the sigle level down deceleration switch position from hoistway self-learning result.	
		07	In automatic operation, the up and low deceleration switches are acting at the same time and the elevator is not at the lowest landing	
		08	The elevator is at the lowest landing, but the down deceleration 1 have not acted.	
12	Malposition of up deceleration switch 2	03	Check during operation: the double level up deceleration switch action position is 150mm lower than the double level up deceleration switch from hoistway self-learning result.	
		04	Check during operation: the double level up deceleration switch action position is 250mm higher than the double level up deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the double level double deceleration switch have acted and present position is 150mm lower than the double level up deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the double level double deceleration switch have not acted and present position is 200mm higher than the double level up deceleration switch position from hoistway self-learning result.	
13	Malposition of down deceleration switch 2	03	Check during operation: the double level down deceleration switch action position is 150mm higher than the double level down deceleration switch from hoistway self-learning result.	
		04	Check during operation: the double level down deceleration switch action position is 250mm lower than the double level down deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the double level down deceleration switch have acted and present position is 150mm higher than the double level down deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the double level down deceleration switch have not acted and present position is 200mm lower than the double level down deceleration switch position from hoistway self-learning result.	
14	Malposition of up deceleration switch 3	03	Check during operation: the treble level up deceleration switch action position is 250mm lower than the treble level up deceleration switch from hoistway self-learning result.	
		04	Check during operation: the treble level up deceleration switch action position is 300mm higher than the treble	

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
			level up deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the treble level treble deceleration switch have acted and present position is 250mm lower than the treble level up deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the treble level double deceleration switch have not acted and present position is 300mm higher than the treble level up deceleration switch position from hoistway self-learning result.	
15	Malposition of down deceleration switch 3	03	Check during operation: the treble level down deceleration switch action position is 250mm higher than the treble level down deceleration switch from hoistway self-learning result.	
		04	Check during operation: the treble level down deceleration switch action position is 300mm lower than the treble level down deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the treble level down deceleration switch have acted and present position is 250mm higher than the treble level down deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the treble level down deceleration switch have not acted and present position is 300mm lower than the treble level down deceleration switch position from hoistway self-learning result.	
16	Malposition of up deceleration switch 4	03	Check during operation: the 4 level up deceleration switch action position is 250mm lower than the 4 level up deceleration switch from hoistway self-learning result.	
		04	Check during operation: the 4 level up deceleration switch action position is 300mm higher than the 4 level up deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the 4 level treble deceleration switch have acted and present position is 300mm lower than the 4 level up deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the 4 level double deceleration switch have not acted and present position is 300mm higher than the 4 level up deceleration switch position from hoistway self-learning result.	
17	Malposition of down deceleration switch 4	03	Check during operation: the 4 level down deceleration switch have acted and present position is 150mm higher than the 4 level down deceleration switch from hoistway self-learning result.	
		04	Check during operation: the 4 level down deceleration switch have acted and present position is 250mm lower than the 4 level down deceleration switch from hoistway self-learning result.	
		05	Check during car stop: the 4 level down deceleration switch have acted and present position is 300mm higher than the 4 level down deceleration switch position from hoistway self-learning result.	
		06	Check during car stop: the 4 level down deceleration switch have not acted and present position is 300mm lower than the treble level down deceleration switch position from hoistway self-learning result.	
19	Door open/close position limit failure	01	At automatic mode, and when elevator stoped, door open limit switch and door close limit switch are in action at the same time for more than 1.5s	
20	Slip protection failure	01	In operation(except for during inspection), the leveling	

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
			switch is not in action for over the time set in F62 (anti-slip time)	
		02	There are 3 kinds of speeds for operation at slow speed: the inspection speed V1 set by parameters, the calculated speed V2 from leveling spile length and leveling switch length, the calculated speed V3 from the max floor distance and anti-slip time. When ALP re-leveling, protect as the value that the max floor distance divide the minimum value of V1, V2, V3, and then added 5s.	
21	Motor overheating	01	Exist input signal at motor overheating input point	
22	Motor reverse failure	01	Slip reverse for consecutive 0.5 seconds (upward speed feedback < -150mm, downward speed feedback->150mm)	
			When brake releasing slip reverse enmergency leveling speed is grater than 0.5m and last over than 0.1s	
23	Elevator overspeed failure	01	Protect when the given speed is less than 1m / s, allowable speed≥ given speed +0.25 m/s and last over than 0.2s. Or protect when the given speed is greater than 1m/s, allowable speed= given speed *1.25 and last over than 0.1s	Record 6 reference and feedback datas, and it can record 3 groups most
24	Elevator over-low speed	01	Failure 24 reported when speed feedback value is less than allowable speed for 0.5 seconds When the given speed is less than 0.5m/s, allowable speed= given speed -0.25 m/s When the given speed is greater than 0.5m/s, allowable speed= given speed *0.5	
27	Up leveling sensor failure	02	After high-speed operation stops, the up leveling sensor doesn't acted	The action times of down leveling switch during operation
		03	Up leveling sensor action distance is greater than valid protection distance. When the leveling spile length is less than 300mm: maximum protection distance for effective action = 300mm*4; When the leveling spile length is greater than 300mm: maximum protection distance for effective action = leveling spile length *4	The action distance of up leveling sensor
		04	The distance that the up leveling sensor haven't acted is greater than maximum invalid protection distance. When the top floor is less than 3: the maximum invalid action protection distance = maximum floor height * 1.5 When the top floor is greater than 3: the maximum invalid action protection distance = maximum floor height * 2.5	The distance that up leveling up sensor have not acted
		05	After elevator up going and traveling over top floor, when re-leveling, when down leveling turn from off state to on state, the up leveling switch have not acted.	
28	Down leveling sensor failure	02	After high-speed operation stops, the down leveling sensor doesn't acted	The action times of up leveling switch during operation
		03	Down leveling sensor action distance is greater than valid protection distance. When the leveling spile length is less than 300mm: maximum protection distance for effective action = 300mm*4; When the leveling spile length is greater than 300mm: maximum protection distance for effective action = leveling spile length *4	The action distance of down leveling sensor
		04	The distance that the down leveling sensor haven't acted is greater than maximum invalid protection distance. When the top floor is less than 3: the maximum invalid action protection distance = maximum floor height * 1.5	The distance that down leveling up sensor have not acted

<table>
<tr><th>Code</th><th>Description</th><th>Sub Code</th><th>Fault Cause Analysis</th><th>Special fault information need to be recorded</th></tr>
<tr><td></td><td></td><td></td><td>When the top floor is greater than 3: the maximum invalid action protection distance = maximum floor height * 2.5</td><td></td></tr>
<tr><td></td><td></td><td>0.5</td><td>After elevator down going and traveling over bottom floor, when re-leveling, when up leveling turn from off state to on state, the up leveling switch have not acted.</td><td></td></tr>
<tr><td>30</td><td>Leveling position error is too large</td><td>01</td><td>When car stops the leveling positon error would be detected, and this fault will be reported when the error detected is overpass than the F146 setting value.</td><td></td></tr>
<tr><td>32</td><td>Safety loop disconnected during operation</td><td>01</td><td>High voltage point of safety loop disconnected during operation</td><td></td></tr>
<tr><td></td><td></td><td>02</td><td>Low voltage point of safety loop disconnected during operation</td><td></td></tr>
<tr><td>35</td><td>Brake contactor contact point fault</td><td>01</td><td>
<table>
<tr><th>Fault</th><th>Fault code</th><th>Brake output</th><th>Contactor feedback</th><th>Switch feedback</th></tr>
<tr><td>Brake contactor adhesion</td><td>Nomal</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td></td><td>3501</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>Brake contactor will not pickup</td><td>3502</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td></td><td>Nomal</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td rowspan="2">Brake contactror wire disconnected detected</td><td>3503</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>Nomal</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td rowspan="2">Brake contactror wire short connected detected</td><td>Nomal</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>3504</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td rowspan="2">Brake switch adhesion or wire short connected to the switch of landing stop announcer</td><td>Nomal</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>3801</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>Brake switch will not pickup or its wire disconnected</td><td>3802</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td></td><td>Nomal</td><td>0</td><td>0</td><td>0</td></tr>
</table>
</td><td></td></tr>
<tr><td></td><td></td><td>02</td><td>
<table>
<tr><th>Fault</th><th>Fault code</th><th>Brake output</th><th>Contactor feedback</th><th>Switch feedback</th></tr>
<tr><td>Brake contactor adhesion</td><td>Nomal</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td></td><td>3501</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>Brake contactor will not pickup</td><td>3502</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td></td><td>Nomal</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td rowspan="2">Brake contactror wire disconnected detected</td><td>3503</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>Nomal</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td rowspan="2">Brake contactror wire short connected detected</td><td>Nomal</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>3504</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td rowspan="2">Brake switch adhesion or wire short connected to the switch of landing stop announcer</td><td>Nomal</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>3801</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>Brake switch will not pickup or its wire disconnected</td><td>3802</td><td>1</td><td>1</td><td>0</td></tr>
<tr><td></td><td>Nomal</td><td>0</td><td>0</td><td>0</td></tr>
</table>
</td><td></td></tr>
<tr><td>36</td><td>Output contactor contact fault</td><td>01</td><td>Motherboard has no drive signal to main circuit contactor, but input signal is detected at input testing point (adhesion failure)</td><td></td></tr>
<tr><td></td><td></td><td>02</td><td>Motherboard has drive signal to main circuit contactor, but input signal is not detected at input testing point (non-adhesion failure)</td><td></td></tr>
<tr><td>37</td><td>Door-lock contactor contact</td><td>01</td><td>The high voltage test point of door lock does not exit, but</td><td></td></tr>
</table>

Code	Description	Sub Code	Fault Cause Analysis	Special fault information need to be recorded
	failure		low voatage test point exit. Adhesion fault	
		02	The high voltage test point of door lock exit, but low voatage test point does not exit. Non-pickup fault	
38	Brake switch failure	01	See table 1	
		02	See table 1	
40	Run signal failure	01	The control part of the AIO sends out run signal, but does not receive the run signal feedback from the drive part	
		02	When the elevator running, the running signal of inverter lost	
42	Deceleration switching action failure	01	Upward overtravel and the lower level force slow switch act at the same time, or Downward overtravel and the upper level force slow switch act at the same time	
45	Pre-opening relay detection fault	01	When the pre-opening relay output is detected inconsistent with the input of pre-opening for over than 0.5s, Y14 has not output, but X17 has input(adhesion)	
		02	Y14 has output ,but X17 has no input(non-pickup)	
48	HAD patarn	01	The elevatro will enter into the HAD patern after the lift door closed in position and the hall door lock loop open over 4s	Report the No. 48 fault, but not entering into the fault status, the left top coner of the LCD window of the handheld operator displayed as “HAD”.
49	Communication failure	01	Communications failure between drive part and control part	
50	Parameter reading error	01	Parameter reading error	
51	TCI-LCOK patern	01	When the TCI input point is valid under the inspection status, return to the automatic satus and the TCI inputs as open connected. During this process, the following steps must be obeyed: a) Open the hall door (that is to open the hall door lock loop) b) Press the emergency stop switch (that is to open the safety loop) c) Leave the car top d) Resume the inspection switch TCI (the input point status changed from valid to invalid) e) Resume the emergency stop switch (that is the safety loop is close) f) Close the hall door (that is to close the hall door lock loop) If the steps above is followed as the sequence, it enter into the TCI-Lock patern	Report the No. 51 fault, but not entering into the fault status, the left top coner of the LCD window of the handheld operator displayed as “TCI-Lock”.
54	Door lock short connected failure	01	Under normal state, hall door lock short connected, when the door does not close in position, the hall door lock input exits still	
		02	Under normal state, car door lock short connected, when the door does not close in position, the car door lock input exits still	
60	Base electrode block failure	01	In operation, when the output contactor contact is detected disconnected, turn off the output of the intergrated controler immediately	
61	Start signal failure		After the brake is opened, no zero servo ending signal is received feeding back from the drive part	
62	No speed output		After start, the elevator maintains the speed at 0, and the elevator does not move	

7.2 Drive System Fault

Table 7.2 Drive System Fault Code Table

Code	Fault Description	Possible Cause	Solution
71	Module protection against over-current	DC terminal with excessively high voltage	Check power grid supply and check whether rapid stop with high inertia loads and without energy consumption
		short circuit at periphery	Check whether the motor and the output wiring are short circuited, whether short circuited to ground
		Phase is open in output	Check whether it is loose between the motor and the output wiring
		Encoder fault	Check whether the encoder is damaged or the wiring is correct
		Encoder phase position error	Check the phase position of encoder
		Motor phase position error	Check the phase position of motor
		The self-learning of phase angle is not correct	Re-do the self-learning of phase angle.
		The current is not sufficient when phase self-learning	Increase the F247 current gain when phase angle self-learning
		Bad contact of hardware or damaged	Ask professional technical personnel for ispection
		Converter internal connectors loose	Ask professional technical personnel for ispection
72	ADC failure	Current sensor damaged	Replace current sensor
		Problem in current sampling circuit	Replace control board
73	Radiator overheating	Ambient temperature is too high	Reduce the ambient temperature, enhance ventilation
		Duct obstruction	Clean dust, cotton and other debris in the duct
		Fan abnormal	Check whether the power cable wiring of fan is well connected, or replace the fan with the same model
		Temperature detection circuit fault	Ask professional technical personnel for ispection
74	Brake unit failure	Brake unit damaged	Replace the corresponding driver module
		External braking resistor short circuit	Check the braking resistor wiring
75	Fuse-off failure	Current is too large to fuse	Check whether the fuse circuit is open, or whether the connection points are loose
76	Over output torque	Over-low input power voltage	Check the input power
		Motor stall or severe load mutation	Prevent occur motor stall, reduce load mutation
		Encoder fault	Check whether the encoder is damaged or the wiring is correct
		Open phase at output	Check whether connection between the motor and output wiring is loose
77	Speed deviation	Acceleration time is too short	Extend the acceleration time
		Overloaded	Reduce the load
		Current limit is too low	Increase the limit value in the allowable range

Code	Fault Description	Possible Cause	Solution
78	(During accelerated running) Bus over-voltage protection	Abnormal input power voltage	Check the input power
		The motor is quick restarted again during high-speed rotation	After stop the motor, restart the motor
	(During decelerated running) bus over-voltage protection	Excessive load inertia	Use appropriate braking components
		Deceleration time is too short	Extend the deceleration time
		The braking resistor has an extremely large value or is disconnected	Connect the appropriate braking resistor
	(In constant speed operation) Bus over-voltage protection	Abnromal input power	Check the input power
		Excessive load inertia	Use appropriate braking components
		The braking resistor has an extremely large value or is disconnected	Connect the appropriate braking resistor
79	Bus under voltage	Supply voltage falls below the minimum operating voltage	Check the input power
		Instantaneous power failure	Check the input power. When the input voltage is normal, restart after reset
		Excessive changes in input power voltage	
		The power wiring terminal is loose	Check the input wiring
		Abnormal internal switching power	Ask professional technical personnel for ispection
		Large starting current load exits in the same power system	Changes the power system to meet the specification values
80	Open phase at output	Abnormal,or omitted connection or disconnection at converter output side	Follow the operation procedures and check the connections at the output side of inverter, eliminate the omitted connection and disconnection
		Output terminal is loose	
		Motor power is too small, below 1/20 of the maximum applicable motor capacity of the invterter	Adjust inverter capacity or motor capacity
		Unbalanced output three-phase	Check whether the motor wiring is intact
			Power off, check whether the inverter output side is consistent with the features of DC side terminal
81	Motor overcurrent at low speed (in acceleration)	Low voltage in power grid	Check the input power
		Abnormal setting of the motor parameters	Set correct motor parameters
		Quick start during the motor operation	Restart after the motor stops rotating
	Motor overcurrent at low speed (in deceleration)	Low voltage in power grid	Check the input power
		Excessive load inertia	Use appropriate braking components
		Abnormal setting of the motor parameters	Set correct motor parameters
		Deceleration time is too short	Extend the deceleration time
	Motor overcurrent at	Load mutation during operation	Reduce the mutation frequency and magnitude of the load

