

Escalator Control Cabinet

Instruction manual

Escalator control cabinet

Operating Instructions

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1. Product description

1.1 Overview

escalator control cabinet is a bypass frequency conversion control of the escalator control cabinet. Using Optimax independent research and development of the escalator inverter, compared with similar products, with small size, low cost, stable operation characteristics.

This manual describes the precautions, installation, functions, maintenance and troubleshooting of the escalator control cabinet. Be sure to read this manual carefully before using this control cabinet.

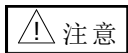
1.2 Security Information

Security definition :

In this manual, the safety precautions fall into two categories:



: Since there is no danger of the situation caused by the operating requirements may result in serious injury or even death.



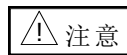
: Since there is no risk resulting from the operation as required, it may result in minor or moderate injuries, and damage to the equipment.

Please read this chapter carefully when installing, commissioning and servicing this system. Be sure to follow the safety precautions required in this chapter. In the event of a violation of the provisions of the operation caused any harm and loss are unrelated to the Company.

A、Before installation:



If you open the cabinet and find that there is water in the cabinet, the parts are missing or damaged parts, please do not install!



Handling should be light lift and gently put down, otherwise there is danger of damage to the device!

Do not use the damaged control cabinet, the risk of injury!

Do not touch the components inside the control panel of the cabinet, otherwise there is the risk of electrostatic damage!

B、When installed:

 危险
Please install in a reliable position, be careful of the risk of falling cabinets; Do not touch the components in the cabinet. Carefully dangerous.

 注意
Do not allow the wire head or screw to fall into the cabinet. Or cause damage to components! Install the control cabinet in a location away from direct sunlight.

C、When wiring:

 危险
Construction must be carried out by qualified personnel in accordance with the requirements of this manual, or an unexpected hazard may occur! Must be equipped with power box, cabinet power supply box to be controlled by the switch! Must be equipped with power box, the power of control cabinet to switch from the power box control!

 危险
Do not connect the input power supply to the output terminals (U, V, W) of the inverter. Note that the terminal tag, do not take the wrong line! Otherwise, the inverter is damaged! Do not connect N (-) to the braking unit, which may cause damage to the inverter. Power supply and host wire diameter Please refer to the cable withstand current standard selection. Otherwise, an accident may occur!

D、Before powering on:

 注意
Check that the voltage level of the input power supply is the same as the rated voltage of the inverter; (L1, L2, L3) and the output terminals (U, V, W) are correct.; and pay attention to check whether there is a short circuit in the external circuit; connected circuits are tightened. Otherwise, damage to the control cabinet!



You must check whether the power supply line is correct before power on. Doing so may cause electric shock!

The wiring of all peripheral accessories must be in accordance with the instructions in this manual and properly wired according to the circuit connections provided in this manual. Otherwise it will cause an accident!

E、After power-up:



Do not touch the cabinet components after power on, otherwise there is danger of electric shock!

Do not touch the inverter and surrounding circuits with wet hands. Otherwise there is danger of electric shock!

Do not touch any of the input and output terminals of the inverter. Otherwise there is danger of electric shock!

At the beginning of the power-on, the inverter will automatically detect the external strong-current circuit. In this case, you must not touch the U, V, W terminals or the motor terminals, otherwise there is danger of electric shock!

Do not change the logic board and inverter manufacturer parameters. Otherwise it may cause damage to the device!

F、Running:



It is important for non-technical personnel to not detect the signal during operation. Doing so may cause injury or equipment damage!

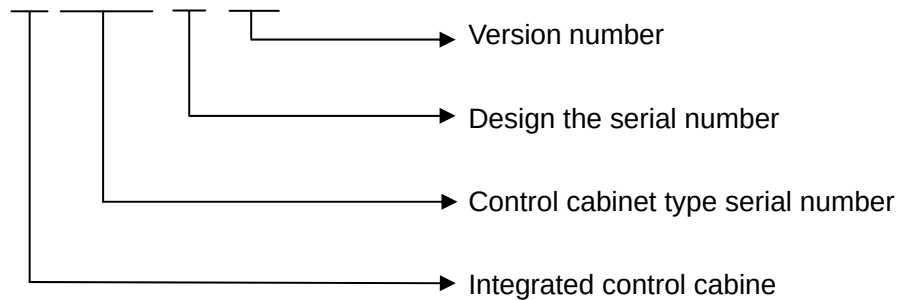
When the inverter is running, it should be avoided that something falls into the device. Doing so may cause equipment damage!

Do not use the power switch off method to control the drive start and stop. Doing so may cause equipment damage!

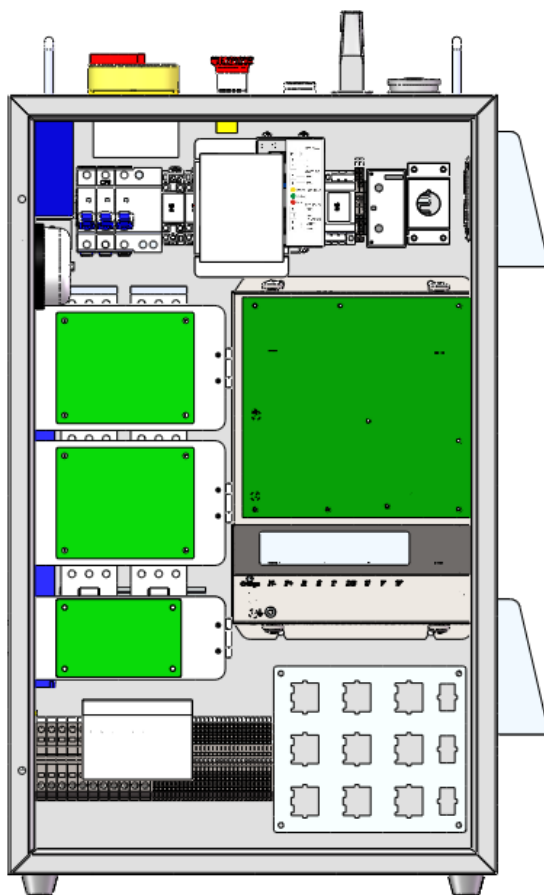
1.3 Product name

Control cabinet naming rules are as follows

XECB – A-2.0



1.4 Product Image



Escalator control cabinet



Bottom room junction box

Remarks: Picture for the outdoor cabinet, if the indoor cabinet, sheet metal for the galvanized sheet.

1.5 Product structure

Escalator control cabinet by the control cabinet, junction box 2 parts, including the control cabinet as the main components, is responsible for logic functions and safety functions; junction box to provide the bottom of the switch connection.

