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1 Preface

AS360 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.

2 Models / Technical, Indicators / Specifications of Integrated Drive Controller

See table 2.1 for all models of AS360 series integraed drive controller.

Table 2.1 Models of AS360 Series Integrated Drive Controller

Model AS360-	Rated capacity（kVA）	Rated output current（A）	Matching Motor（kW）
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

See table 2.2 for technical indicators and specifications of AS360 series integraed drive controller.

Table 2.2 Technical Indicators/Specifications of AS360 Series Integrated Drive Controller

		4T02P2	4T03P7	4T05P5	4T07P5	4T0011	4T0015	4T0018	4T0022	4T0030
Max matching motor capacity（kW）		2.2	3.7	5.5	7.5	11	15	18.5	22	30
Rated output	Rated capacity（kVA）	4.7	6.9	8.5	14	18	24	29	34	50
	Rated current（A）	9	9	13	18	27	34	41	48	65
	Max output voltage（V）	400V：three-phase 380/400/415/440/460V（matching input voltage）								
Input power	Number of phases, voltage, frequency	400V：three-phase 380/400/415/440/460V、50/60Hz								
	Voltage range allowed	-15%～+10%								
	Frequency range allowed	-5%～+5%								
	Endurance capacity of instantaneous	400V：keep running at AC300V or above；Activate under-voltage protection after 15ms from the moment when it drops from rated input condition to								

		4T02P2	4T03P7	4T05P5	4T07P5	4T0011	4T0015	4T0018	4T0022	4T0030
	voltage drop	somewhere lower than AC300V.								
Basic characteristics	Max accessible floor	9 floor								
	Elevator running speed	≤1.75m/s								
Drive characteristics	Control mode	PG card vector control								
	Startup torque	150% 0Hz（PG card vector control）								
	Speed control scope	1:1000（PG card vector control）								
	Speed control precision	±0.02%（PG card vector control 25±10°）								
	Torque limit	yes（set with parameter）								
	Torque precision	±5%								
	Frequency control scope	0～120Hz								
	Frequency precision (temperature fluctuation）	±0.1%								
	Frequency setting resolution	±0.06Hz/120Hz								
	Output frequency resolution （calculation of resolution）	0.01Hz								
	No-load startup compensation	When the elevator load is unknown, suitable torque will, as per the ready-to-travel direction of elevator, be applied on motor so as to ensure smooth start of elevator, minimize the slipping and improve comfort at starting moment								
	Overload capacity	Zero speed 150% , < 3Hz is 160%, > 3Hz is 200%								
	Brake torque	150% (external braking resistor),integrated braking unit								
	Acceleration Deceleration time	0.01～600s								
	Carrier frequency	2～11kHz								
	Battery operation	In case of blackout, the battery instantaneously supplies power to elevator for leveling at low speed.								
PG Card interface port	PG card output	5V、12V，300mA								
	PG card type	Open collector output, push-pull output, SIN/COS、Endat absolute value type								
	PG card signal frequency dividing output	OA，OB orthogonal，frequency dividing coefficient 1～128								
Control input/output signal	Opt-coupler input Control power supply	Isolated 24V DC								
	Relay output control power supply	Isolated 24V DC								
	Low-voltage opt-coupler isolated input	24 channel。Switching capacity.Opt-coupler control signal is isolated 24V DC input signal.								
	High-voltage opt-coupler isolated input	3 channel, Switching capacity。								
	Relay output 1	18 channel, Normal open contact, single-pole and single-throw，contact capacity：resistive load，3A 250VAC or 3A 30VDC								
	Relay output 2	3 channel. Normal open contact, single-pole and single-throw, contact capacity：resistive load，6A 250VAC								
	Button Input/output terminals	20 channels, could be extended to channels								
Protection option	Motor overload protection	Able to use parameter setting for the protection curve of motor								

		4T02P2	4T03P7	4T05P5	4T07P5	4T0011	4T0015	4T0018	4T0022	4T0030
	Overload of frequency converter	< 3Hz is 160%,5 seconds， > 3Hz is 185%，10 seconds								
	Short-circuit protection	Provide protection to elevator integrated drive controller when overcurrent occurs to any tow phases at output side.								
	Input open phase protection	In case that open phase inputted during operation, cut off output to protect the drive controller								
	Output open phase protection	In case that open phase outputted during operation, cut off output to protect the drive controller.								
	Overvoltage threshold	Bus-bar voltage, 810V(400V series)								
	Under-voltage threshold	Bus-bar voltage 380V(400V series)								
	Instantaneous blackout compensation	15ms above protection								
	Heat sink overheat	Protection through the thermistor								
	Antistall	Antisall protection launched when running speed deviation more than 30% of the rated speed								
	Impulse encoder failure	PG disconnection								
	Brake protection	Protection launched when automatically detecting the abnormal condition of brake								
	Module protection	Protection against over-current , short-circuit, overheating								
	Current sensor protection	Self-inspection when power connection								
	Speed reversal protection	Inspection through encoder								
	I^2t protection	Inspection through three-phase current								
	Protection against input overvoltage	400V level＞ 725V，200V level ＞360V,stop and inspect								
	Output grounding protection	Any phase grounding short-circuited during operation, cut off output and protect the frequency converter.								
	Protection against output imbalance	Cut off output and protect frequency converter, after three phase current output imbalance being detected during running.								
	Short-circuit protection for brake resistor	Inspection when braking								
	Encoder interference	Evaluate the degree of interference of encoder and alarm								
	Over-speed protection	Protection launched when exceeding rated speed by 108％								
	Low-speed protection	Protection launched when the elevator running speed is far lower than the rated speed due to some reasons including failures.								
	Running time governor protection	Protection launched when floor passing time exceed the required time								
	Leveling switch fault protection	Protection launched when leveling switch is at fault								
	EEPROM fault	Self-inspection when power connection								
Display	LCD in Chinese and English	Menus at each level								
Environment	Surrounding temperature	-10～+45℃								
	Humidity	Below 95%RH（no condensation）								
	Storage temperature	-20～+60℃（temperature allowable during short-term transport）								
	Application place	indoor（no corrosive gas 、dust and the like）								
	Altitude	Below 1000m								
Structure	Protection grade	IP20								
	Cooling mode	Force air-cooling								
Installation mode		In-cabinet installation								

3 Installation Dimensions / Mass of Integrated Drive Controller

See Figure 3.1 and Table 3.1 for installation dimensions and mass of integrated drive controllers.

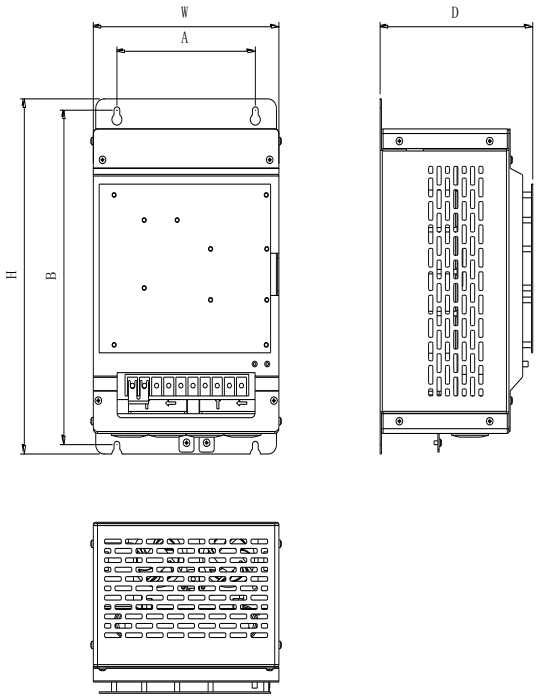


Diagram 3.1 Installation Dimensions of Integrated Drive Controller

Table 3.1 Mass Specifications of Integrated Drive Controller

Model AS360-	A (mm)	B (mm)	H (mm)	W (mm)	D (mm)	Installation hole diameter Φ(mm)	Installation			Tightening torque (Nm)	Mass (kg)
							Bolt	Nut	Mass (kg)		
4T02P2	165.5	357	379	222	205.5	7.0	4M6		4Φ6	3	8.2
4T03P7											
4T05P5											
4T07P5											
4T0011											
4T0015		392	414	232	205.5						10.3
4T18P5											
4T0022											
4T0030	200	512	530	330	291.5	9.0	4M8		4Φ8	6	30

4 Connecting Terminals of Integrated Drive Controller

4.1 Description of Major Loop Terminals

See Diagram 4.1 for the major loop connecting terminals of AS360 series integrated drive controller.

Diagram 4.1 Main loop connecting terminals

See table 4.1 for main loop terminals function description of AS360 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	integrated drive controller output; connect three-phase synchronous/asynchronous motor.
V/T2	
W/T3	

4.2 Description of Control Loop Terminals

See Diagram 4.2 for control loop terminal of AS360 series integrated drive controller.

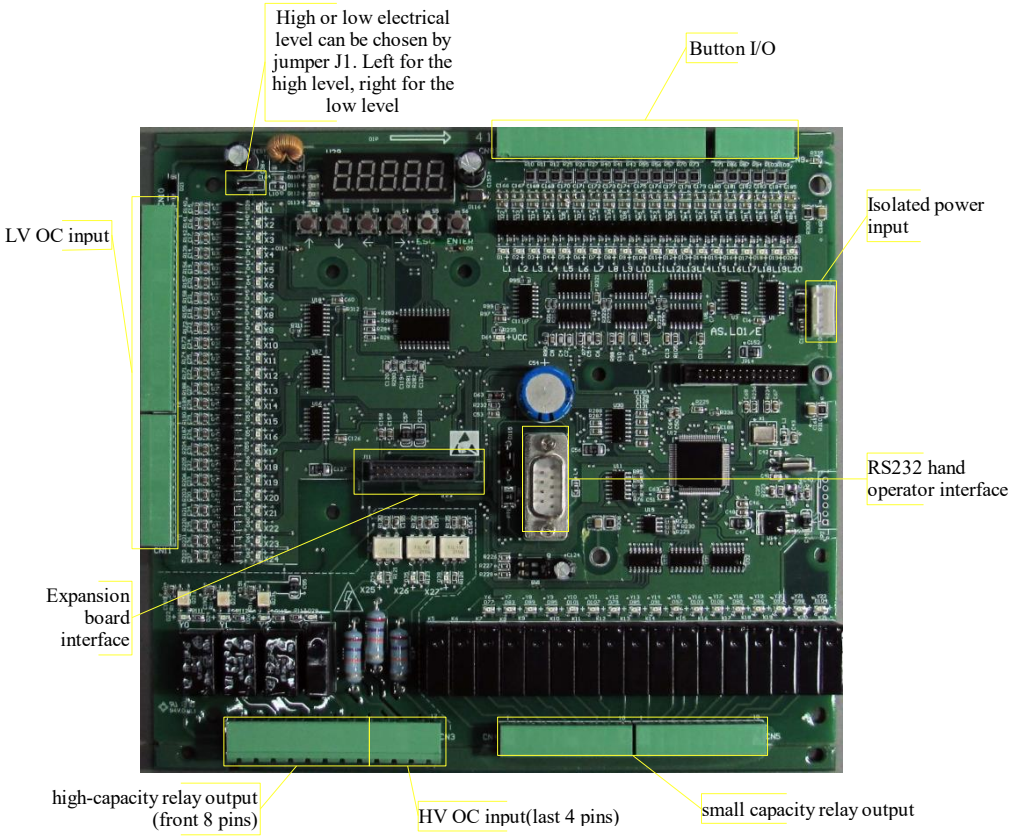


Fig. 4.2 Control Loop Terminals

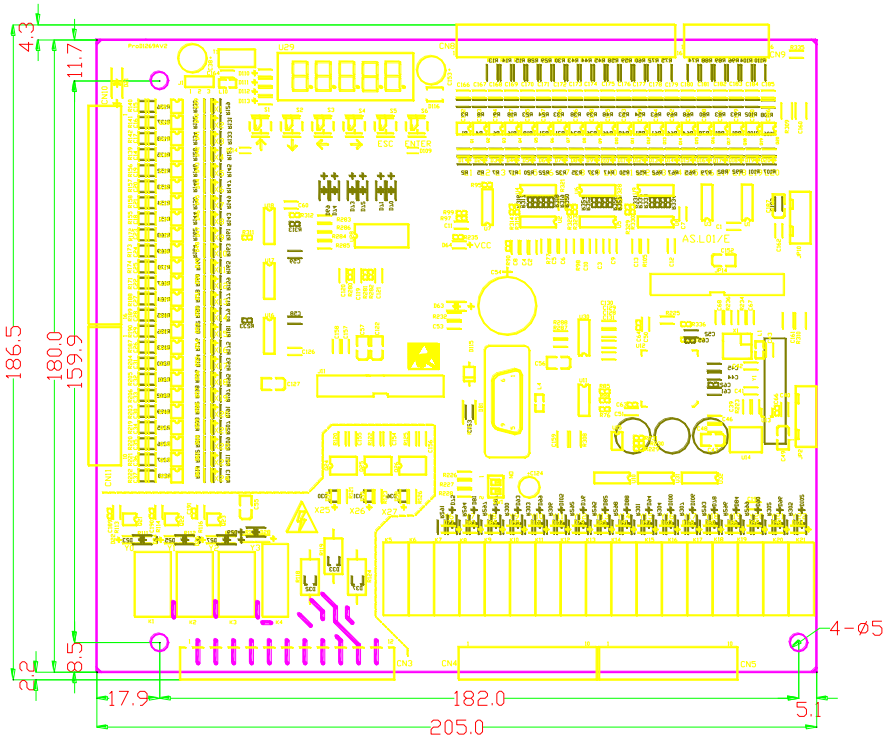


Fig. 4.3 The dimension figure of main control board

See Table 4.2 for control loop terminals function description of AS360 series integrated drive controller.

Table 4.2 Function Description of Control Loop Terminals

No.	Position	Name	Definition	Default Definition	Type	Remark
CN3	CN3.1	Y0	Can be redefined	Brake excitation	Output	0: No definition 1: Run contactor 2: Brake contactor 3: Brake excitation 4: Fan lighting
	CN3.2	M0	Common port Y0		Common port	
	CN3.3	Y1	Run contactor		Output	
	CN3.4	M1	Common port Y1		Common port	
	CN3.5	Y2	Brake contactor		Output	
	CN3.6	M2	Common port Y2		Common port	
	CN3.7	Y3	Can be redefined	Fan lighting	Output	0: No definition 1: Run contactor 2: Brake contactor 3: Brake excitation 4: Fan lighting
	CN3.8	M3	Common port Y3		Common port	
	CN3.9	XCM	High pressure Common port		Common port	
	CN3.10	X25	Safety circuit		Input	
	CN3.11	X26	Hall door lock		Input	
	CN3.12	X27	car door lock		Input	
CN4	CN4.1	Y6	Can be redefined	Openning front door output	Output	0: Not used 6: Opening front door 7: Closing frongt door 8: Openning back door 9: Closing back door 10: Low display code 1 11: Low display code 2 12: Low display code 3 13: Low display code 4 14: Low display code 5 15: Low display code 6 16: Low display code 7 17: Up direction 18: Down direction 19: Negative floor 20: Fire fighting back 21: buzzer 22: overload 23: arriving station bell 24: Full load 25: maintenance 26: Fan lighting 2 27: Open door ahead of time 28: High floor 29: integrated drive Controller running normally 30: Emergency leveling 25: maintenance 26: Fan lighting 2 27: Open door ahead of time 28: High floor 29: integrated drive Controller running
	CN4.2	Y7		Closing frongt door output	Output	
	CN4.3	Y8		Openning back door output	Output	
	CN4.4	Y9		Closing back door output	Output	
	CN4.5	YM1		Common port Y6-Y9	Common port	
	CN4.6	Y10		Low display code 1	Output	
	CN4.7	Y11		Low display code 2	Output	
	CN4.8	Y12		Low display code 3	Output	
	CN4.9	Y13		Low display code 4	Output	
	CN4.10	Y14		Low display code 5	Output	
CN5	CN5.1	Y15		Low display code 6	Output	
	CN5.2	Y16		maintenance	Output	
	CN5.3	YM2		Common port Y10-Y16	Common port	
	CN5.4	Y17		Up direction	Output	
	CN5.5	Y18		Down direction	Output	
	CN5.6	Y19		Negative floor	Output	
	CN5.7	Y20		Fire fighting back	Output	
	CN5.8	Y21		buzzer	Output	
	CN5.9	Y22		overload	Output	
	CN5.10	YM3		Common port Y17-Y22	Common port	

No.	Position	Name	Definition	Default Definition	Type	Remark
						normally 30: Emergency leveling
CN8	CN8.1	24V	24V			
	CN8.2	COM	COM		Common port	
	CN8.3	L1	Can be redefined	front door open button	Button	201: front door open button 202: front door close button 203: front door keep opening 204: Door 2 options 211~220: 1~10 floor front door instruction 221~229: 1~9 floor front door up call 232~240: 2~10 floor front door down call 301: Back door open button 302: Back door close button 303: Back door keep opening 311~320: 1~10 floor back door instruction 321~329: 1~9 floor back door up call 332~340: 2~10 floor back door down call
	CN8.4	L2		front door close button	Button	
	CN8.5	L3		front door keep opening	Button	
	CN8.6	L4		back door open button	Button	
	CN8.7	L5		front door 1st floor instruction	Button	
	CN8.8	L6		front door 2nd floor instruction	Button	
	CN8.9	L7		front door 3rd floor instruction	Button	
	CN8.10	L8		front door 4th floor instruction	Button	
	CN8.11	L9		front door 5th floor instruction	Button	
	CN8.12	L10		back door close button	Button	
	CN8.13	L11		Back door 1st floor instruction	Button	
	CN8.14	L12		Back door 1st floor up call	Button	
	CN8.15	L13		Front door 1st floor up call	Button	
	CN8.16	L14		Front door 2nd floor up call	Button	
CN9	CN9.1	L15		Front door 3rd floor up call	Button	
	CN9.2	L16		Front door 4th floor up call	Button	
	CN9.3	L17		Front door 2nd floor down call	Button	
	CN9.4	L18		Front door 3rd floor down call	Button	
	CN9.5	L19		Front door 4th floor down call	Button	
	CN9.6	L20		Front door 5th floor down call	Button	
CN10	CN10.1	24V	24V			