Code	Fault Description	Possible Cause	Solution
	low speed (in constant speed)	Abnormal setting of motor parameters	Set correct motor parameters
82	Encoder fault	Encoder is not correctly connected	Change encoder wiring
		Encoder has no signal output	Check the encoder and power supply
		Encoder wiring disconnected	Repair the disconnection
		Abnormal function code setup	Confirm the relevant functional configuration of the converter Encoder
83	Current detected at car stoped	Current not effectively blocked when the motor stops	Synchronous motor skid
			Ask professional technical personnel for ispection
84	Velocity reverse in operation	Reverse speed in operation	Check the external load for mutation
		Encoder is inconsistent with the motor phase sequence	Change motor or encoder phase sequence
		Motor reversal at start, and the current reaches the current limit	Current limit is too low, or the motor does not match
85	Velocity detected at stop	Brake loose, the elevator car slides	Check brake
		Encoder interfered or loose	Fasten encoder, eliminate interference
86	Motor phase sequence error	Motor wiring reverse	Reverse the motor wiring, or adjust parameters
87	Overspeed in the same direction (within the maximum allowed range)	Galloping in the field-loss status of synchronous motor	Check motor
		Incorrect self study of angle of synchronous motor	Restart the self-learning
		Encoder parameter error or interfered	Check encoder circuit
		Excessive load in forward direction or load mutation	Check the external causes for load mutations
88	Overspeed in the reverse direction(within the maximum allowed range)	Galloping in the field-loss status of synchronous motor	Check motor
		Incorrect self study in angle of synchronous motor	Restart self study
		Encoder parameter error or interfered	Check encoder circuit
		Excessive load in reverse direction or load mutation	Check the external causes for load mutations
89	Wrong phase sequence of UVW encoder	Problem with encoder connection or wrong parameter setting	Check the connection or change the parameters
90	Encoder communication failure	Encoder fault	Check encoder wiring and try to do encoder self study
91	Abc over-current (3-phase instantaneous value)	Motor single-phase ground short circuit	Check motor and the output wire circuit
		Encoder fault	Check whether the encoder is damaged or the wiring is correct
		Encoder phase error	Check the phase of the encoder
		Motor phase error	Check the phase of the motor
		The self-learning of phase angle is not correct	Redo the self-learning of phase angle

Code	Fault Description	Possible Cause	Solution
		The current is not suffient while doing the self-learning of phase angle	Increase the current gain of F247 when doing self-learning
		Error of detection circuit on driver board	Replace driver board
92	Brake detection failure	No action of output relay	Check the relay control circuit
		Relay action brake is not activated	Check whether the brake power cable is loose or disconnected
		Feedback component fail to detect signal	Regulate feedback component
93	Input over-voltage	Incoming voltage is too high	Check whether incoming line voltage matches converter
		Problems with switching power supply voltage detection circuit	Ask professional technical personnel for ispection
94	UVW Encoder disconnection	Problems with encoder wiring circuit	Check whether the terminal is loose or the wire is broken or damaged
96	Encoder is not self-study	Synchronous motor fails to learn encoder angle	Make encoder self study
97	Output over-current (effective value)	Running under overload for too long time. The greater the load, the shorter the time	Stop running for a period time. If it occurs again after re-running, check whether the load is within the allowable range
		Motor stall	Check motor or brake
		Motor coil short circuited	Check motor
		Encoder fault	Check whether the encoder is damaged or the wiring is correct
		Encoder phase error	Check the phase of the encoder
		Motor phase error	Check the phase of the motor
		The self-learning of phase angle is not correct	Redo the self-learning of phase angle
		The current is not suffient while doing the self-learning of phase angle	Increase the current gain of F247 when doing self-learning
		Output short circuit	Check the wiring or the motor
98	SIN/COS Encoder failure	Encoder damaged or wrong wiring	Check the encoder and the wiring
99	Missing input phase	Abnormal voltage at the input side	Check grid voltage
		Open phase on input	
		Loose terminal on input side connection	Check the input terminal wiring
100	Overspeed protection (protection against exceeding the maximum speed limit)	Encoder parameter setup error or interfered	Check encoder circuit
		Load mutation	Check causes of the external load mutation
		Overspeed protection parameter setup error	Check parameters
101	Over-current when the motor at high-speed	Low voltage power grid	Check the input power
		Load mutation when running	Reduce the load mutation frequency and amplitude
		Abnormal motor parameters setup	Set motor parameters correctly
		Encoder parameter setup error or interfered	Check encoder circuit

Code	Fault Description	Possible Cause	Solution
102	Grounding protection	Wiring connection error	Correct the wiring errors according to user manual
		Abnormal motor	Test earthing insulation before replacing the motor
		Over-current leakage of inverter output side against earthing	Ask professional technical personnel for ispection
103	Capacitance aging	Inverter capacitor aging	Ask professional technical personnel for ispection
104	External fault	Failure signal on external input	Check the external cause of the malfunction
105	Unbalanced output	Converter output side has abnormal wiring, missed wiring, or disconnection	Follow the operational rules and check the wiring of output side of inverter, eliminate ignored wiring and disconnection wiring
		Unbalanced 3-phase motor	Check motor
106	Parameter setting error	Wrongr Parameter setup	Modify the inverter parameters
107	Current sensor fault	Driver board hardware failure	Ask professional technical personnel for ispection
108	Braking resistor short circuit	Short circuited of external braking resistor	Check the braking resistor wiring
109	Current instantaneous value is too large	When Ia, Ib, Ic is not in operation, instantaneous value of 3-phase current is too large and reports alarm	Ask professional technical personnel for ispection
112	IGBT short-circuit protection	Short circuit in periphery	Check whether the motor and output wiring is short circuited, and whether short circuited to earth; check whether the brake is open, when doing the anti-slip test, the parameter could be set as a big value, and after accomplished the experiment set back the parameter as the previous value
113	Communication failure for the integrated inverter	Loose connectors inside inverter	Ask professional technical personnel for ispection
		Hardware has bad contact or is damaged	Ask professional technical personnel for ispection
114	Charging relay failure	Charging relay damaged	Ask professional technical personnel for ispection
		The instantaneous voltage drop of 3-phase input power exceeds 46V	Check the cause for input voltage drop
115	I2t instantaneous value over current	Check whether the temperature rise of radiator is too high, whether the ambient temperature is too high; check whether the fans have problem	Ask professional technical personnel for ispection
116	I2t effective value over current	The motor keeps running with over power	Check the cause of keeping running with over power
117	Hardware fault of the control board	The drive control board hardware does not match	Check the model of the drive control board

Chapter 8 User Guidance of Seven-Segment Code Display Manipulator

See the appearance and meaning of the Seven-Segment Code Display Manipulator as shown in fig. 8.1, and detailed descriptions for the functions of the operation keys in table 8.2.

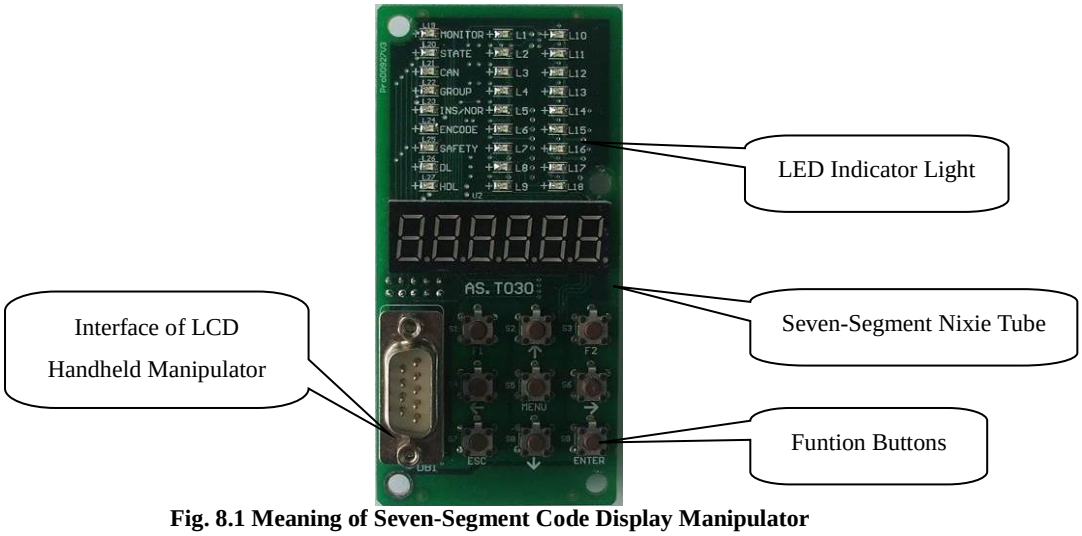


Fig. 8.1 Meaning of Seven-Segment Code Display Manipulator

8.1 LED Indicator Light

Seven-Segment Code Display Manipulator has 27 LED Indicator Lights on the top, including 9 Indicator Lights L19～L27 on the left with fixed meanings (See table 8.1 for their meanings) and 18 Indicator Lights L1～L18 in the middle with definable meanings, see table 8.5.

Table 8.1 Meanings of L19～L27

Code	Display	Meaning	Remarks
L19	MONITOR	Community communication supervision	Flashing- represents communications
L20	STATE	CPU working condition	Rapid flashing - normal / medium speed – in self study / slow - elevator fault / no flash - contact manufacturer
L21	CAN	Lift car / well communications	Flashing- represents communications
L22	GROUP	Parallel connection / group control communications	Flashing- represents communications
L23	INS/NOR	Ispection / automatic mode	Light on- automatic/ light off-Ispection
L24	ENCODE	Rotary Encoder	Light on-with speed feedback
L25	SAFETY	Safety loop	Light on- safety loop connected
L26	DL	General door lock	Light on- loop connected for general lock
L27	HDL	Hall door lock	Light on- loop connected for hall door lock

8.2 Function Keys

9 keys on the bottom of Manipulator. See table 8.2 for their functions.

Table 8.2 Key Function Description

Button	Name	Function
^	Upward button	1. One item upward when browsing the menu 2. Input one digit more
v	Downward button	1. One item downward when browsing the menu 2. Input one digit less
<	Left button	1. Move one menu to the left when selecting functions 2. Cursor moves left when inputting data
>	Right button	1. Move one menu to the right when selecting functions 2. Cursor moves right when inputting data
ESC	Esc button	1. Cancel input
ENTER	Enter button	1. Modify parameters when browsing them 2. Save when entering data
MENU	MENU button	1. Enter into LED Indicator Light function selection interface 2. Enter into the door open/close control interface
F1	F1 button	Press this button to open on the door open/close control interface
F2	F2 button	Press this button to close on the door open/close control interface

8.3 Operation of Manipulator

8.3.1 Menu Structure

See fig. 8.2 for the main menu structure. Due to the limitation of the seven-segment code and button structure, the operational interface uses a first level menu structure. Press the "left"and" right"key to switch between various menus. Press "MENU" button to switch between LED function select and door open/close control.

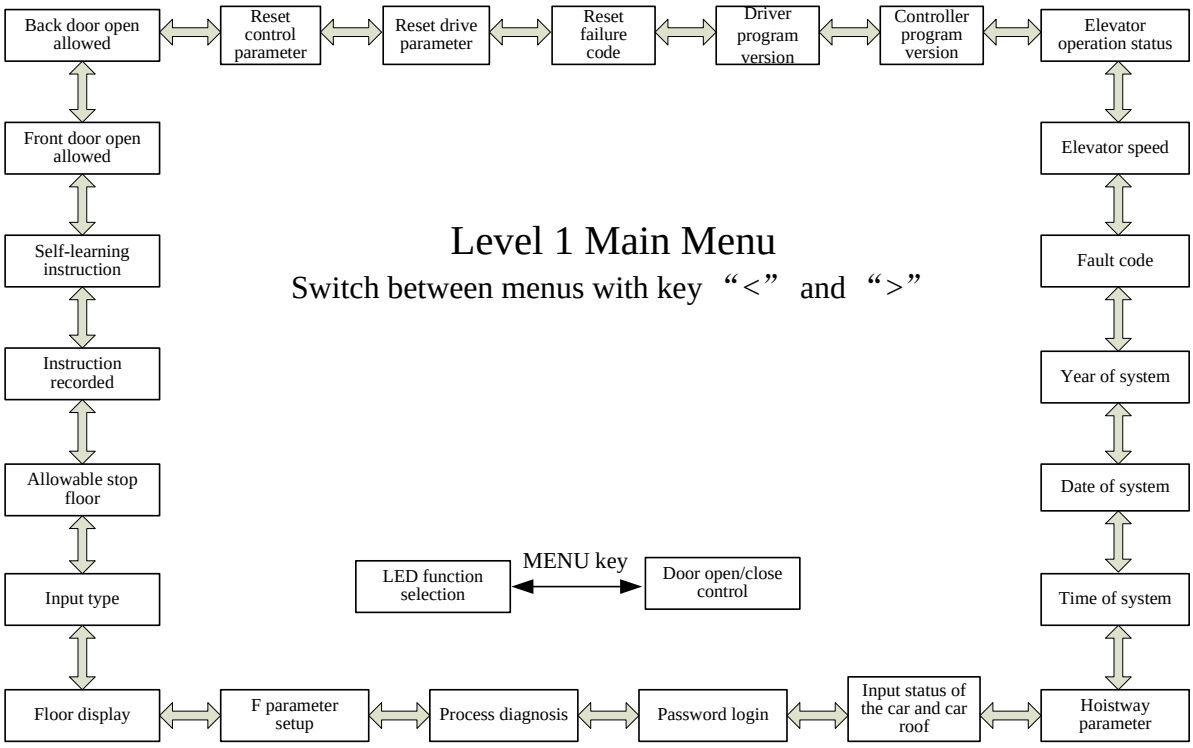
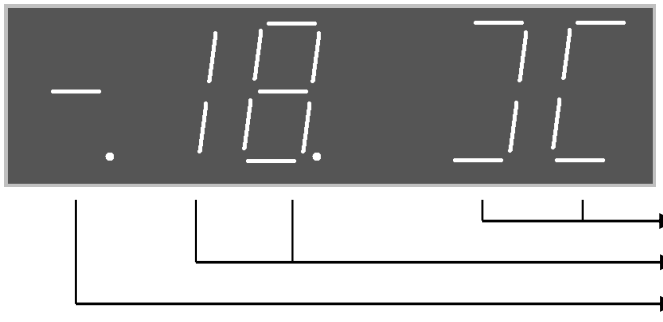


Figure 8.2 Menu Structure

8.3.2 Switch between various menus by the left and right keys

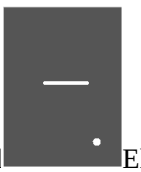
On the first level main menu interface, press the left or right key to switch between various menus. The elevator running state interface is displayed each time. Detailed descriptions of each menu are as follows:

1. Elevator running state (menu displayed when power on)



This menu displays the basic status of the elevator, including: the running state, the floor located, the state of door.

In Running State:


Elevator going upward 
Elevator going downward 
Elevator at

stop

The floor located is displayed by two 10-digit numbers.