1.5.1 Control cabinet

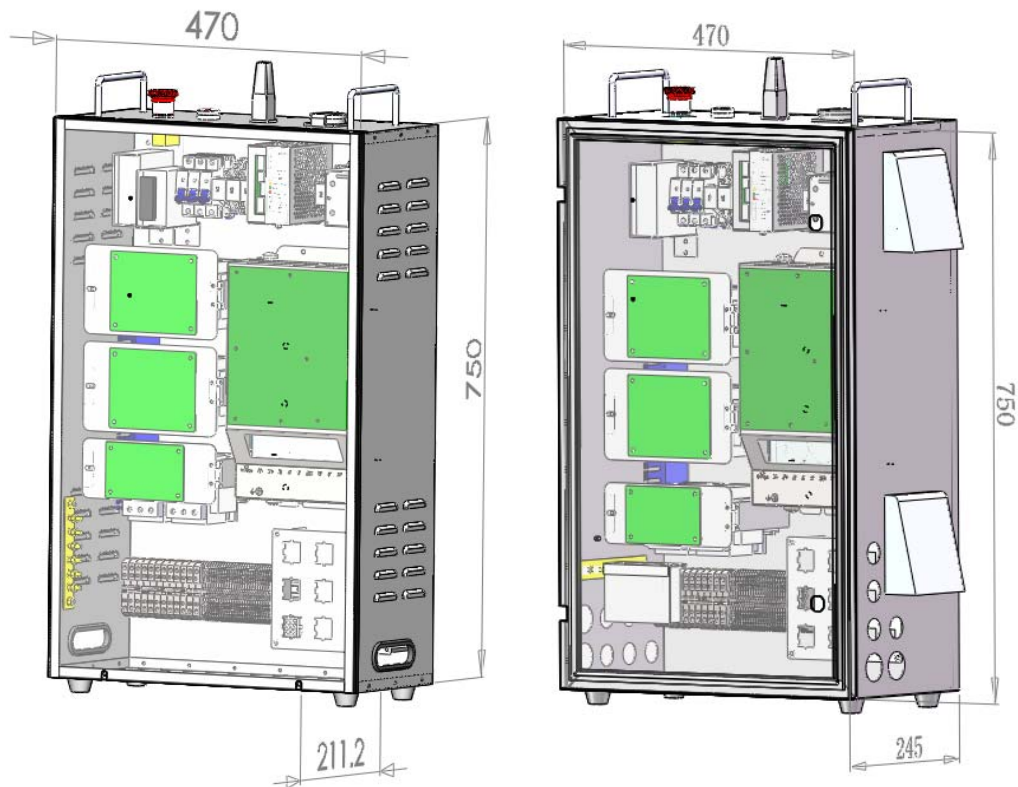
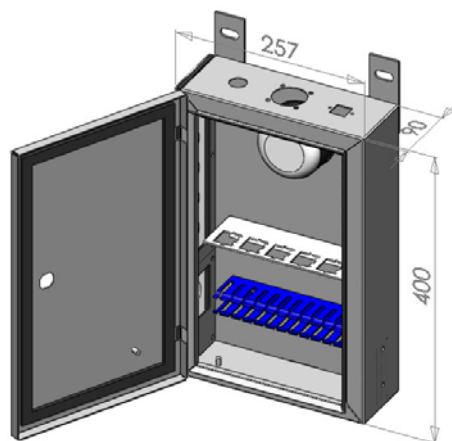


Figure 1. Escalator control cabinet structure Figure 2. Escalator control cabinet structure

Remarks: Figure 1 is an indoor cabinet; Figure 2 is an outdoor cabinet.

The control cabinet is placed in the electromechanical room, which contains the integrated drive, electrical components, function expansion board, fault acquisition board and other components to realize the processing of all input and output signals of the escalator and control the operation of the escalator.

1.5.2 Junction Box



The junction box is located in the bottom electrical room. All switch and sensor signals at the bottom of the escalator are concentrated in the terminal box and then transmitted to the control cabinet in the top electrical and mechanical room via a 40-core upper and lower room connection cable.

2. Product function

No.	Function item	Function Description	Remarks
1	Motor overspeed protection switch	Prevents motor over-speed from danger (mechanical parts)	Standard configuration
2	Motor fan cover protection switch	To prevent the motor fan cover is removed, resulting in the risk of accidents.	Standard configuration
3	Motor thermal protection switch	To prevent the motor burned by overheating.	Standard configuration
4	Handrail entrance switch detection	To prevent the human body such as human fingers or other foreign objects stuck into the escalator damage.	Standard configuration
5	Comb plate switch detection	Prevent foreign body from getting into comb plate.	Standard configuration
6	Step collapse detection	Detects whether a step has collapsed.	Standard configuration
7	Traction chain break switch protection	Detects whether the step chain is loose or broken.	Standard configuration
8	Emergency stop switch function	When emergency stop is required, press this button to emergency stop.	Standard configuration
9	Front panel switch detection	Check whether the front panel is open.	Standard configuration
10	Automatic lubrication function	Automatic lubrication according to the set parameters	Standard configuration
11	Brake switch detection	Check whether the brake is operating	Standard configuration
12	Escalator speed detection	Detection of escalator speed, the escalator after the start of 2S no speed feedback alarm	Standard configuration
13	Escalator speed abnormal protection	To prevent the escalator speed anomalies such as speeding, reversing the danger.	Standard configuration

Continued on the page

No.	Function item	Function Description	Remarks
14	Step loss detection function	Detection of escalator step is missing, deformation, damage.	Standard configuration
15	Handrail speed protection	Check whether the handrail belt speed is consistent with the escalator speed	Standard configuration
16	Phase sequence detection	Detection of power supply, phase sequence, phase loss	Standard configuration
17	Key signal monitoring	Monitoring the key switch to detect whether there is adhesion, whether both the uplink and downlink signals	Standard configuration
18	Contactor adhesion protection	Check whether the main contactor adhesion	Standard configuration
19	Ring prompt function	Normal or inspection start the escalator, there is a ring prompt	Standard configuration
20	Automatic start and high and low speed operation	The escalator enters the zero-speed standby mode without a load and enters the high-speed operation mode when there is a load	Standard configuration
21	Reverse direction into the reminder	When the passenger enters the escalator from the opposite direction, the escalator runs at high speed for 15 seconds to remind the passengers not to enter the wrong direction	Standard configuration
22	Inspection operation function	Jog operation when used for repair and maintenance	Standard configuration
23	Self-learning function	The control system learns the step speed, handrail speed, master drive wheel speed	Standard configuration
24	Braking distance detection	Detects the current braking distance of the escalator	Standard configuration

Continued on the page

No.	Function item	Function Description	Remarks
25	Inverter fault detection	Detection of inverter overheating, overload, overvoltage and other failures	Standard configuration
26	Communication fault detection	Inverter Communication Fault and Safety Board Communication Fault Detection	Standard configuration
27	Program recognitio	The program recognizes the control cabinet model	Standard configuration
28	Bypass frequency conversion function	No passengers entering from the frequency of operation to switch to the Inverter run by the passengers into the run from the Inverter to switch to the frequency of operation	Standard configuration
29	Traffic light indicator	In the upper and lower head of the escalator, the direction of travel of the passenger escalator is indicated	Optional
30	Additional Brake Relay Detection	Check if the additional brake relay is active	Optional
31	Additional Brake Switch Detection	Check if the additional brake is operating	Optional
32	Main drive chain disconnection detection	To prevent the main driving chain of the escalator break, causing a reversal.	Optional
33	Apron panel switch detection	Check whether the apron is loose or damaged	Optional
34	Handrail with broken switch detection	Check if the armrest strap is loose or broken	Optional
35	Status output function	Seven status points are provided for outputting 7 states of the escalator	Optional
36	Oil level detection	Check if the oil level is too low	Optional
37	Water level detection	Detection of escalator under the head room water level is too high	Optional
38	Wear Detection of Brake Shoe	Check whether the motor brake brake shoe is worn	Optional

Continued on the page

No.	Function item	Function Description	Remarks
39	Fan switch detection	Check whether the control cabinet fan is working properly	Optional
40	Fire FIR switch detection	Check if there is a fire in the escalator	Optional
41	Remote parking	Used to monitor the remote control room to stop the operation of the escalator	Optional
42	Lighting function	The illuminator lights when the escalator is running	Optional

