I Preface

The integrated drive controller for AS330 series escalator is a state-of-the-art new generation dedicated escalator control and drive device. Compared with traditional drive controller, it is safe, reliable, and easy to operate, in addition, under the comprehensive consideration of the load characteristics of the escalator, advanced frequency conversion speed regulation and intelligent escalator control technology is used to combine the control and drive of the escalator and, as a result, further improve the performance, simplicity, economy.

II Model, Technical Data and Specification

The models of integrated drive controller for AS330 series escalator are shown in Table 2.1.

Table 2.1 Models of Integrated Drive Controller for AS330 Series Escalator

ModelS330-	Rated Capacity(kVA)	Rated Output Current(A)	Applicable Motor(kW)
4T05P5	8.5	13	5.5
4T07P5	14	18	7.5
4T0011	18	27	11
4T0015	24	34	15
4T18P5	29	41	18.5
4T0022	34	48	22
4T0030	50	65	30
4T0037	61	80	37

The technical data and specification of integrated drive controller for AS330 series escalator is shown in Table 2.2.

Table 2.2 Technical Data and Specification of Integrated Drive Controller for AS330 Series Escalator

	4T05P5	4T07P5	4T0011	4T0015	4T0018	4T0022	4T0030	4T0037
Max. applicable motor capacity(kW)	5.5	7.5	11	15	18.5	22	30	37

Rated output	Rated capacity (kVA)	8.5	14	18	24	29	34	50	61
	Rated current (A)	13	18	27	34	41	48	65	80
	Max. output voltage (V)	400V class: 3 phase 380/400/415/440/460V (corresponding to input voltage)							
Input power supply	Phase, voltage, frequency	400V class: 3phase 380/400/415/440/460V, 50/60Hz							
	Allowable voltage variation	-15%～+10%							
	Allowable frequency variation	-5%～+5%							
	Instantaneous voltage dip withstanding capacity	400V class: continue operation above AC300V; When dip from rated input state to below AC 300V, under-voltage will be activated after 15 ms of operation							
Basic feature	Automatic escalator running speed	≤0.7m/s							
	Communication	CAN bus serial communication							
	Operation	See chapter 3							
Drive feature	Starting torque	180% 0.5Hz							
	Frequency control range	0～120Hz							
	Overload capacity	150% for zero speed, 160% for < 3Hz, 200% for > 3Hz							
	Braking torque	150% (external connection with braking resistor), with internal braking unit							

	Acceleration / deceleration time	0.01～600s
Control I/O signal	Opto-coupler input control power	Isolated 24V DC
	Relay output control power	Isolated 24V DC
	Low voltage opto-coupler isolated input	20 points, switching value. Opto-coupler control signal is the input signal of isolated 24V DC.
	High voltage opto-coupler isolated input	3 points, switching value.
	Relay output 1	9 points, 1 point NO contact, capacity: resistive, 5A 250VAC or 5A 30VDC
	Relay output 2	3 points, 1 point NO contact, capacity: resistive, 6A 250VAC
	CAN communication interface	1 point, for the communication of fault collection board and fault display board.
	RS485 communication interface	1 point for monitoring.
	Analog input port	1 point, input voltage range -10V～+10V with the precision of 0.1%. for receiving the signals of phase collector.
Display	Board operator or handheld operator	Board operator is standard with LED segment code display. The handheld operator is provided with LCD display.
Protection	Overload protection for motor	The protection curve can be set with parameters

	Frequency convertor overload	160%, 5 seconds for < 3Hz, 185%，10 seconds for > 3Hz
	Short-circuit protection	Provide protection for the drive controller when short circuit of any two phase at output side causes over current
	Input phase failure protection in operation	If input phase failure in operation, shut off output to protect the drive controller
	Output phase failure protection in operation	If output phase failure in operation, shut off output to protect the drive controller
	Over-voltage threshold	Bus voltage 410V (200V series) , 810V (400V series)
	Under-voltage threshold	Bus voltage 180V (200V series), 380V (400V series)
	Instantaneous outage compensation	Provide protection above 15ms
	Sink overheat	Provide protection with thermistor device
	Stall protection	30% stall protection when the speed deviation is greater than the rated speed in operation
	Braking unit protection	Automatically detect abnormal braking unit and provide protection
	Module protection	Over-current, short circuit, over-heat protection

	Current sensor protection	Self-check upon power-on
	I²t protection	Detection via 3-phase current
	High input voltage protection	Higher than 725V for 400 V class, higher than 360 V for 200V class, detection when stop
	Output grounding protection	In case of short-circuit of any phase to ground, shut off output to protect frequency converter
	Output imbalance protection	In case of 3-phase current imbalance of output, shut off output to protect frequency converter
	Braking resistor short-circuit protection	Detect at braking
	Over-speed protection	Protection in case of exceeding the rated speed by 100%
	Under-speed protection	Protection in case of running speed of the escalator much lower than rated speed resulting from fault etc.
	EEPROM fault	Self-check upon power-on
Environment	Surrounding temperature	-10 - +45℃
	Humidity	Below 95%RH (no condensation)
	Storage temperature	-20 - +60℃ (short period temperature in transportation)
	Operation location	Indoors (no corrosive gas and dust)
	Altitude	Below 1000m

Structure	Protection degree	IP20
	Cooling method	Forced air cooling
Installation		Installed in the cabinet

III Installation Dimensions and Weight of Integrated Drive Controller

See Fig. 3.1 and Table 3.1 for installation dimensions and weight of integrated drive controller.