In the state of door:

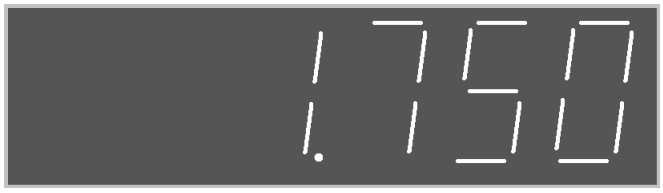

Door opening

Door opened in position


Door closing,

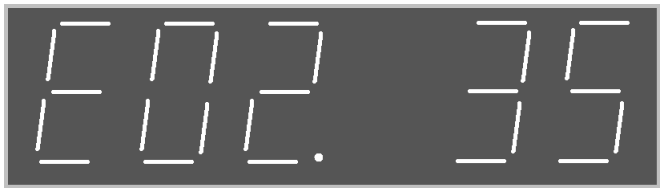
Door closed in position

2. Speed of Elevator



This menu displays the current running speed of the elevator, unit: m/s. As shown in the figure above, the current speed is 1.75m/s。

3. Failure Code



The AIO may staore 20 failure codes. The most recent failure code is under No. 00. Use up and down keys to view these failure codes. Press “Enter” to view the date of failure, press “left” and “right” to view the time and floor of the failure, and press “ESC” to exit.

4. Well Parameters

This parameter shows the data of the well and the length of the leveling spiles, distance of the leveling switch and the position of the deceleration switch.

Specific operation is as follows: use the "up" and "down" keys to view the parameters. Such as P02, "P-02"appears on the screen as shown above, wait a second, the screen shows the P02 parameter is 03.000, as shown above, you will see "03.000". Afterwards, "P-02" and "03.000" display alternately, each for about one second, which inditates 3 meters between Floor 1 and Floor 2. The meaning of each parameter is as follows.

Table 8.3 Meaning of Well Parameters

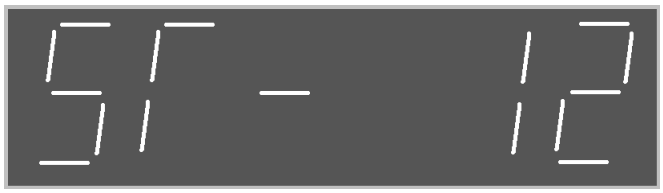
No.	Meaning
P01-P64	Well data from 1st -64th floor
P65	Leveling plug-in board length
P66	Leveling switch center distance
P67	Upper deceleration switch distance on 1st floor
P68	Upper deceleration switch distance on 2nd floor
P69	Upper deceleration switch distance on 3rd floor
P70	Upper deceleration switch distance on 4th floor
P71	Lower deceleration switch distance on 1st floor
P72	Lower deceleration switch distance on 2nd floor
P73	Lower deceleration switch distance on 3rd floor
P74	Lower deceleration switch distance on 4th floor

5. Input Status of Lift Car Top Board

The figure above means: GX0 has no input. Press "up" and "down" keys to select GX serial number from 0 to 15. After the GX matching numbers is selected, the highest level shows that the input has no valid input (0 for no valid input, 1 for valid input).

The figure above means: HX0 has no input. Press "up" and "down" keys to select HX serial number from 0 to 15. After the HX matching numbers is selected, the highest level shows that the input end has no valid input (0 for no valid input, 1 for valid input).

6. Process Diagnosis



This menu displays the current status of the elevator by a two-digit number. The meaning of the status code is as follows

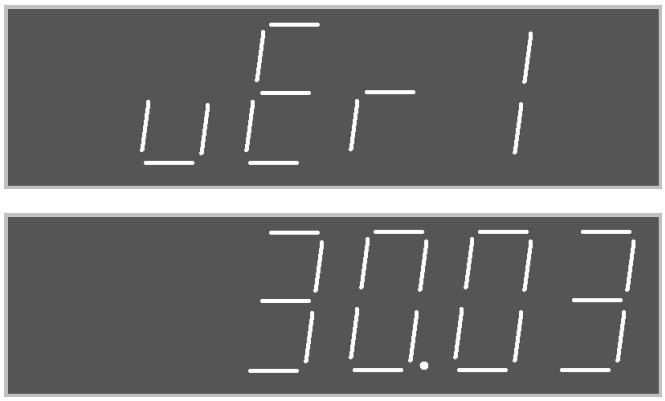
Table 8.4 Meaning of Status Code

No.	Description
0	Safety loop disconnected
1	Elevator breakdown
2	Motor overheating
3	Overload
4	safety edge motion
5	Door opening button motion (door opening button or external call button motion in the same floor)
6	Door lock short circuit/door opening limit motion
7	Elevator door opening
8	Elevator door closing
9	Door closing limit
10	Upward limit
11	Downward limit
12	Door closed, in line with operating conditions
13	KMY contact in detection
14	KMB contact in detection
15	In zero speed servo
16	Elevator in straight running
17	Elevator in operation
18	Elevator door lock disconnected
19	Well learning not completed
20	Detection inverter enabled

7. Command Registration

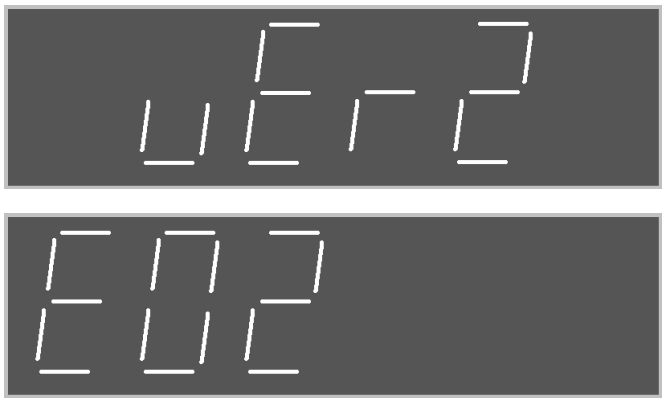
Press “up” and “down” to select the floor to be commanded; press “Enter” to confirm and the command is registered.

8. Version of Driver Program



This menu displays the program version number of AIO driver. After waiting for a second, the screen shows 30.03 in the figure above. Afterwards, “VER1” and “30.03” display alternately, each for 1 second.

9. Version of Control Program

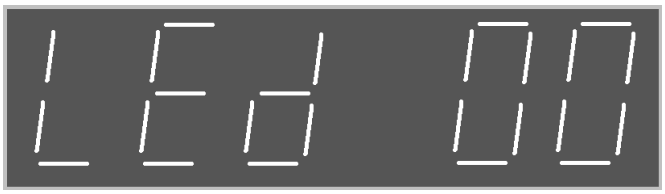


This menu displays the program version number of AIO control. After waiting for a second, the screen shows E02 in the figure above. Afterwards, “VER2” and “E02” display alternately, each for 1 second.

8.3.3 Switch between various menus by MENU

Under any circumstances, press MENU key to switch between “LED function selection” and “Door open/close control”. Press ESC key to return to “State of Elevator”. Detailed descriptions of each menu are as follows:

1. LED Function Selection



Press “up” and “down” keys to select 18 LED Indicator Lights, code of L1～L18, press “Enter” for confirmation, and the LED Indicator Light will change with the definition of code. See table 8.5

for the code of L1～L18.

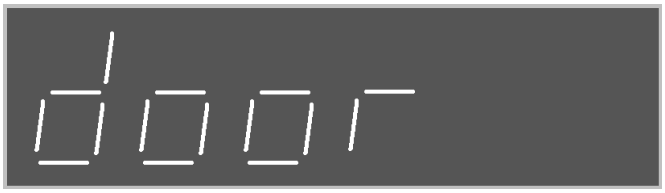
Table 8.5 L1～L18 Display

Digital Display	LED Code	Content Displayed	Remark
LED 00	L1	Door lock relay input signal	Start condition for Ispection. That the 8 lights are all on indicates normal peripheral signal and Ispection can go on.
	L2	Main contactor contact input signal (lighted on when without contactor adhered fault)	
	L3	Brake contactor contact input signal (lighted on when without contactor adhered fault)	
	L4	Brake switch (light if input point is normal)	
	L5	Motor overheated (light if input point is normal)	
	L6	Upper limit switch (combined) status signal	
	L7	Lower limit switch (combined) status signal	
	L8	Inspection upwards/downwards signal (with signal lights)	
	L10	Main contactor drive signal	Internal state of Ispection. The 6 lights will be on in order in normal Ispection.
	L11	Enable signal	
	L12	Up/down signal	
	L13	Operation signal for drive feedback movement	
	L14	brake contactor drive signal	
	L15	Whether speed curve is given or not	
LED 01	L1	Down limit switch status- lights off cannot go down	Status of well switch and leveling switch. The light on indicates the connection of peripheral input point.
	L2	Downwards one floor forced deceleration switch on/off	
	L3	Downwards two floors forced deceleration switch switch on/off	
	L4	Downwards three floors forced deceleration switch switch on/off	
	L5	Downwards four floors forced deceleration switch switch on/off	
	L6	Upwards one floor forced deceleration switch on/off	
	L7	Upwards two floors forced deceleration switch on/off	
	L8	Upwards three floors forced deceleration switch on/off	
	L9	Upwards four floors forced deceleration switch on/off	
	L10	Upper limit switch status-lights are off and lift cannot go up	
	L11	Upper leveling switch on/off	
	L12	Lower leveling switch on/off	
LED 02	L1	Door lock relay (X17/parameter setup –if it is not in normal light)	Running start condition of express car. That all the 11 lights are on indicates normal peripheral signal and meets the start requirements.
	L2	Main contactor contact input signal (without contactor lighting)	
	L3	Brake contactor contact input signal (without contactor lighting)	
	L4	Brake switch	
	L5	Motor overheated	
	L6	Upper limit switch (combined) status signal	
	L7	Lower limit switch (combined) status signal	
	L8	Door closing limit switch signal (front/rear door)	
	L9	Be ligthed on without interal fault whitch cann’t start up	
	L10	Orient whether there are valid signal registraion or not in the front direction	
	L11	Automatic high speed status signal	
	L12	Main contactor drive signal	Internal state of the running of express car. The 6 lights will be on in order when the express car is in normal operation.
	L13	Enable signal	
	L14	Up/down signal	
	L15	Drive feedback operation signal	
	L16	Brake contactor drive signal	
	L17	Whether speed curve is given or not	
LED 03	L1	Front door opening limit on/off	The door/close related signal, light on indicates the connection of peripheral input point.
	L2	Front door closing limit on/off	
	L3	Rear door opening limit on/off	
	L4	Rear door closing limit on/off	
	L5	Front door safety edge switch on/off	
	L6	Rear door safety edge switch on/off	
	L7	Front door screen switch on/off	
	L8	Rear door screen switch on/off	

Digital Display	LED Code	Content Displayed	Remark
	L9	Overload switch on/off	
	L10	Door opening button signal	
	L11	Door closing button signal	
	L12	Door opening signal of this floor	
	L13	Lights on in attendant or independent status	
	L14	Lights on in fireman operation status	
	L15	Front door opening output	
	L16	Front door closing output	
	L17	Rear door opening output	
	L18	Rear door closing output	
LED 04	L1	Main contactor contact input on/off	Contact detection related signal, light on indicates the connection of peripheral input point.
	L2	brake contactor contact input on/off	
	L3	First brake inspection switch contact input on/off	
	L4	Second brake inspection switch contact input on/off	
	L5	Safety loop high voltage point input on/off	
	L6	Safety loop relay contact input on/off	
	L7	Door lock loop high voltage point input on/off	
	L8	Door lock relay contact input on/off	
	L10	Main contactor drive output	
	L11	Brake contactor drive output	
LED 05	L1	Down limit switch status	Main input signal logic state.
	L2	Downwards one floor forced deceleration switch on/off	
	L3	Downwards two floors forced deceleration switch on/off	
	L4	Downwards three floors forced deceleration switch on/off	
	L5	Downwards four floors forced deceleration switch on/off	
	L6	Upwards one floor forced deceleration switch on/off	
	L7	Upwards two floors forced deceleration switch on/off	
	L8	Upwards three floors forced deceleration switch on/off	
	L9	Upwards four floors forced deceleration switch on/off	
	L10	Upper limit switch status	
	L11	Up leveling switch status	
	L12	Down leveling switch status	
	L13	Firefighting return/fireman operation switch	
	L14	Motor overheated signal	
LED 06	L1 ～ L18	Corresponding input point: X0～X17 status	The connected or disconnected status of the mother board input point. Light on indicates the external input point being connected.
LED 07	L1	Door lock relay (X17/parameter setup-if no, normal disconnected and the light off)	Start condition for well self study. That all the 9 lights are on indicates normal peripheral signal and well self study may start.
	L2	Main contactor contact input signal (lighted on when without contactor adhesion fault)	
	L3	Brake contactor contact input signal (lighted on when without contactor adhesion fault)	
	L4	Brake switch	
	L5	Motor overheated	
	L6	Upper limit switch (combined) status signal	
	L7	Lower limit switch (combined) status signal	
	L8	Door closing limit switchsignal (front/rear door)	
	L9	Be ligthed on without interal fault whitch cann’t start up	
	L10	Self study command 1	Internal state of the well self study. The 6 lights will be on in order during self study.
	L11	Next floor strong/slow status	
	L12	Lower leveling switch status	
	L13	Upper leveling switch status	

Digital Display	LED Code	Content Displayed	Remark
	L14	Self study command 2	
	L15	Self study startup	

2. Door Open/Close Control



When parameter F165's (Door opening/closing control) Bit3 is set to 1, it activates LED operator's door opening/closing function. In this screen, when press F1, the system will output door opening signal; when press F2, the system will output door closing signal.

8.4 LED Displayed Numbers and Letters

Because of the structure limit of LED, numbers and letters displayed are confusing sometimes, therefore, the graph and meaning are given in the following table:

Table 8.6 The 7 segment code figures displayed vs. their Meanings

Display	Meaning	Display	Meaning	Display	Meaning	Display	Meaning	Display	Meaning	Display	Meaning
	1		2		3		4		5		6
	7		8		9		0		A		B
	C		D		E		F		G		H
	I		J		K		L		M		N
	O		P		Q		R		S		T
	U		V		W		X		Y		Z

Chapter 9 Elevator Commissioning Guide

9.1 Simple Commissioning Diagram

A new elevator equipped with **AS380** integrated drive controller manufactured by Shanghai STEP Electric Corporation. Its debugging process in electrical control and drive aspects is as follows.