No.	Position	Name	Definition	Default Definition	Type	Remark
	CN10.2	COM	COM		Common port	
	CN10.3	X1	Can be redefined	Door area	Input	Door area switch must be defined as X1,X23 or X24 when there're 1 leveling switch(F76=1); Up and down leveling switch must be defined as X1,X23 or X24 when there're 2 leveing switches(F76=0)
	CN10.4	X2	KMY detection（Normal close）		Input	1~99: Normal open 101~199: Normal close 4: KMY detection 5: KMB detection 6: brake switch 1 7: sealing star feedback 8: Open door ahead of time detection 9: maintenance（only normal close） 10: upgoing（Only normal open） 11: downgoing: （Only normal open） 12: Fire fighting back 13：reserved 14: Lock elevator 15: upper limit 16: lower limit 17: Up decelerate 18: Down decelerate 19: overload 20: full load 21: reserved 22: open front door in place 23: open back door in place 24: close front door in place 25: close back door in place 26: front door screen 27: back door screen 28: driver 29: drive straightly 30: driver reversing 31: independent 32: door 2 Selection 33: Emergency leavling 34: open door button 35: close door button 36: Safety circuit 37: Door lock circuit 1 38: Door lock circuit 2 39: half load 40: brake switch 2 41: front door safety contact board 42: back door safety contact board 43: back-up source 44: earthquake 45: firemen 46: terminal switch
	CN10.5	X3	KMB detection（Normal close）		Input	
	CN10.6	X4	detection（Normal close）		Input	
	CN10.7	X5	upgoing		Input	
	CN10.8	X6	downgoing		Input	
	CN10.9	X7	Can be redefined	Fire fighting back	Input	
	CN10.10	X8		Lock elevator	Input	
	CN10.11	X9	Can be redefined	upper limit（Normal close）	Input	
	CN10.12	X10		lower limit（Normal close）	Input	
	CN10.13	X11	Up decelerate（Normal close）		Input	
	CN10.14	X12	Down decelerate（Normal close）		Input	
	CN10.15	X13	Can be redefined	overload	Input	
	CN10.16	X14		open front door in place（Normal close）	Input	
CN11	CN11.1	X15		front door screen（Normal close）	Input	
	CN11.2	X16		driver	Input	
	CN11.3	X17		driver reversing	Input	
	CN11.4	X18		close front door in place（Normal close）	Input	
	CN11.5	X19		Full load	Input	
	CN11.6	X20		open back door in place（Normal close）	Input	
	CN11.7	X21		close back door in place（Normal close）	Input	
	CN11.8	X22		back door screen（Normal close）	Input	
	CN11.9	X23		up leveling	Input	Door area switch must be

No.	Position	Name	Definition	Default Definition	Type	Remark
	CN11.10	X24		down leveling	Input	defined as X1,X23 or X24 when there're 1 leveling switch(F76=1); Up and down leveling switch must be defined as X1,X23 or X24 when there're 2 leveing switches(F76=0)
J11	expansion interface					
J12	Other encoder interface					

Note：The Port definitions of CN4.6、CN4.7、CN4.8、CN4.9、CN4.10、CN5.1（That is outputs:Y10、Y11、Y12、Y13、Y14、Y15、Y16）can be refered of the detailed instructions of F78 in "chapter 6.2 Detailed instructions of mainboard F parameters"

Table4.3 Dial switch SW1 Setup instructions

SW1	ON	Burning program state	Factory setup is OFF (Maintain OFF during operation)

4.3 Extension Board SM.09IO/D Introduction

4.3.1 Extension Board SM.09IO/D Outside View

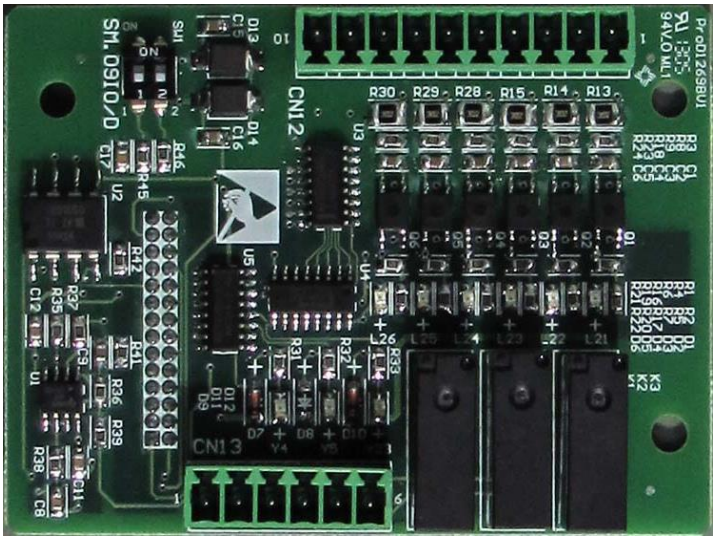


Fig. 4.4 The outside view of extension board

4.3.2 Extension Board SM.09IO/D Dimension Figure

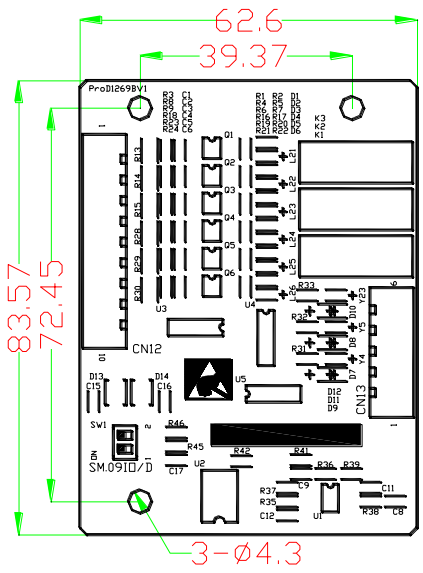


Fig. 4.5 The dimension figure of extension board

4.3.2 The Port Definitions of the Extension Board SM.09IO/D

Table 4.4 Port definitions of extension board

No.	Position	Name	Definition	Default Definition	Type	Remark
CN13	CN13.1	Y4	Can be redefined	Unused	Relay output	0: Unused 6: front door open 7: front door close 8: back door open 9: back door close 10: low Seven-segment code a 11: low Seven-segment code b 12: low Seven-segment code c 13: low Seven-segment code d 14: low Seven-segment code e 15: low Seven-segment code f 16: low Seven-segment code g 17: Up direction 18: Down direction 19: Negative floor 20: Fire fighting back 21: buzzer 22: overload 23: arriving station bell 24: full load 25: maintenance 26: Fan lighting 2 27: Open door ahead of time 28: High floor 29: integrated drive Controller running normally 30: Emergency leveling
	CN13.2	M4		Unused	Common port	
	CN13.3	Y5		Unused	Relay output	
	CN13.4	M5		Unused	Common port	
	CN13.5	Y23		Unused	Relay output	
	CN13.6	M23		Unused	Common port	
CN12	CN12.1	L21	Can be redefined	Unused	Button	201: front door open button 202: front door close button
	CN12.2	L22		Unused	Button	

No.	Position	Name	Definition	Default Definition	Type	Remark
	CN12.3	L23		Unused	Button	203: front door keep opening 204: Door 2 options 211~220: 1~10 floor front door instruction 221~229: 1~9 floor front door up call 232~240: 2~10 floor front door down call 301: Front door open button 302: Front door close button 303: Front door keep opening 311~320: 1~10 floor front door instruction 321~329: 1~9 floor front door up call 332~340: 2~10 floor back door down call
	CN12.4	L24		Unused	Button	
	CN12.5	L25		Unused	Button	
	CN12.6	L26		Unused	Button	
	CN12.7	AI+	Differential analog input interfaces(0-10V)			
	CN12.8	AI-				
	CN12.9	GND				
	CN12.10	CANH	CAN communication interface			
	CN12.11	CANL				
	CN12.12	GVIO				
J3	Extension interface					

4.3.3 Dial Switch SW2 Setup Instructions of Extension Board SM.09IO/D

The Setup instructions of Dial switch SW2, shown as table 4.5 below.

Table 4.5 Dial switch SW2 Setup instructions of extension board SM.09IO/D

SW2	ON	Monitor CAN terminal resistance valid state	Factory setup is OFF for SW2
	OFF	Monitor CAN terminal resistance Invalid state	

4.4 PG Card

The following part introduce the PG card suitable for the SIN/COS encoder.

4.4.1 SIN/COS PG card Terminal Arrangements

See diagram 4.6 for SIN/COS PG card (Model AS.T024) terminal arrangements.

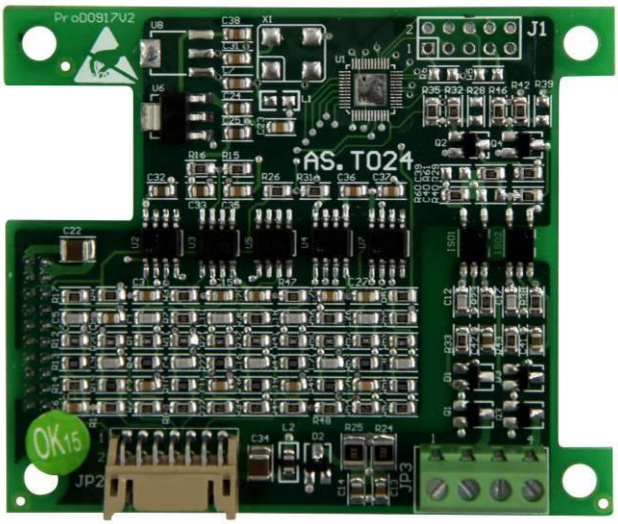


Diagram 4.6 SIN/COS PG card (Model AS.T024) terminal arrangements

4.4.2 SIN/COS PG Card Terminal Label

JP2 is input terminal (14-pin socket) with labels as follows:

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+

JP3 is (fractional frequency) output terminal with labels as follows:

	V0	FB	V0

4.4.3 SIN/COS PG Card Terminal Function Description

See Table 4.4 for SIN/COS PG card (AS.T024) terminal functions.

Table 4.6 SIN/COS PG card terminal function description

Name	Terminal Label	Function Description	Specifications
Collector open output	FA	fractional frequency signal output Phase A	Triode close/open output (Max. output frequency 100kHz);
	0V	24V GND	
	FB	Fractional frequency signal output Phase B	
	0V	24V GND	
Encoder input	A+,A-	Encoder Phase A signal	Differential signal; Max. input frequency: 100kHz
	B+,B-	Encoder B phase signal	
	R+,R-	Encoder Z signal	
	C+,C-	Encoder SIN signal	
	D+,D-	Encoder COS signal	
	V+	+5V	
	0V	+5V GND	

5 Parameter Table of Integrated Drive Controller

5.1 F Parameter List

Table 5.1 F Parameter List

No.	Name	Factory Setup	Scope	Unit	Remarks
F00	Accelerating slope	0.3	0.200～1.500	m/s^2	
F01	Decelerating slope	0.3	0.200～1.500	m/s^2	
F02	S curve T0 (initial S angle time T0)	1.3	0.300～3.000	s	
F03	S curve T1 (S angle T1 at end of acceleration)	1.1	0.300～3.000	s	
F04	S curve T2 (S angle time T2 at the beginning of deceleration)	1.1	0.300～3.000	s	
F05	S curve T3 (S angle time T3 at the end of deceleration)	1.3	0.300～3.000	s	
F06	Nominal speed	0.5	0.100～10.000	m/s	
F09	Parking floor	1	1～10	×	
F10	Offset floor	0	0～10	×	
F11	Floor number	5	2～10	×	
F12	Inspection speed	0.25	0～0.630	m/s	
F13	Re-leveling speed	0.06	0.010～0.150	m/s	
F14	Closing delay 1 (repsonse to hall call)	20	0～300.0	s	
F15	Closing delay 2 (repsonse to car call)	20	0～300.0	s	
F16	brake delay	0.2	0～2.0	s	
F17	Automatic enable signal release time	0.6	0.2～3.0	s	
F18	Fire floor	1	1～10	×	
F20	Base station return delay time	0	0～65535	s	0 represents not open; other numbers represents open and delayed time.
F21	Leveling switch motion delay distance (full-speed)	6	0～40	mm	
F22	Single and Duplex return to base station	1	1～10	×	
F23	Group control mode	0	0～3	×	
F25	Input type 1 (normal open or close setup for X0～X15 input point)	28430	0～65535	×	The input NO/NC setting can be set with 2 ways: 1. Use F25,F26 bit parameter to set NO/NC; 2. Use the input point port self-define to set. If the value is big than 100, it's set as NC point, or it's set as NO point.
F26	Input type 2 (normal open or close setup for X16～X25 input point)	58	0～65535	×	
F29	Service floor 1 (Set up if 1～16 floors can be docked)	65535	0～65535	×	
F33	Auomatic operation interval for test run	5	0～60	s	
F34	Automatic operation times for test run.	0	0～65535		
F35	Firefighting switch input definition and firefighting mode selection	0	0～65535	×	Bit0: 0: ordinary firefighting, 1: Schindler fire mode Bit1: 0: fireman switch without lift car board; 1: fireman switch with lift car board Bit2: 0: ordinary firefighting signal display;

No.	Name	Factory Setup	Scope	Unit	Remarks
					1: Shandong firefighting signal display Bit3: 0: Motherboard X15 input for firefighting return; 1: Motherboard X15 input for fireman switch
F36	Band-type Brake switch detection mode	0	0～2	×	
F40	Weight data bias	48	0～100	%	
F41	Weighter 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 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 1～16 floors)	65535	0～65535	×	
F53	Rear door opening permission 1 (opening setup value for 1～16 floors)	0	0～65535	×	
F56	Up leveling adjustment (50 to refernece value)	50	0～240	mm	
F57	Down leveling adjustment (50 to refernece value)	50	0～240	mm	
F59	Zero speed brake delay	0	0～10.00	0.01s	
F61	Arrival distance by 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 lock, 1: output contactor off, immediate lock
F66	With or whithout upper and lower limt	0	0～1		0: no 1: yes
F67	With or whithout entension board	0	0～1		0: no 1: yes
F68	open the function of learning normal open, normal close	0	0~1		0: open 1: close
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 number of leveling switch	0	0～1		0: Two leveling switch 1: One leveling switch
F77	High floor output value	1	0~6		
F78	Display code output type option	0	0~3		
F79	With or without end station switch	0	0~3		Bit0: with up end station Bit1: with down end station
F81	Serial communication function selection	0	0~1		Extension CAN port function set: F81 = 0: Group control F82 = 1: Community monitoring
F82	The time delay of finding door area after single leveling switch upward	10	1~100	0.1s	
F83	The time delay of finding door area after single leveling switch downward	10	1~100	0.1s	
F115	The limit time of opening door time delay	15	3～30	s	

No.	Name	Factory Setup	Scope	Unit	Remarks
F116	The limit time of closing door time delay	15	3～30	s	
F117	The delay time of door foced to close or the time of keeping the door open	120	0～1800	s	
F118	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	Signal delay release time in Inspection.	0.3	0～10.0	s	
F128	Control of front and rear doors	1	0～15	×	
F129	Activate the functions of re-leveling and/or pre-opening	0	0～3	×	
F130	Maintain the opening/closing torque	0	0～7	×	Bit0: 1: door maintaining open Bit1: 1: door maintaining closed Bit2: 1: door maintaining closed during operation
F137	Service floor 1 (Floor 1~ 16) when NS-SW function is set.	65535	0～65535	×	
F141	Time of delay release of the main contactor (after enabled)	0.5	0.50～10.00	s	
F145	Bus voltage gain	100	80～120	%	
F146	Position error distance	180	180～1000	mm	
F147	Protection of contact 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	high-voltage input detection with or without hall door lock	1	0/1	×	0: No 1: Yes
F156	With or without lock relay contact detection	1	0/1	×	0: No 1: Yes
F161	The function of floor blocking for a time slot	0	0～65535	×	Bit0: 1: block instruction Bit1: 1: block upward call Bit2: 1: block downward call
F163	Choose whether the back-up power continues running after returning to the base in case of 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 for the elevator Bit3: 1: whether to open the door by LED operator
F175	Creeping speed at startup	0.006	0～0.100	m/s	
F180	Speed gain	100	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	Learn trip speed	0	0～Rated speed of elevator	m/s	0: self-learning speed is at the rate of 50% of the rated speed
F186	Creeping time at startup	0.5	0～10.00	s	
F187	Monitor items	0	0～255	×	
F196	Second base station at Duplex	0	0～10	×	

No.	Name	Factory Setup	Scope	Unit	Remarks
F200	inverter software version	Factory setup		×	Read-only
F201	Inverter drive mode	3	0 / 1 / 2 /3	×	Set inverter basic mode: 0: V/F control mode 1: Vector control without speed sensor 2: Torque control with speed sensor 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	
F204	Motor nominal current	By Inverter parameter	0．0～300．0	A	
F205	Motor nominal frequency	50	0.00～120.00	Hz	
F206	Motor nominal rotation speed	1460	0～3000	rpm	
F207	Motor nominal voltage	By Inverter parameter	0.～460	V	
F208	Number of poles of motor	4	2～128	×	
F209	Motor nominal slip frequency	1.4	0～10.00	Hz	
F210	Encoder type	0	2000/1/2	×	0: incremental Encoder 1: SIN/COS Encoder 2: Endat Encoder
F211	Encoder pulse number	1024	500～16000	PPr	
F212	Zero speed PID adjustor incremental 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	0.5	0.00～655.35	×	
F215	Low speed PID adjustor incremental P1	70	0.00～655.35	×	
F216	Low speed PID adjustor integral I1	30	0.00～655.35	×	
F217	Low speed PID adjustor differential D1	0.5	0.00～655.35	×	
F218	Medium speed PID adjustor incremental P2	120	0.00～655.35	×	
F219	Medium speed PID adjustor integral I2	25	0.00～655.35	×	
F220	Medium speed PID adjustor differential D2	0.2	0.00～655.35	×	
F221	High speed PID adjustor incremental P3	140	0.00～655.35	×	
F222	High speed PID adjustor integral I3	5	0.00～655.35	×	
F223	High speed PID adjustor differential D3	0.1	0.00～655.35	×	
F224	Low speed point switch frequency F0	1	0.0～100.0	%	
F225	High speed point switch frequency F0	50	0.0～100.0	%	
F226	Zero servo time	0.8	0.0～30.0	s	
F227	Band-type Brake release time	0.25	0.00～30.00	s	
F228	Current slowdown time	0	0.00～10.00	s	
F229	Torque compensation direction	0	0/1	×	0: positive direction 1: negative direction

No.	Name	Factory Setup	Scope	Unit	Remarks
F230	Torque compensation gain	100	0.0～200.0	%	
F231	Torque compensation bias	0	0.0～100.0	%	
F232	Filtering time for feedback signal of encoder	0	1～30	ms	
F233	Feedback direction of encoder	1	0/1	×	1: positive sequence 0: negative sequence
F234	Motor phase sequence	1	0/1	×	1: positive direction 0: negative direction
F235	Motor no-load current coefficient	32	0.00～60.00	%	Unnecessary to set up nomally
F236	PWM carrier frequency	6	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	Nominal power of inverter			KW	This is a read-only query data
F242	Phase angle of encoder	0	0.0～360.0	Degree	
F243	Zero position correction of encoder	0	0/2	×	Set 2 for zero point correction

5.2 Definition of Function Parameter

F0 —— Accelerated speed**.** The acceleration slope rate is the slope rate of linear accelerating section between T0-T1,

F1 —— Decelerated speed. The deceleration slope rate is the slope rate of linear Decelerating section between T2-T3

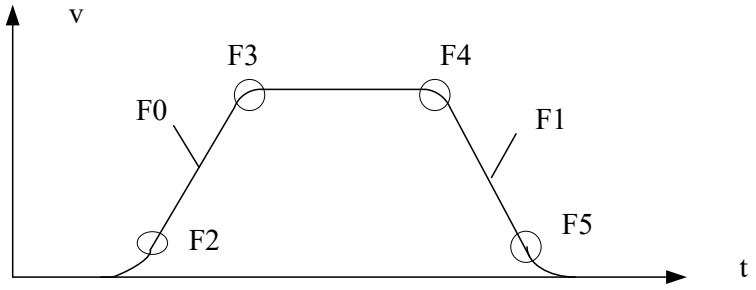
F2 —— S curve T0 is acceleration time for starting round angle of S curve. Default parameter value is 1.3S

F3 —— S curve T1 is acceleration time for accelerating round angle of S curve. Default parameter value is 1.1S

F4 —— S curve T2 is acceleration time for decelerating round angle of S curve. Default parameter value is 1.1S

F5 —— S curve T3 is acceleration time for leveling round angle of S curve. Default parameter value is 1.3S

The below diagram illustrate the specific positions of the above six parameters in the S curve of elevator operation.