3. Scope of application

Basic characteristics	Lifting height	According to the host power to be
	Speed of escalator	≤ 0.9 m/s
	Drive component power	5.5KW to 18.5KW
	Angle of inclination	$\leq 35^\circ$
	Operation mode	Bypass frequency conversion
	Standards compliance	GB16899-2011

4. Main specifications and technical parameters

Input power	Phase, voltage, frequency	3phase; 380V; 50/60Hz
	Three-phase unbalance rate	$\leq 2\%$
	Allows voltage fluctuation	$-15\% \sim +10\%$
	Allows the frequency to fluctuate	$\pm 5\%$
	Three - phase five - wire system	Neutral, earth wire can not be mixed
Drive characteristics	Control method	Escalator - specific control
	Starting torque	100%/0.5HZ
	Speed control range	1: 100
	Speed control accuracy	1%
	Frequency control range	0-60HZ
Logical IO characteristics	Operating Voltage	DC24V
	Frequency control range	50/60HZ
	Port input voltage range	18V~26V
	The maximum load voltage is output	277 VAC, 125 VDC
	Outputs the maximum load current	5 A
	Output maximum load power consumption	1250VA, 150W

5. Working conditions

Environment	Ambient temperature	-10℃～+40℃
	Humidity	95%RH（No condensation）
	Save the temperature	-20～+60℃（Short-term temperature during shipment）
	Use of premises	Indoor and outdoor
	Altitude	<1000m（>1000m Need to reduce the capacity to use）
	Installation environment	Indoor and outdoor

6. Installation and commissioning instructions

6.1 Installation Notes

6.1.1 Safety Precautions

Caveat: Be sure to install the control cabinet with the power cut off and make sure that the power supply is not switched on during installation!

6.1.2 Preparation before installation

Ready to install the necessary tools such as screwdrivers and cable ties.

6.1.3 Installation and adjustment steps

1. Place the control cabinet in the upper machine room, and install the switch on the upper part of the escalator to the position corresponding to the escalator.
2. Place the junction box in the lower electrical room, and install the switch in the lower part of the escalator to the corresponding position of the escalator.
3. Dock the connection cables between the upper and lower machine room.
4. Connect the power supply cable and the motor power cable to the corresponding terminals of the control cabinet.

6.2 Debugging instructions

6.2.1 Inspection and preparation before commissioning

Check the power supply line is connected correctly; to ensure that no wrong or missed connection.

Check that the power cable of the host is correctly connected to ensure that the power cable is correctly connected or not.

6.2.1 Commissioning personnel qualification requirements

1. Must have the lift operation, electrical installation and maintenance project qualification of the "The People's Republic of China special equipment operating personnel card."
2. Must undergo the escalator professional guidance training, familiar with the escalator mechanical and electrical structure.
3. Must receive the IECB- II board debugging instruction training.

4. Before use please read the " control cabinet electrical schematic" and " control cabinet instructions."

6.2.2 Debugging steps

6.2.2.1 Operating condition check

Make sure that all mechanical parts have been commissioned before inspection running.

6.2.2.2 Check the control cabinet

Open the door of the control cabinet Check for loose connections and damage to components, check and take care of the random files, replace the damaged parts, and tighten the loose connections in the control cabinet. Pay particular attention to the connection of the power, power and plug-in boards.

6.2.2.3 Wiring check

Check the power cable on the control cabinet according to the wiring diagram, the plug-in on the plug-in board and the key switch box. Check the plug-in on the terminal box, the connection cable and the safety switch. Check each device's Ground wire is grounded reliably. If it is a segmented escalator, check that the wiring in the connection box of the connecting cable is properly connected.

6.2.2.3 Insulation inspection

Disconnect the ground wire and HL connection, pull out all the plug-ins on the IECB- II board. Unplug all sensor signals, key switch box signals, and plug-ins for traffic lights. Turn all the breakeres to the "OFF" position. Measure the insulation resistance between HL and power line, motor power line, safety circuit, control circuit, brake coil, socket lighting and earth ground with insulation meter to ensure the insulation resistance is within the specified value. The resistance of each circuit reference value in Table 1, measured correctly, after re-connected to the grounding line IECB- II board plug-ins.

Table 1. Reference values for insulation resistance of each circuit

Circuit classification	Permissible insulation resistance
Power circuits and safety circuits	$\geq 1\text{M}\Omega$
Control circuits, lighting circuits and signal circuits	$\geq 1\text{M}\Omega$

6.2.2.4 Short circuit check

Push on the FA3, FA5 breakeres in the control cabinet and use a multimeter to measure whether the three phases L1, L2, L3 are short-circuited, whether there is short circuit between each phase and ground PE, and between each phase and zero line Whether short circuit;

Make sure that the zero line N and the ground line PE in the control cabinet do not share ground;

With a multimeter to measure three-phase U1, V1, W1 between the two short-circuit; between each phase and the PE is short-circuit between; each phase and the short circuit between the zero line N;

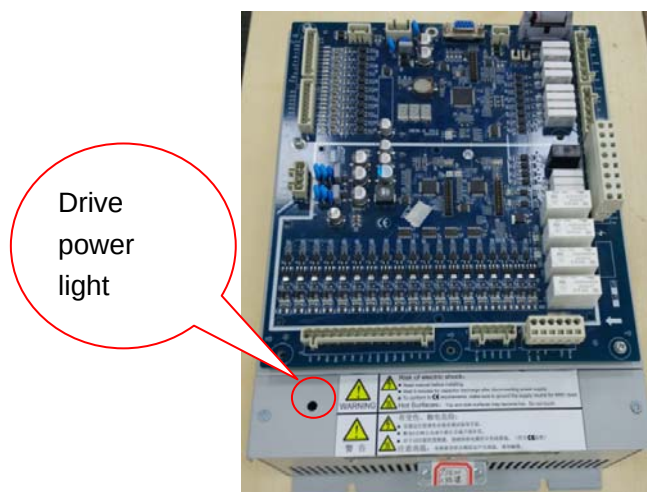
With a multimeter to measure three-phase U2, V2, W2 between the two are short-circuit; between each phase and ground PE is short-circuit; between each phase and the zero line N is short-circuit;

With a multimeter to measure the switching power supply SWP between the terminals L and N, L and PE between the short-circuit. Short circuit between terminals DC24V + and DC0V, short-circuit between terminals DC24V and L or N, and short-circuit between terminals DC0V and L or N.

Use a multimeter to measure the short circuit between the breaker FA3-2 and N.

6.2.2.5 Check the input voltage

Measure with the multimeter whether the upper end L1, L2, L3 in the main power switch box is AC380V $\pm$ 10%, and measure whether the FA2-1 at the upper end of the lighting space is between AC220V $\pm$ 10%. And the main voltage switch FA1 and the illuminated breaker FA2 are turned on after the measurement of the voltage is correct.



Drive power indicator

After the measurement is correct, measure whether the FA3 terminal of the air switch FA3 in the control cabinet and the voltage of the neutral line is AC220V. If it is not AC220V, please check the wiring. If the circuit breaker FA3 is correctly pushed on, observe whether the SWP power supply is lit or abnormal. If not, turn off the circuit breaker FA3 and check the input between the L and N of the SWP power supply. If the green light is on, measure the voltage between the FA4-1 terminal of the FA4 and the DC0V terminal of the SWP with the multimeter. Is the voltage between the DC0V terminal of the FA5-1 and SWP DC24V? If not, please check the wiring and Switching power supply SWP, if it is DC24V push on FA5. Observe the status of the IECB-II board. Turn off the circuit breakers Q1, FA2, FA3 immediately if any abnormality occurs. Check whether the power supply between the P4-1 and P4-2 on the IECB-II logic board is DC24V $\pm$ 10%, whether the power supply between P4-3 and P4-4 is DC24V $\pm$ 10%, between P8-1 and P8-2 Whether the power supply is DC24V $\pm$ 10%.