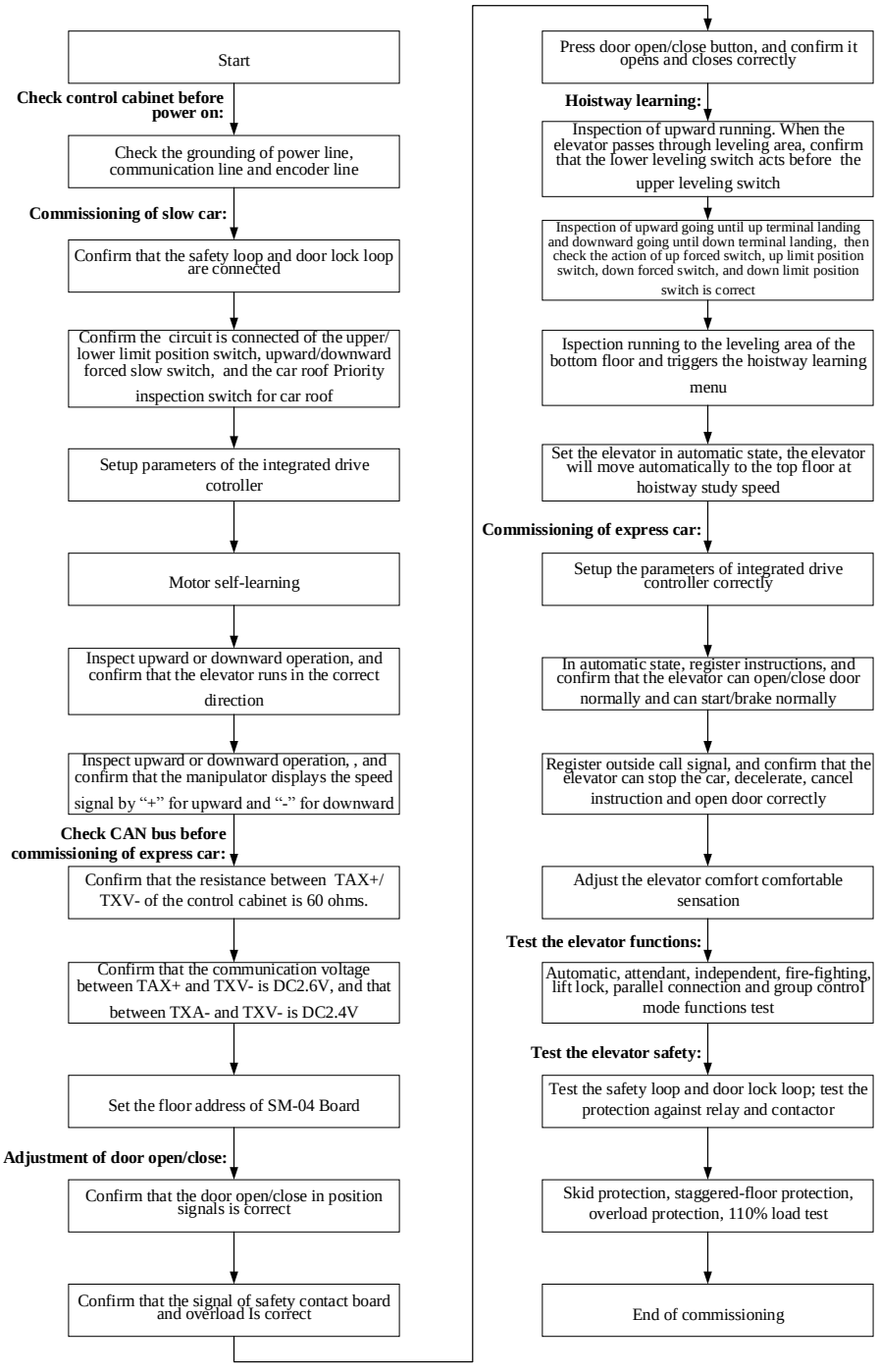


Table 9.1 AS380 integrated drive controller simple commissioning flow chart

9.2 Check before Power on

After installation of electrical control systems, electrical parts must be checked:

1) Check the connection of all parts, according to the user manual and electrical schematic diagram.

2) Check whether the strong current part and the weak current part are connected. Check the resistance between various voltage circuits and the earthing resistance with ohm grade of a multimeter, and they should both be ∞.

3) Please carefully check whether the power incoming line of the control cabinet and motor connections are correct, to avoid burning the elevator integrated drive controller after power on.

4) Check whether the control cabinet case, motor case, lift car earthing wire, hall door earthing wire are reliably and securely grounding, to ensure personal safety.

▲Note: The cabinet case and the motor case should be one point grounding.

9.3 Power on and Check

9.3.1 Confirm before Power on

1. Check the control cabinet for earthing short circuit before power on:

1) input power line three-phase ground

2) motor line three-phase ground

3) terminal 220V ground

4) communication line ground

5) Encoder line ground

Please exclude all items above if short circuited.

2. Grounding check: (Make sure the following items are reliably grounded)

1) Control cabinet ground

2) Motor ground

3) Lift car ground

4) Door motor ground

5) Trough ground

6) Encoder shield control cabinet ground

7) Encoder shield motor ground

Note: single terminal grounded for asynchronous motor encoder shield, both terminals grounded for synchronous motor Encoder shield.

3. Check communication lines, encoder cable and power line wiring: (Please confirm whether the site meets the following requirements, if not, please correct):

1) Well communication line is twisted pair line and the twist distance <35cm;

2) Lift car communication line is twisted pair and the twist distance <35cm;

3) Parallel connection group control communication line is a twisted pair line and the twist distance<35cm (only parallel connection or group control elevator);

4) Encoder lines and power lines go separate trunking;

5) Communication lines and power lines go separate trunking;

6) Parallel connection group control communication lines and power lines go separate trunking (only parallel connection or group control elevator).

9.3.2 Checks after Power on

1. Close the main power switch. If the green light on the phase sequence relay KAP is on, the phase position is correct. If the green light is not on, shut off the main power supply, swap any two-phase positions and then power on again.
2. Check all terminal voltage of the isolation transformer TCO in the control cabinet, and see whether they are within the nominal range.
3. In the premise of carrying out the above steps correctly, proceed with the following steps:

1) Close the fuse **FUn** (n = 1, 2, 3,...);

2) Close the door open/close power control switch; open/close TPB is powered on, and the motherboard is electrified to run.

Each terminal voltage of switching power supply is as follows:

Table 9.1 Terminal voltage of switching power supply

Terminal	L～N	24V～COM
voltage	220±7%VAC	24.0±0.3VDC

3) Reset the emergency stop switch of the control cabinet, connect safety loop, and the LED lights corresponding to the motherboard are on.

4) Check the following circuit:

Check whether the door lock loop is normal;

Check whether the leveling switch signal is normal;

The elevator status on the handheld programmer should show "**Ispection**";

If abnormal, please check and correct accordingly.

9.4 Configuration of System Basic Parameters and Self Study of Motor Parameters

9.4.1 Setup of System Basic Parameters

First set the system basic parameters in Table 7.2 correctly through a dedicated handheld LCD Manipulator (see Chapter 5 for the use of hand-held Manipulator), and then make commissioning as described in the following sections. For each new system, before setting parameters, it's recommended to make a parameter reset through a dedicated LCD Manipulator.

Parameter reset as follows:

1. The elevator is in stop state;

2. Find "parameter reset" command interface in handheld Manipulator;

3.Align the cursor with "parameter reset" command and press Enter key, the system will complete parameter reset immediately.

After parameter reset, all the parameters are changed into factory default values. Configure the basic parameters on the basis of parameter reset, and the other parameters are set to be the factory default values, to ensure normal and reliable operation of the system.

Table 9.2 System Basic Parameters

No.	Name	Default Value	Scope	Unit	Remarks
F06	Elevator rated speed	1.750	0.100～10.000	m/s	
F09	Parking floor	1	1～64	×	
F10	Offset floor	0	0～64	×	
F11	Floor number	18	2～64	×	
F12	Ispection speed	0.250	0～0.630	m/s	
F23	Group control mode	0	0～3	×	
F25	Input Type 1 (normal open or normal closed configuration for X0 ~ X15 input point)	819	0～65535	×	
F26	Input Type 2 (normal open or normal closed configuration for X16 ~ X25 input point)	2	0～65535	×	
F27	Lift car board input type (normal open or normal closed configuration for GX0 ~ GX15 input point)	0	0～65535	×	
F28	Car top board input type (normal open or normal closed configuration for HX0 ~ HX15 input point)	327	0～65535	×	
F182	Deceleration switch series	0	0～10	×	
F183	Learn trip speed	0.800	0～1.000	m/s	
F202	Motor type	0	0 / 1	×	0: asychronous 1: synchronous
F203	Motor rated power	According to inverter parameter	0．40～160．00	KW	
F204	Motor rated current	According to inverter parameter	0．0～300．0	A	
F205	Motor rated frequency	50.00	0.00～120.00	Hz	
F206	Motor rated rotary speed	1460	0～3000	rpm	
F207	Motor rated voltage	According to inverter parameter	0.～460	V	
F208	Motor pole number	4	2～128	×	
F209	Motor rated slip frequency	1.40	0～10.00	Hz	
F210	Encoder type	0	0 / 1 / 2	×	0:incremental Encoder 1:SIN/COS Encoder 2: Endat Encoder
F211	Encoder pulse number	1024	500～16000	PPr	

Note:Before debugging, the basic parameters above must be correctly set; the basic parameters of the motor can be input based on nameplate; according to the actual situation of the site, please refer to Chapter VII for the parameter setting method and detailed definition.

9.4.2 Self-learning of Motor Parameter

No motor parameters self study for the synchronous motor. Because **AS380** series elevator integrated drive controller adopts the most advanced and unique driver technology which can automatically obtain Encoder phase angle data, therefore, there is no need for motor auto-tuning of Encoder phase angle.

Note that: every time AS380 series elevator integrated drive controller is used to control synchronous motors, it will automatically capture Encoder information at its first running after powered on, which takes 2 seconds or so. Therefore, the given running signal at this time is slightly later than usual. Please do consider this detail in the design for this control system, to avoid unnecessary failure.

For the induction motor, if the on-site motor parameters are confirmed to be very accurate, in particular if the F209 (motor rated slip frequency) parameters are ensured to be accurate, the following self study of motor internal characteristic parameters will not be necessary. However, if the on-site motor parameters are not accurate enough, or with the purpose of ensuring excellent operating characteristics of the system, self study can be carried out on site regarding the motor internal operating parameters. Specific methods are as follows:

1) The connections between **AS380** series elevator integrated drive controller and motor, between integrated drive controller and encoder have been correctly completed;

2) Correctly power on for AIO;

3) Confirm that the safety loop and lock loop are in a normal connected state;

4) The Auto / Ispection (or emergency power operation) switch is in position of Ispection (or emergency power operation):

5) Select "induction motor self study" command by Seven-Segment Code Display Manipulator or LCD handheld Manipulator, and then press the Enter key;

6) AIO starts static self study: the main contactor between AIO and the motor will automatically pull, AIO obtains internal characteristics parameters of the motor by applying test current on the motor. But the brake contactor will not pull, neither will the motor rotate;

7) The motor parameters complete their self study after 30 seconds, and the main contactor releases automatically.

If the self study does not work, mainly check the following items:

1) Whether the safety loop and the lock loop are connected. If not, the main contactor will not pull, so it is impossible to complete the self study;

2) Whether the Encoder wiring is correct, whether A, B phase is reversed;

3) Whether the motor parameters are set correctly.

9.5 Test Run at slow speed

9.5.1 Ispection Operation of Engine Room and Preparations for Express Car Running

1. Points to be conformed before slow car run of engine room

1) Ispection (or emergency power operation) switch of the control cabinet to "**ispection**"(or emergency power operation) position, and car top Ispection switch to "**normal** " position;

2) Safety loop and lock loop work properly. **Remember not to have lock shorted**;

3) Encoder properly installed and wired correctly;

4) After powered on, the elevator integrated drive controller displays normally and checks whether its parameters are set correctly, and manual programming shows that the elevator is in a status of "Ispection";

5) Connect the tractor brake line onto the terminal in the control cabinet correctly;

6) The upper and lower slow down switches are correctly wired;

7) Ispection priority circuit on the car top is correctly wired.

2. Operation of engine room slow car

After the engine room slow car meets the operating conditions, press the upward (downward) button on the control cabinet, and the elevator should go upward (downward) at a previewed Ispection speed.

1) Observe whether the elevator follows the right direction, when it goes up or down. If in the wrong direction, first check whether the up and down buttons are correctly wired: JP8.3 of AIO motherboard should be connected to upward button signal, JP8.4 should be connected to the downward signal button. If correctly wired, change the F234 motor phase sequence parameters (from 0 to 1or from 1 to 0).

2) When the slow car goes upward or downward, if the motor displayed by AIO feedbacks an unstable speed or gives a value with significant deviation, check the wiring between Encoder and the motherboard:

a) whether the cable is properly used. If the Encoder is a differential signal, use shielded twisted-pair cable; if not differential signal, use general shielded cable.

b) whether the alignment is reasonable. The Encoder cable and power lines should go trunking together, and must be strictly separated.

c) Check whether the shielding lines and net are reliably grounded.

3) Check whether the upper and lower leveling switches are correctly wired: when the elevator goes up slowly, X7 (lower leveling switch) motion should be confirmed before passing through the leveling floor, and X6 (upper leveling switch) motions after. In case of the opposite order, the well cannot complete self study successfully. In that case, the wiring of the two switches to the motherboard must be reversed.

Note: Under many circumstances, slow running is not a Ispection operation, but an emergency power operation. At this point, in the safety loop, the safety gear switch, limiter switch, upward speed protection switch, upper and lower terminal limit switch and buffer reset switch are all shorted in the slow run time, to which particular attention should be paid. It is recommended that the engine room emergency operation should not last too long in time and distance, and do not have the lift car run to the end position.

9.5.2 Car Top Ispection Operation

After engine room slow car functions normally, you can run the car top Ispection operations. The Ispection speed may be adjusted appropriately lower in the first overhaul. After the operator enters into the car top:

1) First set immediately the car top Auto / Ispection switch to Ispection position, and confirm that the upward and downward buttons in the control cabinet of the engine room do not work at this moment.

2) Press the upward and downward buttons by car top, and confirm the button direction is the same with the lift car running direction.

3) The operator should operate on the car top the elevator for a test run of back and forth, carefully observe the surrounding of the lift car and confirm that there is no obstruction for the lift car in the entire well.

4) By Ispection operation on the car top, confirm that the motion and movement position of the deceleration switch at the end of the well terminal are correct.

5) By Ispection operation on the car top, confirm that the well leveling switch and leveling spiles are installed correctly; at all leveling positions, each leveling switch motions at the right point.

9.5.3 Check of CAN Communication Lines and Setting of 04 Board Address

1. Check of communication terminal resistance:

1) Confirm that the terminal resistance between the CAN 1 communication port TXA + and TXA- is 60 ohms (inside the car and outside the hall there is a respective jumper terminal resistance of 120 ohms).

2) Confirm that the terminal resistance of CAN2 communication port TXA1 +, TXA1-parallel connection or group control is 60 ohms (for parallel connection or group control elevator, the terminal resistance at motherboard CAN2 port should be inter-connected).

2. Setting of SM-04 board address

Please start from the lowest floor order, set the SM-04 board address from 1 until the top floor. Set the car inside SM-04 board address to 0.

Note that: if it is parallel connection or group control, the address sequence is based on the order of the entire elevator group. For example: three elevators A, B, C for group control, Elevator A serves floor -2, -1,1,2 ~ 8; B serves -1,1,3 ~ 8; C serves 1,2,4 ~ 7. Then set the SM-04 board of each elevator to the address as shown below.

Table 9.3 Setup of the SM-04 board address

Floor	Elevator A SM-04 board address setup	Elevator B SM-04 board address setup	Elevator C SM-04 board address setup
-2	1	×	×
-1	2	2	×
1	3	3	3
2	4	×	4
3	5	5	×
4	6	6	6
5	7	7	7
6	8	8	8
7	9	9	9
8	10	10	×

The "×" in the table above indicates that there is no SM-04 board on the floor. In specific

settings, first set the address switch on the SM-04 board (SW5.1 or SW1.4) to ON position, or set the address to the jumper pin (S1) or short with a short circuit cap (whether it is switch or jumper pin and what the switch code should be is determined by different types of SM-04 board. Refer to Section 6.3 Definition of Display Penal Port). Then, empower the SM-04 board, it is in the address setting state, the normal display of the elevator location now shows the address of SM-04 board. Press the up and down buttons to adjust the address data upward and downward, until the address displayed shows that the SM-04 board should set on this floor. Finally, reset the address setting switch and the jumper pin make SM-04 board back to normal operation.