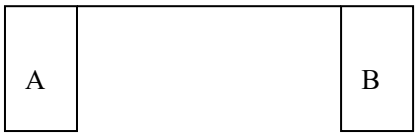


F6 —— rated speed of elevator. S

F9 —— base floor lock. The floor that elevator should return when entering the elevator lock Mode. It is a floor sequencing data. The lowest floor is 1。 Please note that the floor Sequencing should be done in accordance with the overall condition of the entire elevator group when the group is in group control mode or parallel connection. For example, suppose that there are three elevator: A,B,C, of which the floors of elevator A are -2、-1、1～8；the floors of elevator B are -1、1～8；the floors of elevator C is 1～8。All three elevators should return floor one after entering into lock mode. It is no question to set F9 of elevator A as 3. But elevator B and elevator C are required to start the floor sequencing from floor -2 too. So the F9 of elevator B and C are also required to be set as 3.

F10—— offset floor. It refers to the D-Value between the lowest floor of the elevator and those of all the elevators within the group control or in the parallel connection. The value of single elevator always is zero. However it is required to set the parameter when the bottom floors of each elevator within the group control or in parallel connection are not same

F11—— Total floor number. The total floor number is that of real leveling plates of elevator.



The following is the example explaining the setting method of parameter F10 and F11

Suppose that there are two elevators in parallel connection in a building. Elevator A serves 15 floors above ground only while Elevator B serves 15 floors above ground and 2 floors underground.

For Elevator A, the total floor number is 15; offset floor is 2; the address of lowest floor call and registration begin with 3.

For Elevator B, the total floor number is 17; offset floor is 0, the address of lowest floor call and registration begin with 1.

Note: if the by-pass floors of elevators within the group control or in parallel connection are different, it is required to artificially make the service floors by installing the leveling plate to the by-pass floors of those elevators. In this way do guarantee the same floor sequencing among the elevators within the group control or in parallel connection.

Example as the following table

Table 7.2 example for F10 and F11 parameter setting

Actual Floors	Actual Indication	Floors By Elevator A	Fl. address of Elevator A	Set Indications for Elevator A	Floors by Elevator B	Fl. address of Elevator B	Set Indications for Elevator B
4	4	4	5	4	4	5	4
3	3	3	4	3	3	4	3
2	2	2	3	2	by-pass	3	2
1	G	1	2	70	1	2	70
-1	-1				-1	1	50

As show in the above table, Elevator B must install a leveling plate at the by-pass position of second floor to keep its floor number as same as Elevator A.

For elevator A, the total floor number is 4; floor offset is 1; the address of first floor call and registration begin with 2. Display setting: first floor=70; second floor=2;

Third floor=3; forth floor=4.

Parking floor: G (stand for the specific floor address) –yes (Parking allowed) 2-Yes; 3-Yes; 4-Yes.

For elevator B, the total floor number is 5; floor offset is 0; the address of floor -1 call and registration begin with 1. The address of first floor is 2.

Display setting : floor －1 =50； floor 1=70；floor 2=2；floor 3=3； floor 4=4。

Parking floor: -1- Yes；G-Yes；2-No (parking not allowed, the call and registration of floor address 3 of elevator B is invalid)

3-Yes；4-Yes。

F12—— inspection speed. The inspection speed range from 0 to 0.63m/s

F13——releveling speed. It refer to the speed that elevator with the non-inspection status reach the leveling zone in the process of automatically leveling searching, as well as the running speed of releveling. The scope range from 0.01 to 0.15 m/s .the speed of automatic leveling searching is inspection speed.

F14—— door-closing delay 1.

When the elevator responds to landing call, the door will keep opening within the setting time duration. The door will close when the timing end. The function valid only without attendant

F15—— door-closing delay 2.

When the elevator parks only with the registration call, the door will keep opening within the setting time duration. The door will close when the timing end. The function valid only without attendant

F16—— brake delay. The time delay from running signal dispatching to band-type brake contactor release, when startup.

F17—— Running signal release delay when in automatic status. The time delay from band-type brake contactor release to running signal signoff, when in automatic status.

F18—— Firefighting base station. The elevator will automatically return to default floor set by the parameter when the firefighting switch is on.

F20—— Auto homing time delay. Auto homing function deactivated when F20=0.

Auto homing function activated when F20≠0.The parameter is the auto homing time delay. When the elevator respond the last call or registration and no new call or registration come after within the time delay set by F20,elevator automatically return to the base station set by the parameter F22. the parameter is invalid in the group control mode because that auto base station return setting and base station position are controlled by group control system.

F21—— Leveling switch motion delay distance. The purpose of setting this parameter is to compensate the distance deviation caused by leveling switch motion delay distance when doing position correction. Since this distance deviation has something to do with speed, the parameter may be adjusted a little bit higher when the elevator run at high speed. Under current circumstance, the rated speed of the elevator shall be under 2.5m/s. Default value is generally used since the above-mentioned deviation distance is relatively minor.

F22—— single or duplex return to base station. The function valid only when F20 set to non-zero

F23—— Group control mode**.** Set each elevator to 3 when in single or duplex. Meanwhile, it is required to use F181 to set the principle elevator and auxiliary elevators when in parallel

connection. All elevators within the group control are set 2.

F25—— mainboard input selection 1. Constant open/close setting for switch input point X0-X15 of mainboard. It is 16 bit data. The bottom bit for X0, The ceiling bit for X15. When any point within that range is set as constant open, the corresponding bit should be set as zero. When any point within that range is set as constant close, the corresponding bit should be set as one. The parameter in operator is set point by point（one bit after another）during the actual operation. Therefore there is no need to calculate the value.

F26—— mainboard input selection 2. Constant open/close setting for switch input point X16-X32 of mainboard. It is 16 bit data. The bottom bit for X16, the ceiling bit for X31. When any point within that range is set as constant open, the corresponding bit should be set as zero. When any point within that range is set as constant close, the corresponding bit should be set as one. The parameter in operator is set point by point（one bit after another）during the actual operation. Therefore there is no need to calculate the value.

F27—— Car wall-mounted control board input selection. Constant open/close setting for switch input point GX0-GX15 of car board. It is 16 bit data. The bottom bit for GX0, The ceiling bit for GX15. When any point within that range is set as constant open, the corresponding bit should be set as zero. When any point within that range is set as constant close, the corresponding bit should be set as one. The parameter in operator is set point by point（one bit after another）during the actual operation. Therefore there is no need to calculate the value.

F28—— Car ceiling-mounted control board selection. Constant open/close setting for switch input point HX0-HX15 of car ceiling. It is 16 bit data. The bottom bit for HX0, The ceiling bit for HX15. When any point within that range is set as constant open, the corresponding bit should be set as zero. When any point within that range is set as constant close, the corresponding bit should be set as one. The parameter in operator is set point by point（one bit after another）during the actual operation. Therefore there is no need to calculate the value.

Note: supplementary explanation for input type setup.

HX6—— The overload switch must be constant close switch. If the constant open switch is used, it will not work if the overload switch broken down or the overload circuit disconnected. The failure to detect an overload situation would most likely to put the elevator in service in danger.

So are the limit switches and terminal deceleration switches and etc. constant close contact recommended. Otherwise potential safety hazard may occur to the elevator.

HX4—— NO-Load switch(input at this point means that the car is no-load. The action point of the switch is the load of less than 100 KG

If this switch is not in use, the HX4 must be set as constant open.

Otherwise, the system will permanently identify the car as no-load. The following consequence will occur. When the system in the elevator detect more than 5 call registrations (according to the parameter setting of F120), the system mistakenly identify the car as no-load. The system in the elevator indentifies so many call registrations as the result of children making trouble. The system will activate anti-nuisance function and cancel all the existing call registration in order to reduce waste.

HX7—— door-opening limit switch for rear door, HX8 door-closing limit switch for

Rear door and HX10 safety edge for rear door

If there is no rear door for the elevator, HX7 set as constant open, HX8 as constant close, HX10 as constant open. The setting of the elevator with rear door should be in conformity with the actual condition.

F29—— Service floor 1, F29 value set whether the actual floor sequence from 1 to 16 is allowed to park or not. It is 16 bit data. The bottom bit for the lowest floor, The ceiling bit for 16th floor. When any point within that range is set as one, the corresponding floor should be set as service floor for parking. Vice versa, when any point within that range is set as zero, the corresponding floor should be set as non-service floor with no parking allowed. The non-service floor with no parking allowed can not register call. The parameter in operator is set floor by floor（one bit after another）during the actual operation. Therefore there is no need to calculate the value.

F30—— service floor 2, F30 value set whether the actual floor sequence from 17th to 32nd is allowed to park or not. It is 16 bit data. The bottom bit for the 17th floor, the ceiling bit for 32nd floors. When any point within that range is set as one, the corresponding floor should be set as service floor for parking. Vice versa, when any point within that range is set as zero, the corresponding floor should be set as non-service floor with no parking allowed. The non-service floor with no parking allowed can not register call. The parameter in operator is set floor by floor（one bit after another）during the actual operation. Therefore there is no need to calculate the value.

F31—— service floor 3, F31 value set whether the actual floor sequence from 33rd to 48th is allowed to park or not. It is 16 bit data. The bottom bit for the 33rd floor, the ceiling bit for 48th floors. When any point within that range is set as one, the corresponding floor should be set as service floor for parking. Vice versa, when any point within that range is set as zero, the corresponding floor should be set as non-service floor with no parking allowed. The non-service floor with no parking allowed can not register call. The parameter in operator is set floor by floor（one bit after another）during the actual operation. Therefore there is no need to calculate the value.

F190——service floor 4, F190 value set whether the actual floor sequence from 49th to 64th is allowed to park or not. It is 16 bit data. The bottom bit for the 49th floor, the ceiling bit for 64th floors. When any point within that range is set as one, the corresponding floor should be set as service floor for parking. Vice versa, when any point within that range is set as zero, the corresponding floor should be set as non-service floor with no parking allowed. The non-service floor with no parking allowed can not register call. The parameter in operator is set floor by floor（one bit after another）during the actual operation. Therefore there is no need to calculate the value.

★ the setting of service-floor (floor blocking) can also be controlled on group control panel within group control. The floor sequence should be arranged in accordance with the floor sequence of the whole elevator group if the group is in group control or parallel connection.

F33—— the time interval between the running testing startup and auto running. The default value is 5 seconds

F34—— the auto running times after running testing startup. The default value is 0, which means the deactivation of running testing function in elevator.

Note: The two values of F33 and F34 is set for the elevator running test. Once the F33 and F34 are set, tester can use handheld operator or control wheel to register call and the elevator will run automatically among the registered floor until the defined times set by F34

F35—— definition of firefighting switch input point and firefighting mode selection.

Among which:

Bit 0 set as 1: Schindler firefighting mode.

Bit 0 set as 0: common firefighting mode.

Bit 1 set as 1: activate firefighting switch input of car board.

Bit 1 set as 0: invalid firefighting switch input point of car board.

Bit 2 set as 1: firefighting indicator lighting mode in ShangDong Mode

Bit 2 set as 0: firefighting indicator lighting mode in common mode.

When users set the parameter F35 on the handheld operator, it will guide the users to set the parameter bit by bit instead of calculating and setting all in one time.

F36—— Band-type brake switch inspection mode. 0: no band-type brake switch inspection; 1: inspection mode outside Hong Kong region. 2: inspection at Hong Kong region.

F40—— Weighing data offset. Observe the weighing percentage value with an operator when the elevator is balance-loaded. Then set the F40 with the above value.

If such value is not set, the incorrect null position of weighing instrument will affect the startup comfort when elevator is balance-loaded.

F41—— the self-study and parameter setting. These parameters need the handheld operator to set. Only DTZZIII-DC-SC weighing instrument is valid.

F41	Description
1	No-load self-study command and the return data after the successful no-load self-study.
2	Full-load self-study command and the return data after the successful full-load self-study.
10	Activity range of weighing device sensor 0～10mm. The parameter setting of weighing device and return data after successful self-study.
20	Activity range of weighing device sensor 0～20mm. The parameter setting of weighing device and return data after successful self-study.
30	Activity range of weighing device sensor 0～30mm. The parameter setting of weighing device and return data after successful self-study.
40	Activity range of weighing device sensor 10mm～0. The parameter setting of weighing device and return data after successful self-study.
50	Activity range of weighing device sensor 20mm～0. The parameter setting of weighing device and return data after successful self-study.
60	Activity range of weighing device sensor 30mm～0. The parameter setting of weighing device and return data after successful self-study.

After inputting the corresponding self-study command, F41 will display 5 if it starts self-study, and the inputted self-study command will display after studying successfully. Otherwise, zero will display if it fail.

For self-study mode 1 and 2, it can resume only when the F41 display 6.

When conducting self-study, set the activity range of weighing instrument sensor before starting the mode 1 and mode 2 self studies.

F43—— landing call buzzing/flashing and door-closing standby option when in attendant status.

This parameter is only valid in attendant status.

Among which:

Bit0 set as 1, buzzing inside car when pressing call button

Bit0 set as 0, no buzzing inside car when pressing call button.

Bit1 set as 1, the corresponding inductor button inside car flash to the floor with call registration.

Bit1 set as 0, no flashing inductor button in car

Bit2 set as 1, door-closing and standby allowed in attendant status.

Bit2 set as 0, door-closing and standby not allowed in attendant status

Bit3 set as 1, schindler attendant mode

Bit3 set as 0, common attendant mode

When users set the parameter F43 on the handheld operator, it will guide the users to set the parameter bit by bit (function by function) instead of calculating and setting all in one time.

F44——local address of serial communication, the value of elevator running or single elevator monitoring is set to 255. If the port 485 community monitoring or port 232 remote monitoring is applied to banks, every elevator in the bank can be set one of natural number smaller than 255 for the main board identification by remote PC. Therefore every elevator in the bank can have independent setting.

F49—— Emergency leveling orientation mode,

0: judge return leveling orientation through pretorque. If the pretorque is less than 0, return leveling turns upward.

1: judge return leveling orientation through pretorque. If the pretorque is less than 0, return leveling turns downward.

2: use weighing compensation value to judge the return leveling orientation.

F50—— front door opening allowed. 1. Setting whether the floor 1-16 (floor sequence) allowed opening or not. The lowest position corresponds to the front door of the lowest floor. The highest position corresponds to the front door of 16th floor counting from the lowest floor.

F53—— rear door opening allowed. 1. Setting whether the floor 1-16 (floor sequence) allowed opening or not. The lowest position corresponds to the rear door of the lowest floor. The highest position corresponds to the rear door of 16th floor counting from the lowest floor.

F56—— Upper leveling precision adjustment

F57—— Down leveling precision adjustment

Upper leveling precision adjustment F56 and down leveling precision adjustment F57 is only aimed at the condition that the precision deviations of every floor leveling are same. The specific adjustment method as following: lower F56 for over-leveling when moving upward. Increase F56 for under-leveling when moving upward, while lower F57 for over-leveling when moving downward, increase F57 for under-leveling when moving downward. The setting scope of F56 and F57 ranges from 0 to 100. The default value is 50, which mean no leveling adjustment.

Note: both parameters F56 and F57 are the compensation adjustment for leveling precision. Common leveling precision deviation within 15mm can be adjusted with F56 and F57. If the deviation value is too large, it is recommended to adjust the items such as the leveling switch installation position, drive parameter, hoistway data-study. If the leveling precision deviation of each floor is not in conformity with each other, the installation position of leveling plate of the corresponding floor should be adjusted.

F59—— zero-speed band-type brake delay, switch on band-type brake after F59 time upon the zero

speed reached.

F61—— distance between car and destination leveling position when arrival indicator and arrival gong activated. The data can be used to adjust the time points given by arrival indicator and arrival gong. The default is 1200, which mean the two signals will be given by car at about 1.2m away from the destination floor leveling position.

F62—— time limit for anti-slippage operation, the default is 32. If the elevator fails to receive any leveling signal within 32 seconds, it will stop service, reporting fault NO 25.(the value is defined by GB7588-2003 as between 20～45 seconds)

F65—— base electrode lock mode, 0: No base electrode lock mode. 1: immediately turn off the integrated system output once it detect cutoff of output contactor

F66——Set whether with up/down governer switches, the range: 1~3;

Bit0: 0, without the hardware limit switches;
1, with the hardware limit switches;
Bit1: 0, without the software limit switches;
1, with the hardware limit switches;

- If F66=3, with both the hardware limit switches and the software limit switches, and the elevator would stop once it going upward over one of leveling switch or the up limit switch acts;
- The elevator would stop once it going downward to the bottom over one of the leveling switches or the down limit swith act;
- F66 can not modified as 0, 0 stands for without softwar limit switch or without hardward limt switch. If it is set as 0, it would become 2 automatically.

F67——Without or with extension board

F68—— Open the function of NO/NC points self-study:

Front / rear door open / close limit NO/NC point,
Front / rear door safety eage board NO/NC point,
Front / rear door light curtain NO/NC point,
Over / full / light load switch NO/NC point,
With / without door relay detect.