The power-on status of the logic board is shown in Table 2 below

Table 2. IECB- II logic board power-on state

Indicator light	status
Digital tube LED4, LED4 and LED48	Displays three digits of Arabic numerals
POWER indicator	Always on
CAN	Always illuminated when there is expansion board communication
SYN indicator	Synchronized to complete high-speed operation to maintain constant light (flashing)

The normal power-on of the IECB-II safety control panel is shown in Table 3 below

Table 3. The normal state of the safety section on power up

Indicator light	Features	State Description
SPI1	IECB- II board CPU1 and CPU2 communication between	Flashes (If the indicator is on, the communication is faulty)
COMM1	IECB- II logical part and the security part of the communication between	Flashes (If the indicator is on, the communication is faulty)

6.2.2.6 Check the power supply output

After confirming the correct input voltage, make sure that the motor power cable is connected to the control cabinet. When the control cabinet is powered down, measure whether U1 and U2 are conducting, V1 and V2 are conducting, W1 and W2 are conducting. Check that the motor power supply wiring is correct.

After the power supply of the motor is connected correctly, power on the control cabinet and measure whether the voltage between P3-1 and P3-15 on the IECB- II safety control board is $DC24V \pm 10\%$. If not, check whether the wiring is correct.

After the control cabinet is powered on, and the circuit breaker FA2 is on, measure whether the voltage of the lighting socket of the upper and lower machine room is $AC220 \pm 10\%$. If not, please check whether the wiring is correct.

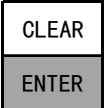
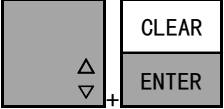
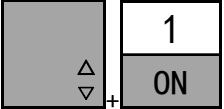
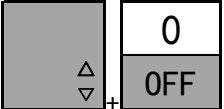
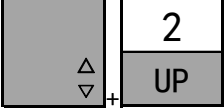
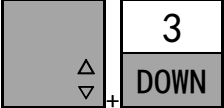
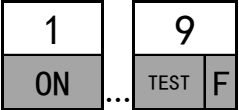
6.2.2.7 Debugging tool instructions

Server is a small terminal equipment, escalator debugging, status monitoring, parameter settings can be achieved through the server. The server all the parameters set and monitoring status, the figure is the server's physical map and key description:



control cabinet need to use the operation keys described in Table 4 below.

Table 4. Keys Instructions

Key	Function Description	Remarks
	Go back to the main page	In any interface to return to the main interface
	Display contents Scroll backward GO ON	/
	Display contents Page forward GO BACK	/
	Clear, and Exit CLEAR	/
	Confirm ENTER	/
	Under certain menu ON, Such as clearing fault records	
	Under certain menu OFF, Such as RSL address monitoring to force the closure of the output	M124 Address Monitor menu
	Under certain menu UP	
	Under certain menu DOWN	
	Input parameter value	Enter a value when changing parameters

6.2.2.8 Parameters to be confirmed before running

M1-3-1 Logical parameter table

NO.	Name	Parameter function	Defaults	Range
1.	DEFAUL	All parameters are restored to their factory values	0	0/1
2.	ESF-FB	0 = No soft stop function, 1 = Soft stop function	0	0/1
3.	ETA-EN	0 = No ETA-PLUS function, 1 = With ETA-PLUS function	0	0/1
4.	INT-EN	0 = No self-starting function, 1 = Self-starting function	0	0/1
5.	LUB-EN	0 = No automatic refueling, 1 = Pulse pump 2 = Gear pump	1	0/1/2
6.	LUBstp	Pump refueling interval time (h)	6	0~255(Integer)
7.	LAT_EN	0 = Key switch indicator display, 1 = Key switch dot matrix display	1	0/1
8.	CONTYP	1 = Bypass inverter 2 = Non-inverter 3 = Completely inverter	1	0/1
9.	RISETM	Inverter acceleration time	3	0~255(Integer)
10.	EB-EN	Does not detect the additional brake relay action, 1 = Detection of additional brake relay action, 2 = Detection of additional brake relay and controller fault	0	0/1/2
11.	INT-LR	Long running time in the positive direction with automatic start(unit s)	60	0~255(Integer)
12.	ValveT	Gear pump out of oil time(unit s)	60	0~255(Integer)
13.	YD-T	Star Triangle Conversion Time (unit s)	5	0~9(Integer)
14.	LUBwrk	Pulse pump out the number of times	50	0~255(Integer)
15.	SYNTIM	The forced switching time when the synchronization signal is lost	7	0~255(Integer)
16.	LUBtst	0= Normal refueling, 1= Refueling test	0	0/1
17.	INT-SR	Short start-up time when the passenger enters in the opposite direction when starting automatically(unit s)	10	0~255(Integer)
18.	INT-VF	0= The low-speed running time of the inverter is 30S when starting automatically; 1-240=Custom inverter low-speed running time	0	0~255(Integer)
19.	BLW-EN	Reserved	0	0/1
20.	PRSMMax	Star delta conversion requires the greatest number of people	5	0~30(Integer)
21.	CAN010	Extension board dialing code 010: 1= Communication is active; 0= Communication is invalid	0	0/1
22.	CAN011	Extension board dialing code 011: 1= Communication is active; 0= Communication is invalid	0	0/1
23.	CAN100	Extension board dialing code 100: 1= Communication is active;	0	0/1

		0= Communication is invalid		
24.	CAN101	Extension board dialing code 101: 1= Communication is active; 0= Communication is invalid	0	0/1
25.	CAN110	Extension board dialing code 110: 1= Communication is active; 0= Communication is invalid	0	0/1
26.	CAN111	Extension board dialing code 111: 1= Communication is active; 0= Communication is invalid	0	0/1

M1-3-2 Drive parameter table

NO.	Name	Parameter function	Defaults	Range
1	MAXFRE	Highest frequency	50.30	50.00~99.99
2	RISETM	Acceleration time	2.5(5.5~11kW),3(15~18kW)	0.1~999.9
3	FALLTM	Deceleration time	15(5.5~7.5kW),20(9~11kW),23(15kW)	0.1~999.9
4	LMTFRE	Upper limit frequency	51.00	0.01~51.00
5	RATVOL	Rated voltage	According to the contract the motor parameter settings	
6	RATCUR	Rated current	According to the contract the motor parameter settings	
7	LOFRE	Low speed frequency	20.00	0~51.00
8	HIFRE	High - speed frequency	50.30	0~51.00
9	INSFRE	Frequency of inspection	20.00	0~51.00
10	TREC	Fault reset wait time	5.0	2~6.0
11	NREC	The number of failure recovery attempts	3	0~10
12	BRKEN	Energy consumption braking enabled	1	0/1
13	BRKVOL	Energy consumption braking starting voltage	680	620~750(Integer)
14	CARFRE	Carrier frequency adjustment	8	1~10(Integer)
15	FANCTL	Fan control selection	1	0= On power has been running 1= Escalator runtime operation 2= Temperature control
16	INIT	Parameter initialization	0	1= Clear the inverter fault

				2= Drive parameter initialization
--	--	--	--	-----------------------------------

M2-1-2-1 in the IECB- II safety function parameters set in the table below:

M2-1-2-1 Parameters Table

NO.	Name	Parameter function	Defaults	Range
1	step SPF (mm)	Escalator speed	500	0~900
2	step width (mm)	Step width	406.4	0~1000
3	ESCTYP	Escalator type	0/1	0: Escalator 1: Autowalk

The parameter "step SPF" set the escalator nominal speed;

The parameters "step width" set the escalator step depth;

The parameter "ESCTYP" sets the type of escalator.