9.5.4 Door Open/Close Adjustment

1) Set the elevator to Ispection status and leave the lift car at the leveling position;

2) Send in gantry crane power;

3) Move the car door manually, monitor on the handheld Manipulator whether the door closing in place (HX0) signal and the door opening in place (HX1) signal work correctly;

4) Confirm the safety edge signal and the overload signal are not in action;

5) Confirm F165 parameter set to 0 (door operation allowed during the elevator Ispection);

6) Have the car door in complete open state;

7) Press close button to confirm that the elevator door may close correctly until close in place;

8) Then, press the button to open the door, make sure the elevator door may open correctly until open in position.

9.6 Well Self Study

Running well self study means the elevator runs at self study speed and records the position of each floor that of each switch in the well, as the floor location is the basis for the normal brake and operation of the elevator and for the floor display. Therefore, before the express car operates, it is mandatory to run well self study first.

9.6.1Well Self Study Method

1) Confirm the elevator complies with safe operating conditions.

2) Confirm that all switches within the well are correctly installed and wired, and the connection of accompanying cables and outside cables is correct;

3) Have the elevator into Ispection (or emergency electric operating) state;

4) Enter into self study menu by hand-held programmer, follow the menu instructions, and find well self study interface. Then move the cursor to well self study command and press Enter key;

5) Set the elevator into the automatic state, and the elevator runs down to the bottom level at s Learn trip speed (set by F183) and then automatically goes up at self study speed, and begin well self study. Well study is complete until the elevator arrives at the top leveling position and stops automatically. The handheld Manipulator shows "self study completed" after the success of the self study;

6) In the self study process, if the control system is abnormal, self study will stop and give the

corresponding fault number, and the handheld Manipulator shows "self study unsuccessful".

9.6.2 Main Reasons for Unsuccessful Hoistway Self-learning

1) The total story number set (F11) is inconsistent with the number of leveling spiles installed in the well;

2) The number of slow down switches installed is inconsistent with the data set by parameter F182;

3) The upper and lower leveling switch wiring reversed;

4) The leveling switch and leveling spiles are installed in the position not accurate enough to make leveling switch motion effectively and correctly when the leveling spile of each floor inserts;

5) The set norm. open / norm. closed input of leveling switch is inconsistent with the actual one;

6) Wrong motion or wrong installation position of slow down switch (when the lift car is at the ground floor leveling position, the slow down switch on the lower single level must motion, before the lift car goes upward to the leveling position of the second bottom floor, the slow down switch on the lower single level must have been reset; when the lift car is at the top floor leveling position, the slow down switch on the upper single level must motion, before the lift car goes downward to the leveling position of the second top floor, the slow down switch on the upper single level must have been reset);

7) The set norm. open / norm. closed input of slow down switch is inconsistent with the actual one;

8) Encoder signal is interfered or Encoder has wiring error;

9) Leveling switch signal interfered;

10) Leveling switch failure or Encoder failure.

Note1: in 2 levels / 2 stops self study, run the elevator to the lower limit after it enters Ispection state. Proceed with normal self study after the upper leveling switch pulls away.

Note2: Express car operation is only possible after well self study.

9.7 Express Car Operation

1. Test Run of Express Car

After slow car runs correctly, first make sure the elevator complies with safe operating conditions. After well self study, proceed with express car test run. Specific steps are as follows:

1) Set the elevator in normal state.

2) Monitor the selected floor by hand-held programmer to select the floor where the elevator runs. Test run is possible for single floor, double floor, multi floors and full trip.

3) Check whether the elevator can correctly close the door, start, accelerate, run, cut, decelerate, stop, cancel and open.

4) In case of abnormal operation, follow the fault code (see Chapter IX) and operate accordingly.

2. Safety Test

1) Safety loop

Testing requirements: When the elevator stops, any of the safety switches motions. After safety

loop is disconnected, the elevator can not start; when the elevator is under Ispection operation, any of the safety switches motions. After safety loop is disconnected, the elevator takes an emergency stop.

2) Door lock loop

Testing requirements: When the elevator stops, after any of the hall door locks is disconnected, the elevator can not start; when the elevator is under Ispection operation, after any of the hall door locks is disconnected, the elevator takes an emergency stop.

3) Safety loop relay adhesion protection (This function may not be tested if no safety loop relay)

Testing requirements: Press the emergency stop of control cabinet to disconnect the safety loop, and then force the safety loop relay not to release by any means. The system should be protected and not reset automatically;

4) Door lock loop relay adhesion protection (This function may not be tested if no door lock loop relay)

Testing requirements: Under door-open circumstances, force the door lock loop relay not to release by any means. The system should be protected and not reset automatically;

5) Brake contactor adhesion protection

Testing requirements: Under stop circumstances, force the brake contactor not to release by any means. The system should be protected and not reset automatically;

6) Output contactor normal adhesion protection

Testing requirements: Under stop circumstances, force the brake contactor not to release by any means. The system should be protected and not reset automatically;

7) Skid protection function

Testing requirements: Move the elevator Ispection to the middle floor, remove the leveling sensor lines from the control cabinet wiring terminal (assuming leveling floor signal is norm. open), switch to normal, the elevator goes leveling at low speed, the system protected within 45 seconds and will not reset automatically;

8) Split-level protection

Testing requirements:

a) Move the elevator ispection to the middle floor, and switch to Ispection or emergency power operation. If the slow down switch is normal closed contact, disconnect the JP8.5 wiring at the upper single deceleration switch input on the motherboard; but if it is norm. open contact, short JP8.5 and JP10.3 (input COM terminal). And thus create an intentional split-level fault, and then the system will display the top floor data. Then, change the JP8.5 wiring at the upper single deceleration switch input back to normal, and switch the elevator to normal state, register the bottom instructions, elevator express car goes down, make sure the elevator can decelerate and level normally to the bottom floor and does not sink to the bottom;

b) Move the elevator ispection to the middle floor, and switch to Ispection or emergency power operation. If the slow down switch is normal closed contact, disconnect the JP8.5 wiring at the lower single deceleration switch input on the motherboard; but if it is norm. open contact, short JP8.5 and JP10.3 (input COM terminal). And thus create an intentional split-level fault, and then the system will display the bottom floor data. Then, change the JP8.5 wiring at the lower single deceleration switch input back to normal, and switch the elevator to normal state, register the top instructions, elevator express car goes up, make sure the elevator can decelerate and level normally to the top

floor and does not rush to the top.

9) Overload function

Testing requirements; elevator overload switching, check the elevator should not be closed, the buzzer sounds inside the car, and the overload indicator light on.

9.8 Adjust Elevator Comfort

9.8.1 Factors Relating to Elevator Comfort in Operation

1. Electrical factors:

1) Operating curve parameters setting: acceleration, deceleration, S curve bend time, start brake delay, stop brake delay, etc.;

2) Vector control PID parameters: proportional, integral and differential constants, etc.

2. Mechanical factors:

Guide rail verticality, surface roughness, connection, guide shoe tension, uniformity of steel wire rope tension, etc.

The coordination in the mechanical system is the most fundamental factor to determine the comfort of the elevator operation; electrical parameters can only cooperate with the mechanical system, and further improve the comfort. The electrical factor is adjusted by the serial motherboard parameter and inverter parameter.

If there are problems in mechanical systems affecting the comfort, the serial motherboard parameter and inverter parameter can only improve comfort, but cannot change the mechanical defects fundamentally. The commissioning and related technical personnel should pay sufficient attention to this.

9.8.2 Adjust Elevator Comfort

9.8.2.1 Adjust Mechanical Factors

1. Slideway:

- Slideway surface roughness
- Slideway installation verticality
- Connections between slideways

The slideway verticality and the parallelism between two slideways should be controlled within the limits prescribed by the national standard (GB). If the error is too large, it will affect the elevator comfort in high-speed operation, there will be jitter or oscillation, or the lift car shakes from left to right in some positions.

The improper connections of slideway will add step feelings to the elevator operation in some fixed positions.

2. Tension of Guide Shoe

In case the guide shoe is too tight, there will be step feeling, and it will generate brake feeling at stop; when guide shoe is too loose, the lift car will give shaking feeling.

If the guide shoe is sliding, then a small space should be maintained between the guide shoe and

the slideway. Without the space, or even guide shoe rubs the slideway surface, there will be oscillation or step feeling when the elevator starts and stops.

When commissioning, shake the lift car with your feet from left to right on the car top. It will be enough if the lift car has a obvious small displacement from left to right.

3. Uniformity of Steel Wire Rope Tension

If the steel wire rope tension is uneven, some ropes will be tight but some loose to cause jitter or oscillation in the elevator operation, and thus will affect the start, high-speed operation and stop.

In commissioning, the elevator can be stopped on the middle floor. Pull every steel wire rope manually with the same force on the car top. If the pull distance is roughly the same, the steel wire ropes are under the uniform tension; if not, ask the installer to adjust the tension of steel wire ropes.

In addition, steel wire ropes are tied in the circle before installation, so with response torsional stress. Installed directly, the elevator operation will prone to vibration. Therefore, before installation, fully release such torsional stress.

4. Lift Car Installation Fastening and Sealing

When the elevator is running at high speed, the entire lift car will be under a great force. If the lift car bracket or the lift car wall is not well fastened, it will generate dislocation in high speed operation and have the lift car vibrate. The buzzer acoustic resonance of the lift car is generally related to the fastening degree of the installation, the sealing of the lift car and the well.

5. Anti-Mechanical Resonance Device

- Pad rubber gasket under tractor shelf girder;
- Use wood chuck or other similar devices at the pigtail of the lift car steel wire rope to eliminate vibration.
- At present, for decorative effects, some lift cars use new lightweight materials, which reduces the weight of the lift car and produces "mechanical resonance ", especially in high speed elevator. When such phenomenon occurs, add appropriate load on the lift car to change its natural frequency and eliminate mechanical resonance.

6. Tractor

Sometimes improper assembly of tractor leads to poor mesh between turbine worm and gear; or long use wares the turbine worm and gear, causes axial movement in acceleration or deceleration and results in the step feeling in acceleration or deceleration.

7. Lift car balance

Sometimes, the design or installation or other reasons lead to uneven weight of the lift car to slide to one side. In the elevator operation, the guide shoe tightly rubs the slideway surface, which generates jitter or vibration. At this point, add a block on the lighter side of the lift car and test.

8. Other

Such as the parallelism of traction wheel and guide wheel, adjustment of run-time brake clearance, etc.

9.8.2.2 Adjust Electrical Factors

Electrical aspects that affect comfort mainly include: the performance of the speed curve, electromagnetic interference of analog signal speed reference signal (if using analog signal speed reference method), Encoder feedback signal quality and inverter drive performance. Our later discussion is established on that all other factors that may affect comfort have been adjusted. How can we adjust the parameters relating to this integrated drive controller, to improve the drive

performance of the system and to improve the elevator comfort.

1. Adjust starting comfort

Integrated drive controller uses original non-load sensor start-compensation technology, so even if there is no pre-load device for start compensation, it can also be adjusted by parameters to achieve good starting comfort.

1) Conventional method for adjusting starting comfort

Under normal circumstances, adjust the inverter's zero servo PID parameters and the excitation time and other parameters, to improve the starting comfort. Refer to the Table below for relevant adjustment parameters.

Table 9.4 Inprove the elevator start comfortable sensation by adjusting the inverter zero servo PID and the excitation time parameter

Function Code	Name	Content	Factory Setup	Scope	Unit	Remarks
F212	Zero servo gain P0	Gain value of PID regulator that takes effect on zero servo	100.00	0.00～655.35	×	
F213	Zero servo integral I0	Integral value of PID regulator that takes effect on zero servo	120.00			
F214	Zero servo differential D0	Differential value of PID regulator that takes effect on zero servo	0.50			
F226	Zero servo time	After keeping torque for the F226 time which starts from the inverter giving out the running signal, execute the accelerating start	0.8	0.0～30.0	s	

Note 1: The speed at the starting point to be adjusted around PID regulator

F226 is a zero servo time parameter, used to adjust and control the delay time given by the system speed curve; this time is also the action time of PID regulator P0, I0, and D0 at zero servo (or zero speed). See the following for the detailed timing sequence diagram.

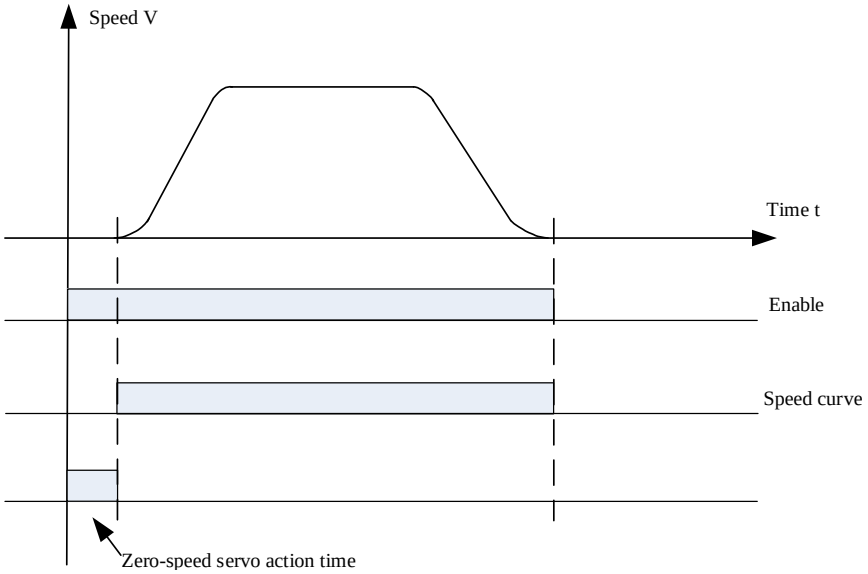


Fig. 9.2 Zero servo timing sequence diagram

When zero servo ends, AIO inverter gives the controller a signal with speed instruction, and the

elevator begins to accelerate.

F212, F213 and F214 are proportional (P0), integral constant (I0) and the differential constant (D0) of the zero servo regulator. In adjustment, fist set P0 to a very small value, and have the elevator go downward non-loaded; at this moment, the elevator shows pull-back at start. Increase the P0 value gradually, until the elevator stops showing pull-back at start. However, if P0 is too large, the elevator may oscillate up and down at start. So in case of obvious oscillation at start, decrease the P0 value. I0 is the integral constant of zero-speed PID regulator at stop. The greater I0 is, the shorter the response time is. If the I0 value is too small, P0 will not have enough time to motion; if I0 is too large, high frequency oscillation may be easily produced. D0 helps the system with the response speed. The larger D0 is, the faster response is; but too large D0 can cause oscillation.

2) Adjust timing sequence to improve starting comfort

The starting timing sequence is the coordination between the main contactor pull, the release of inverter upward or downward command (or enable signal), brake open and the speed signal, when the elevator starts. In general, at the elevator starter, the main contactor pulls first, then inverter enable signal releases, and then the brake open and the speed reference command give out. The order between the speed reference and the brake has a great impact on the starting comfort of the elevator. The ideal coordination point is: at the mechanical movement (really open) of the brake, the speed reference is given. However, due to the brake contactor delay and the mechanical brake delay, it is not easy to give accurate data for the two motions to achieve the desired effect.