1) Park the elevator at the door area, ensure the door lock is closed, and there is no body or object to hinder the self-study. Triger the self-study of the swithes NO/NC point under the inspection status via the operator menu of “Debug operate” --> “input self-study”;
2) When the door lock is closed, the NO/NC points status can be self-studied, according the input point status of front / rear door open / colse limit switches and the safety eage board switch, the light curtain switch.
3) Please ensure there is no load in the elevator, after the elevator opend the door in position. The NO/NC status of the over / full / light switch is determined by the status of the over / full / light load switches; if the door lock relay acts, corresponding parameter is need to be set to detect the door lock relay.
4) After the door closed the door in position, it exit the self-study mode, and the self-study is compeleted.

F70——Light load uplink gain .Ranges from 0% to 300%. The default value is 100%.

F71——Light load lowlink gain.Ranges from 0% to 300%. The default value is 100%.

F72——Heavy load uplink gain. Ranges from 0% to 300%. The default value is 100%.

F73——Heavy load lowlink gain. Ranges from 0% to 300%. The default value is 100%.

F74——Light load height gain. Ranges from 0 to 1024. The default value is 512.

F75——Heavy load height gain. Ranges from 0 to 1024. The default value is 512.

Note 1:

The parameter F70～F75 is only valid when the F164 set as 0,3,4. Namely: the above three parameter is only used when the weighing device DTZZ-III-DC-SC or switch of light-load or full-load is used in elevator for startup preload compensation,

On detailed adjusting method of above three parameters, please take reference to the section 8, 10 of chapter 8 (the detailed introduction about adjusting method of the elevator startup pre-load compensation function).

F76——The leveling switch function

Set as 0: double leveling switches;

Set as 1: single leveling switch;

- When double leveling switches, the up / down leveling switch must be set on the input point of X1, X23, X24; when single leveling switch, the door area must be set on the input point of X1, X23, X24;
- The sigle leveling switch detect the leveling area via the door area switch;
- Simulate that the up / down leveling switch signal is given:

1) When the elevator going upward, the down leveling switch equals as the door area switch, after entering the door area and over the distance of % F82 of the elevator leveling palte, give the up leveling switch signal, until it take off the door area switch; the default value of F82 is 45%, its range: 0~100;

2) When the elevator going downward, the up leveling switch equals as the door area switch, after entering the door area and over the distance of % F83 of the elevator leveling palte, give the down leveling switch signal, until it take off the door area switch; the default value of F83 is 45%, its range: 0~100;

- Self-study:

1) For the 2 floors jobsite, the elevator at the bottom runs downward and off the leveling switches, and the 1st slow down switch acts simultaneously; the self-study would end after going upward when the leveling switches act ;

2) For the above 2 floors jobsit: the elevator at the bottom floor, the 1st slow domn switch acts, and the leveling switches act; then proceed the self-study upward, and end it after 1st slow down switch acting and leveling switch acting;

3) The length of the leveling spile equals to the position of splie off the leveling switch minus the position when entering the leveling switch, when do the up going self-studing.

The floor position = (the position when off the leveling switch + the position when splie entering the switch) / 2;

- Adjust the position: do the current position calibration after the splie off the switch, and calibration is enabled only when the error with standard program position data ＜ 200mm
- Return back leveling operation:

1) Return back leveling operation: the function of re-leveling after door open and pre-opening door are not available when there is only 1 leveling switch;

2) When the elevator stops at no door area during running, it can proceed the return back leveling nearby according to the current encode position;

3) After the elevator stops, when it escape the door area by force (after the elevator stop, the leveling swtiches act and then off) , and then the door closed, if the destination dispatch system instrution or out call exit, proceed the fast running directly; if no destination dispatch system instruction or out call exit, proceed the return back releveling; if it still not leveling in position when the elevator running distanse ＞ 1.5 times of the leveling pile length, then the elevator would stop and find the leveling position in reverse direction;

4) After the leveling switches act when return back leveling, and run the inner analog giving the up/down leveling signal, cut off the return back leveling;

5) The velocity of return back leveling: is the inspection speed when at no door area where the leveling switches are not acting; is the creep speed whitch can be set by F13, after entering the door area.

- Finding zero position operation:

1) Proceed the finding zero position opration after the elevator floor being wrong, the direction is the nearest floor position recorded befor the floor being wrong;

2) The velocity to find zero position: find zero position; after slow down switch(up or down) act, the speed of elevator decelerate to the inspection speed, then into the terminal floor creeping, delay the stop, exit the finding zero position status.

F77——The floor high position value output display code. If it's set as 1, output the floor code 10~19; if it's set as 2, output the floor code 20~29. The default value is 1.

F78——Display code output type option (0~3)

0: BCD code;
1: binary code;
2: Gray code;
3: 7 segment LED code.

Note: The set of the control circuit terminal CN4.6, CN4.7, CN4.8, CN4.9, CN4.10, CN5.1 (and the output terminal Y10, Y11, Y12, Y13, Y14, Y15, Y16) can be selected neatly, according the selection of F78. If the F78 is set as 3, it is for the 7 segment code. The low position displaying code 1, 2 ,3, 4, 5, 6, 7 is corresponding to the low position display code a, b, c, d, e, f, g.

F79——Set whether with up/down terminal switches:

Bit0: 0, without up terminal switch;
1, with up terminal switch;
Bit1: 0, without down terminal switch;
1, with down terminal switch;

- Input by the same input point, when the up and down terminal switches exits simutaneously;
- F79 to set as with down terminal switch, if up going self-study
- When set with down terminal switch, if down going slow down switch is off when up going self-studying, and the bottom terminal switch does not act, report the No. 1009 fault;
- When F79 set with up terminal switch, if up terminal switch does not act after up going self-studying, report 1009 fault;
- When the termial switches in available, ther termianl switches and the deceleration switches assembled as the elevator terminal position. When the up terminal switch and up deceleration switch act both, it stands for the up terminal position; when the bottom terminal switch and down deceleration switch act both, it stands for the bottom termial position;

- If the deceleration switch does not act at the bottom or top floor, proceed the finding zero position function;
- The soft limit switch is assembled by the terminal switch, the deceleration, and the leveling switch.When the elevator up going to the up terminal, the up deceleration switch dose not act, and the leveling spil is off the down leveling switch, it can be concluded that the elevator up going over floor, then the elevator stops and reports fault. And vice versa for down going;

F81——Serial communication function selection

F81 = 0: Group control

F82 = 1: Community monitoring

F82——The time delay of finding door area after single leveling switch upward

F83——The time delay of finding door area after single leveling switch downward

F115—— time limit for door-opening timeout. If the door-opening limit switch fail to work after the ending of time set by F115 for door opening. The elevator will stop the door-opening and turn to close the door. The default value is 15s. range from 3s～30s

F116——time limit for door-closing timeout. If the door-closing limit switch fail to work after the ending of time set by F116 for door closing. The elevator will stop the door-closing and turn to open the door. The default value is 15s. range from 3s～30s

F117——forced door closing or opening time duration. Force the door to close or open button (hold button) the door-opening will maintain for the setting time after pressing the button

F118—— the disable door-opening time duration, the door-opening time duration for the disable.

F120——Anti-nuisance function and instructions for threshold of judging anti-nuisance.

0: no anti-nuisance function. **1:** activation of anti-nuisance function in line with the action of light curtain: if the elevator park for three floors consecutively without the activation of light curtain, then the mischief can be identified. All registered instruction signal will be cleared away.

2-64: activate the anti-nuisance function based on non-empty-load switch and registered instructions. If the non-empty-load is not activated (the load in car is little, close to empty-load) but registered instructions are more than the value set by F120, mischief can be identified by the system. The entire registered instruction signal will be cleared away.

F121——activate the function of door nudging with buzzer.

0: no activation of the function, **1:** activation of the function. When the function of door nudging with buzzer activated under the circumstance of no presence of attendant, the elevator door will be closed forcibly once the door keep opening as the result of repetitive F117 time setting from door-opening button, ROHB function, light curtain action and etc. At the same time, the system will close the door forcibly while ignoring the signals from door-opening button, ROHB function, and light curtain.

F122——Running signal release delay during inspection, the delay time from the disconnection of band-type contactor output to the turnoff of frequency converter output.

F128—— control mode for front/ rear door. 0: the separate control of front door and rear door. 1: integrated control of front door and rear door.

F129—— activate the pre-opening of door and re-leveling of door opening.

The range set from 0 to 3. 0: all deactivated. 1: only activate the pre-opening of door. 2: only activate the function of re-leveling of door-opening. 3 activated both two

functions mentioned above.

F130—— holding door-opening/closing torque. 0: no torque holding. 1: door-opening torque holding, 2: door-closing torque holding, 3: door-opening/closing torque. 4: only the door-closing torque holding during operation.

F137—non service floor setting of switch control. F137 set the value from the bottom floor to the 16th floor. The bottom bit corresponds to the bottom floor. The highest bit corresponds to 16th floor.

F141—— delay release time of main contactor. The time delay range from the elimination of running signal to main contactor release while the elevator stopped. The default is 0.5s.

F145—— busbar voltage gain. If it is found during the inspection that there is error between the busbar voltage in display and that in actual inspection, set the parameter F145 to make the above two data consistent. The default is 100%, which mean no adjustment.

F146—— position deviation distance. Do inspection on the deviation of leveling position when stop the elevator. The parameter represents the allowed deviation distance.

F147—— contact inspection protection mode. 0: self-protection against fault after detecting the contacts adhesion failure. Power cutoff or inspection reset is required. 1: stop the elevator when detecting contact adhesion and keep running after the troubleshooting.

F152—— the delay time of auto shutdown of in-car lighting and fan. The system will automatically shut down the in-car lighting and fan when idle time of elevator in automatic mode reach the value set by the parameter. The default value is 3 minutes.

F153—— high-voltage input detection with or without hall door lock

1: high-voltage input detection with hall door lock.

0: high-voltage input detection without hall door lock.

The default value is 1.

F156—— detection on existence of door lock relay. 1: yes, 0: no

F160—— activation/deactivation of manually clearing away error instruction .

1: activation, 2: deactivation. When such function is activated, the wrong instruction signal can be cleared away by pressing the button twice once the wrong instruction signal is registered.

F161—— activation/deactivation of time slot floor blockade

1: activation, 0: deactivation.

F163—— the elevator continue to run or stop after homing while the signal or parallel backup power supply is running. 0: the elevator stops after homing while backup power supply is running.1: the elevator continues to run after homing while the backup power supply is running.

F164—— load-weighing instrument type, the acquisition method of weighing signal and compensation signal. The following table gives a list of corresponding load-weighing instrument type, the acquisition method of different weighing signal and compensation signal with difference F164 parameter.

F164 setting value	Load-weighing instrument modle	Signal acquisition method of light-load, heavy-load, full-load, over-load	Acquisition method of compensation signal
0	DTZZ-III-DC-SC	Switch signal input to car ceiling board	Input load-weighing instrument signal through CAN, Then calculate the final compensation value based on the weighing instrument signal, F193,F194,F195
1	DTZZ-II	Input the load-weighing instrument signal	Input the load-weighing instrument signal

F164 setting value	Load-weighing instrument modle	Signal acquisition method of light-load, heavy-load, full-load, over-load	Acquisition method of compensation signal
		through CAN, then calculate based on the weighing instrument signal.	through CAN
2	DTZZ-II	Switch signal input to car ceiling board	Input the load-weighing instrument signal through CAN
3	DTZZ-III-DC-SC	Input the load-weighing instrument signal through CAN, then calculate based on the weighing instrument signal	Input load-weighing instrument signal through CAN, Then calculate the final compensation value based on the weighing instrument signal, F193,F194,F195
4	none	Switch signal input to car ceiling board	Calculated the weighing compensation value of light-load and heavy-load based on the light-load or heavy-load switch signal as well as F193, F194, F195. meanwhile, F40 set as 50%
5		Switch signal input to car ceiling board	Input weighing instrument signal through analog quantity.
6		Input the weighing instrument signal through analog quantity. And calculate based on the weighing instrument signal	Input weighing instrument signal through analog quantity.
99		Switch signal input to car ceiling board	None.

Note 1:

When F164 is 0～3 , the load-weighing device is model DTZZ-III-DC-SC or DTZZ-II specialized for STEP corporation. The weighing signal is transmitted to main board through CAN. When F164 is 4, the elevator is without electronic weighing device but mechanic weighing switch. When F164 is 5 and 6, the elevator weighing device is other type device. The weighing signal is transmitted into analog quantity input port through analog quantity of DC 0～10V.

Note 2:

When F164 is 0,2,4,,5, the over-load, full-load, light-load switch signal is acquired through inputted switching value signal. When F164 is 1,3,6, the over-load, full-load, light-load switch signal is calculated based on inputted weighing signals.

Note 3:

When F164 is 0 and 3, the pre-load compensation value at startup is calculated based on the data of weighing signal plus that of linear correction results of F193,F194,F195 .When F164 is 4, make sure the car loading condition based on light-load or heavy load switch signal before doing else. Then, calculate the pre-load weighing compensation value of light-load and heavy-load based on the parameters F193,F194,F195. When F164 is 1,2,5 and 6, use the weighing data obtained from weighing device as the pre-loading weighing compensation value.

F165—— special control parameters for door operation. Bit 0: door operation allowed or not in inspection. Bit1: door-opening allowed or not during the period of adjustment and setting. Bit2: elevator standby with/without door-opening. Bit 3: door operation with or without onboard LED operator.

F175—— creeping speed at startup. For the comfort adjustment at startup
When starting resistance of tractor is too much, the tractor will be adjusted appropriately to the startup creeping speed. When creep speed at startup is set as 0. it is in no use. This value should be used together with that of startup creeping duration F186.

F180—— speed gain. Gain for the speed given peak. The range is from 0.0% to 110.0%

The default value is 1000. (Reading as 100.0%)

F181—— mutual parallel mode (F23=3) of elevator number setting. The range is 0～1, the main elevator setting is 0. The auxiliary elevator is 1.

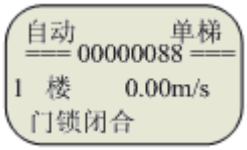
F182—— the installation series of deceleration switch at hoistway.(Equal to the half deceleration switch number) Setting 0 represent the deceleration switch series based on rated speed (see table 4.1)

F183—— setting the running speed during the hositway self-study.

F186—— creeping duration at startup, for adjusting the startup comfort. It can be used together with startup creeping speed F175.

F187—— Monitoring items

The display position of running times in the main interface of operator can be set by F187 to show various kinds of monitoring items. Take the 00000088 in the following figure as example.



F187 set as 0: to display the running times of elevator

F187 set as 1: to display the interference evaluation. The meaning of the counting is to record the interference situation of last time running.

The number can be updated only when the elevator stop. If there is no-interference, the number should be 0. When the counting reaches 1000 great interference from encoder should be identified. There is need to test the interference situation of encoder.

F187 set as 2: to display the fault counter of CAN1(the CAN communication between hoistway and car). The meaning of this counter: if the CAN communication is ok, the value should be 0.If the counting reach 96, big problem for communication should be identified. It is necessary to check the communication line.

F187 set as 3: to display the fault counter of CAN2 (the CAN communication in group control or parallel connection). The meaning of this counter: if the CAN communication is ok, the value should be 0.If the counting reach 96, big problem for communication should be identified. It is necessary to check the communication line.

F187 set as 4: to display the running speed of motor. The unit is rpm

F187 set as 5: to display the voltage of busbar. The unit is V

F187 set as 6: to display the output current, the unit is 0．01A

F187 set as 7: to display the output torque, the unit is ‰ (rated load)

F187 set as 11: to display the pre-torque, the unit is ‰ (rated load)

F187 set as 14: to display the weighing value.

F196—— 2nd homing base station when in parallel connection

F200—— frequency converter version number. It is the default read-only data.

F201—— frequency converter control mode.

If need to motify, first set F244=2345, then set F201. After powering-down and powering-up again, F201 is 3 automaticly.

0: none- speed sensor V/f control mode.

1: none-speed sensor vector control mode. 2: speed sensor torque control mode. 3: speed sensor vector control mode. The default is 3. The speed sensor vector control mode is usually adopted in formal use. Therefore the default parameter is 3. However, the parameter can be set as 0 for time being to run the frequency converter in open loop V/F control mode at some adjusting &setting situation so that the car can be moved before the encoder installed.

Please note: before preparing hoist way self-study, it is necessary to install the encoder, complete the wiring, and reset the F201 to 3.

F202—— motor type selection. 0: asynchronous, 1: synchronous

F203—— motor rated power, the unit is KW, set in accordance with nameplate

F204—— motor rated current, the unit is A , set in accordance with nameplate

F205—— motor rated frequency, the unit is Hz, set in accordance with nameplate

F206—— motor rated revolution, the unit is rpm. Set in accordance with nameplate

F207—— motor rated voltage, the unit is V. Set in accordance with nameplate.

F208—— motor poles number, set in accordance with nameplate. If no poles number is shown on the nameplate, please take reference to the following formula.

The NO. of poles=（120×f）÷n. In the formula: n—rated revolution; f –rated frequency. For the calculated result, the even-integral number is adopted as poles number.

F209——motor rated slip frequency. The unit is Hz. Only be effective for asynchronous motor. Set in accordance with nameplate. If the rated slip frequency is not shown on the nameplate, please take reference to the following formula for F209 setting value.

Rated frequency—F (F205), Rated revolution—N (F206), motor poles No. (F208)

Slip frequency= f—（（n×p）÷120）。

For example: the rated frequency-50Hz, the rated revolution-1430rpm, the motor pole No-4

F209 setting value= 50—（（1430×4）÷120）＝2.33Hz

F210——encoder type. 0: increment encoder, 1: sin/cos encoder. 2: Endat encoder

F211——encoder pulse No. Per circle . The unit is Ppr

F212——Zero speed PID adjustor incremental P0

F213——Zero speed PID adjustor integral I0

F214——Zero speed PID adjustor differential D0

F215——low speed PID adjustor incremental P1

F216——low speed PID adjustor integral I1

F217——low speed PID adjustor differential D1

F218——medium speed PID adjustor incremental P2

F219——medium speed PID adjustor integral I2

F220——medium speed PID adjustor differential D2

F221——high speed PID adjustor incremental P3

F222——high speed PID adjustor integral I3

F223——high speed PID adjustor differential D3

F224——low speed point switch frequency F0.Setting the phased low speed point switch frequency value of the PID adjustor, it is set in accordance with percentage of rated frequency. If the rated frequency is 50Hz, the required switch frequency F0 is 10Hz. Since 10 Hz is 20% of 50Hz, the value should be set as 20.

F225——high speed point switch frequency F1. Setting the phased high speed point switch frequency value of the PID adjustor, it is set in accordance with percentage of rated frequency. If the rated frequency is 50Hz, the required switch frequency F1 is 40Hz. Since 40Hz is 80% of 50Hz, the value should be set as 80.

F212～F225 : The role of proportional constant P of PID adjustor: the increase in P value will improve the system response speed. But too big the P value will cause the overstrike and oscillation. The effect of P value upon the feedback is as the following Fig 7.1. The integral constant I value affect the response time. The bigger value I is, the faster speed is.