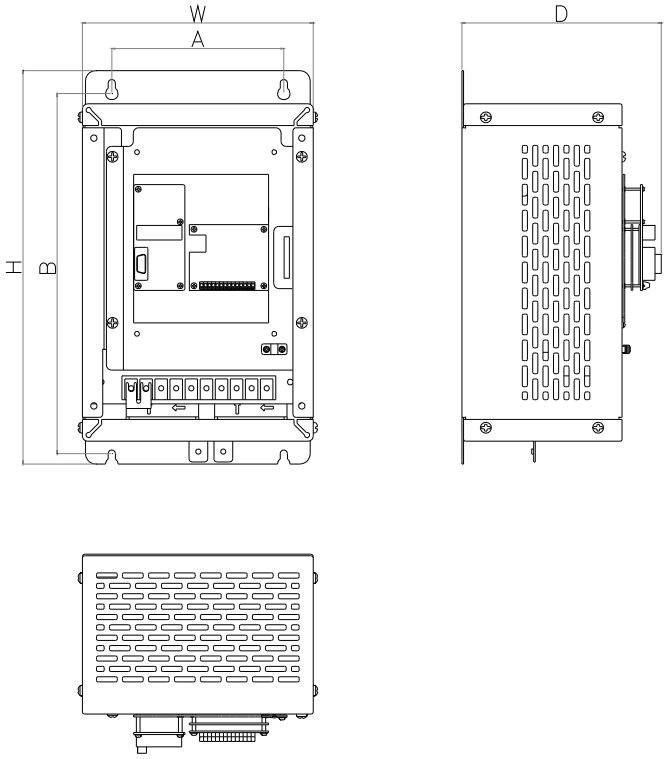


Fig. 3.1 Schematics for Installation Dimensions of Integrated Escalator Drive Controller

Table 3.1 Weight Specification of Integrated Escalator Drive Controller

Model AS330	A (mm)	B (mm)	H (mm)	W (mm)	D (mm)	Installation Hole Φ(mm)	Installation			Tightening Torque (Nm)	Weight (kg)
							Bolt	Nut	Washer		
4T05P5	100	253	265	151	166	5.0	4M4	4M4	4Φ4	2	4.5
4T07P5	165.5	357	379	222	192	7.0	4M6	4M6	4Φ6	3	8.2
4T0011											
4T0015	165.5	392	414	232	192						10.3
4T18P5											
4T0022											
4T0030	200	512	530	330	290	9.0	4M8	4M8	4Φ8	6	30
4T0037										9	

IV Wiring of Integrated Escalator Drive Controller

1 Description of main circuit terminals

Terminal layout of main circuit terminals

⊕1	⊕2	B	⊖	R/L1	S/L2	T/L3	U/T1	V/T2	W/T3

Label and function description of circuit terminals

Table 4.1 Function Description of Main Circuit Terminals

Label	Function Description
⊕1	Can be externally connected with DC reactor and set to short-circuit at factory
⊕2	
⊕2	External braking resistor connection
B	
⊖	Negative output terminal of DC bus
R/L1	AC power input of main circuit, to connect with 3-phase input power
S/L2	

T/L3	
U/T1	Frequency converter output, to connect with 3-phase synchronous / asynchronous motor
V/T2	
W/T3	

2 Wiring of control circuit terminals

The layout of control circuit terminal is shown in fig. 4.1 Control Circuit Terminal.

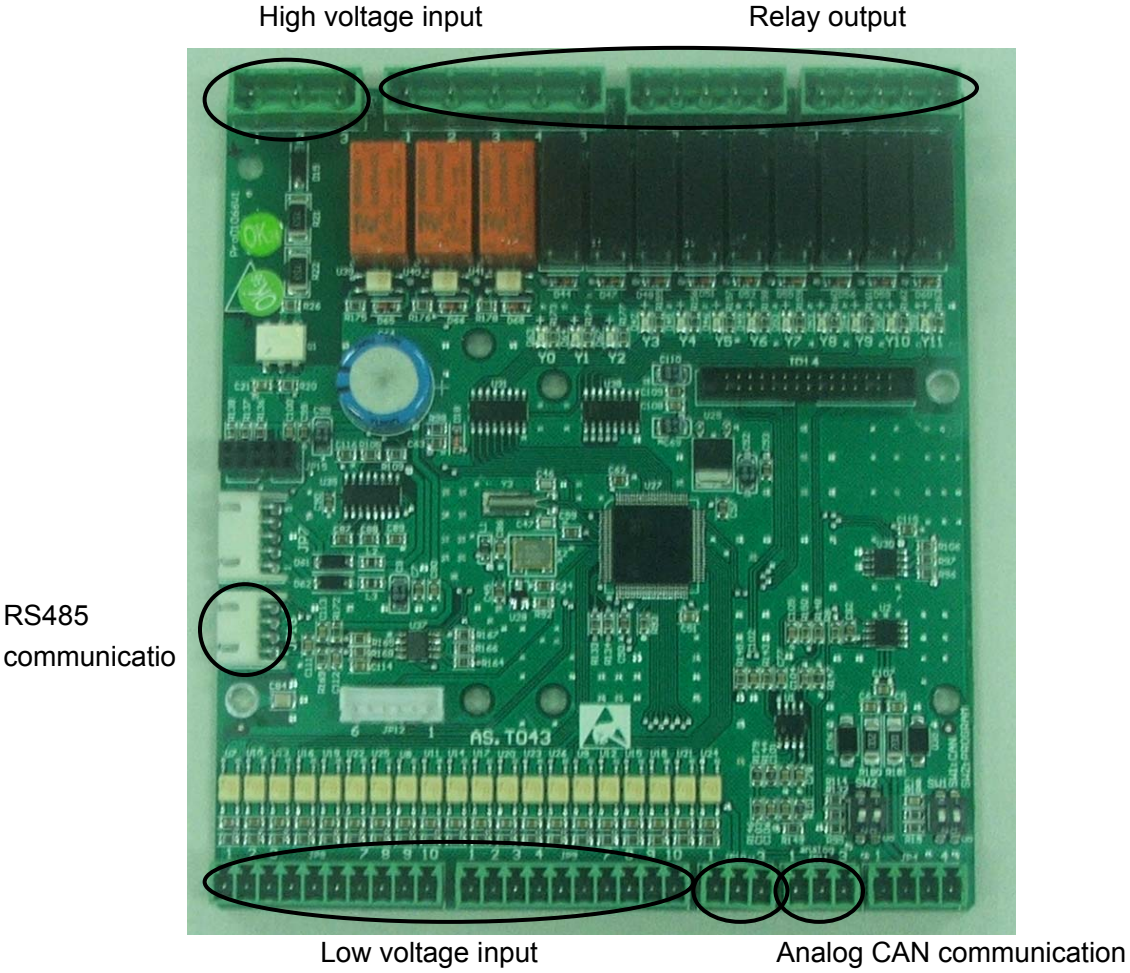


Fig. 4.1 Control Circuit Terminal

Label and function description of control circuit terminal

See Table 4.2 and Table 4.3 for function description of control circuit terminals