The following principles may be observed for adjusting timing sequence: in no-load operation, if the downward start shows an obvious pull back, postpone the opening time of the brake (or set the reference speed earlier; if the downward start shows a weak pull back, but an obvious push for the upward start, set the brake opening time earlier ahead (or postpone the given time of the reference speed). The timing sequence diagram at start and stop can be refered in below Fig. 9.3.

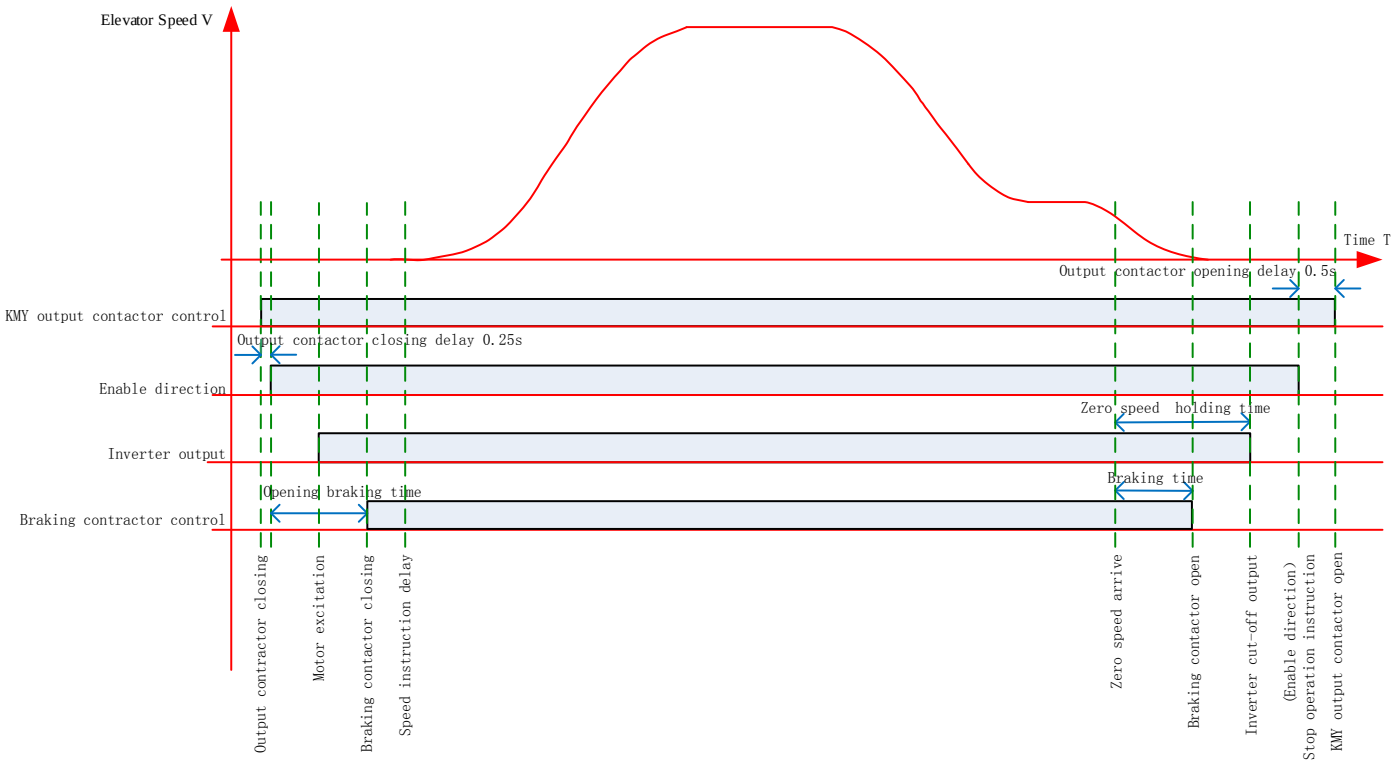


Fig. 9.3 Adjustable Timing Sequence Diagram

2. Comfort adjustment during operation

By adjusting the PID regulator parameters at each speed segment in the elevator running process, the comfort can be improved. The adjusting parameters are as follows.

Table 9.5 Inprove the elevator comfortable sensation during operation by adjusting the PID adjuster parameters at multi speed section

Function Code	Name	Content	Factory Setup	Scope	Unit	Remarks
F215	Gain P1 at low speed	The effective PID regulator gain value when the given speed is lower than the switching frequency F0	70.00			See the following description
F216	Integral I1 at low speed	The effective PID regulator integral value when the given speed is lower than the switching frequency F0	30.00			See the following description
F217	Differential D1 at low speed	The effective PID regulator differential value when the given speed is lower than the switching frequency F0	0.50			See the following description
F218	Proportional P2 at medium speed	The effective PID regulator gain value when the given speed is between switching frequencies F0 and F1	120.00			
F219	Integral I2 at medium speed	The effective PID regulator integral value when the given speed is between switching frequencies F0 and F1	25.00			
F220	Differential D2 at medium speed	The effective PID regulator differential value when the given speed is between switching frequencies F0 and F1	0.20			
F221	Gain P3 at high speed	The effective PID regulator gain value when the given speed is higher than the switching frequency F1	140.00			
F222	Integral I3 at high speed	The effective PID regulator integral value when the given speed is higher than the switching frequency F1	5.00			
F223	Differential D3 at high speed	The effective PID regulator differential value when the given speed is higher than the switching frequency F1	0.10			
F224	Switching frequency F0 at low speed point	Set the switching frequency parameter of PID regulator at low speed point, which is based on a percentage of nominal frequency. If the rated frequency is 50Hz, the required switching frequency F0 is 10Hz. Because 10HZ accounts for 20% of 50Hz, the data should be set to 20	1.0	0.～100.0	%	See the following description. In the medium-speed segment between F0 and F1, PID regulation data is automatically generated by the system based on the low and high-speed PID
F225	Switching frequency F1 at high speed point	Set the switching frequency parameter of PIDregulator at high speed point, which is based on a percentage of nominal frequency. If the rated frequency is 50Hz, the required switching frequency F1 is 40Hz. Because 40HZ accounts for 80% of 50Hz, the data should be set to 80	50.0	0.0～100.0	%	See the following description. In the medium-speed segment between F0 and F1, PID regulation data is automatically generated by the system based on the low and high-speed PID

Parameters F215 ~ F217 are P, I and D values (P1, I1, D1) of the PID regulator at the low-speed

section, F218 ~ F220 are P, I and D values (P2, I2, D2)of the PID regulator at the medium-speed section, F221 ~ F223 are P, I and D values (P3, I3, D3) of the PID regulator at the high-speed section. They play roles in different sections on the running curve during the entire elevator operation (see Figure 8.3). Parameters F224 and F225 are switching frequency between partitions (see Figure 8.3). Adjust Parameters F215 ~ F217, F218 ~ F220 and F221 ~ F223 and F224 and F225 to improve respectively the comfort of the elevator when running through different sections.

Increase of the proportional constant P can enhance the system's dynamic response. But if P is too large, it may generate overshoot and oscillation of the system. The impact of P on the feedback tracking is as shown below.

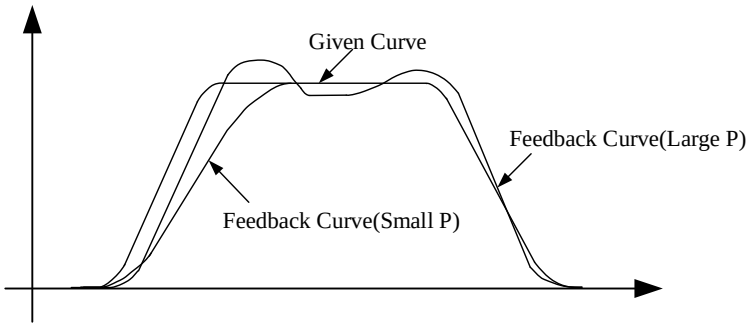


Fig. 9.4 Impact diagram of propotional constant P on the feedback tracking

Increase of the integral constant I can enhance the system's dynamic response. Increase I if the overshoot is too large or the dynamic response is too long. But if I is too large, it may generate overshoot and oscillation of the system. The impact of P on the feedback tracking is as shown below.

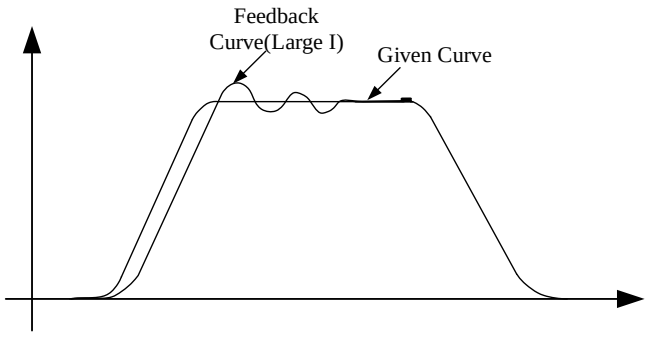


Fig. 9.5 Impact diagram of integral constant I on the feedback tracking

Similarly, increasing the differential constant D can increase the sensitivity of the system. However, if D is too large, the system will be too sensitive and cause oscillation.

In the adjustment of PID regulator parameters, it is usually to adjust the proportional constant P first. Under the premise of system not oscillated, maximize the P value, and then adjust the integral constant I, so that the system has both fast response and little overshoot. Only when the adjustment results of P and I are not satisfactory, adjust the D value.

The segment of the PID regulator in Elevator operation curve is as shown in Fig. 8.3 below.

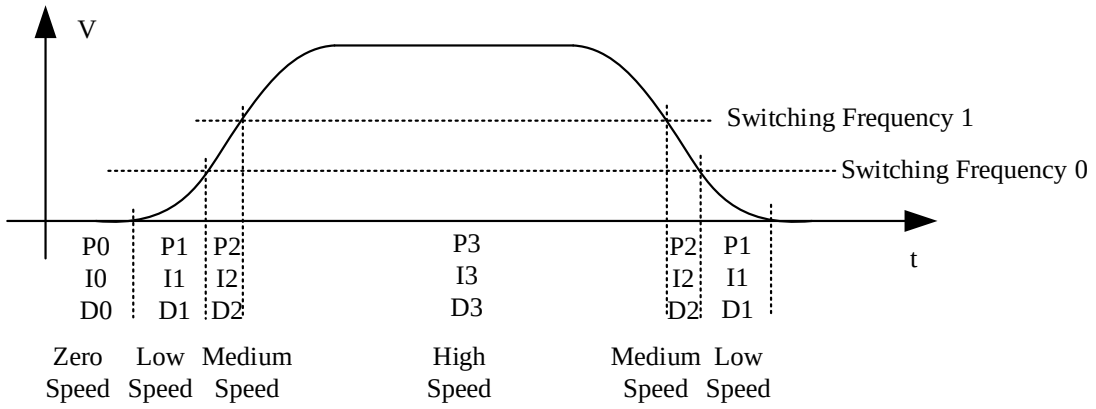


Fig. 9.6 Segment PI control chart of the elevator operation curve

Seen from the figure above, the PID regulator of this inverter is adjusted in three different speed sections, which facilitate the commissioning work. In case of poor comfort effect in high-speed section, it will be enough to adjust PID parameters in high speed section, which has little impact on the other two sections. Similarly, in case of poor comfort effect in medium and low-speed sections, it will be enough to adjust the corresponding PID parameters. Because different sections require different PID parameters to achieve the best comfort, adjusting PID values by sections can make each speed section gain their best effect.

3. Adjust Elevator Operation Curve

The shape of elevator operation curve will also directly affect the comfort of elevator. In order to satisfy passengers' requirements for comfort and operational efficiency, the elevator should run according to the S-curve as shown in fig. 9.6. The system can adjust the acceleration / deceleration slopes of the S curve and time constant at the four corners to ensure the comfort and operational efficiency of the elevator. The main parameters that may affect the curve are as follows.

Table 9.6 Inprove the elevator comfortable sensation by adjusting the acceleration/deceleration slope and the time constant at the 4 corner of the S curve

No.	Name	Recommended values and reference range	Parameter range
F0	Acceleration slope a1	0.500 (0.400～0.650)	The smaller this value is, the more stable the acceleration is. But too small will be inefficient. The greater this value is, the more sudden the acceleration is: ① if too sudden, users do feel comfortable; ② too sudden can lead to over-current fault. General 0.400 for 1m / s, 0.500 for 1.5 ~ 1.8m / s and 0.600 for 2.0m / s are appropriate. Especially it should not be great for elevators in hotels or the residential elevators with many children and old people.
F1	Deceleration slope a2	0.500 (0.400～0.650)	The smaller this value is, the more stable the acceleration is. But too small will be inefficient. The greater this value is, the more sudden the acceleration is: ① if too sudden, users do feel comfortable; ② too sudden can lead to over-current fault. General 0.400 for 1m / s, 0.500 for 1.5 ~ 1.8m / s and 0.600 for 2.0m / s are appropriate. Especially it should not be great for elevators in hotels or the residential elevators with many children and old people.
F2	S Curve T0	1.300 (1.300～1.600)	T0: transition time curve from start-up to acceleration beginning, the greater the value is, the more stable the start-up is. In this time, the elevator runs at very low speed. But too long may lead to failure of motor to drag the elevator and cause "PGO" fault, or over-current fault, especially when lift car is fully or heavily loaded.
F3	S Curve T1	1.100 (1.00～1.200)	T1 is the transition time curve between acceleration end to the highest speed, T2 is the transition time curve between the highest speed deceleration beginning. T1 and T2 have no significant effect on comfort, generally not adjusted. If T2 adjusted too much, may lead to level rush.
F4	S Curve T2	1.100 (1.000～1.200)	

No.	Name	Recommended values and reference range	Parameter range
F5	S Curve T3	1.300 (1.300～1.600)	T3is the transition time curve between deceleration end tostop, the greater the value is, the more stable the stop is. In this time, the elevator runs at very low speed. But too long may lead to failure of motor to drag the elevator and cause "PGO" fault, or over-current fault, especially when lift car is fully or heavily loaded.

Note: Properly reducing F0 and F1 will increase the comfort of the elevator, but also decrease the operational efficiency. Properly increasing the time of the four corners F2 ~ F5 can improve the comfort, but also decrease the operational efficiency.

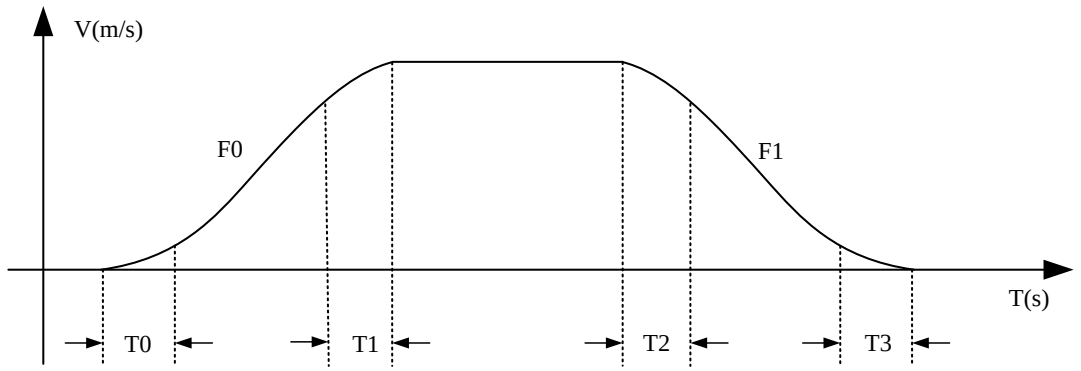


Fig. 9.7 Elevator Operation Curve

4. Adjust Comfort at Stop

The following two points affect the elevator comfort most at stop: 1. the PID value in low-speed section. According to the previous section, adjusting the PID value in low-speed section may help the elevator gain the best comfort at stop. 2. Timing for stop. It is mainly the coordination between the reference speed at stop and the brake action. The ideal state is: when the reference speed is zero, elevator has just held the brake. The adjustment principle is: if the elevator jerks at stop, it means the brake is held too early; the other hand, if the elevator skids at stop, it means the brake is held too late.