Once users find the system overstrike is too big or dynamic response too slow, properly increase the value I. But once the value I is too big, system oscillation may occur. The effect of value I upon the feedback is as the following Fig 7.2. Differential constant D affects the sensitiveness of system response. The increase in D value makes the system response quick.

But once the value D is too big, system oscillation may occur.

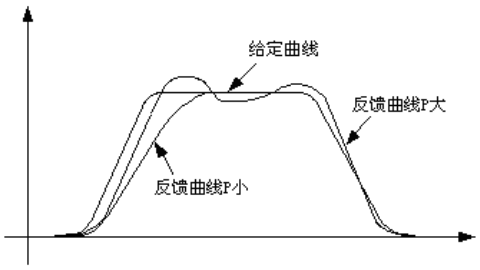


Fig 7.1 effect of proportional Constant upon feedback

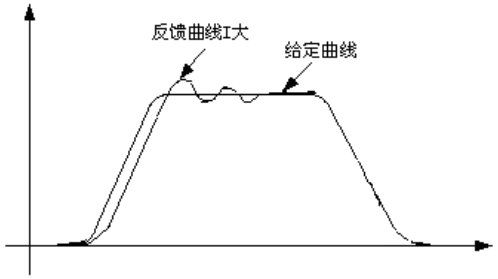


Fig 7.2 effect of integral constant I upon feedback

During the PID constant adjustment, usually the proportional constant P should be adjusted firstly. Increase the value P as big as possible under the precondition of guaranteeing system stability. Then adjust the integral constant I to make the system both response quickly and overstrike not much. The differential constant D can be adjusted properly under the precondition of adjustment of P and I still not enough for the improvement of system sensitiveness.

The effect scope of PID adjustor of various speed is shown as following fig 7.3

F226—— zero servo action time adjustment parameter. The zero servos is that the Frequency converter output a phase of zero speed torque holding during the Period from the end of excitation to given speed. The parameter determine Action time of three zero servos PID parameter of F212、F213 and F214 The action time of zero servos is as following figure 7.4

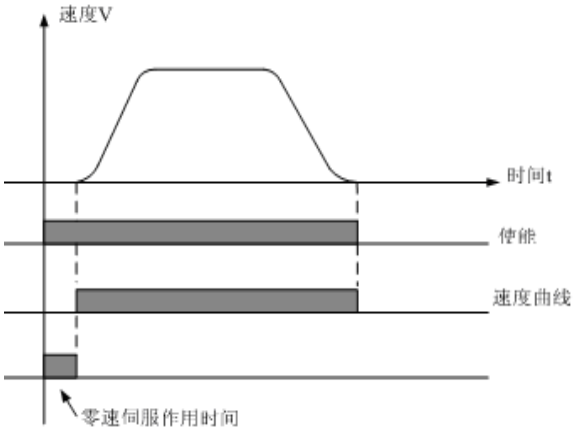
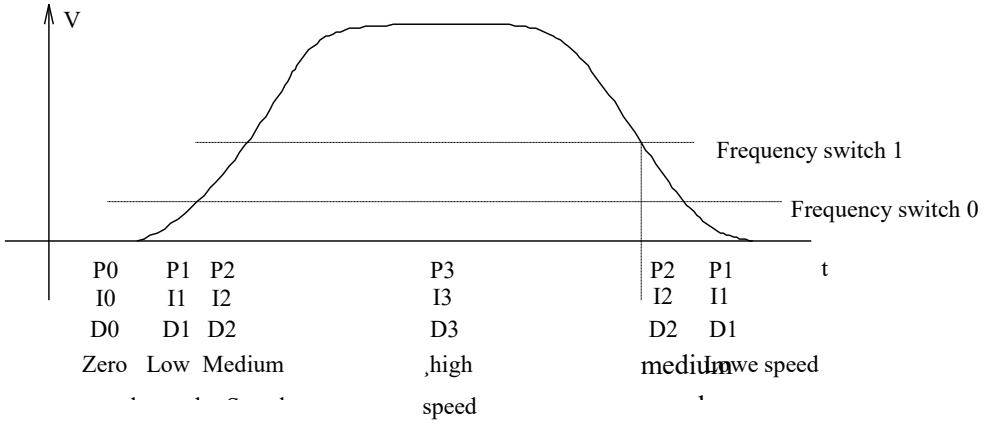


Fig 7.4 the action time of zero servos



F227—— band-type brake action time, it is the adjustable parameter for band-type brake mechanic release time. The parameter is set in accordance with the actual band-type brake mechanic release time.

F228—— time parameter of current slowdown . The parameter F228 set the current slowdown time period from frequency converter receiving stop-output command to actual zero output current. The default value is 0. Only under the some special circumstance, the rapid current release of frequency converter will cause big noise to motor as the elevator stop. Therefore, appropriately increase the value should be necessary. But the value should increase no bigger than the delay time of main contactor release. Otherwise, the contactor live release will cause contacts pull arc and affect the service life of contactor as the result. The frequency converter will not output any current since the loop disconnect after contactor release.

F229——compensation torque direction adjustment parameter. The parameter work when there is startup pre-load compensation function. The default value is 0. But if the system torque compensation direction is wrong as the result of other reasons, simply set the F229 value from 0 to 1 to solve the problem.

F230—— compensation torque gain. The frequency convertor calculate the actual torque compensation value on the basis of the compensation value given by the control system and also increased/decreased by the F230 parameter gain, when there is startup pre-load compensation function.(when F230 bigger than 100 is referred to as increase. When

F230 smaller than 100 is referred to as decrease.) . Set the parameter in accordance with the following principle. If the compensation is not enough, the value increase is required. When the compensation is too much, the value decrease is required. The insufficient compensation refer to the phenomenon of full-load downward impact（slippage when upward, acceleration when downward ） and the light-load upward impact (slippage when downward, acceleration when upward). The overcompensation refer to the phenomenon of full-load upward impact (slippage when downward, acceleration when upward) and light-load downward impact (slippage when upward, acceleration when downward)

F231—— compensation torque offset. The parameter work when there is startup pre-load compensation function. The parameter is set in the following way.
When car and counterweight reach complete balance, the inspection speed is set as 0. Meanwhile, the car should remain still while handling the elevator inspection operation. If the car is active, the parameter should be set until the car reach complete still while doing the inspection operation.

F232—— encoder feedback signal filtering time parameter. The default value is 0. Only when on-site interference is very serious, properly expansion the filtering duration will increase the anti-interference capacity of the system.

F233—— encoder feedback direction. 0: negative sequence. 1: positive sequence. The default value is 1. Under the normal circumstance, there is no need to change the value. But if the feedback direction is directly opposite to the actual direction due to the wrong encoder wiring, set the parameter F233 to adjust it.

F234—— motor phase sequence, the default value is 1. but if it is found that the rotating direction of motor is directly opposite to the required rotating direction, set the parameter F234 from 1 to 0 to reverse the direction of motor.

F235—— motor none-load current parameter, set the proportion value of tractor non-load current in term of rated current . The default value is 32%. Under the normal circumstance, there is no need to change the value.

F236—— PWM carrier frequency. The higher the carrier frequency is, the smaller the noise of the motor is, the more the lost will be. Under the normal circumstance, there is no need to change the setting, just use the default value (6KHz). Since the increase in the carrier frequency will aggravate the waste of frequency converter, so if there is on-site need to reduce the motor noise by increasing the carrier frequency and the increased carrier frequency exceed the default value, the frequency converter need to be derated by 5% for every 1KHz increase.

F237—— PWM carrier frequency width. Under the normal circumstance, users only need to operate with the default value. To change automatically the carrier frequency within the width range so as to reduce the motor noise in some situation. For example, the setting value of F236 is 6KHz, the setting value of F237 is 0.4KHz. the actual carrier frequency of frequency converter change automatically within the scope of 5.8～6.2KHz

F238—— adjustor mode. Generally the default value is 1. The standard adjustor mode

F239—— output torque limit. It set the limit value of output torque. It is percentage data of rated torque. the default value is 175（175％）

F240—— rated voltage of frequency converter. Setting the output voltage of frequency converter

F241—— rated power of frequency converter. It is default value. for the reference only, Modification not allowed.

F242—— phase angle of encoder. It is the encoder phase angle data automatically acquired by the system. For the reference only

F243—— zero position correction of encoder. 0: regular mode. 2: encoder zero position correction. When the operation inspections are ok, synchronize the elevator to do the encoder zero-position correction to realize the better control precision. The specific method as follow: at first, set the inspection speed to 4 rpm. Then set the F243 to 2. Press up-down button to run the elevator at low speed for 30 seconds. And then the integrated control will stop. The F243 turn to 0 and the encoder zero-position correction completed.

6 Fault Analysis

6.1 Control System Self-Learning Fault Code

Table 6.1 Control System Self-Learning Fault Code Table

Code	Description	Sub Code	Fault Cause Analysis
10	Dislocation of upward deceleration switch 1	01	Lost upward deceleration switch 1; Upward deceleration switch 1 have not been learn.
		02	Upward deceleration switch 1 is too short from the terminal station; When the level of deceleration switch is higher than 1; The action position of upward deceleration switch 1 is higher than 3/5 top floor position height; Or, The action position of upward deceleration switch 1 is higher than the shortest deceleration distance.
		09	Up terminal station switch haven't been learn.
11	Dislocation of downward deceleration switch 1	01	Lost downward deceleration switch 1; Downward deceleration switch 1 have not been learn when Downward deceleration switch 1 and higher lever switches act.
		02	Downward deceleration switch 1 is too short from the terminal station; When the level of deceleration switch is higher than 1; The action position of downward deceleration switch 1 is lower than 3/5 bottom floor position height; Or, The action position of downward deceleration switch 1 is lower than the shortest deceleration distance.
		09	Down terminal station switch haven't been learn.
27	Up leveling switches haven't been detected.	01	Row on the elevator, the flat during the switch OFF on flat layer switch did not change. When the elevator go upstairs, and down leveling switch is OFF, up leveling switch did not change.
28	Down leveling switches haven't been detected.	01	Row on the elevator, the flat during the switch OFF on flat layer switch did not change. When the elevator go upstairs, and down leveling switch is OFF, up leveling switch did not change.
68	The combination of the length of the self study leveling spile and the distance between the leveling switches does not meet the requirements	01	When the elevator go upwars, and the two leveling switches both have not being detected, Class 1 downward deceleration switch turns from ON to OFF, and the 2 leveling switches both have not change.
		02	Leveling switch connected reversely, the state of uperword/downward leveling switch turn from ON/ON to OFF/ON. When that happens,it is judged to be leveling swith have being connected reversely.
		03	The leveling spile is too long. Algthm: (length of the leveling spile + leveling switch space)/2 greater than 900mm.
		04	The leveling spile is too short. Algorithm: (length of the leveling spile + leveling switch space)/2 less than 100mm.
		05	The leveling area is too long. Algorithm: (length of the leveling spile - leveling switch space)/2 greater than 100mm.
		06	The leveling area is too short. Algorithm: (length of the leveling spile - leveling switch space)/2 less than 100mm.
69	The inconsistency of the number of self study spiles and the total storey number of the elevator and the number of the floor bias	01	It is inconsistency of the self learning floor and the floor set by parameter
		02	The height of storey is too long, and greater than 8m.

Other Control System Fault Code are as follows:

Table 6.2 Other Control System Fault Code Table

Code	Description	Sub Code	Fault Cause Analysis
02	Door lock disengagement during operation (emergency stop)	01	Safety loop during operation without door lock high pressure point
		02	Safety loop during operation without door lock low pressure point
03	Elevator overtravels when going upwards	01	In automatic operation, the upper and lower limit switches are in action at the same time and the elevator is not at the highest level
		03	In upward operation, the elevator crosses the top level
04	Elevator overtravels when going downwards	01	In automatic operation, the upper and lower limit switches are in action at the same time and the elevator is not at the lowest level
		03	In downward operation, the elevator crosses the bottom level
05	Door lock will not open	01	Door fails to open in position after the door-open signal outputs for consecutive 15 seconds, reports failure for 3 times
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 close button flashing after fault protection
		02	Inconsistence for 4 seconds between door-close limit and door lock determines time-out for door close. Failure reported after 8 inconsistencies. The close button flashing after fault protection. The door lock anti-shake parameter is added into door keeping close parameter(F130),whitch keeping output after the door closed for 0.5s.
10	Dislocation of upward deceleration switch 1	03	Check during operation: the acting position of the upward deceleration switch on the single floor is 100mm lower than the position of the upward deceleration switch on the single floor when shaft learning.
		04	Check during operation: the acting position of the upward deceleration switch on the single floor is 150mm higher than the position of the upward deceleration switch on the single floor when shaft learning.
		05	Check during stop: the acting position of the upward deceleration switch on the single floor is 100mm lower than the position of the upward deceleration switch on the single floor when shaft learning.
		06	Check during stop: the acting position of the upward deceleration switch on the single floor is 150mm higher than the position of the upward deceleration switch on the single floor when shaft learning.
		07	In automatic operation, the upper and lower limit switches are in action at the same time and the elevator is not at the top floor
		08	The elevator is at the top floor, but upward deceleration Switch 1 is acting.
11	Dislocation of downward deceleration switch 1	03	Check during operation: the acting position of the downward deceleration switch on the single floor is 100mm higher than the position of the downward deceleration switch on the single floor when shaft learning.
		04	Check during operation: the acting position of the downward deceleration switch on the single floor is 150mm lower than the position of the downward deceleration switch on the single floor when shaft learning.
		05	Check during stop: the acting position of the downward deceleration switch on the single floor is 100mm higer than the position of the downward deceleration switch on the single floor when shaft learning.
		06	Check during stop: the acting position of the downward deceleration switch on the single floor is 150mm lower than the position of the downward deceleration switch on the single floor when shaft learning.
		07	In automatic operation, the upper and lower limit switches are in action at the same time and the elevator is not at the bottom floor
		08	The elevator is at the bottom floor, but bottom deceleration Switch 1 is not acting.
19	Door open/close fault	01	At automatic mode, during the elevator stopped, the door open limit

Code	Description	Sub Code	Fault Cause Analysis
			switch and the door close limit switch act at the same time with time-out for 1.5s
20	Slip protection	01	The leveling switch dose not act for over the time set in F62 (anti-slip time) during operation(except for maintenance).
		02	There are 3 kinds of speed during elevator run at low speed: The maintenance Speed V1 set by parameters; The calculated speed V2 by length of the leveling spile and leveling switch length; The calculated speed V3 by the maximum storey distance and anti-slip time. When ALP re-leveling, execute protection by the calculated result as the maximum storey distance divided by the minimum value of V1, V2, and V3, then plus 2s.
21	Motor overheating	01	Input signal at motor overheating point
22	Motor run reversely	01	Skid for consecutive 0.5 seconds (upward speed feedback<-150mm, downward speed feedback>150mm)
23	Elevator overspeed fault	01	When speed feedback value is less than allowable speed for 0.1 seconds, protect as 0.2s; when speed feedback value is greater than allowable speed for 0.1 seconds, protect as 0.1s. When the given speed is less than 1m / s, allowable speed = given speed + 0.25 m / s. When the given speed is greater than 1m / s, allowable speed = given speed * 1.25. The maximum permissible speed < rated speed *108%. When terminal level runs at a decelerating speed of 0.8m/s^2, Failure 23 reported when speed feedback value is greater than allowable speed for 0.1 seconds.
24	Elevator over-low speed fault	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	Sensor failure for upper leveling floor	02	After high-speed operation stops, the sensor for upper leveling floor dose not act.
		03	The upper leveling sensor acting distance is greater than the maximum effective protection distance. When the length of the leveling spile is less than 300mm: the maximum protection distance for effective action = 300mm*4 When the length of the leveling spile is greater than 300mm: the maximum protection distance for effective action = the length of the leveling spile*4.
		04	The distance of the uperward leveling sensor not acting is greater than the maximum protection distance for invalid action. When the top floor is less than 3: the maximum protection distance for invalid action = maximum storey height*1.5 When the top floor is greater than 3: the maximum protection distance for invalid action = maximum storey height*2.5
		05	After the elevator go uperward crosses over the top level, when re-leveling , and downward leveling switch turns from OFF to ON, the upward leveling switch dose not act.
28	Sensor failure for lower leveling floor	02	The sensor for lower leveling floor dose not act, after the elevator whitch run at a high speed stopped.
		03	The downward leveling sensor acting distance is greater than the maximum effective protection distance. When the length of the leveling spile is less than 300mm, the maximum protection distance for effective action = 300mm*4 When the length of the leveling spile is greater than 300mm: the maximum protection distance for effective action = the length of the leveling spile*4.
		04	The distance of downward leveling sensor not acting is greater than the

Code	Description	Sub Code	Fault Cause Analysis
			maximum protection distance for invalid action. When the top floor is less than 3: the maximum protection distance for invalid action = maximum storey height*1.5 When the top floor is greater than 3: the maximum protection distance for invalid action = maximum storey height*2.5
		05	After the elevator go downward crosses over the bottom level, when re-leveling , and upward leveling switch turns from OFF to ON, the downward leveling switch dose not act.
30	Leveling position error is too large	01	Detect the leveling position error when elevator stops. This failure report when the error detected is greater than the value set by F146.
32	Safety loop disconnected in operation	01	Safety loop high pressure point disconnected in operation.
		02	Safety loop low pressure point disconnected in operation.
35	Brake contactor contact fault	01	The brake contactor adheres
		02	The brake contactor does not suck
		03	The detection Connection of the brake contactor is broken
		04	The detection Connection of the brake contactor is short met
36	Output contactor contact fault	01	Motherboard has no drive signal on circuit contactor, but input signal is detected at input testing point (adhesion failure)
		02	Motherboard has drive signal on circuit contactor, but input signal is not detected at input testing point (non-adhesion failure)
37	Door-lock contactor contact fault	01	Door lock contactor adhesion failure, without door lock high voltage detection point, and with low voltage detection point.
		02	Door-lock close signal input exists when the door-open limit signal is in action
		03	Hall door lock contactor adhesion failure, without door lock high voltage detection point, and with low voltage detection point.
38	Brake switch malfunction	01	The brake switch adhered or its connection was short met
		02	The brake contactor does not suck or its connection is broken.
40	Run signal failure	01	The control part of the AIO sends out run signal, but the run signal feedback from the drive part has not being received.
		02	The running signal of the inventer lose, while the elevator running.
42	Deceleration switching error	01	Overtravel in upward movement and the lower level forces slow open/close, or overtravel in downward movement and the upper level forces slow open/close
45	Pre-opening relay detection fault	01	It's inconsistent between the output of the pre-opening relay and the input of the pre-opening detection for over 0.5s, and the relay adhere without output but with input
		02	The relay dose not suck with output but without input
49	Communication failure	01	Communications fault in drive part and control part
50	Parameter read error	01	Parameter read error
		02	The limit position parameter was wrongly set: 1)There is only one leveling switch ,but which has being set without position limit(F66=0); 2)F66=1, but the upward and downward limit position switch portshave not been defined.
		03	Leveling switch set error: 1) F76=0, and there are 2 leveling switches but the port of upward and downward limit position switches have not been defined. 2) F76=1, there is only 1 leveling switch, but the port of door area switch has not been defined, or the the port of door area switch have not been defined into high speed input port (X1, X23, X24).
		04	Terminal station switch set error.
54	Inconsistent fault of the door locks	01	The general door lock has input, but the hall door lock hasn't input.
		02	The general door lock hasn't input, but the hall door lock has input.
60	Base closure failure	01	In operation, the output contactor contact is detected disconnected, turn off the output of the AIO and report Failure 60
61	Start signal failure	01	After the brake is opened, no zero servo terminal signal is received returning from the drive part.