Table 4.2 Function Description of Control Circuit Terminals in Full Frequency Conversion Mode

NO.	Pos.	Name	Definition	Type	Comment
JP1	JP1.1	Y0	Running contactor1	Output	Relay output Y0~Y2 contact parameter: 6A 250VAC/30VDC Y3 contact parameter: 5A 250VAC/30VDC
	JP1.2	Y1	Brake contactor	Output	
	JP1.3	Y2	Running contactor 2	Output	
	JP1.4	Y3	Auxiliary braking contactor	Output	
	JP1.5	COM1	Common of output relay Y0-Y3		
JP2	JP2.1	Y4	Upward signal output	Output	Y4~Y6 provide signals to safety
	JP2.2	Y5	Downward signal output	Output	

	JP2.3	Y6	Service signal output	Output	monitoring board ES.11/A Relay output contact parameter: 5A 250VAC/30VDC
	JP2.4	Y7	Reserved	Output	
	JP2.5	COM2	Common of output relay Y4-Y7		
JP3	JP3.1	Y8	Upward direction indication output	Output	Relay output contact parameter: 5A 250VAC/30VDC
	JP3.2	Y9	Downward direction indication output	Output	
	JP3.3	Y10	Buzzer signal output	Output	
	JP3.4	Y11	Oiling signal output	Output	
	JP3.5	COM3	Common of output relay Y8-Y11		
JP4	JP4.1	24V	24V DC		
	JP4.2	0V	0V DC		
	JP4.3	CANH	Serial communication signal terminal(TXA0+)		Twisted pair
	JP4.4	CANL	Serial communication signal terminal(TXA0-)		
JP5	JP5.1	XCOM	X20 input signal common 0V		110VAC/220VAC input
	JP5.2	X20	Positive voltage terminal of safety circuit detection	Input	
	JP5.3	XCOM	X20 input signal common 0V		
JP7	JP7.1	G5VIO	Backup power 0V		External connection when main control board is used independently
	JP7.2	+5VIO	Backup power +5V		
	JP7.3		Empty		
	JP7.4	G24VIO	Backup power 0V		
	JP7.5	+24VIO	Backup power +24V		
JP8	JP8.1	X0	Service / Automatic	Input	
	JP8.2	X1	Upward running input	Input	
	JP8.3	X2	Downward running input	Input	
	JP8.4	X3	Running contactor 1 detection	Input	
	JP8.5	X4	Upper entrance photoelectric detection	Input	
	JP8.6	X5	Lower entrance photoelectric detection	Input	
	JP8.7	X6	Safety circuit detection	Input	
	JP8.8	X7	Auxiliary brake switch detection	Input	
	JP8.9	X8	Safety board fault collection 0	Input	
	JP8.10	X9	Safety board fault collection 1	Input	
JP9	JP9.1	X10	Safety board fault collection 2	Input	Receive fault signal from safety monitor board ES.11/A
	JP9.2	X11	Safety board fault collection 3	Input	
	JP9.3	X12	Safety board fault collection 4	Input	
	JP9.4	X13	Auxiliary brake contactor detection	Input	
	JP9.5	X14	Running contactor 2 detection	Input	

	JP9.6	X15	Firefighting	Input	
	JP9.7	X16	Mechanical wear detection	Input	Can be redefined
	JP9.8	X17	Motor temperature detection	Input	
	JP9.9	X18	Oil level detection	Input	
	JP9.10	X19	Water level switch	Input	
JP10	JP10.1	+24VIO	Isolated input power +24V with internal connection with JP7.5		
	JP10.2	VSIO	In case of external connection with JP10.1, the input is effective in low level and JP10.3 now is input common; in case of external connection with JP10.3, the input is effective in high level and JP10.1 now is input common		
	JP10.3	G24VIO	Isolated input power 0V with internal connection with JP7.4		
JP11	JP11.1	0V	Analog input 0V		
	JP11.2	AIN-	Differential analog input -		
	JP11.3	AIN+	Differential analog input ＋		

Table 4.3 Function Description of Control Circuit Terminal in Bypass Frequency Conversion Mode

No.	Pos.	Name	Definition	Type	Comment
JP1	JP1.1	Y0	Brake contactor	Output	Relay output Y0~Y2 contact parameters: 6A 250VAC/30VDC Y3 contact parameters: 5A 250VAC/30VDC
	JP1.2	Y1	Frequency conversion contactor	Output	
	JP1.3	Y2	Power frequency contactor	Output	
	JP1.4	Y3	Auxiliary braking contactor	Output	
	JP1.5	COM1	Common of output relay Y0 – Y3		
JP2	JP2.1	Y4	Upward signal output	Output	Y4~Y5 provide signals to safety monitor board ES.11/A Relay output contact parameters: 5A 250VAC/30VDC
	JP2.2	Y5	Downward signal output	Output	
	JP2.3	Y6	Star contactor output	Output	
	JP2.4	Y7	Delta contactor output	Output	
	JP2.5	COM2	Common of output relay Y4 – Y7		
JP3	JP3.1	Y8	Upward direction indication output	Output	Relay output contact parameters: 5A 250VAC/30VDC
	JP3.2	Y9	Downward direction indication output	Output	
	JP3.3	Y10	Buzzer signal output	Output	