9.9 Leveling Adjustment

After comfort adjustment, leveling accuracy can be regulated.

9.9.1 Basic conditions to ensure the elevator leveling

1. Ensure the door area sensor and the deck board are installed very accurately, which means:
   - The deck length at door area of each floor must be accurate and consistent;
   - The bracket must be solid;
   - The deck boards should be installed at accurate. When the lift car is at leveling position, the deck center should coincide with the center between sensors of two doors. Otherwise, there will be leveling deviation of this floor, which means it is higher or lower than the upper and lower leveling points.

2. If a magnetic sensor switch is used, the deck board should be inserted deep enough when installed. Otherwise, it will affect the action time of the sensor switch, and lead to higher on top and lower on

bottom when leveling on this floor.

3. To ensure leveling, the system also requires elevator to creep for a short distance before stop.

4. In the actual adjustment, adjust one of the middle floors first until leveled up. Then, take this floor as parameter to adjust other floors.

By adjusting the curve selection, proportional, integral gain as in the previous section, ensure that the stop position (that is, the stop position should have an error of ≤ ± **2 ~ 3mm**) should be repeated for the elevator to go both upward and downward to stop in the middle.

9.9.2 Adjust Leveling Accuracy

1. Confirm the repeat of stop position

By adjusting the curve selection, proportional, integral gain as in the previous section, ensure that the stop position (that is, the stop position should have an error of ≤ ± **2 ~ 3mm**) should be repeated for the elevator to go both upward and downward to stop in the middle.

2. Adjust deck board at door area

1) Have the elevator stop floor by floor, measure and record the deviation △ S between the lift car sill and the hall door sill (positive when the lift car sill is higher than the hall door sill, otherwise negative.)

2) Adjust the position of deck board at door area floor by floor, if △S> 0, then move the deck board downward by △S; if △S <0, then move the deck board upward by △S.

2) After the adjustment of deck board at door area, carry out well self study again.

4) Check the leveling again. If the leveling accuracy does not meet the requirements, repeat steps 1) ～ 3).

3. Adjust parameter menu

If the stop positions of the elevator are repetitive, but not at the same position for upward or, downward leveling on each floor, such as up higher down lower, or up lower down high, make leveling adjustment of Parameter F56, F57 in the parameter menu. Its default value is **50mm**. decrease this value for up higher down lower, and increase this value for up lower down higher, by the **adjustment amount of half of the leveling difference**. For example: the total difference for up higher down lower is **20mm** and then decrease this value by **10mm**.

9.9.3 Installation Standard for Leveling Switch

When the lift car sill and the hall door sill keep the absolute level, the upper surface of the leveling spile is about 10mm higher than the lower leveling switch, and the lower surface of the leveling spile is about 10mm lower than the upper leveling switch, which facilitates the adjustment of comfort and leveling accuracy. The standard length of leveling spile is 220mm to ensure that every spile is of the same length (the length error should be less than 3mm). (See Fig. 8.5)

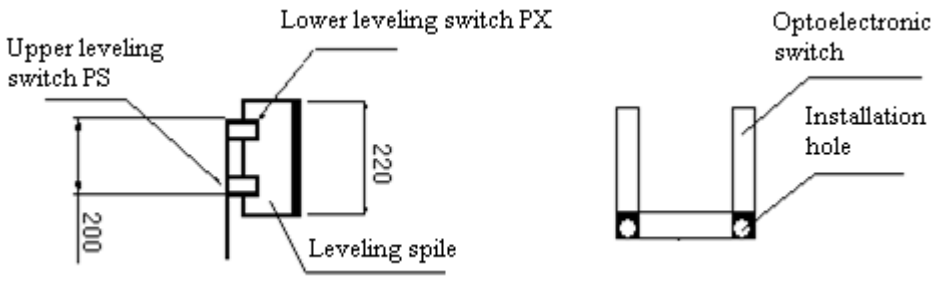


Fig. 9.8 Installation standard for leveling switch

Select magnetic switch as leveling switch:

1. Insert the leveling switch into the leveling spile deep enough to ensure that the action of leveling switch is effective and reliable;

2. The verticality of the leveling spile is very demanding to ensure that it will not happen for leveling stop that only one leveling switch acts effectively, but the other has run out of effective motion range, which will affect the normal operation of elevator.

3. Select optical switch as leveling switch (**our company generally accepts low-level effective signal for the input interface of the serial system**).

Follow the following points to gain a better effect:

1) Scrape the paint in the shadow around the installation hole, to guarantee that the metal shell is well grounded by photoelectric switch bolts, brackets and car top; if press an earthing wire under the mounting bolt after scrape, and connect it to the earthing pile of the connection box on the car top, the effect will be better;

2) Photoelectric switch should be connected to the connection box on the car top, and ground the shield layer;

3) Photoelectric switch should use normal open switch, to reduce interference of photoelectric switch itself.

4) The photoelectric switch flashing in operation may cause exception for elevator operation or leveling, then it may be subject to interference, so connect a capacitor of 0.1μF63V between the photoelectric switches COM and PS (or PX). Shown as following figure.

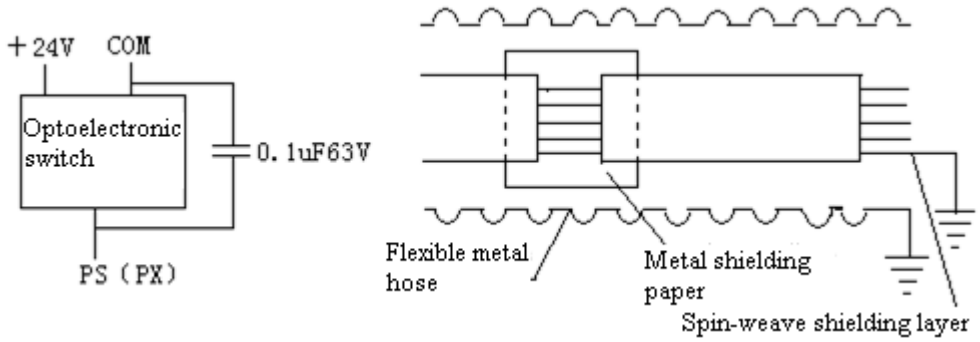


Fig. 9.9 Capacitor connection diagram

Note: improper dispose of leveling photoelectric switch may interfere with normal operation, and frequent change is not a fundamental solution, and will greatly increase the cost. Taking

the above 4 methods will greatly reduce the interference and even eliminate interference.

9.9.3 Notes for leveling switch installation

1) The optical switches or magnetic switches should be inserted to 2 / 3 of the leveling spile, and check the leveling spile on each floor should be vertical and the insertion depth should be the same.

2) After the optical switches or magnetic switches inserted into the leveling spile, ensure that both ends expose 10mm-30mm, as shown below:

3) During installation, Keep the spile center on each floor is along the same line with the sensor center, which will guarantee the leveling effect.

4) When the elevator goes upward and downward respectively and arrives at every floor normally, record the height difference between the lift car sill and the hall door sill. When the elevator runs up: lift car sill higher means leveling excess, otherwise means leveling lack; when the elevator runs down: lift car sill lower means leveling excess, otherwise means leveling lack. After recording, move the unleveling well spile, and record again after moving.

If the leveling difference is considerable for each floor, adjust the leveling spiles to set them to the same deviation. Take this as reference, and debug parameters to control these leveling deviations within the standard scope.

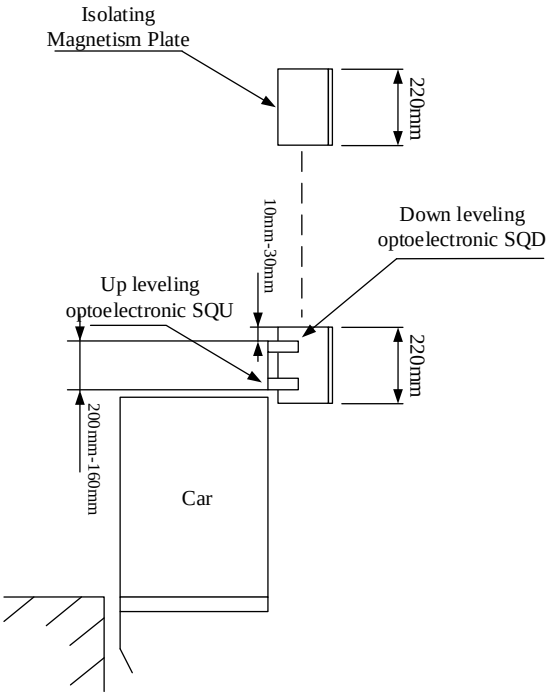


Fig. 9.10 Installation instruction of leveling switch

5) When the rotary Encoder is interfered or in poor quality, it will also affect the leveling accuracy.

Note: Check whether the Encoder uses shielding lines, and the shielding layer should be grounded at one end of the control cabinet. Also note that when wiring, the Encoder lines should not be place in the same trough as the power lines.

9.9.4 Notes for adjusting leveling in serial control system:

1. Recommended value for the center spacing of the leveling sensor:

In case of door close and under leveling function: the center spacing of the leveling sensor is suggested to be 60mm shorter than the length of spile, that is 30mm exposed on both sides. In case of door open and under leveling function: the center spacing of the leveling sensor is suggested to be 40mm shorter than the length of spile, that is 20mm exposed on both sides

2. Set F21(leveling sensor delay adjustment) to 6mm below 1.75 m/s, to 10mm below 2.0 - 3.0m/s.

3. Set F56 = 50, F57 = 50. Set the leveling fine-tuning of each floor to 20

4. Adjust the PI value of the elevator integrated drive controller, eliminate its overshoot.

5. Record the leveling data for each floor. Record as a positive number when the lift car is higher than the sill, and record as a negative number when lower.

- Single level runs upward, from Floor 2 to Floor N, the upward leveling deviation is recoded as Up(2),Up(3), ... Up(N);
- Single level runs downward, from Floor N-1 to Floor 1, the upward leveling deviation is recoded as Dn(N-1),...Dn(2),Dn(1);

Calculate the current leveling position error of each floor:

X(2) = (Up(2) + Dn(2)) / 2;
X(3) = (Up(3) + Dn(3)) / 2;
X(4) = (Up(4) + Dn(4)) / 2;
...
...
X (N-1) = (Up (N-1) + Dn (N-1)) / 2;

- If the deviation of X(2)～X(N-1) exceeds 10 mm, please adjust spile , a positive X(n) means the spile of this floor is too high; a negative X(n) means the spile of this floor is too low. If the deviation is less than 10mm, adjust with leveling fine-tuning software.

6. After rough adjustment for spile, carry out well self study again, and record leveling data.

- Single level runs upward, from Floor 2 to Floor N, the upward leveling deviation is recoded as Up(2),Up(3), ... Up(N);
- Single level runs downward, from Floor N-1 to Floor 1, the upward leveling deviation is recoded as Dn(N-1),...Dn(2),Dn(1);

1) Calculate the current leveling position error of each floor:

X(2) = (Up(2) + Dn(2)) / 2;
X(3) = (Up(3) + Dn(3)) / 2;
X(4) = (Up(4) + Dn(4)) / 2;
...
...
X(N-1) = (Up(N-1) + Dn(N-1)) / 2;

2) Calculate the current average offset XUp, XDn; end station is not included:

Upward average offset XUp = (Up(2) + Up(3) + ... + Up(N-1)) / (N-2);
Downward average offset XDn = (Dn(2) + Dn(3) + ... + Dn(N-1)) / (N-2);
Central position pX = (XUp - XDn) / 2;

Note: XUp, XDn, pX are operations with symbols

3) Adjust F56, F57:

F56 = 50 - pX;

F57 = 50 - pX;

4) Adjust leveling fine-tuning, record the leveling fine-tuning data of the N^{th} floor to L(n)

L(2) = 20 - X(2)

L(3) = 20 - X(3)

...

L(n) = 20 - X(n)

...

L(N-1) = 20 - X(N-1)

Calculate the leveling fine-tuning of the end station.

9.9.5 Reasons Why Leveling not Well Adjusted

There may be the following questions, please check in order:

1. The following parameters will lead to improper leveling adjustment if not reasonably set

1) Check **F21 (leveling sensor delay adjustment)**, the factory value: 6 mm.

- Below 1.75m / s, it can be set to 6mm when the elevator uses optical leveling sensor;
- It can be set to 10 mm when the high-speed elevator (3.0m / s or above) uses optical leveling sensor;
- It can be set to 16 mm when the high-speed elevator (5.0m / s or above) uses optical leveling sensor.

2) **F56 upward leveling adjustment**, factory value: 50 mm.

3) **F57 downward leveling adjustment**, factory value: 50 mm.

4) **Leveling fine-tuning**: set the leveling fine-tuning of each floor to factory default: 20 mm

2. Encoder interference

1) Encoder shielded wire is not grounded, or the signal lines and power lines are not separated, or interfered by power lines.

This problem is very serious on the synchronous motor site. Sincos Encoder or resolver is small analog signal signal, more vulnerable to interference, which is reflected by random irregular unleveling.

2) Check methods:

Record the well data (from the bottom to the top) after self study, re-start well self study, compare the two self study data, with a corresponding position error of less than 3mm (usually identical or difference of + - 1mm), error of more than 3 mm can be regarded as Encoder interfere or traction wheel skid.

3) Solutions:

a) Confirm that the motor ground wire has been connected from the motor to the control cabinet;

b) Confirm that the shielding line from Encoder to the inverter PG card has been grounded at the inverter end. Check whether this grounding line has intermediate connection terminal. If any, make sure both ends of the shielding lines are grounded. **Note: the connection of the synchronous motor Sincos Encoder!!!**

c) Confirm hat the shielding line from the inverter PG Card to the motherboard Encoder has

been grounded;

d) Confirm the Encoder lines separated from power lines and braking resistor lines (cover the Encoder lines with flexible conduit if in the same groove);

e) Confirm that the 0V of PG card is connected with the 0V of the motherboard (in particular, in multi-speed A +, A-, B +, B-output);

f) Check whether connecting shaft of Encoder skids.

3. Steel wire rope of traction wheel slips

1) Phenomenon:

The leveling is not accurate in case of operation with no-load or full load, or the upward leveling is inconsistent with downward leveling, half-load operation leveling is accurate.

2) Check method:

At any floor (assumed to be Floor 3), mark an aligning chalk line between the steel wire rope and the traction wheel, run a single level back and forth layer (Floor 3 -> Floor 4, Floor 4 to Floor 3), and back to Floor 3, check the error distance with the chalk mark (required to be less than 5mm). This error distance is the slip error for a single level. The slip error should be done twice respectively in no load and full load. All slip error greater than 5 mm must be resolved.

3) Solution

a) There may be a 200Kg weight difference for the lift car before and after decoration. Has the lift car decoration finished? Is the current balance coefficient correct? If not sure, set the lift car to half loaded, is there still leveling error?

b) If it is impossible to resolve the slipping problem for high-speed elevator, there are two solutions as follows:

① Install Encoder on one side of the speed governor to feedback the position to the motherboard;

② Use creeping to absorb slip error, set F24 = 2 (analog signal with creeping) or F24 = 0 (multi-speed operation).