Inspection running since before learning

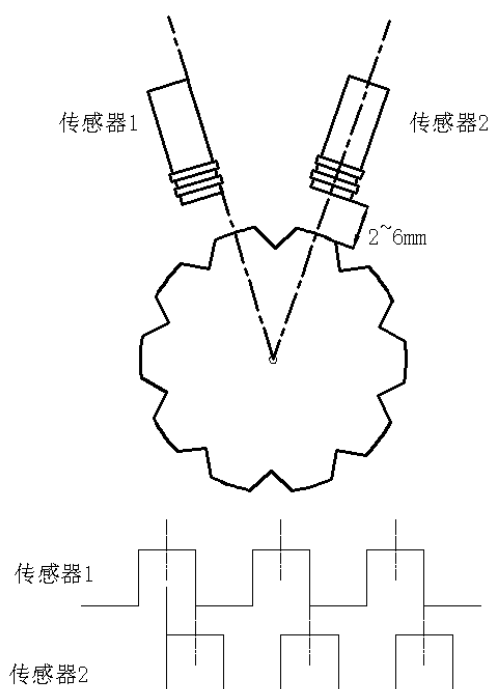
The control cabinet of the factory is not self-learning. After power-on, the key switch box displays "NAV" and the IECB- II board displays "17". This state, the escalator can not be normal inspection operation or start with the key. It is necessary to turn the "SW1" switch on the IECB-II to the "RE" side before turning on the inspection operation. If the key switch shows "L / 1L" (power frequency status display "L", inverter status display "1L"), IECB- II logic board displays "00". Note: Only when the factory is equipped with the escalator, the not self-learning inspection function can be used. Under this function the IECB-II board is not self-learning, so the following faults are not detected: OS (overdrive), NRD (non-steering reversal), MSD (step loss detection), HRS (armrest speed offset detection), operating brake Feedback, front panel open detection. Before learning, it is necessary to set "SW1" to the other side of "RE" to perform self-learning. If the escalator has completed self-learning, set the "SW1" dialing switch to the other side of "RE". Otherwise, it will report INV fault.

6.2.2.9 Installation and commissioning of the sensor

6.2.2.9.1 Installation and commissioning of main drive speed sensor

Before the commissioning of the escalator, make sure that the distance between the two main drive wheel speed sensors and the main drive gear is 2mm-3mm. The center distance between the two main drive wheel speed sensors should be 40 ± 1 mm. When the main driving wheel is rotated, the speed sensor can sense the speed pulse and will not collide with the main driving wheel. In the actual installation process, the sensor surface should be free of oil so as not to affect the detection precision of the sensor.

The main drive sensor installation diagram is shown below:



Main drive sensor mounting dimensions

After installing the main drive sensor, in the non-self-learning maintenance operation, through the M2-1-1-5 menu interface can monitor the two main drive sensor pulse. Normal 0.5m / s and 0.65m / s speed of the ladder, the feedback speed pulse between 14 ~ 25HZ. When the speed of the escalator is 0.5m / s, the main drive value in the server monitoring interface is shown as follows. For the server usage, refer to chapter 3.1:

SPD1: 0015HZ
SPD2: 0015HZ

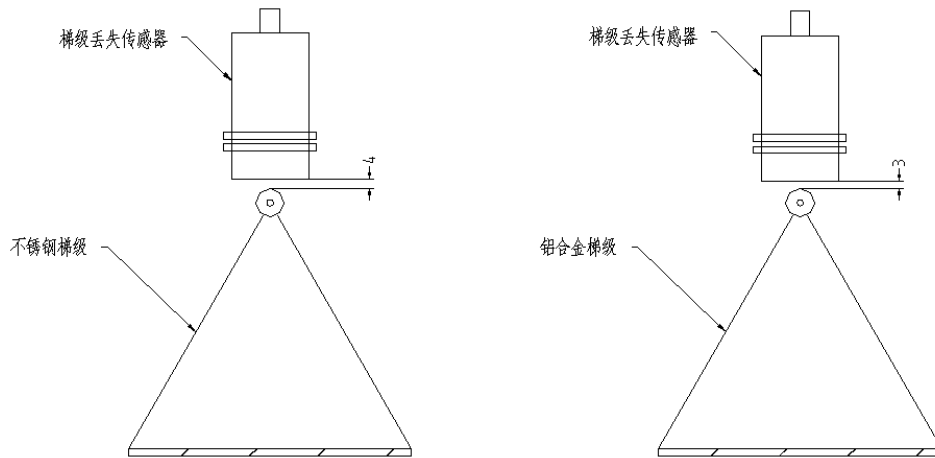
The actual display value of SPD1 (main drive tachometer sensor 1) and SPD2 (main drive tachometer sensor 2) will vary depending on the whole ladder parameter.

Speed sensor In the installation, the main drive speed sensor 1 and the main drive speed sensor 2 must ensure that the formation of an AB phase angle, the phase angle is the best value of 90 ° to allow the deviation of the phase angle of 70 ° ~ 110 °. If the phase angle between the speed pulse and phase AB is not within the range, adjust the sensor mounting position as shown above.

6.2.2.9.2 Installation and debugging of step loss sensor

Step detection sensor is mainly installed on the head of the escalator and the lower head corner position, the sensor probe and the step must be maintained between the appropriate distance to ensure that the operation can not only detect the step, but not with the step collision, stainless steel step sensor general installation distance For the 4 ~ 6mm, aluminum step sensor installation distance is generally 3 ~ 5mm, in the actual installation process to ensure that the sensor surface is no oil so as not to affect the detection accuracy of the sensor.

Step loss sensor installation diagram shown below:



Step lost sensor mounting dimensions

Step detection sensor for different materials, the effective detection range will be different, the detection of aluminum step distance will generally decay to the sensor rated detection distance of about 38%, the dynamic detection distance $\leq 3\text{mm}$; stainless steel step dynamic detection distance $\leq 8\text{mm}$.

Installed step missing sensor, through the self-learning before the maintenance run, you can monitor two sensor step missing detection input signal in the M2-1-1-5 menu interface, the server to monitor the step signal is the "SPD" value (Master drive wheel pulse) conversion after the step width, that is a step width corresponding to the number of "SP" pulse. The "MSD" value (the number of the main drive pulses corresponding to the step width) in the server monitoring interface is displayed as follows when the escalator with a step width of 406 mm is running:

MSD1:0012pls/stp MSD2:0012pls/stp

The actual display values for MSD1 (upper step) and MSD2 (lower step) will vary depending on the escalator parameters.

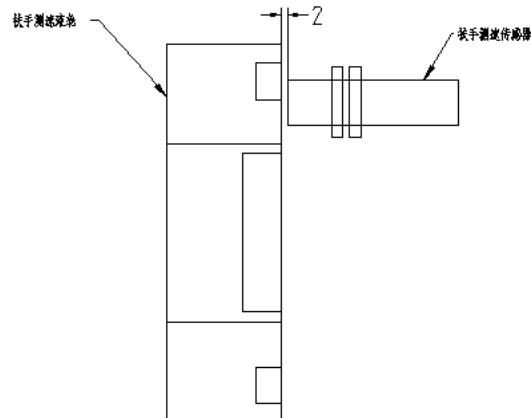
MSD1 is the upper step sensor signal, MSD2 is the lower step sensor signal. The unit pls / stp means the main drive pulley / step.