	JP3.4	Y11	Oiling signal output	Output	
	JP3.5	COM3	Common of output relay Y8 – Y11		
JP4	JP4.1	24V	24V DC		
	JP4.2	0V	0V DC		
	JP4.3	CANH	Serial communication signal terminal (TXA0+)		Twisted pair
	JP4.4	CANL	Serial communication signal terminal(TXA0-)		
JP5	JP5.1	XCOM	X20 input signal common 0V		110VAC/220VAC input
	JP5.2	X20	Positive voltage terminal of safety circuit detection,110VAC/220VAC input	Input	
	JP5.3	XCOM	X20 input signal common 0V		
JP7	JP7.1	G5VIO	Backup power 0V		Externally connected when main control board is used independently
	JP7.2	+5VIO	Backup power +5V		
	JP7.3		Empty		
	JP7.4	G24VIO	Backup power 0V		
	JP7.5	+24VIO	Backup power +24V		
JP8	JP8.1	X0	Service / Automatic	Input	
	JP8.2	X1	Upward input	Input	
	JP8.3	X2	Downward input	Input	
	JP8.4	X3	Contact adhesion detection	Input	
	JP8.5	X4	Upper photoelectric detection	Input	
	JP8.6	X5	Lower photoelectric detection	Input	
	JP8.7	X6	Safety circuit detection	Input	
	JP8.8	X7	Auxiliary brake switch detection	Input	
	JP8.9	X8	Safety board fault collection 0	Input	Receive fault signal from safety monitor board ES.11/A
	JP8.10	X9	Safety board fault collection 1	Input	
JP9	JP9.1	X10	Safety board fault collection 2	Input	
	JP9.2	X11	Safety board fault collection 3	Input	
	JP9.3	X12	Safety board fault collection 4	Input	
	JP9.4	X13	Auxiliary brake contactor detection	Input	
	JP9.5	X14	Frequency conversion contactor detection	Input	
	JP9.6	X15	Power frequency contactor detection	Input	
	JP9.7	X16	Mechanical wear detection	Input	Can be redefined
	JP9.8	X17	Motor temperature detection	Input	
	JP9.9	X18	Oil level detection	Input	
	JP9.10	X19	Water level detection	Input	
JP10	JP10.1	+24VIO	Isolated input power +24V with internal connection with JP7.5		

	JP10.2	VSIO	In case of external connection with JP10.1, the input is effective in low level and JP10.3 now is input common; in case of external connection with JP10.3, the input is effective in high level and JP10.1 now is input common		
	JP10.3	G24VIO	Isolated input power 0V with internal connection with JP7.4		
JP11	JP11.1	0V	Analog input 0V		
	JP11.2	AIN-	Differential analog input -		
	JP11.3	AIN+	Differential analog input ＋		

Note: the ports can be redefined for JP9.7 - JP9.10. What can be redefined is as follows:

Idle	0
Speed selection (two choices for rated speed)	1
Mechanical wear detection	2
Motor temperature detection	3
Oil level detection	4
Water level detection	5
Fire protection detection	6
Upper photoelectric detection for the second one	7
Lower photoelectric detection for the second one	8
Safety circuit low voltage detection for the second one	9
Mode selection	10

For port redefinition: if multiple points are defined for the same function, it is decided by the input of the last port. For those noted with second channel, all the points are performed or operated to final state.

Configuration description for dial switch

SW1	ON	Monitor the effective state of CAN terminal resistance	SW1 is set to ON at factory;
	OFF	Monitor the ineffective state of CAN terminal resistance	
SW2	ON	Program flashing state	Set to OFF at factory (Maintain OFF state in operation)
	OFF	Normal operation state	

V Function Parameters

1 Function parameter table

Table 5.1 F Parameter List

Mainboard parameters:

No.	Name	Default Value	Range	Unit	Comment
F0	Drive mode	0	0~2		0 Full frequency conversion 1Bypass frequency conversion 2 Only star-delta is available for bypass frequency conversion (when the frequency converter is in fault, it can be set to 2. The port definition and mode is the same to 1)
F1	Leisure mode	0	0~2		0 No leisure mode 1 Only leisure half speed 2 Both leisure half speed and leisure stop are available
F2	Fire ladder	0	0~2		0 No fire ladder 1 Upward evacuation 2 Downward evacuation
F3	Rated speed 1	500	100~3000	0.001m/s	
F4	Service speed	150	10~3000	0.001m/s	
F5	Leisure speed	150	10~3000	0.001m/s	
F6	Normal additional brake release time	50	1~1000	0.1s	
F7	Leisure motor torque restriction	900	800~2000	0.1%	In leisure mode, protection is provided when the motor torque exceeds the set value
F8	Star-delta conversion time	50	5~500	0.1s	
F9	Buzzing time in case of fault	20	0~10000	0.1s	Fault of safety circuit disconnection
F10	Buzzing time in case of service	0	0~50	0.1s	

No.	Name	Default Value	Range	Unit	Comment
F11	Alarming time in case of reverse entry	30	10~1000	0.1s	
F12	Function enable	0	0~65535		Bit0：Additional brake Bit1：Adhesion can be reset Bit2：Oiling mode Bit3：Cancel high voltage safety circuit Bit4：Low speed over-current protection mode (- for stop, * for switch to star-delta mode, default to 0) Bit5：If safety collection board is available or not (- for no, * for yes, default to -. If detected, it will change to 1 automatically) Bit6：First star-delta start (first power-on or escalator stops for longer than 6 hours) Bit7：Reverse photoelectric is ineffective in high speed or leisure slow speed Bit8：Direct star-delta start with no star-delta conversion (mainly low power motor. One contactor can be saved)
F13	Oiling interval	12	0~1000	Hour	
F14	Single oiling time	10	0~1000	s	
F15	Input type X0-X15	0	0～65535		
F16	Input type X16-X31	0	0~65535		
F17	Reserved	0	0~65535		
F18	Input type TX0-TX15	0	0~65535		
F19	Input type TX16-TX31	0	0~65535		
F20	Input type TX32-TX47	0	0~65535		
F21	Single pickup time in oiling	10	1~100	0.1s	