4. When using magnetic reed sensor, ensure adequate insertion depth. Check whether the leveling spile of each floor has been inserted into within the red line of the sensor and check whether any spile is installed tilt.

5. The leveling spiles have inconsistent lengths. The spile on the second floor is the baseline length, the spiles of the other floors should be of the same length with that on the second floor, otherwise it may cause leveling problems.

6. The well self study is not carried out again after spiles adjusted.

9.10 Method for Adjusting Pre-Load Weighing Compensation at Elevator Start

This integrated drive controller adopts advanced non-load sensor start compensation technology, so even without pre-load weighing device, the elevator can still gain comfort at start. Its start features show as below.

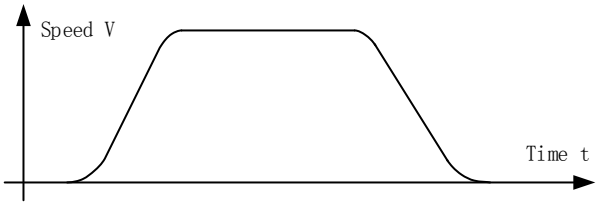


Fig. 9.11 Compensation characteristic diagram for no load sensor startup

Although, under normal circumstances, AS380 series integrated drive controller does not need pre-load weighing device. However, on some occasions, in order to obtain overload and full load signal, analog signal weighing device is installed; or some elevator users have particularly high comfort requirements for elevator starter and ask for pre-load weighing device for starting compensation; there exists also another case: in case of using non-gear tractor, no Encoder complies with non-pre-load starting compensation requirements, the elevator will need pre-load devices, and inverter adopts torque compensation technology at start.

When pre-load weighing is used to compensate starting, it is necessary to set and adjust the following parameters.

Table 9.7 The parameters need to be set and adjusted, adopting the pre-load weighing compensation start method

Function Code	Name	Factory Setup	Scope	Unit	Remarks
F164	Type of weighing device	99	0～99	×	See the following descriptions for details
F70	Light load upward going gain	100	0-300	%	
F71	Light load downward going gain	100	0=300	%	
F72	Heavy load upward going gain	100	0-300	%	
F73	Heavy load downward going gain	100	0-300	%	
F74	Light hight gain	512	0-1024		
F75	Light hight gain	512	0-1024		
F229	Torque compensation direction	0	0/1	×	Set start torque compensation direction : 0: forward direction 1: reverse direction
F230	Torque compensation gain	100.0	0.0～200.0	%	Set start torque compensation gain
F231	Torque compensation bias	0.0	0.0～100.0	%	Set start torque compensation bias

The detail meaning of the parameter F164 is show as below table:

Table 9.8 The meaning of each setting value of the parameter F164

F164 set value	Model of weighing device	Acquisition method of light, heavy, full and over load signal	Acquisition method of compensation signal
0	DTZZ-III-DC-SC	Input switching value signal to the car roof board	Input weighing device signal though CAN, and then calculate the final compensation value by weighing device signal, and the F70-F75 parameters.
1	DTZZ-II	Input weighing device signal though CAN, and then calculate the result by weighing device signal	Input weighing device signal though CAN
2	DTZZ-II	Input switching value signal to the car roof board	Input weighing device signal though CAN
3	DTZZ-III-DC-SC	Input weighing device signal though CAN, and then calculate the result by weighing device signal	Input weighing device signal though CAN, and then calculate the final compensation value by weighing device signal, and the F70-F75 parameters.

F164 set value	Model of weighing device	Acquisition method of light, heavy, full and over load signal	Acquisition method of compensation signal
4	None	Input switching value signal to the car roof board	Calculate the light and heavy load weighing compensation values from the light, heavy load switching value signal and the F70-F75 parameters. And F40 is set to be 50% at this moment.
5		Input switching value signal to the car roof board	Input weighing device signal by analog value
6		Input weighing device signal by analog value, and then calculate the result by weighing device signal	Input weighing device signal by analog value
99		Input open/close signal to the car top board	None

Different types of weighing devices correspond to three different adjustment methods: the first is use of DTZZ-III-DC-SC weighing device (F164 set to 0 or 3); the second is use of non-DTZZ-III-DC-SC weighing device (F164 set to 1, 2, 5 or 6); the third is without weighing device, a simple compensation by using light-load and heavy-load switch.The following three sections make a detailed introduction on how to adjust the F70-F75 or the three parameters F229 ~ F231 in the three start compensating methods mentioned above. In the absence of start compensation, the parameter F164, F70-F75 do not need to be set, and set as their default value will be ok; the three parameters F229 ~ F231 can also use their default values.

9.10.1 The Start Compensation Adjustment Method Using of DTZZ-III-DC-SC Weighing Device (F164 set as 0 or 3)

When DTZZ-III-DC-SC model weighing device is chosen, its weighing data is sent to the control system in **AS380** series integrated drive controller via CAN communications. Based on the values of the three adjustment parameters F70~F75, the control system calculates the final exact compensation data to the inverter in integrated drive controller, and the inverter makes starting torque compensation directly based on this data. Therefore, in this case, it is enough to adjust only the three parameters F70~F75.

1. Self-learning of weighing device

In adjustment, set DTZZ-III-DC-SC model weighing device via Parameter F41 and carry out self study. The meaning of Parameter F41 is as follows:

Table 9.9 The meaning of each setting value of the parameter F41

F41 Value	Meaning
1	The return data after setting the no load self study command, and the successfully no load self-learning
2	The return data after setting the full load self study command, and the successfully full load self-learning
10	When the activity of weighing device sensor ranges within 0~10mm, the return data from setting commond to the weighing device parameter and the successfully self-learning
20	When the activity of weighing device sensor ranges within 0~20mm, the return data from setting commond to the weighing device parameter and the successfully self-learning
30	When the activity of weighing device sensor ranges within 0~30mm, the return data from setting commond to the weighing device parameter and the successfully self-learning
40	When the activity of weighing device sensor ranges within 10~0mm, the return data from setting commond to the weighing device parameter and the successfully self-learning
50	When the activity of weighing device sensor ranges within 20~0mm, the return data from setting commond to the weighing device parameter and the successfully self-learning
60	When the activity of weighing device sensor ranges within 30~0mm, the return data from setting commond to the weighing device parameter and the successfully self-learning

Step 1, based on the actual activity scope of the device, set a correct data in 10～60 by F41;

Step 2, have lift car no-loaded, set F41 to 1, the weighing device carries out no-load self study. After the self study completes successfully, F41 displays as 1;

Step 3, have lift car full-loaded, set F41 to 2, the weighing device carries out full-load self study. After the self study completes successfully, F41 displays as 1. After these three steps, the self study of the weighing device ends.

2. Confirm the compensation direction

Then, confirm whether the compensation direction is correct: if the increase of F194 may reduce the downward impact oscillation of the lift car at start (slipping back when start upward or rushing when start downward), it means the compensation direction is correct; otherwise, it means the compensation direction is wrong. If wrong, change the value of Parameter F229 (from 0 to 1, or from 1 to 0).

After confirming the compensation direction, you can adjust the three parameters F70-F75.

3. Set the F40 value according to the equilibrium coefficient of the lift

4. Adujust the full load starting comfortable sensation

1) Stop the elevator at the bottom floor, run upwards in ispection status. If the elevator slips downwards, increase the F72; if the elevator pulls upwards, decrease the F72.

2) Stop the elevator among the bottom and the 2nd floor, run downwards in ispection status. If the elevator slips downwards, increase the F73; if the elevator pulls upwards, decrease the F73.

3) Stop the elevator at the top floor, run downwards in ispection status. If the elevator slips downwards, increase the F75; if the elevator pulls upwards, decrease the F75.

5. Adujust the no load starting comfortable sensation

1) Stop the elevator at the bottom floor, run upwards in ispection status. If the elevator slips downwards, decrease the F70; if the elevator pulls upwards, increase the F70.

2) Stop the elevator among the bottom and the 2nd floor, run downwards in ispection status. If the elevator slips downwards, decrease the F71; if the elevator pulls upwards, increase the F71.

3) Stop the elevator at the top floor, run downwards in ispection status. If the elevator slips downwards, decrease the F74; if the elevator pulls upwards, increase the F74.

6、 In general, F74 and F75 is not need to adjust(Unless the the field floor is particularly high or the weighing value inconformity between at bottom and at top floor).

9.10.2 The Start Compensation Adjustment Method Using of Non-DTZZ-III-DC-SC Weighing Device (F164 set to 1, 2, 5 or 6)

When non-DTZZ-III-DC-SC model weighing device is usd, its weighing data is sent to the control system in AS380 series integraed drive controller via CAN communications or analog signal signal input port. The control system sends this data directly to the inverter in integraed drive controller. Based on the adjustment of the three adjustment parameters F229 ~ F231, the inverter calculates the final actual torque compensation value and then makes starting torgue compensation. Therefore, in this case, it is necessay to adjust the three parameters F229 ~ F231.

First, adjust the compensation offset parameter F231. Load the lift car to the balance load, run the lift car to the middle position, and then confirm that the lift car is in complete balance with its counterweight (after powered off, with the brake released, the lift car can remain completely

motionless). Set the ispection speed F12 to 0, adjust the parameter F231 so that the elevator can remain completely motionless in ispection operation.

Then, confirm whether the compensation direction is correct: Leave the lift car stop no-loaded at the leveling position of any floor in the middle, if the decrease of F230 (compensated gain) may reduce the upward impact oscillation of the lift car at start (slipping back when start downward or rushing when start upward), it means the compensation direction is correct; otherwise, it means the compensation direction is wrong. If wrong, change the value of Parameter F229 (from 0 to 1 or from 1 to 0).

After confirming the compensation direction, you can finally adjust compensation gain parameter F230. Run the no-load lift car to the leveling position of the top floor, set the Ispection speed (F12) to 0, adjust the compensation gain parameter F230 (if the lift car moves upward at start, decrease this parameter; if downward, increase this parameter, until the lift car does not motion when the Ispection starts.

9.10.3 Simple Start Compensation Adjustment Method Using of Light-load and Heavy-load Switch (F164 set to 4)

AS380 integrated elevator dedicated drive controller adopts pre-load starting compensation with weighing device and another simple starting compensation: by using light-load and heavy-load switch. With this starting compensation, Encoder can adopt 8192 pulse A, B, Z phase incremental Encoder, and does not need accurate weighing devices but simply installs two micro-switches on the car bottom. For synchronous gearless tractor elevator, high resolution SIN/COS Encoder is mandatory for a no weighing starting compensation mode. Compared with A, B, Z phase incremental Encoder, SIN/COS Encoder is more expensive with more wiring and weaker to interference. So, compared with no weighing starting compensation mode, the light-load and heavy-load switch starting compensation is less expensive, with less wiring and stronger to interference. Compared with pre-load starting compensation with analog signal input, it is less expensive, easier to be installed and simpler for commissioning due to the absence of an accurate weighing device. Therefore, we recommend the light-load and heavy-load switch starting compensation mode to the customers who use the dedicated drive controller of **AS380** integrated elevator.

When the light-load and heavy-load switch starting compensation mode is adopted, it is necessary to install a light-load and a heavy-load switch on the car bottom. We recommend that the light-load switch motions when the lift car load is less than 25% of the rated load, while the heavy-load switch motions when the lift car load is greater than 75% of the rated load. The light-load switch can be connected to JP6-02 (HX4) of (SM-02H) on the car top board, while the heavy-load switch can be connected to JP6-03 (HX5) terminal of (SM-02H) on the car top board.

1. Set the F40 value according to the equilibrium coefficient of the lift

2. Adujust the full load starting comfortable sensation

1) Stop the elevator at the bottom floor, run upwards in ispection status. If the elevator slips downwards, increase the F72; if the elevator pulls upwards, decrease the F72.

2) Stop the elevator among the bottom and the 2nd floor, run downwards in ispection status. If the elevator slips downwards, increase the F73; if the elevator pulls upwards, decrease the F73.

3) Stop the elevator at the top floor, run downwards in ispection status. If the elevator slips downwards, increase the F75; if the elevator pulls upwards, decrease the F75.

3. Adujust the no load starting comfortable sensation

1) Stop the elevator at the bottom floor, run upwards in ispection status. If the elevator slips downwards, decrease the F70; if the elevator pulls upwards, increase the F70.

2) Stop the elevator among the bottom and the 2nd floor, run downwards in ispection status. If the elevator slips downwards, decrease the F71; if the elevator pulls upwards, increase the F71.

3) Stop the elevator at the top floor, run downwards in ispection status. If the elevator slips downwards, decrease the F74; if the elevator pulls upwards, increase the F74.

4、In general, F74 and F75 is not need to adjust(Unless the the field floor is particularly high or the weighing value inconformity between at bottom and at top floor).

Notice to Customers

Dear customers:

RoHS is the abbreviation for *The restriction of the use of certain hazardous substances in electrical and electronic equipment* which was implemented by EU on July 1st, 2006. It stipulates that in the newly developed electrical and electronic equipment, the following six hazardous substances are restricted: lead, mercury, cadmium, hexavalent chrome, PBB and PBDE.

In China, *the Electronic Information Products Pollution Control Management Measures* was issued on February 28th, 2006 jointly by the Ministry of Information Industry, State Development and Reform Commission, Ministry of Commerce, General State Administration for Industry and Commerce, Administration of Customs of the P.R.C, General Administration of Quality Supervision, Inspection and Quarantine and State Bureau of Environmental Protection, became a RoHS direction of Chinese Version and was enforced. On February 1st, 2008, *electronic waste environmental pollution prevention and control management measures* issued by the State Bureau of Environmental Protection of the P.R.C began to be executed, clearly specifying that the users of electronic and electrical products shall provide or entrust the electronic waste to be disassembled and disposed by the qualified company (including small individual businesses) with corresponding business scope listed in directory (or temporary directory).

All electronic components, PCB filters, wire straps, structural parts used in our products are selected and purchased by following *the Electronic Information Products Pollution Control Management Measures* and RoHS directive. The six hazardous substances (lead, mercury, cadmium, hexavalent chrome, PBB and PBDE), are strictly controlled. During manufacturing PCB components are welded on a XinChi lead free welding production line with a lead free welding technology.

Hazardous substances may be contained in the following assemblies:

Type of assembly	Electronic components	PCB Board	Metal sheet	Radiator	Plastic piece	Conductor
Possible hazardous substances	Six hazardous substances: lead, mercury, cadmium, hexavalent chrome, PBB and PBDE					

1) Environment analysis: Our electronic products will produce some heat in operation, which may lead the spread of little amount of hazardous substances. It will not cause any serious consequence for ambient environment. Once the life cycle of those electronic products is end and the product is discarded, the heavy metal and chemical hazardous substances contained in the products may seriously contaminate the soil and water resource.

2) Life cycle of electronic products and devices: Any electronic products and devices has its life cycle and will be discarded, replaced and upgraded by a new product, even it is still functional. The life cycle of our company electronic products is generally not more than 20 years.

3) Electronic products discard treatment: If the discarded electronic products aren't treated properly, it may contaminate the environment. Our customers are required to follow up the related national regulation and set up a reclaiming system. It can't be discarded as a regular household refuse or solid industrial wastes. The discarded products shall be stored in an environment-friendly way, or reclaimed by qualified company, and should be strictly complied with the *electronic waste environmental pollution prevention and control management measures* issued by the State Bureau of Environmental Protection of the P.R.C. Any unqualified individual or company is prohibited in disassembling, utilizing, disposing of electronic wastes.

Please don't throw away the electronic waste together with your ordinary domestic waste. Please call local waste disposing agencies or environment protection agencies for the advice of proper electronic waste handling.

Shanghai STEP Electric Corporation