Step loss detection function can not be shielded during non-inspection operation, and will be automatically shielded during inspection operation.

6.2.2.9.3 Installation and commissioning of armrest velocity sensor

Escalator Before commissioning, it must be confirmed that the distance between the two handrail speed sensors and the sensing plate is 2 ~ 3mm, so that the speed sensor of the handrail belt will produce speed pulse while the sensor probe will not collide with the induction disk.

Handrail speed sensor installation diagram shown below:



Handrail speed sensor mounting dimensions

After installing the armrest speed sensor, non-self-learning maintenance operation, and through the M-2-1-1-5 two-way sensor speed pulse monitoring. When the escalator is running at a speed of 0.5 m / s, the value of the handrail speed in the server monitoring interface is displayed as follows ("HDR" is the right handrail speed and "HDL" is the left handrail speed) and the displayed value is 2 times the actual number of pulses:

HDR: 0022HZ
HDL: 0022HZ-

The actual display values of "HDR" and "HDL" will vary depending on the escalator parameters.

Handrail speed measurement function can not be shielded in the non-inspection operation, in the inspection process will automatically shield.

6.2.2.10 Self-learning

Self-learning operation flow:

Steps			Server Display
1	Press "M2-1-5" to enter the Password menu.	Password: 9999	Enter Password
2	Press "M2-1-2-2" to enter the interface to restore the factory settings.		Resume factory Press Enter...
3	Press "SHIFT" + "ENTER" to restore the factory settings.		Affirm Resume Press Enter...
4	Press "SHIFT" + "ENTER" to restore the factory settings		Resume Factory Success!
5	Press "M2-2-5" to enter the password menu	Password: 9999	Enter Password
6	Press "M2-2-2-2" to enter the interface for restoring factory settings		Resume factory Press Enter...
7	Press "SHIFT" + "ENTER" to restore the factory settings		Affirm Resume Press Enter...
8	Press "SHIFT" + "ENTER" to restore the factory settings		Resume Factory Success!

9	Press "M2-1-2-1" to enter the parameter setting interface		
10	Set the escalator speed "step SPF"		Set according to the actual escalator type
11	Set step or pedal depth "step width"		Set according to the actual escalator type
12	Insert the inspection plug		
13	Press M2-1-4 to enter the self-learning interface		Para. Learning Press<ENTER>
14	Press "SHIFT KEY + ENTER" to enter the self-learning state		Start esc up by Inspection Box
15	In the inspection state, run the escalator in the upward direction until it indicates that the self-learning is successful or failed		

Fault description of self - learning failure

No.	Fault	Description	Troubleshooting
1	SP Fault	SP1 Signal Abnormal	Check the rung speed step SPF in M2-1-2-1 and step width step width to check if the installation of SP1 and SP2 sensors is satisfactory.
2	SP Fault	The difference between SP1 and SP2 is 5Hz	Check whether the SP1 and SP2 sensors are installed to meet the requirements.
3	ABF	The phase difference between AB phase (SP1 is A phase and SP2 is B term) is not between 45 ° and 135 °	Check whether the SP1 and SP2 sensors are installed to meet the requirements.
4	MSD Fault	MSD1 values are not within the ranges specified in Table 4	Check that the upper step sensor is installed correctly
5	MSD Fault	The MSD2 values are outside the ranges specified in Table 4	Check that the lower step sensor is installed correctly
6	HRS Right Fault	The right armrest belt speed pulse value deviation of more than 10% or self-learning process pulse mutation	Check that the right handrail sensor is installed correctly
7	HRS Left Fault	Left hand rail with a speed pulse value deviation of more than 10% or self-learning process pulse mutation	Check that the left hand sensor is installed correctly

6.2.2.11 CHK: Self-learning after the completion of Self-examination

Self-learning is completed, insert the non-inspection plug, with the key switch to start the normal escalator, the escalator self-examination run. During the self-test operation, the escalator will run continuously for 2 minutes. During this 2-minute period, the auto-start function will be temporarily disabled and all the fault protection of the escalator will be checked. If the fault is not detected during the self-test, it will automatically return to the normal running state. Do not need to restart the escalator; if found fault, the escalator will stop running, and display the corresponding failure, common troubleshooting see Table 8, troubleshooting, need to re-self-test, each self-test key switch box will display CHK .

Each time from the maintenance state into the normal state, the escalator will enter the self-test state, the key switch box during the self-test will display CHK, and traffic lights off.

6.2.2.12 Normal inspection run debugging

Escalator control cabinet must be self-learning to normal inspection operation, the normal maintenance operation will monitor overspeed, NRD and PSD failure.

According to the operation of the previous chapters check the line, troubleshooting, set the parameters and self-learning after the completion of the escalator inspection operation. The segment code display on the logic board should be displayed as 00 and the key switch box as L / 1L (power frequency display L, frequency conversion display 1L).

Unplug the non-inspection plug of the upper control cabinet or lower control cabinet and insert the inspection box, press the common button "C" and UP (up) button or DOWN button on the inspection box at the same time, the elevator will start the inspection operation, Start the bell will ring for 3 seconds to remind the relevant personnel attention to safety. If both non-inspection plugs are unplugged or both service kits are inserted at the same time, service can not be performed.

When the bypass frequency conversion mode is selected, the inspection speed is set by parameter INSFRE in M1-3-2, default is 20HZ.

Select the standard frequency operation mode, the inspection operation speed of 50HZ.

Check that the running direction of the escalator is the same as the direction pressed by the inspection box. If not, replace the power line phase sequence of the main unit. Turn U1 and V1 to the opposite direction and swap U2 and V2.

If the configuration of the key switch box with the show, you also need to observe the direction of the key switch box instructions, the downlink, the key switch box shows the arrow should point to the lower room, the upper key switch box arrow should be pointing up room, Not the same need to replace the key switch box.

If equipped with traffic lights, then also you need to observe traffic lights direction. If the direction is different, replace the output signal wiring for the upper and lower traffic lights according to the electrical schematic.

In the maintenance of running state, do not detect the loss of steps, handrails with speed offset, brake feedback, front panel open.

6.2.2.13 Normal operation

If the inspection running function is normal, insert the non-service plug into the maintenance socket, and the escalator returns to the normal preparation mode. The switch in Figure 8 to switch to INV (frequency) or STD (frequency) to set the escalator whether the bypass frequency operation or standard frequency operation, the use of key switch start escalator, start the alarm will ring 3 seconds to remind the relevant Personnel pay attention to safety. When the normal start, according to the direction of instructions to turn the key switch until the host running and then loose, but the rotation time can not exceed 5 seconds, otherwise it will trigger the key adhesion failure.

Each time from the maintenance status into the normal state, start the escalator, the control system will enter the CHECK self-test mode, the key switch box display CHECK, run about 2 minutes, the display automatically return to normal.

6.2.2.13 Automatic start function debugging

In the frequency conversion mode: Set the INT-EN parameter to 1, start the escalator should start in the frequency star state, run 30s (set by the parameter INT-VF) after the escalator to stop running, when checked to After the passenger enters the escalator, it will run for a period of time (set by the parameter INT-LR) to switch to the inverter, then switch to the low speed operation and then enter the standby mode after running 30S. When the passengers from the opposite direction into the escalator, the escalator frequency star running 15S, to remind passengers the wrong direction.

The standard frequency of the automatic start function with the bypass frequency of the automatic start function is

consistent, but no inverter low speed operation, the speed of the escalator only a high frequency.