Code	Description	Sub Code	Fault Cause Analysis
62	No speed output	01	After start, the elevator maintains the speed at 0, and the elevator does not move.

6.2 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 low speed (in constant speed)	Load mutation during operation	Reduce the mutation frequency and magnitude of the load
		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

Code	Fault Description	Possible Cause	Solution
		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
		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	Incoming voltage is too high	Check whether incoming line voltage matches converter

Code	Fault Description	Possible Cause	Solution
	over-voltage	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
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	Driver board hardware	Ask professional technical personnel for ispection

Code	Fault Description	Possible Cause	Solution
	fault	failure	
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

7 User Guidance of Seven-Segment Code Display Manipulator

See the appearance and meaning of the Seven-Segment Code Display Manipulator as shown in diagram 7.1, and detailed descriptions for the functions of the operation keys in Table 7.2.

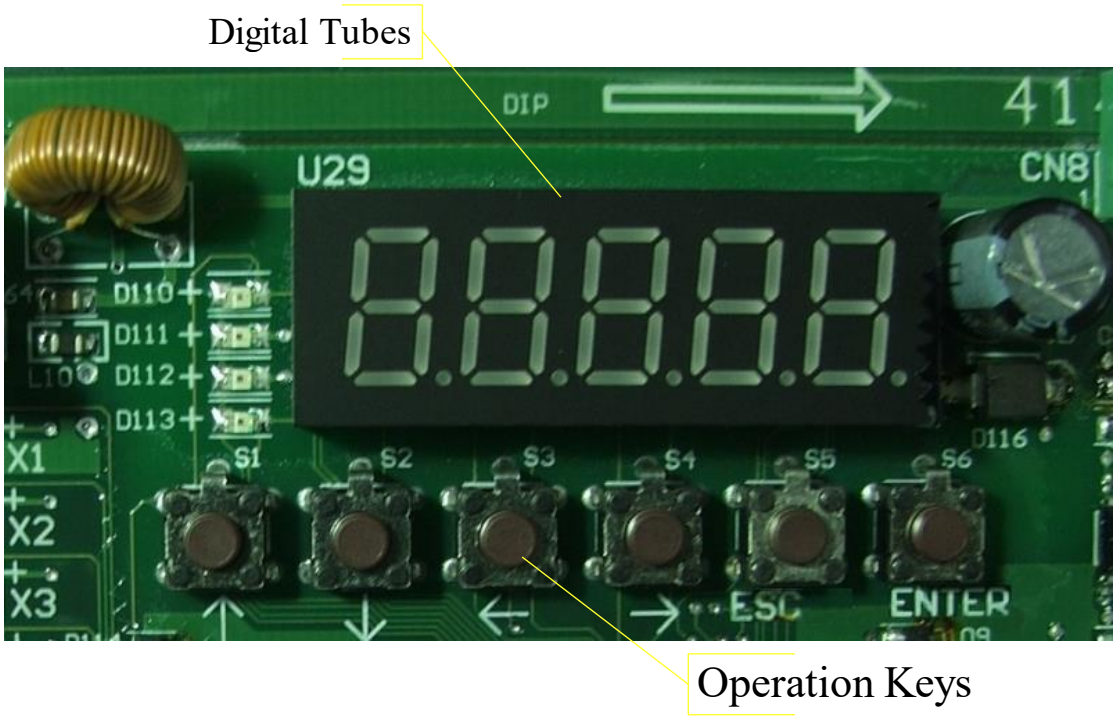


Diagram7.1 Meaning of Seven-Segment Code Display Manipulator

7.1 LED Indicator Light

Seven-Segment Code Display Manipulator has 4 LED Indicator Lights on its left. See Table7.1 for the meanings of the 4 lights.

Table8.1 Meanings of D110～D113

Code	Meaning
D110	When the safety loop conducts, this light turn bright; When the safety loop is broken, this light turn dark.
D111	State flashing light,when in normal state, flashes rapidly; when in self-study state, flashes at medium speed; when in fault state, falshes slowly.
D112	Tuns bright when the general door lock high presure loop conducts; Turns dark when the general door lock high presure loop disconnected.
D113	Tuns bright when the hall door lock high presure loop conducts; Turns dark when the hall door lock high presure loop disconnected.

7.2 Function Keys

There are 9 keys at the bottom of Manipulator. See Table 7.2 for their functions.

Table7.2 Key Function Description

Button	Name of Button	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.
<	Leftward button	1. One item leftward when selecting functions; 2. Cursor moves leftward when inputting data.
>	Rightward button	1. One item rightward when selecting functions; 2. Cursor moves rightward when inputting data.
ESC	Esc button	Cancel input
ENTER	MENU button	1. Modify parameters when browsing them 2. Save while entering data

7.3 Operation of Manipulator

7.3.1 Menu Structure

See Diagram 7.2 for the main menu structure. Due to the limitation of the seven-segment code and button structure, the operational interface usually uses the first level menu structure. Press the "left"and" right"key to switch between various menus.

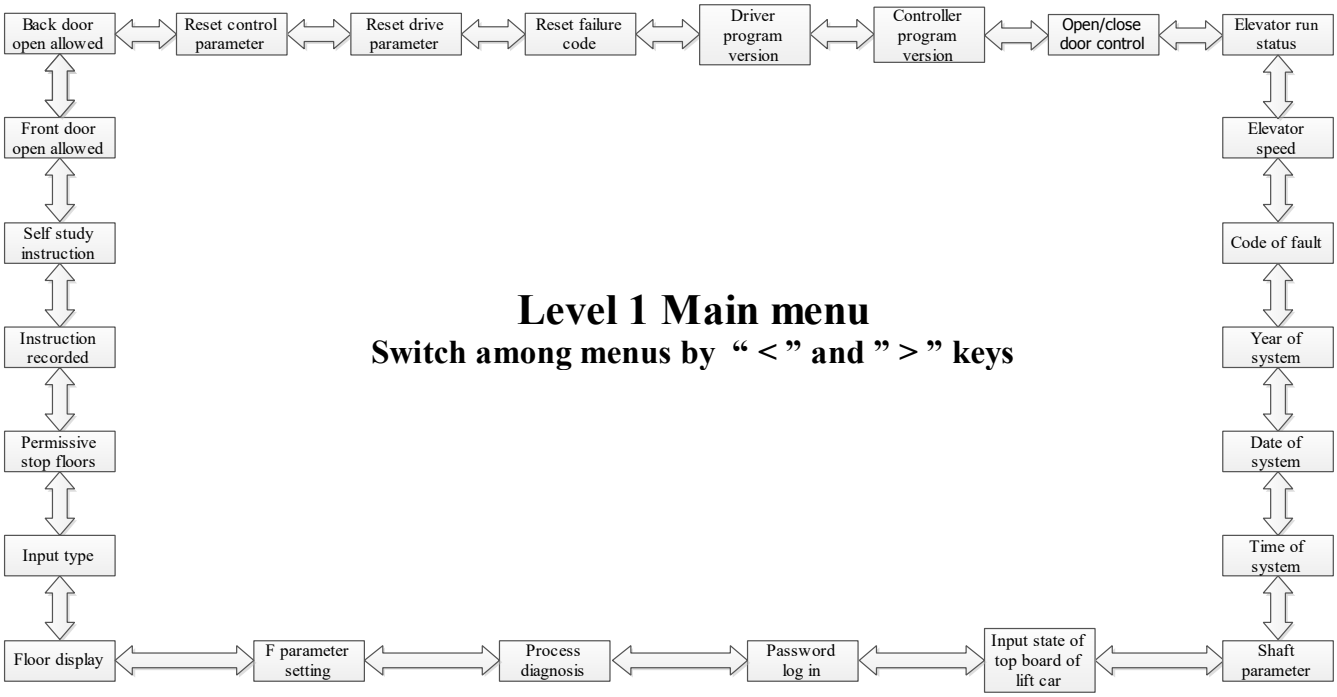
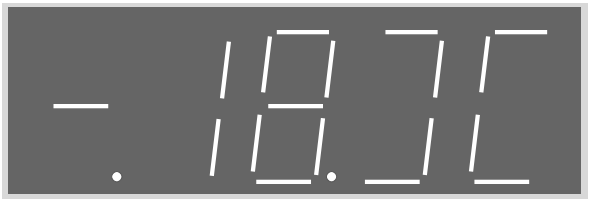


Diagram 7.2 Menu Structure

7.3.2 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 when power on each time. Detailed descriptions of each menu are as follows:

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



State of Door
Floor Located
Running State

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

In the state of door:

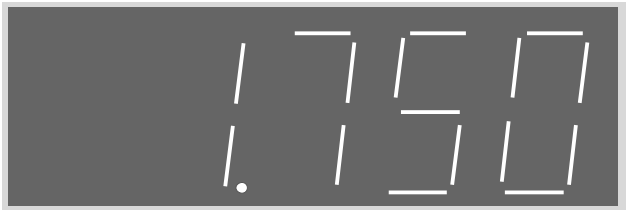

Door opening,

Door opened in position,


Door closing,

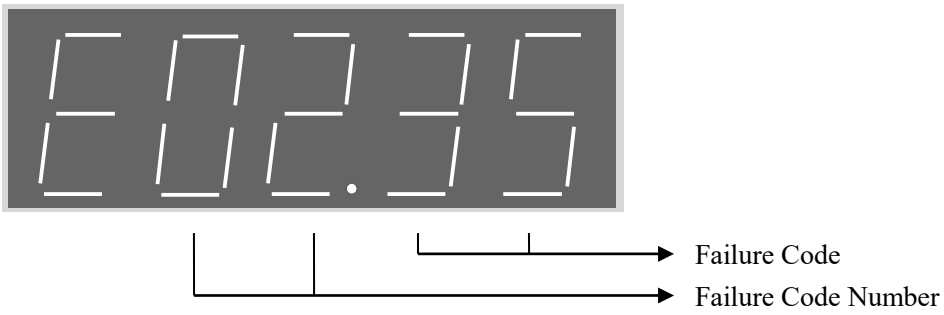
Door closed in position.

2. Speed of Elevator



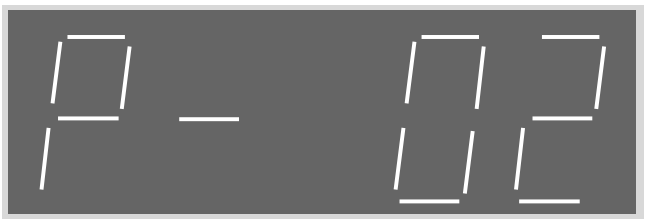
This menu displays the current running speed of the elevator, unit: m/s. As shown in the figure above, the current speed is 1.75m/s。

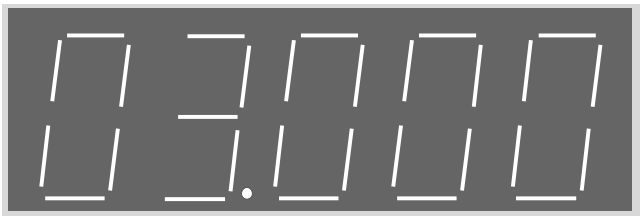
3. Failure Code



The AIO may staore 20 failure codes. The latest 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 shaft and the length of the leveling spiles, distance of the leveling switch and the position of the deceleration switch.

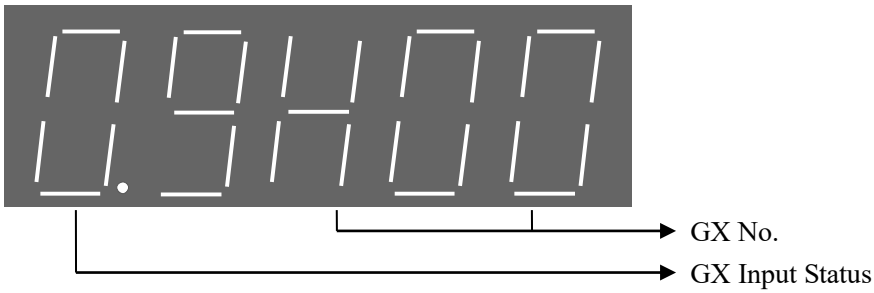
Specific operation is as follows: use the "up" and "down" keys to view the parameters. Such as P02, "P-02"appears on the screen as shown above, wait a second, the screen shows the P02 parameter is 03.000, as shown above, you will see "03.000". Afterwards, "P-02" and "03.000" display alternately, each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

Table 7.3 Meaning of Shaft Parameters

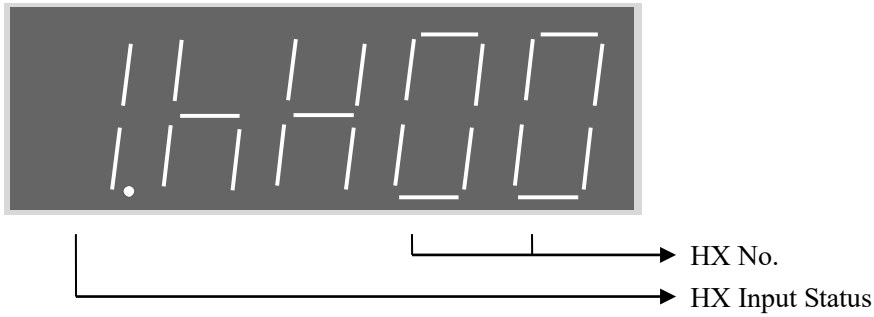
No.	Meaning
P01-P64	Shaft data from 1st -64th floor
P65	Leveling plug-in board length
P66	Leveling switch center distance
P67	Upper deceleration switch distance on 1st floor

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

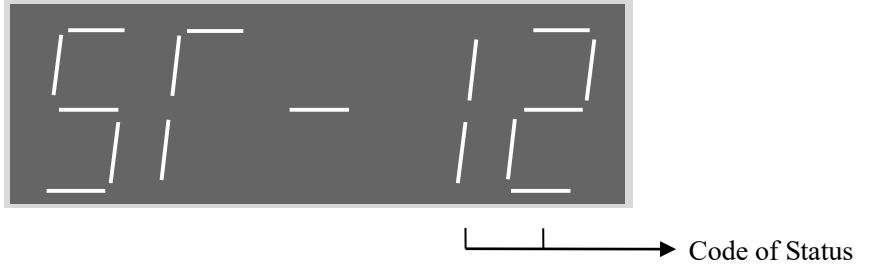


The figure above means: GX0 has no input. Press "up" and "down" keys to select GX serial number from 0 to 15. After the GX matching numbers is selected, the highest level shows that the input has no valid input (0 for invalid input, 1 for valid input).



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 invalid input, 1 for valid input).

6. Process Diagnosis



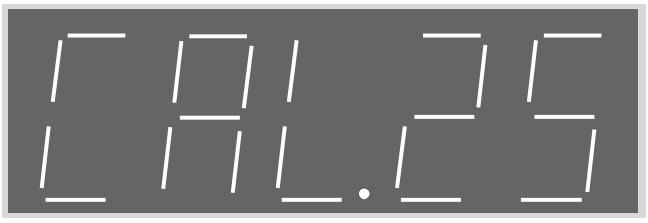
This menu displays the current status of the elevator by a two-digit number. The meaning of the

status code is as follows

Table 7.4 Meaning of Status Code

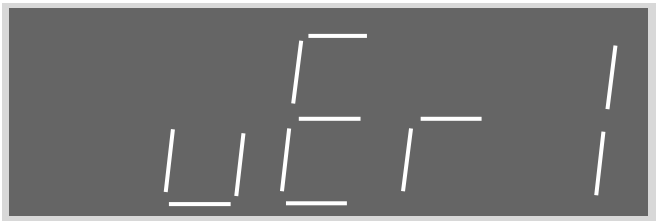
No.	Description
0	Safety loop disconnected
1	Elevator breakdown
2	Motor overheating
3	Overload
4	Safety edge motion
5	Door opening button motion (door opening button or external call button motion on the same floor in the same direction)
6	Door lock short circuit/door opening limit motion
7	Elevator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

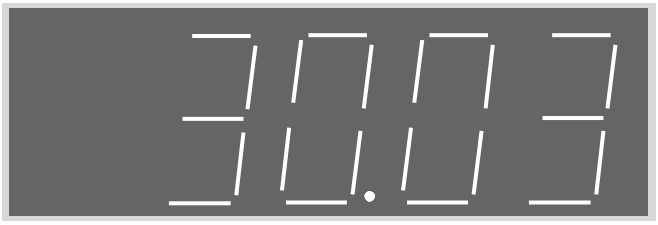
7. Command Registration



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

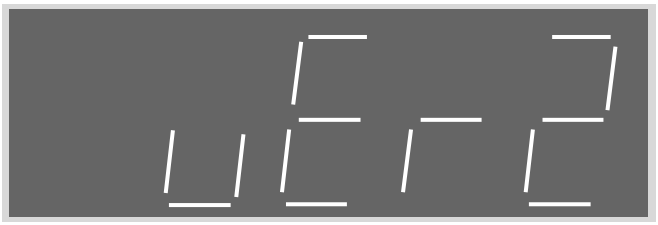
8. Version of Driver Program

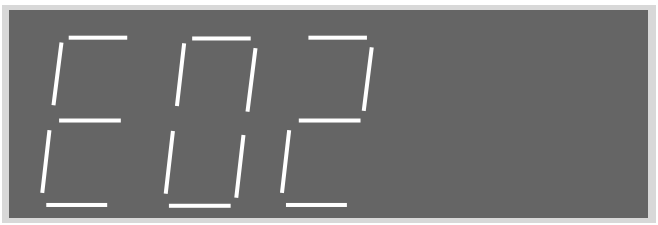




This menu displays the program version number of AIO driver. After waiting for a second, the screen shows 30.03 in the figure above. Afterwards, “VER1” and “30.03” display alternately, each for 1 second.

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.