No.	Name	Default Value	Range	Unit	Comment
F22	Single release time in oiling	20	1~100	0.1s	
F23	Leisure low speed time in same rotating direction	100	100~10000	0.1s	
F24	Leisure low speed time in reverse rotating direction	100	1~10000	0.1s	
F25	Leisure stop time in leisure low speed rotation	30	1~100	0.1s	
F26	Rated speed 2	650	100~3000	0.001m/s	
F35	Running time restriction	0	0~60000	Hour	Super password is needed to do the modification. If it is set to 9, the parameter will decrease by 1 when viewed via controller every hour. When it reaches 0, the escalator stops. The running time will count anew when the parameter is set again. The function is disabled when it is set to 0.
F36	Monitoring address	0	0~255		

Frequency converter parameter:

No.	Name	Factory Setting	Range	Unit	Comment
F200	Frequency converter software version	Factory value		×	Read only
F201	Frequency converter driving mode	0	0 / 1 / 2 /3	×	Set basic modes of frequency converter: 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	Rated power of motor	According to frequency converter parameter	0．40～160．00	KW	
F204	Rated current of motor	According to frequency converter parameter	0．0～300．0	A	
F205	Rated frequency of motor	50.00	0.00～120.00	Hz	
F206	Rated speed of motor	1460	0～3000	rpm	
F207	Rated voltage of motor	According to frequency converter parameter	0.～460	V	
F208	Number of poles of motor	4	2～128	×	
F209	Rated slip frequency of motor	1.40	0～10.00	Hz	
F210	Encoder type	0	0 / 1 / 2	×	0 ： Incremental encoder 1： SinCos encoder 2：Endat encoder
F211	Encoder pulse number	1024	500～16000	PPr	
F212	Zero speed PID regulator gain P0	130.00	0.00～655.35	×	
F213	Zero speed PID regulator integral I0	80.00	0.00～655.35	×	
F214	Zero speed PID regulator differential D0	0.50	0.00～655.35	×	
F215	Low speed PID regulator gain P1	70.00	0.00～655.35	×	
F216	Low speed PID regulator integral I1	30.00	0.00～655.35	×	
F217	Low speed PID regulator differential D1	0.50	0.00～655.35	×	

F218	Intermediate speed PID regulator gain P2	120.00	0.00～655.35	×	
F219	Intermediate speed PID regulator integral I2	25.00	0.00～655.35	×	
F220	Intermediate speed PID regulator differential D2	0.20	0.00～655.35	×	
F221	High speed PID regulator gain P3	140.00	0.00～655.35	×	
F222	High speed PID regulator integral I3	5.00	0.00～655.35	×	
F223	High speed PID regulator differential D3	0.10	0.00～655.35	×	
F224	Low speed switching frequency F0	1.0	0.0～100.0	%	
F225	High speed switching frequency F0	50.0	0.0～100.0	%	
F226	Zero servo time	0.5	0.0～30.0	s	
F227	Brake release time	0.25	0.00～30.00	s	
F228	Slow current drop time	0.00	0.00～10.00	s	
F229	Torque compensation direction	0	0/1	×	0：Forward 1：Reverse
F230	Torque compensation gain	100.0	0.0～200.0	%	
F231	Torque compensation offset	0.0	0.0～100.0	%	
F232	Encoder feedback signal filter time	0	1～30	ms	
F233	Encoder feedback direction	1	0／1	×	1：Negative 0：Positive
F234	Motor phase sequence	1	0／1	×	1：Forward direction 0：Reverse direction
F235	No-load current coefficient of motor	32.00	0.00～60.00	%	No need to set normally
F236	PWM carrier frequency	6.000	1.100～11.000	kHz	Not adjusted normally
F237	PWM carrier width	0	0.000～1.000	kHz	Not adjusted normally
F238	Regulator mode	1	0/1/2/3	×	Not adjusted normally
F239	Output torque restriction	175	0～200	%	Not adjusted normally
F240	Input voltage of frequency converter	380	0～460	V	
F241	Rated power of frequency converter			KW	Read-only data for query

F242	Encoder phase angle	0.0	0.0～360.0	Degre e	
F243	Encoder zero position calibration	0	0/2	×	Set to 2 to perform the calibration
F244	Client version number				
F245	F246~F255 parameter function selection	0	0～65535	×	If this parameter is modified, the definition of F246 - F255 will be different
F246	Heat sink over-heat protection time	50	000～65535	0.01s	Protection is initiated when default heat sink over-heat exceeds 0.5 s
F247	Over-speed protection coefficient	12000	0～65535	0.01%	Default over-speed protection threshold is 120%
F248	Over-speed protection time	100	0～65535	0.01s	Protection is initiated when default speed exceeds the value of F247 for 1s
F249	Input phase failure confirmation number	35	0～65535	times	As default, protection is initiated when input phase failure exceeds 35 at any moment
F250	Braking resistor short-circuit confirmation number	10	0～65535	times	As default, protection is initiated when the braking resistor short-circuit occurs over 10 times at any moment
F251	SinCos encoder disconnection confirmation number	2	0～65535	times	As default, protection is initiated when encoder disconnection confirmation occurs more than 2 times at any moment
F252	Output phase failure confirmation time	2000	0～65535	0.001s	As default, protection is initiated when output phase failure exceeds 2 s

F253	Charging relay fault confirmation voltage	65	0～65535	V	In operation, 3 phase input voltage drops by 65.414 = 46 protection and No.114 fault will be generated. It may be caused by damage of charging relay or instantaneous drop of grid voltage.
F254	Encoder CD phase fault confirmation threshold	300	0～65535		No.28 fault will be generated when the difference between absolute position and calculated position of encoder exceeds the set value.
F255	ABZ encoder disconnection protection threshold	20	0～100		Protection is initiated when speed feedback deviation of synchronous motor exceeds this value
F256	IGBT protection number	2	0~65535	times	Instantaneous over-current number of IGBT
F257	I2t protection selection	0	0/1/2		0: two types of I2t protection;1: only one type of I2t protection; 2: only the second type of I2t protection
F258	Reserved				Internal parameter, do not modify
F259	Reserved				Internal parameter, do not modify
F260	Reserved				Internal parameter, do not modify
F261	Reserved				Internal parameter, do not modify
F262	Reserved				Internal parameter, do not modify
F263	Reserved				Internal parameter, do not modify