6.2.2.14 Refueling function

Parameter LUB-EN is set to 1 when the pulse pump refueling, set to 2 when the gear pump refueling. The parameter LUBstp is used to set the fueling interval. The parameter LUBwrk is used to set the number of pump oils for each refueling cycle of the pulse pump. The parameter Valve T is used to set the oil time for refueling cycle of the gear pump. When the parameter LUBtst is set to 1, the fueling test mode is activated. The pump will refuel a cycle when running the escalator.

6.2.2.15 Safety switch commissioning

Escalator in the normal stop ladder state, trigger each safety switch on the escalator and check the IECB board shows the fault code, the key switch box shows the fault code and the code in Table 8 is the same, if not consistent, please check the switch Whether the line is correct.

6.2.2.16 Stop distance debugging

Place the corresponding load on the rung according to the rated load and then stop the escalator from running. If the stop distance exceeds the range, the system will report the fault, the key switch display code PSD, IECB- II board display code 70 or 71, the detailed fault code table in Table 8, if the reported stop distance fault, adjust the brake clearance. Through the menu M2-1-1-1 can see the last time when the stop distance.

If the stop distance exceeds 1.4 times the maximum allowable stop distance, it will trigger the action of the additional brake. If the escalator has the auxiliary brake function, after adjusting the brake clearance, you need to restore the additional brake before normal operation.

6.2.2.16 Additional brake

When the escalator is equipped with additional brakes, the function needs to be debugged. In the normal state of the safety circuit, the additional brake should be in the open state, please check the additional brake when debugging state. When the escalator is 120% faster, the escalator is reversed during operation or the braking distance exceeds 1.4 times the maximum stopping distance. The additional brake should be actuated immediately and trigger the additional brake switch action.

IECB- II trigger additional brake action, trigger additional brake action failure after 5s, IECB- II board automatically reset the additional brake control relay, this time to allow the escalator to run normally, continue to show additional brake action fault code. If the additional brake switch is still in operation, the IECB- II board will cut off the safety circuit to stop the operation of the escalator. Wait 5 seconds before restarting. The reset operation can be repeated.

6.2.2.16 Escalator debugging

Escalator debugging to the escalator manufacturers of the debugging process shall prevail.

7. Use maintenance instructions

7.1 Normal use instructions

After troubleshooting, ask the maintenance personnel to ensure that the fault has been ruled out, and the function of a simulation test to ensure that the safety function is normal, and continue to run the escalator for 2 minutes to ensure that the escalator is running in the correct state, for which we also in Security module Added the system self-detection function (CHK function).

The system will self-test for 2 minutes when the operation status is entered by the inspection status. In the system self-detection process, the key switch shows CHK, if the CHK in the process of failure, escalator emergency stop operation, need to re-CHK after troubleshooting; If there is no fault in the CHK process, the escalator enters the normal operating state.

During the self-test, if the escalator is in the automatic start mode, it will not stop automatically. Only after CHK is completed will it enter the normal self-starting operation mode.

In the process of self-test system, maintenance personnel must be in the field until the end of the entire CHK process until the system is normal.

7.2 General maintenance instructions

Maintenance cycle: 15 days maintenance time

Maintenance method:

- 1、 Check whether the main drive speed sensor, rungs loss sensor, armrest speed sensor installation is loose, the installation of the pitch is offset. And timely fixed a good sensor and adjust the installation spacing.
- 2、 Check the sensor and sensor cable is damaged, if damaged, please replace.
- 3、 Remove the stain on the sensor surface.
- 4、 Check whether the protective cover of the Security module is loose, whether the protective cover is deformed and damaged.
- 5、 Remove the stain on protective cover of the Security module.
- 6、 Open the MSCB board protective cover, check the protective cover inside the fouling or water, and timely cleaning.
- 7、 Check whether the wiring of the Security module port plug is loose and tightened in time.
- 8、 Check the components of the Security module surface package is damaged, if damaged, please return to the factory maintenance;
- 9、 Check whether the connection cable between the Security module and the control system is damaged, whether the fasteners are loose or damaged;
- 10、 15 days power off operation once, to detect Security module safety relay work is normal.

7.3 Common faults and troubleshooting methods

Fault name	Fault code	Locked	Fault	Triggering conditions
NON	00		No error	
ECB	01		Control cabinet type error	Control cabinet type setting error (full frequency conversion CONTYP should be set to 3)
J	02		Power phase error	Detect phase sequence error in three phase power or lack of any phase
E16	03		Peripheral 24V power failure	No input of peripheral-supplying switching power (P11-1, P11-2 no input power)
MO1	06		Safety chain monitoring 1	Upper step collapse switch
MO2	07		Safety chain monitoring 2	Host mechanical over-speed, main drive tight, host fan cover, host thermal switch
MO3	08		Safety chain monitoring 3	Upper left / right handrail entry, upper left / right comb plate switch
MO4	09		Safety chain monitoring 4	Upper left skirting, upper right skirting switch
MO5	10		Safety chain monitoring 5	Left / right handrail, lower left / right handrail entry, lower left / right comb plate, lower left skirting, lower right skirting switch
MO6	11		Safety chain monitoring 6	Lower step collapse switch
MO7	12		Safety chain monitoring 7	Lower left / right step traction chain switch, lower emergency stop switch, lower stop switch, R lower stop switch
MO8	13		Safety chain monitoring 8	Upper emergency stop switch, upper stop switch, R upper stop switch
MO9	14		Safety chain monitoring 9	Additional brake S53.2 switch action
NAV	17		Running enable state	Not complete self learning
OC	21		Over current OC in constant speed	When inverter is running at constant speed, output current exceeds over current value
OC1	22		Over current OC-1 in acceleration	When the inverter is running at accelerating speed, the output current exceeds the over-current value (2.2 times of the rated current of inverter)
OC2	23		Over current OC-2 in deceleration	When the inverter is running at decelerating speed, the output current exceeds the over-current value (2.2 times of the rated current of inverter)
OU	24		Over voltage OU in constant speed	When the inverter is running at constant speed, the DC voltage of the main circuit exceeds the set value. (more than 750V)
OU1	25		Over voltage OU-1 in acceleration	When the inverter is running at accelerating speed, the DC voltage of the main circuit exceeds the set value. (more than 750V)
OU2	26		Over voltage OU-2 in deceleration	When the inverter is running at decelerating speed, the DC voltage of the main circuit exceeds the set value. (more than 750V)
POF	27		Under-voltage P. OFF	During the running process, the DC voltage of main circuit is not enough, the detected level: 400V level, about 380VDC or lower
OH	28		Overheat (OH)	The radiator temperature is greater than or equal to Oh detection value (about 80 DEG to the temperature switch)
OL	29		Overload (OL)	Motor and current exceed the rated load capacity
EEP	31		Write parameter fault EEP	Inverter control unit fault