7.3.3 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 7.5 Meaning of Status Code

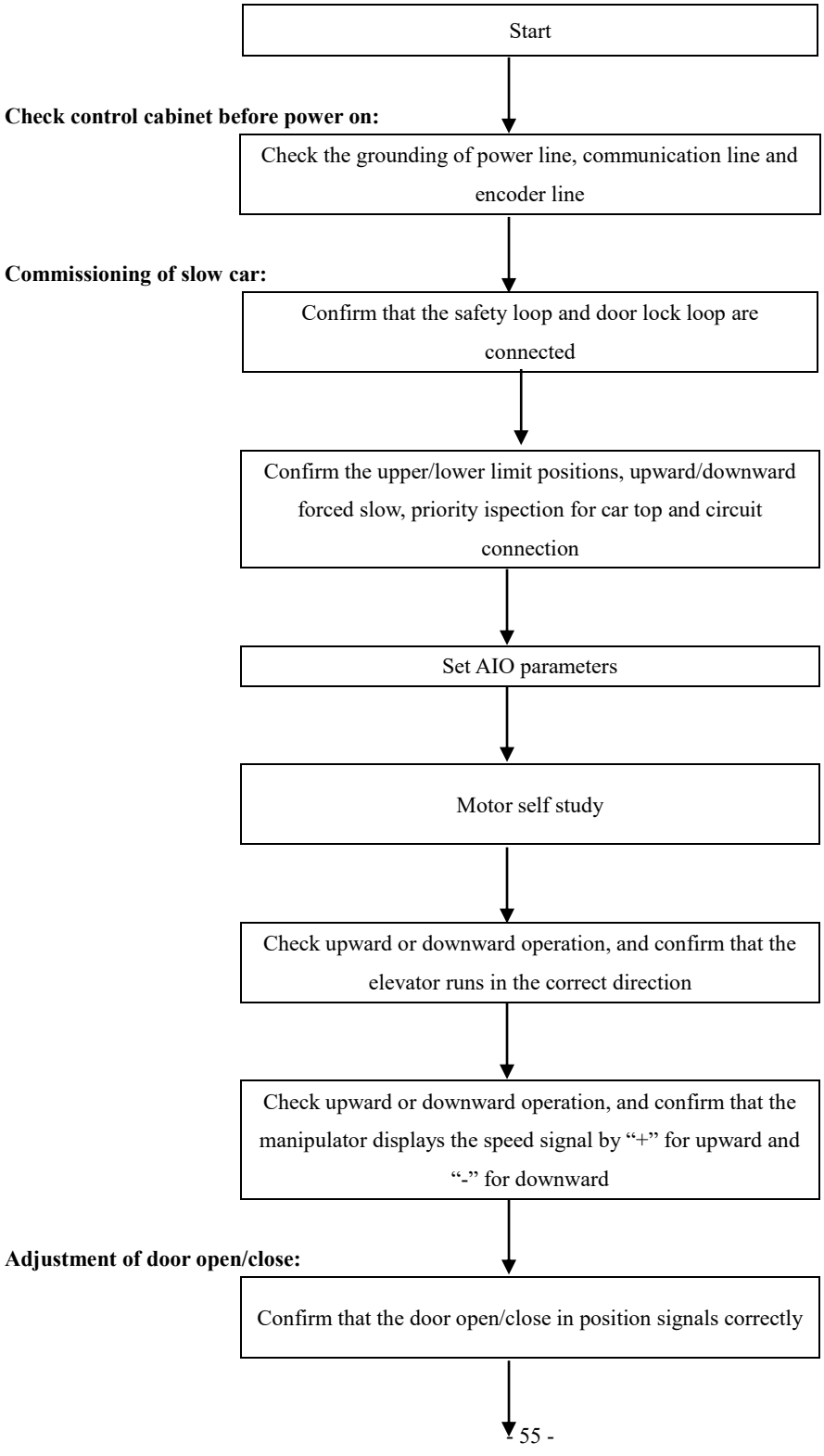
Display	Meaning	Display	Meaning	Display	Meaning	Display	Meaning
	1		2		3		4
	5		6		7		8
	9		0		A		B

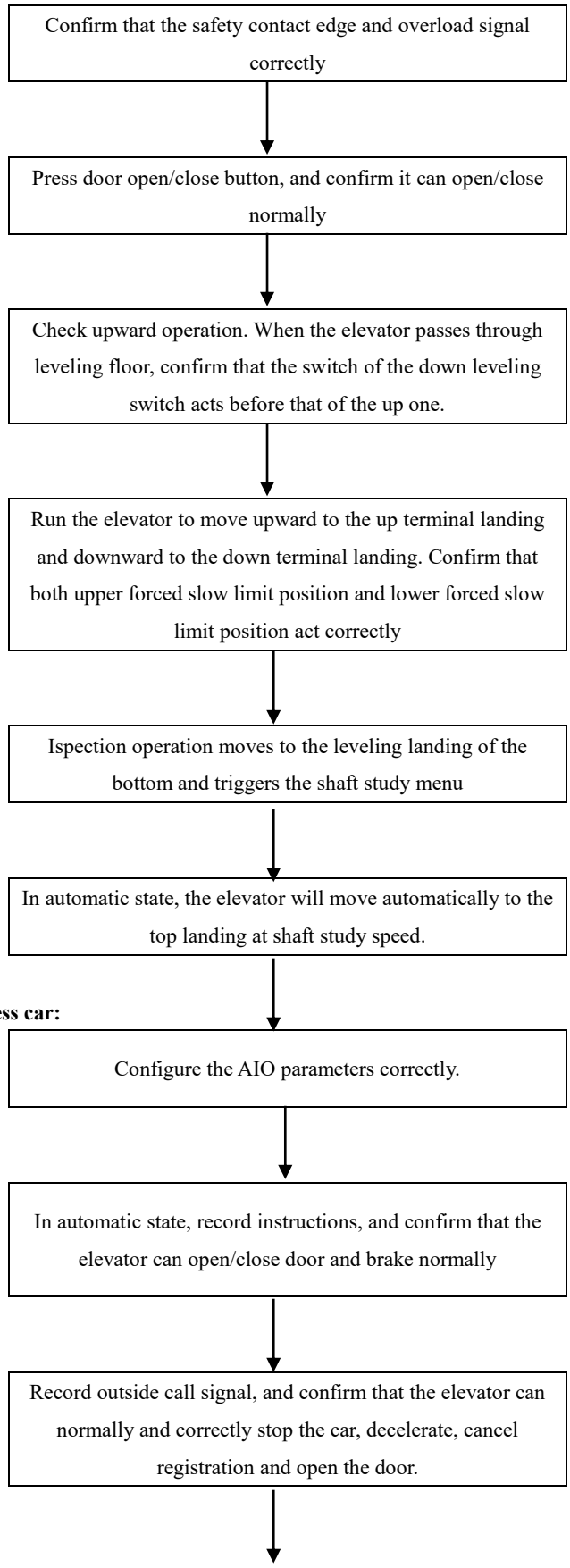
	C		D		E		F
	G		H		I		J
	K		L		M		N
	O		P		Q		R
	S		T		U		V
	W		X		Y		Z

8 Elevator Commissioning Guide

8.1 Simple Commissioning Diagram

A new elevator equipped with AS360 AIO manufactured by Shanghai STEP Electric Corporation. Its debugging process in electrical control and drive aspects is as follows.




Confirm that the safety contact edge and overload signal correctly
Press door open/close button, and confirm it can open/close normally
Shaft study:
Check upward operation. When the elevator passes through leveling floor, confirm that the switch of the down leveling switch acts before that of the up one.
Run the elevator to move upward to the up terminal landing and downward to the down terminal landing. Confirm that both upper forced slow limit position and lower forced slow limit position act correctly
Ispection operation moves to the leveling landing of the bottom and triggers the shaft study menu
In automatic state, the elevator will move automatically to the top landing at shaft study speed.
Commissioning of express car:
Configure the AIO parameters correctly.
In automatic state, record instructions, and confirm that the elevator can open/close door and brake normally
Record outside call signal, and confirm that the elevator can normally and correctly stop the car, decelerate, cancel registration and open the door.

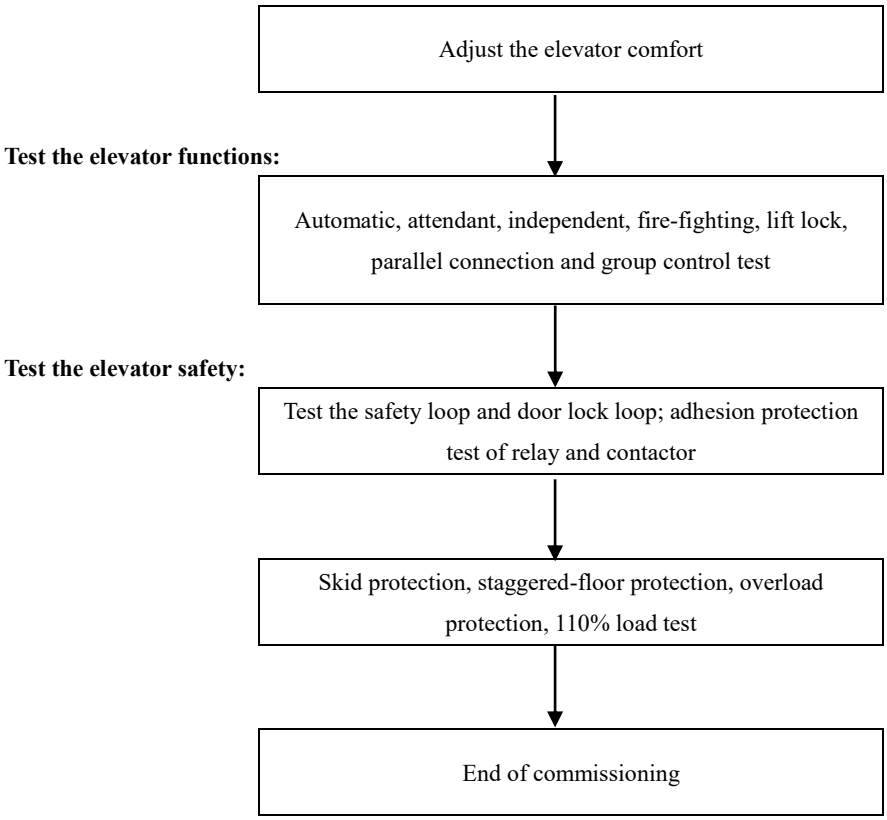


Diagram 8.1 Simple Commissioning Diagram to the the controller and the frequency converters of the AS360 AIO

8.2 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.

8.3 Power on and Check

8.3.1 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 encoder cable and power line wiring:

Encoder lines and power lines go separate trough.

8.3.2 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; switching power supply TPB is powered on, and the motherboard is electrified to run.

Each terminal voltage of switching power supply is as follows:

Table 8.1 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 turned on.

4) Check the following circuit:

a) Check whether the door lock loop is normal;

b) Check whether the leveling switch signal is normal;

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

If abnormal, please check and correct accordingly.

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

8.4.1 Configuration of System Basic Parameters

First set the system basic parameters in Table 5.1 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 8.2 System Basic Parameters

No.	Name	Default Value	Scope	Unit	Remarks
F06	Elevator rated speed	0.500	0.100～10.000	m/s	
F09	Parking floor	1	1～10	×	
F10	Offset floor	0	0～10	×	
F11	Floor number	5	2～10	×	
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)	28430	0～65535	×	The input NO/NC setting can be set with 2 ways: 1. Use F25,F26 bit parameter to set NO/NC; 2. Use the input point port self-define to set. If the value is big than 100, it's set as NC point, or it's set as NO point.
F26	Input Type 2 (normal open or normal closed configuration for X16 ~ X25 input point)	58	0～65535	×	
F182	Slow down switch series	0	0～10	×	0: determine automatically by speed
F183	Learn trip speed	0	0～Rated speed of elevator	m/s	0: self-learning speed is at the rate of 50% of the rated speed
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 5 for the parameter setting method and detailed definition.

8.4.2 Self-learning of Motor Parameter

No motor parameters self study for the synchronous motor. And because AS360 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: The drive controller of AS360 series elevator AIO is used to control synchronous motors, and every time after powered on, it will automatically capture Encoder information at its first running, 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 asychronous 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 AS360 series elevator AIO and motor, between AIO and encoder have been correctly completed;

2) Correctly power on for AIO;

3) Confirm that the safety loop and door 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 "asychronous motor self learning" command by Seven-Segment Code Display Manipulator or LCD handheld Manipulator, and then press the Enter key;

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

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

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

a) Whether the safety loop and the door lock loop are connected. If not, the main contactor will not suck, so it is impossible to complete the self learning;

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

c) Whether the motor parameters are set correctly.

8.5 Test Run of Slow Car

8.5.1 Ispection Operation of Engine Room and Preparations for Express Car

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

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 door 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 handheld operator shows that the elevator is in a status of "Ispection";

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

6) The upper and lower deceleration switches are correctly wired;

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

2. Slow run of engine room

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 preset 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. 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 higher, 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 wiring is reasonable. The Encoder cable and power lines should not go trunking together, and must be strictly separated; c) Check whether the shielding lines and net are reliably grounded.

3) If 2 leveling switches are installed, check whether the upper and lower leveling switches are correctly wired: when the elevator goes up slowly and before passing through the leveling floor,it should be confirmed that the down leveling switch act befor the up leveling switch. Otherwise, the shaft cannot complete self study successfully. In case of that, must swap the connection wiring of the two switches to the motherboard.

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, speed 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 time and the distance of engine room emergency running should not last too long, and do not run the lift to the teminal position.

8.5.2 Car Top Ispection Operation

After engine room slow run normally, you can run the car top Ispection operations. The ispection speed may be adjusted appropriately lower in the first commissioning. After the operator entering onto 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) Jog 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 the elevator to the car top 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 shaft.

4) By ispection operation to the car top, confirm that the shaft terminal deceleration switch act

correctly and its movement position correct.

5) By ispection operation to the car top, confirm that the shaft leveling switch and leveling spiles are installed correctly, and at all leveling positions, each leveling switch act at the right point.

8.5.3 Door Open/Close Adjustment

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

2) Electrify gantry crane power;

3) Move the car door manually, monitor on the handheld Manipulator and confirm whether the door closing in place signal and the door opening in place 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.

8.6 Shaft Self Learning

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

8.6.1 Shaft Self Learning Method

1. Confirm the elevator complies with safe operating conditions.
2. Confirm that all switches and its wiring within the well are correctly installed, and the connection of accompanying cables and outside cables are correct;
3. Make the elevator into ispection (or emergency electric operating) state;
4. Enter into self study menu by hand-held manipulator, 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 landing at the self learning speed (set by F183) and then automatically goes up at self study speed, and start well self study. Well study is complete until the elevator arrives at the top leveling position and stops automatically. The hand-held manipulator shows "self study completed" after the success of the self study;
6. During the self study process, if the control system is abnormal, self study will stop and give the corresponding fault code, and the hand-held Manipulator shows "self study unsuccessful".

Main reasons for unsuccessful well self study include:

1) The total storey 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 installed positions of the leveling switch and leveling spiles are not accurate enough that make leveling switch cann’t act effectively and correctly when the leveling spile of each floor inserts;

5) The input point setting to leveling switch of normally open/normally closed is inconsistent with the actual situation;

6) The terminal deceleration switch act wrongly or is installed to a wrong position (when the lift car is at the ground floor leveling position, the down single landing terminal deceleration switch must act; before the lift car goes upward to the leveling position of the next floor bottom, the down single landing terminal deceleration switch must have been reset; when the lift car is at the top floor leveling position, the up single landing terminal deceleration switch must act, before the lift car goes downward to the leveling position of the next floor top, the up single landing terminal deceleration switch must have been reset).

7) The input point setting to the terminal deceleration swith of normally open / normally closed is inconsistent with the actual situation;

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

9) Leveling switch signal interfered;

10) Leveling switch failure or Encoder failure.

Special Note: during 2 landings / 2 stops self learnling,

1. As to the situation in which 2 leveling switches are installed, after the elevator in inspection state, must run the elevator to the down limit position manually,and make sure that the normally self learning operation can be done only after the up leveling switch taking off.

2. As to the situation in which only 1 leveling switch is installed, the down limit and the down limit position must short circuited, and make sure that the normally self learning operation can be done only after the down leveling switch taking off.

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

8.7 Express Car Operation

1．Test Run of Express Car

After slow car running correctly, first of all, make sure the elevator meets safe operating conditions. After well self learning, the elevator can proceed with express car test run. Specific steps are as follows:

1) Set the elevator in normal state.

2) Monitor the selected floor interface by hand-held manipulator to select the floor to where the elevator heading. 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 6) and operate accordingly.

2．Safety Test

1) Safety loop

Testing requirements: when the elevator stops,and any of the safety switches acts, and after safety loop is disconnected, the elevator can not start; when the elevator is under Ispection operation, any of the safety switches motions, and 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 relieve to 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 relieve to 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 terminal deceleration switch is normal closed contact, disconnect the wiring of input point at the upper single deceleration switch on the motherboard; but if it is norm. open contact, short the input and COM terminal. And thus create an intentional split-level fault, and then the system will display the top floor data. Then, change the wiring of input at the upper single deceleration switch back to normal, and operate 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 terminal deceleration switch is normal closed contact, disconnect input point wiring at the lower single deceleration switch on the motherboard; but if it is a normal open contact, short input and COM terminal. And thus create an intentional split-level fault, and then the system will display the bottom floor data. Then, change input point wiring at the lower single deceleration switch back to normal, and operate 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 switch motions, check the elevator should not be closed, the buzzer sounds inside the car, and the overload indicator light on.

8.8 Adjust Elevator Comfort

8.8.1 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 gain, integral and differential constants, etc.

2. Mechanical factors:

Rail verticality, surface roughness, connection, guide shoe tightness, uniformity and tension of steel wire rope, 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 technicist should pay sufficient attention to this.

8.8.2 Adjust Elevator Comfort

1. Adjust Mechanical Factors

1) Slide way:

- ✧ 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, the elevator will jitter and vibrate, or the lift car shakes from left to right in some positions.

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

2) Tension of Guide Shoe

In case that 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 the sliding sort, 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, must call the installer for adjusting the tension of steel wire ropes.

In addition, steel wire ropes are tied in circle around before installation, whitch with inner response torsional stress. If installed directly, the elevator operation will prone to vibrate. Therefore, before installation, it is necessary to 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 during high speed operation, it will generate dislocation 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 is easy to produce "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 due to the use time is too long, the wear of the turbine worm and gear is greater, and causes axial movement when elevator acceleration or deceleration, which generate step feeling during elevator acceleration or deceleration.

7) Lift car balance

Sometimes, the design or installation or other reasons lead to imbalance 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, the adjustment of run-time brake clearance, etc.