F264	Reserved				Internal parameter, do not modify
F265	Reserved				Internal parameter, do not modify
F266	Reserved				Internal test parameter, do not modify
F267	PWM modulation mode	1	0～2	×	0：5-segment; 1：7-segment ; 2：<40%rpm 7-segment, >40% 5-segment When as low speed, the integrated unit has strong interference on outside, such as poor CAN communication signal, it can be rather effective to change it to 0 (5-segment) and can also reduce the heat of frequency converter. But it might cause significant noise at low speed.
F268	Reserved				Internal test parameter, do not modify
F269	Reserved				Internal test parameter, do not modify

F270	3-phase current balance coefficient			×	Read-only. It will be changed automatically after the calibration of 3-phase current balance coefficient. For synchronous motor, when the asynchronous motor self-learning command is activated, the output contact will pick up to perform 3-phase current balance coefficient calibration. This function reduces the vibration of motor and improves comfort.
F271	Reserved				
F272	Forward / reverse rotation enable	0	0/1		0: enable forward / reverse rotation, 1: only enable forward rotation, disable reverse rotation
F273	Forward / reverse dead zone time	20	0~60000	0.1s	Zero speed retention time at the switching of forward / reverse rotation
F274	Acceleration over-current threshold of frequency converter	180	0～200	%	If current exceeds the set value in acceleration, it will stop and maintain current speed. The acceleration will resume when current drops

F275	Deceleration over-voltage threshold of frequency converter	750	0～800	V	If bus voltage exceeds the set value in deceleration, it will stop and maintain current speed. The deceleration will resume when voltage drops
F276	Current ring P	140	35～280	0.01	Current ring Kp (normally no modification is needed)
F277	Current ring I	100	25～200	0.01	Current ring Ki (normally no modification is needed)
F278	Current ring D	0	0～200	0.01	Current ring Kd (normally no modification is needed)
F279	Reserved				Internal parameter, do not modify
F280	Reserved				Internal parameter, do not modify
F281	Reserved				Internal parameter, do not modify
F282	Reserved				Internal parameter, do not modify
F283	Reserved				Internal parameter, do not modify
F284	Torque direction	0	0/1		0:Forward ;1: Reverse
F285	Reserved				Internal parameter, do not modify
F286	ID number 6			×	Read only
F287	ID number 0			×	Read only
F288	ID number 1			×	Read only
F289	ID number 2			×	Read only
F290	ID number 3			×	Read only
F291	ID number 4			×	Read only
F292	ID number 5			×	Read only

F293	Rated current of frequency converter			0.1A	Read only
F294	Rated current of frequency converter current sensor			A	Read only
F295	Power factor of motor	200	50~400	%	Set the max. output power of motor and no modification is needed normally
F296	Stator resistance			0.001 欧	Stator resistance of asynchronous motor
F297	Rotor resistance			0.001 欧	Rotor resistance of asynchronous motor
F298	Stator inductance			0.0001 H	Stator inductance of asynchronous motor
F299	Rotor inductance			0.0001 H	Rotor inductance of asynchronous motor
F300	Mutual inductance			0.0001 H	Mutual inductance of asynchronous motor
F301	Low speed over-current threshold of motor	1500	0～65535	0.1%	When motor speed is lower than 20% of rated speed, if the current exceeds this value and lasts more than F252, the low speed over-current fault will be generated and the motor will stop
F302	Low speed over-current time	600	0～65535	0.1s	Low speed over-current duration of motor
F303	High speed over-current threshold of motor	1200	0～65535	0.1%	When motor speed is higher than 20% of rated speed, if the current exceeds this value and lasts more than F254, the high speed over-current fault will be generated and the motor will stop

F304	High speed over-current time	3000	0～65535	0.1s	High speed over-current retention time
F305	Encoder division factor (require PG card support)	0	0～7		0: (no division); 1: (2 division); 2: (4 division); 3: (8 division); 4:(16 division); 5: (32 division); 6:(64 division); 7:(128 division) (Note: require PG card support)
F306	Whether to perform angle self-learning when synchronous electrode is energized	1	0/1		Choose whether to perform angle self-learning when synchronous electrode is energized, 0: No;1：Yes
F307	Current gain in self-learning	150	0～400	%	Current gain in angle self-learning of synchronous motor
F308	Command selection	2	0/1/2		Running command selection
F309	Current ring gain in zero servo process	100	48~65535	%	Current ring gain in zero servo process
F310	Reserved				
F311	Reserved				
F312	Reserved				
F313	Reserved				
F314	Reserved				
F315	Reserved				

F316	Max. current in tracking	100.0	0~6553.6	%	The switching current limit in the switching from power frequency to frequency conversion. It is the percentage of rated current of motor. When little tows large, make sure in tracking max. current is lower than rated current of frequency converter. If over-current occurs in tracking, this value should be decreased
F317	Initial tracking frequency	50.00	0.00~655.35	Hz	Initial frequency in the switching from power frequency to frequency conversion. It is often set to max. running frequency before switching. If inertia stopping speed drops fast, this value can be lowered
F318	Tracking frequency change gain	130.0	10.0~200.0	%	Frequency change speed in the switching from power frequency to frequency conversion, if over-voltage occurs or F218 higher than 600V in the switching, this value should be decreased