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Fault name	Fault code	Locked	Fault	Triggering conditions
FLT	32		Module fault FLT	Inverter external fault causes automatic protection of module
FLB	33		Brake module fault FLT_B	Inverter braking unit fault
CUR	34		Current sampling fault CUR_	Motor and current exceed the allowable rated load capacity
REY	36		Drive relay failure	Drive relay failure
E62	39		Contactor not closed after escalator starts	Inverter contactor not closed after escalator starts, start detection is 2s
E63	42		Contactor not trip after escalator stops	Inverter contactor not trip after escalator stops, stop detection is 2s
S05	43		Front plate opened	In non-overhaul state, the parallel switches of the front plate turn on simultaneously
S06	44		Front plate abnormally opened	In non-overhaul state, the parallel switches of the front plate turn on with adhesion
B25	45	LOCK	Upper step missing	Step of upper head is detected missing
B26	46	LOCK	Lower step missing	Step of lower head is detected missing
E12	47		Upper and lower control signals simultaneously	Ascending and descending control signals are effective in input at the same time
SFL	48	LOCK	Additional brake no action	Additional brake does not work when over-speed 120% or non reversal device occurs
E15	49		Key signal triggers wrong direction	Direction of the key is inconsistent with the feedback direction of safety circuit ascending and descending
E84	50		Key reset	15 seconds after the start, the key signal input continues 1S
E17	51		Key signal switch button adhesion	Effective time of key switch signal is detected more than 8S
KN2	52		Key signal switch button adhesion	Key signal switch button adhesion
E67	53		Contactor not closed after escalator starts	After the escalator starts the star delta contactor not closed (full frequency: after start the brake contactor not closed), and the effective detection time of start is 2S
E65	54		Contactor not closed after escalator starts	After the escalator starts the ascending and descending contactors not closed (full frequency: after start the main contactor not closed), and the effective detection time of start is 2S
E44	55		Contactor not trip after escalator stops	After the escalator stops the ascending and descending contactors not trip (full frequency: after stop, the main contactor not released), and the effective detection time of stop is 2S
E66	56		Contactor not trip after escalator stops	After the escalator stops the star delta contactors not released (full frequency: after stop, the brake contactor not trip), and the effective detection time of stop is 2S
OS2	57	LOCK	Host speed abnormal 20%	Host speed > 120% the normal value of self learning
OS1	58	LOCK	Host speed abnormal 10%	Host speed > 110% the normal value of self learning
B9	59		Right handrail sliding 15%	HRS-R pulse frequency < 85% self learning value
B8	60		Left handrail sliding 15%	HRS-L pulse frequency < 85% self learning value
LNF	61	LOCK	Self learning failure	SP/MSD/HRS parameter value obtained by self-learning is not within the specified range of the program

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Fault name	Fault code	Locked	Fault	Triggering conditions
SPS	62	LOCK	Host AB phase sensor fault	Pulse frequency difference between SP1 and SP2 exceeds 5Hz
ABF	63	LOCK	Host speed detects AB phase error	Phase difference between SP1 and SP2 is not between 35 degrees ~135 degrees; or ascending and descending AB phase angle difference is more than 40 degrees; or within 1.5S not determine the running direction; or SP1 and SP2 sensors are installed in reverse order
S33	64	LOCK	Brake 1 lifted	After escalator starts, detect the brake not lifted
S34	65	LOCK	Brake 2 lifted	After escalator starts, detect the brake not lifted
S33	66	LOCK	Brake 1 drops	After escalator stops, detect the brake not drops
S34	67	LOCK	Brake 2 drops	After escalator stops, detect the brake not drops
NRD	68	LOCK	NRD UP ascending reversal	In escalator ascending process, NRD occurs
NRD	69	LOCK	NRD DOWN descending reversal	In escalator descending process, NRD occurs
PSD	70	LOCK	Stopping distance over 140%	In stop, the braking distance exceeds 140%
PSD	71	LOCK	Stopping distance over 140%	In stop, the braking distance exceeds 120%
S53	72		Additional brake switch	Detect the additional brake switch action
KO2	73		Additional brake relay status abnormal	Additional brake status abnormal
S44	78		Oil level switch	Oil level switch action, the escalator can again run for 24h (one refueling cycle)
B17	79		Water level switch	Water switch action, the escalator can again run for 60s.
IA1	81		Extended board reservation	Extended board reservation
IA2	82		Extended board reservation	Extended board reservation
LNK	83		Stop linkage (remote stop)	Stop linkage (remote stop) extended board
CNF	84		Additional delay controller failure	Additional delay controller failure
POL	85		Power under-voltage	Power under-voltage
HEA	86		Heating box fault	Heating box fault extended board
IVT	87		General inverter fault	General inverter fault extended board
BW2	88		Brake wear	Brake wear extended board
SYN	91		Synchronous fault	Synchronous fault
E79	92		Inverter fault	Inverter fault
E80	93		E2 data is not formatted, the parameter is not in the normal range	Power on, read the EEPROM parameter error or uninitialized parameters (if the initialized parameter is power off and is not valid after power on again, it need return to the factory)
E81	94		Inverter communication fault	Correct data packet not received within 3s
S70	95		In running process switch toggle switch or toggle switch status error during operation	In running process, detect the power frequency bypass toggle switch action Full frequency conversion: toggle switch need go to non- INV state
FIR	96		Fire alarm	Fire alarm extended board
STP	97		Remote stop	Remote stop extended board
FAN	98		Motor room fan alarm	Motor room fan alarm extended board
XCM	99		Communication fault	Communication loss

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Fault name	Fault code	Locked	Fault	Triggering conditions
EC1	100		Peripheral interface board communication failure, number: 010	Peripheral interface board (collection board and extended board) communication failure
EC2	101		Peripheral interface board communication failure, number:011	Peripheral interface board (collection board and extended board) communication failure
EC3	102		Peripheral interface board communication failure, number:100	Peripheral interface board (collection board and extended board) communication failure
EC4	103		Peripheral interface board communication failure, number:101	Peripheral interface board (collection board and extended board) communication failure
EC5	104		Peripheral interface board communication failure, number:110	Peripheral interface board (collection board and extended board) communication failure
EC6	105		Peripheral interface board communication failure, number:111	Peripheral interface board (collection board and extended board) communication failure
4J1	142		Upper step collapse switch	Upper step collapse switch action
4J2	143		Host over-speed switch	Host over-speed switch action
4J3	144		Main drive tension switch	Main drive tension switch action
4J4	145		Host fan switch	Host fan switch action
4J5	146		Host thermal switch	Host thermal switch action
4J6	147		Upper left handrail entry switch	Upper left handrail entry switch action
4J7	148		Upper right handrail entry switch	Upper right handrail entry switch action
4J8	149		Upper left comb plate switch	Upper left comb plate switch action
4J9	150		Upper right comb plate switch	Upper right comb plate switch action
4JA	151		Upper left skirting switch	Upper left skirting switch action
411	152		Upper right skirting switch	Upper right skirting switch action
412	153		Upper emergency switch	Upper emergency switch action
413	154		Upper stop switch	Upper stoop switch action
414	155		R upper stop switch	R upper stop switch action
415	156		Additional brake switch 2	Additional brake safety switch 2 action
5J1	160		Right handrail break switch	Right handrail break switch action
5J2	161		Left handrail break switch	Left handrail break switch action
5J3	162		Lower left handrail entry switch	Lower left handrail entry switch action
5J4	163		Lower right handrail entry switch	Lower right handrail entry switch action
5J5	164		Lower left comb plate switch	Lower left comb plate switch action
5J6	165		Lower right comb plate switch	Lower right comb plate switch action
5J7	166		Lower left skirting switch action	Lower left skirting switch action
5J8	167		Lower right skirting switch	Lower right skirting switch action
5J9	168		Lower step collapse switch	Lower step collapse switch action
5JA	169		Lower left step chain switch	Lower left step traction chain switch action
511	170		Lower right step chain switch	Lower right step traction chain switch action
512	171		Lower emergency stop switch	Lower emergency stop switch action
513	172		Lower stop switch	Lower stop switch action
514	173		R lower stop switch	R lower stop switch action

When fault collection uses the 36 way, this fault code is adopted, M01-M09 fault code is invalid and is not displayed