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 above-mentioned 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.

a) 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 effectively. Refer to the Table below for relevant adjustment parameters.

Table 8.3 The parameter of conventional method for adjusting starting comfort

Function Code	Name	Content	Factory Default	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	Start accelerated movement after the inverter gives operating signal and this time maintains torque.	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.

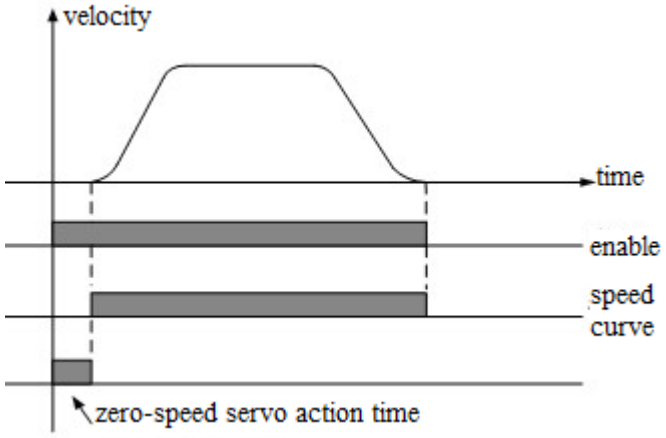


Diagram 8.2 Zero Servo Timing Sequence Diagram

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 gain (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 let the elevator go downward non-loaded; at this moment, the elevator would pull-back at start. Increase the P0 value gradually, until the elevator stops pulling-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 start. The greater I0 leads to the shorter the response time. 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.

b) 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 preset, 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 given command givn out. The order

between the speed preset and the brake open 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 preset is given at the same time. 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 preset speed earlier); if the downward start shows a weak pull back, but an obvious push for the upward start, set the brake open ahead of time(or postpone the preset speed given time). Timing Sequence diagram at start and stop as follows.

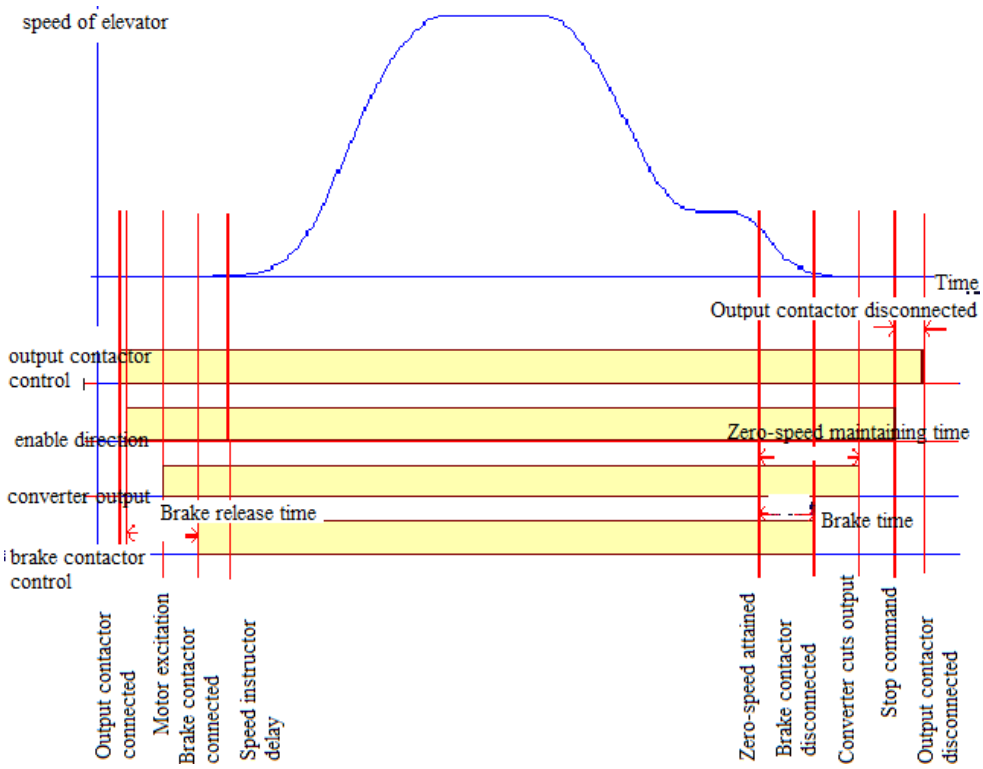


Diagram 8.3 Adjustable Timing Sequence Diagram

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 8.4 The comfort adjustment parameters during operation

Function Code	Name	Content	Scope	Unit	Factory Setup	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

Function Code	Name	Content	Scope	Unit	Factory Setup	Remarks
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	0.～100.0	%	1.0	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	0.0～100.0	%	50.0	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 8.6). Parameters F224 and F225 are switching frequency between intervals (see Figure 8.6). 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.

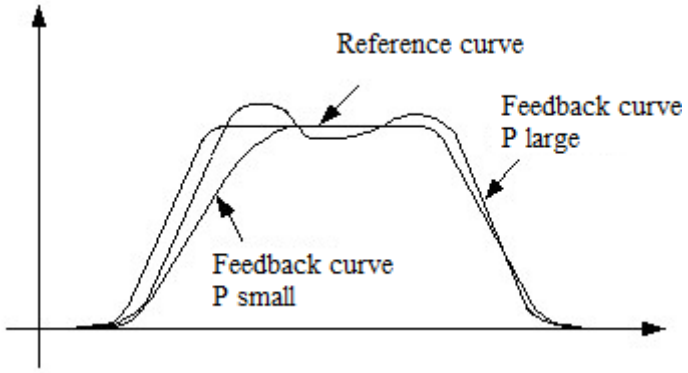


Diagram 8.4 Impact of P (Propotional Constant) on the Feedback Tracking

Increase of the integral constant I can accelerate the system's dynamic response. Increase I if the overshoot is too large or the dynamic response is too slow. 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.

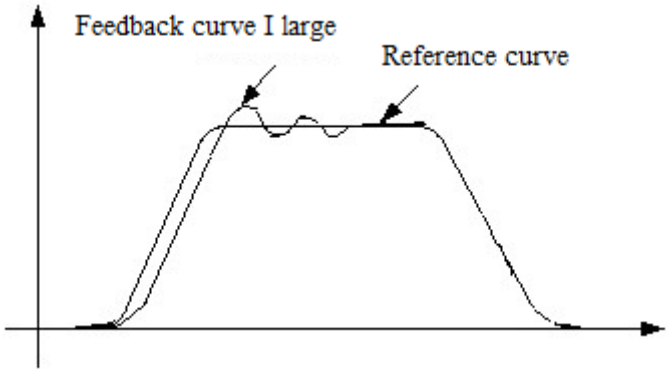


Diagram 8.5 Impact of I (Integral Constant) on the Feedback Tracking

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, increase the P value as far as possible, 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 Diagram 8.6 below.

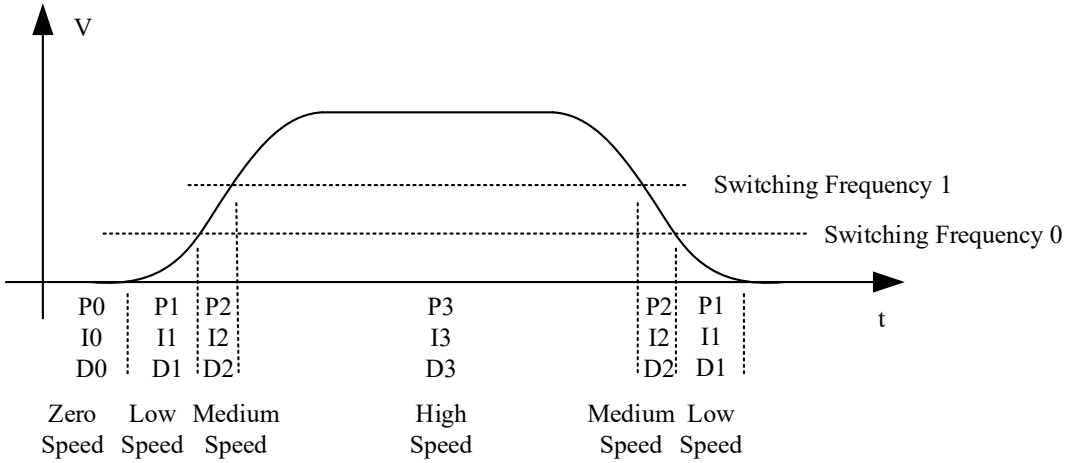


Diagram 8.6 Elevator operation curve segment PI control chart

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 could be enough to only 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 could be enough to only 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

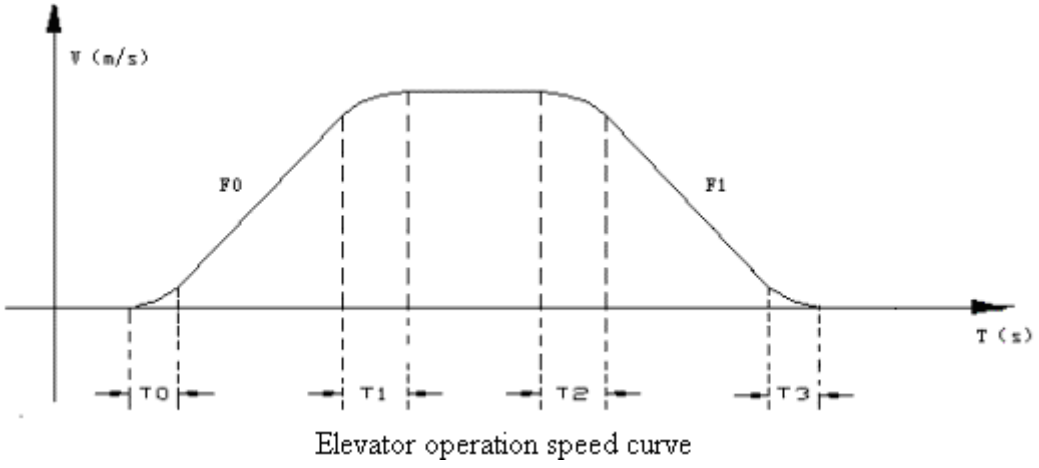
The shape of elevator operation curve will also directly affect the comfort of elevator. In order to satisfy passengers' requirements for comfort and operational efficiency, the elevator should run according to the S-curve as shown in Diagram 8.7. The system can adjust the acceleration / deceleration slopes of the S curve and time constant at the four turning corners to ensure the comfort and operational efficiency of the elevator. The main parameters that may affect the curve are as follows.

Table 8.5 The comfort adjustment parameters of the elevator operation 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 uncomfortable; 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 too 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 deceration is. But too small will be inefficient. The greater this value is, the more sudden the deceration is: ① if too sudden, users do feel uncomfortable; ② too sudden can lead to overvoltage 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 too 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

No.	Name	Recommended values and reference range	Parameter range
			elevator runs at very low speed. But if for a too long time may lead to failure of motor to drag the elevator and cause encoder 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)	
F5	S Curve T3	1.300 (1.300～1.600)	T3 is the transition time curve between deceleration end to stop, the greater the value is, the more stable the stop is. In this time, the elevator runs at very low speed. But if for a too long time may lead to failure of motor to drag the elevator and cause encoder 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 turning corners F2 ~ F5 can improve the comfort, but also decrease the operational efficiency.



Elevator operation speed curve

Diagram 8.7 Elevator Operation Speed 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 content of the above, adjusting the PID value in low-speed section may help the elevator gain the best comfort at stop. 2. Time sequence for stop. It is mainly the coordination between the preset 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.

8.9 Leveling Adjustment

After comfort adjustment, leveling accuracy can be regulated.

8.9.1 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 door areas. 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 deeply 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, level 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 mentioned above, ensure that the stop position (that is, the stop position should have an error of ≤ ± 2 ~ 3mm) should be repeatable for the elevator to go both upward and downward to stop at a middle floor.

8.9.2 Adjust Leveling Accuracy

1. Confirm the repeatability of stop position

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

2. Adjust deck board at door area

1) Make 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.

3) 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 repeatable, but not at the same position on each floor, for upward or downward leveling, such as up higher down lower, or up lower down higher,this fault can be solved by adjusting the leveling parameters of F56, F57 in the parameter menu. Its default value is **50mm**. Decrease the F56 value when the elevator goes upward and rushed over the level (over leveling). Increase the F56 value when the elevator goes upward and is short of the level (less leveling). Decrease the F57 value when the elevator goes downward and rushed over the level (over leveling). Increase the F57 value when the elevator goes downward and is short of the level (less leveling).

4. Lift car leveling adjustment

1) Call the elevator to the top floor;

2) The "Leveling Mode" function menu has been added into the "Debug Operation" menu of the mainboard manipulator. Afer entering the "Leveling Mode", the outside call is invalid, and the inside instruction can be valid only when the door of the elevator is close;

3) After the elevator arriving the station, keep the door open. According the last running

direction at the high speed, it can be chosen that whether running upward leveling micro-adjustment or running downward leveling micro-adjustment; according the inner call buttons of the top floor and the bottom floor, the leveling could be adjusted. The top floor inner call button ecch pressed, the leveling position of lift car increased 5mm in height. Tht bottom floor inner call button each pressed, the leveling position of lift car decrease 5mm in height. After the top and bottom inner call buttons both being pressed for 1s, the changed position would be automaticly saved by the CPU, and the door would close automaticly.

4) During leveling, the inner display tube shows the leveling adjustment value, whose initial value is 0. The number showed on display tube shift 1 by 1, after each leveling adjustment. When the leveling direction is upwarrd, the adjustment value is positive with the upward arrow light on.When the leveling direction is downward, the adjustment value is negative with the downward arrow light on. When the door automatically closed, the leveling adjustment value would be zero cleared.

5) After the door being closed, press the inner call button which needs leveleing adjustment, and then the elevator head for the floor.

6) After finishing the leveling, enter into the engine room, switch the emergency power to ON, and switch back to OFF to return to normal mode.

8.9.3 Reasons Why Leveling Cannot be Adjusted:

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

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

Check F21 (leveling sensor delay adjustment), the factory value: 6 mm. It can be set to 6mm when the elevator with the speed below 1.75m/s uses optical leveling sensor.

It can be set to 10 mm when the high-speed elevator (with the speed of 3.0m/s or above) uses optical leveling sensor.

It can be set to 16 mm when the high-speed elevator (with the speed of 5.0m/s or above) uses optical leveling sensor.

F56 upward leveling adjustment value. Factory value: 50mm.

F57 downward leveling adjustment value. Factory value: 50mm.

2. Encoder interference

1) Encoder shielded wire is not grounded, or the encoder is interfered by power lines for the reason of that the signal lines and power lines are not separated. This problem is even more serious on the synchronous motor site. The signal of the sincos encoder or resolver is a small analog signal signal, more vulnerable to be interfered, which is shown as 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, while the 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 floor uperward and downward rount trip (Floor 3 -> Floor 4, Floor 4 to Floor 3), then return back to Floor 3, check the error distance with the chalk mark (should be less than 5mm). This error distance is the slip error for a single floor. The slip error should be done twice respectively with 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 slantly.

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 the leveling spiles being adjusted.

8.10 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. See its start features as shown in Diagram 8.8.

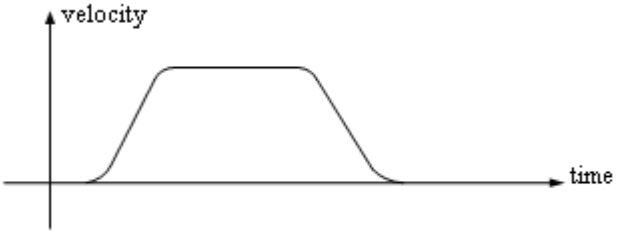


Diagram 8.8 Compensation characteristic diagram for no load sensor startup

Although, under normal circumstances, AS360 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 when elevator starts 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 would need install the pre-load devices additionally, 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 8.6 The parameters of the pre-load weithing compensation function set and adjusted when the elevator starts

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

Table 8.6 The parameters of the pre-load weithing compensation function set and adjusted

Name	Content	Scope	Unit	Factory Setup	Remarks

F164	Weithing device type		0～99	×	99	See the following descriptions for details
F40	Weighing data offset	48	0～100	%		
F70	Light-load upward gain	100	0-300	%		
F71	Light-load downward gain	100	0-300	%		
F72	Heavy-load upward gain	100	0-300	%		
F73	Heavy-load downward gain	100	0-300	%		
F74	Light-load hight gain	512	0-1024			
F75	Light-load hight gain	512	0-1024			
F229	Torque compensation direction	Set start torque compensation direction	0/1	×	0	0: forward direction 1: reverse direction
F230	Torque compensation gain	Set start torque compensation gain	0.0～200.0	%	100.0	
F231	Torque compensation bias	Set start torque compensation bias	0.0～100.0	%	0.0	

Parameter F164 has the meanings as follows:

Table 8.7 F164 The meanings 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	Reserved		
4	None	Input open/close signal to the car top board	Calculate the weighing compensation values at light load and heavy load by light/heavy switch signal, F70-F75 parameters. And F40 is set to be 50% at this moment.
5		Input open/close signal to the car top board	Input weighing device signal by analog signal
6		Input weighing device signal by analog signal, and then calculate the result by weighing device signal	Input weighing device signal by analog signal
99		Input open/close signal to the car top board	None

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

8.10.1 Simple Start Compensation Adjusting Method Using Light-load and Heavy-load Switch (F164 set to 4)

AS360 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 anti-interference ability. 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 anti-interference ability. 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 AS360 series AIO.

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 lift 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 lift car top board.

1. Set the value of F40 according to the elevator balance coefficient.

2. Adjust the comfort without load after no-load self study

1) Stop the elevator at the bottom floor, switch on inspect mode, let the elevtor go upward. If down wash, reduce F70; if upward pull, increase the F70;

2) Stop the elevator among the bottom and the 2nd floor, switch on inspect mode, let the elevator go downward. If down wash, reduce F71; if upward pull, increase the F71;

3) Stop the elevator at the top floor, switch on the inspect mode, let the elevator go downward. If down wash, reduce F74; if upward pull, incease the F74.

3. Adjust the comfort with full load after full load self study

1) Stop the elevator at the bottom floor, switch on inspect mode, let the elevtor go upward. If down wash, reduce F72; if upward pull, increase the F72;

2) Stop the elevator among the bottom and the 2nd floor, switch on inspect mode, let the elevator go downward. If down wash, reduce F73; if upward pull, increase the F73;

3) Stop the elevator at the top floor, switch on the inspect mode, let the elevator go downward. If down wash, reduce F75; if upward pull, incease the F75.

4. Generally, F74 and F75 need not to be adjusted(unless the floors are extremely high or the weighing device's weighing values are inconsistent between at the bottom floor and at the top floor).