F319	Tracking voltage Kp	0.20	0~655.35	-	Kp in the switching. If this value is too low, the switching process will get longer. If this value is too high, over-current will occur
F320	Tracking voltage Ki	0.30	0~655.35	-	Ki in the switch. If this value is too low, the switching process will get longer. If this value is too high, over-current will occur
F321	Tracking delay time	1000	0~9000	ms	This time is used to await motor to demagnetize. If over current occurs at the start of switching, this value should be increased
F322	Reserved				Used to await demagnetization of motor. This parameter is reserved
F323	Tracking exit delay	1000	1000~10000	ms	The ending delay of switching from power frequency to frequency conversion to ensure smooth switching process. Increasing this time is helpful for smooth exit.
F324	Tracking timeout time	100	0~65535	0.1s	0：No timeout Non-zero: processed in two ways after timeout
F325	Tracking timeout processing method	0	0~1		0：idle start 1：Fault stop (123# fault)

F326	Max. voltage in tracking	0	0~65535	V	This parameter is read-only, for monitoring max. bus voltage in tracking
F327	Max. current in tracking	0.0	0.0~6553.5	A	This parameter is read-only, for monitoring max. RMS current in tracking
F328	I2G switching frequency	49.50	0.00~53.00	Hz	Switching frequency of switching from frequency conversion to power frequency. Fine tune this value to reduce the speed variation in the switching
F329	Synchronous angle adjustment I2G	130.0	0.0~360.0	度	Correction angle of switching from frequency conversion to power frequency, for decreasing the speed variation in the switching. Normally, no adjustment is needed. In adjustment, it should be done with unit of 20 degrees to find the angle with lower variation and perform fine-tuning around the angle

F330	Synchronization timeout	10.0	0.0~16.0	s	Max. phase synchronization waiting time in the switching from frequency conversion to power frequency. If synchronization signal is not detected after the time, the escalator will still switch to power frequency
F331	No PWM detection delay	0	0~65535	ms	0：This fault is not detected (121# abnormal operation output current)
F332	AVR function selection	0	0~2		0：Invalid AVR 1：always valid 2： valid in deceleration
F333	V/F torque compensation	0.0	0.0~15.0	%	Set the torque voltage boost value at 0Hz
F334	Max. frequency of V/F compensation	10.00	0.00~20.00	Hz	Set the range of torque boost. Frequency segment below this frequency will be boosted
F335	Inhibit upper limit of oscillation	5.0	0.0~10.0		In case of great current variation of motor, this value usually should be decreased progressively (0.5 each time) to find the best setting
F336	Inhibit lower limit of oscillation	5.0	0.0~10.0		
F337	Automatic fault reset time	10.0	0.0~6553.5	s	
F338	Automatic fault reset number	3	0~65535	-	
F339	Max. frequency	60.00	0.00~655.35	Hz	
F340	Lower limit of frequency	5.00	0.00~10.00	Hz	

F341	Acceleration time Ta0	5.00	1.00~655.35	s	
F342	Deceleration time Td0	5.00	1.00~655.35	s	
F343	Acceleration fillet Ts0	1.00	0.00~655.35	s	Staring fillet of acceleration
F344	Acceleration fillet Ts1	1.00	0.00~655.35	s	Ending fillet of acceleration
F345	Deceleration fillet Ts2	1.00	0.00~655.35	s	Staring fillet of deceleration
F346	Deceleration fillet Ts3	1.00	0.00~655.35	s	Ending fillet of deceleration
F347	Acceleration time Ta1	5.00	1.00~655.35	s	
F348	Deceleration time Td1	5.00	1.00~655.35	s	

VI Operator

1 Onboard operator

The outlook and definition of the onboard operator is shown in Fig. 5.1. In Fig. 5.1, a detailed description of the functions of keys is provided.

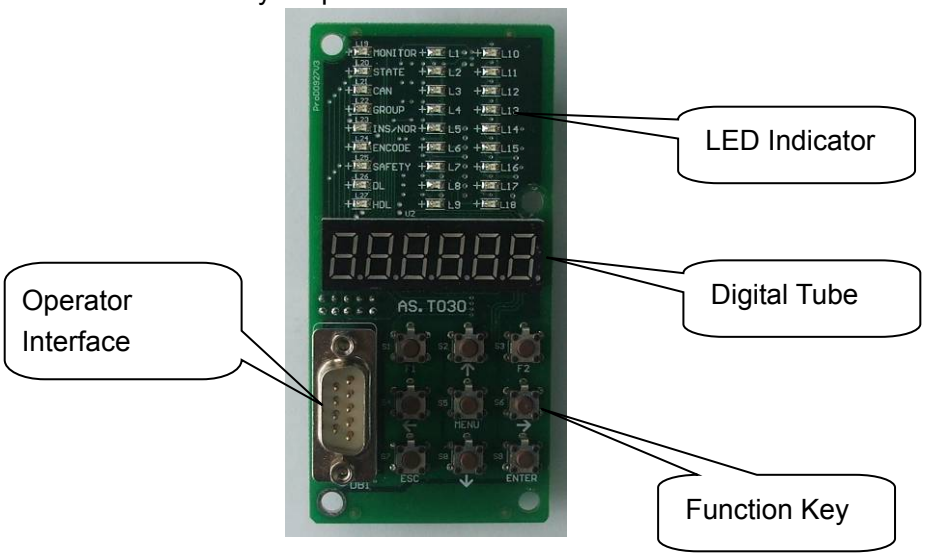


Fig. 6.1 Definition of Each Part of Onboard Operator

2 LED indicator

There are 27 LED indicators on the onboard operator. The definition of L1 – L18 on the right side is input status of X0 – X17. Light on means input is available. Light off means no input. The other indicators are invalid.

Code	Display	Definition	Comment
L19	MONITOR		
L20	STATE	CPU operation state	Fast flashing – normal/medium speed – self learning medium/slow speed – escalator fault/ no flashing – contact manufacturer
L21	CAN	CAN communication	Flashing - Communication available
L22	GROUP		
L23	INS/NOR	Service / automatic mode	Light on means automatic / light off means service
L24	ENCODE	Safety board fault display	Light on – fault available
L25	SAFETY	Safety circuit	Light on – safety circuit on
L26	DL		
L27	HDL		

3 Function key

There 9 keys in the lower part of the operator. The functions of the keys are shown in table 6.1.

Table 6.1 Function Description of Keys

Key	Name	Function
∧	Up	1.Move up one item when browsing menus 2.Increase current number by 1 when entering data
∨	Down	1.Move down one item when browsing menus 2.Decrease current number by 1 when entering data
<	Left	1.Move left one menu when choosing function 2.Move left cursor when entering data
>	Right	1.Movie right one menu when choosing function 2.Move right cursor when entering data
ESC	Esc	1.Cancel entering when entering data
ENTER	Enter	1.Perform modifications when browsing parameter 2.Save when entering data
	MENU	Drive status
F1	F1	Display fault code
F2	F2	I/O port status

4 Operation of the operator

4.1 Menu structure

Main menu structure is shown in Fig. 6.2. Restricted by the structure of 7-segment code and keys, one level menu structure is used for the operation interface. Press “left” and “right” key to switch between each menus. Press “MENU” key to switch between LED function selection and door open / close control.

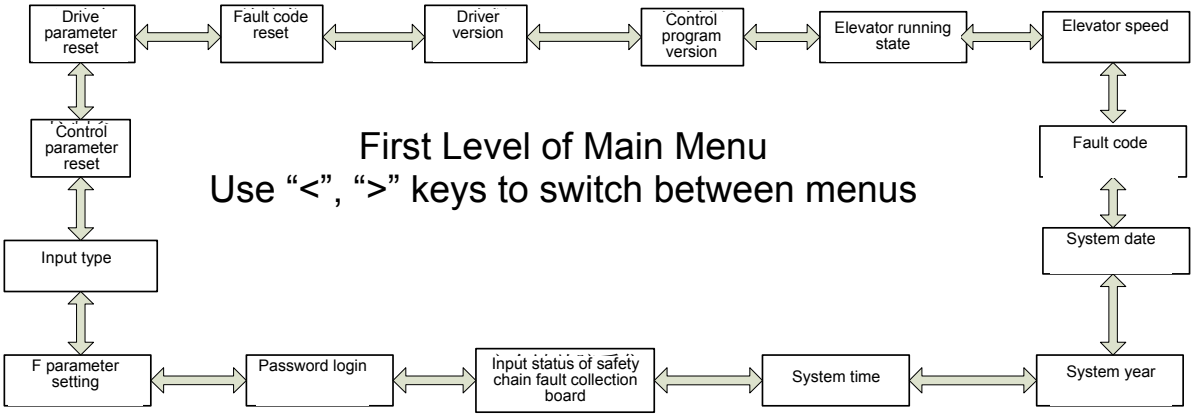
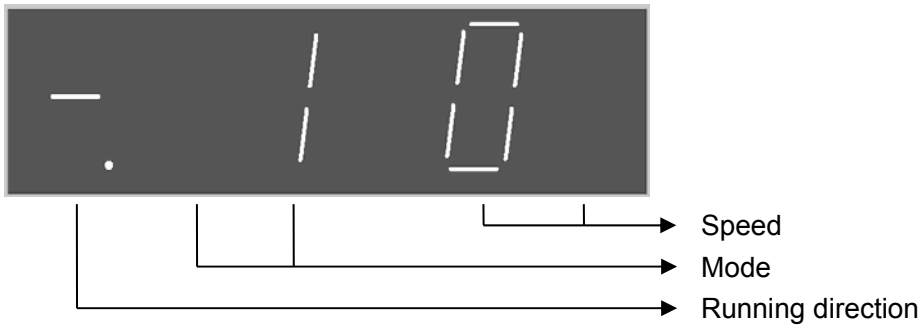


Fig. 6.2 Menu Structure

4.2 Operation description of menus switched with left and right keys

In the first level of main menu, press left or right key to switch between menus. The escalator operation status screen is displayed when energized. Detailed description of each menu is as follows:

1 Escalator running status (displayed when energized)



Basic status of the escalator is shown in this menu, such as: running status, the floor, status of doors.

In running direction:

 means running upward,  means running downward,  means stop.

In running mode:

 means complete power frequency,  means complete frequency conversion,  means bypass frequency conversion,  means frequency conversion in bypass frequency conversion

In running speed:

 means no speed,  means leisure low speed

 means service,  means normal

2 Fault code

The integrate controller can store 50 fault codes. The number of the latest fault code is 00. You can use up and down key to browse the fault codes. Press “Enter” key to display the date of the fault. Press “Left” and “Right” to view the date of floor of the fault. Press “ESC” key to exit.

3 System year

The meaning of the above pic is: year of 2010. “Y” is the abbreviation of Year. When modification is needed, press “Enter” key and the lowest digit begins to flash. Use “Left” and “right” key to choose desired digit. The chosen digit will begin to flash. Press “Up” and “Down” key to modify the number. Press “Enter” key to confirm the modification.

4 System date

The meaning of the above pic is: Aug. 12th. “d” is the abbreviation of Day. When modification is needed, press “Enter” key and the lowest digit begins to flash. Use “Left” and “right” key to

choose desired digit. The chosen digit will begin to flash. Press “Up” and “Down” key to modify the number. Press “Enter” key to confirm the modification.

5 System time

The meaning of the above pic is: 15:36. “T” is the abbreviation of Time. Please note: in the integrated controller, all the “T” are shown as above pic. When modification is needed, press “Enter” key and the lowest digit begins to flash. Use “Left” and “right” key to choose desired digit. The chosen digit will begin to flash. Press “Up” and “Down” key to modify the number. Press “Enter” key to confirm the modification.

6 Password login

Press “Enter” to enter the menu and the following screen is displayed:

Enter password. In the above picture, the password is 149

You will see “login” in the login menu. Press “Enter” and the lowest digit of LED begins to flash. Press “Up” or “Down” to choose a number for this digit. Press “Up” or “Down” key to choose the digit you want enter number. The chosen digit will begin to flash to indicate it enters number entering state. Press “Up” or “Down” again to choose the desired number. When the password is entered, press “Enter” key to complete the login. If the entered password is correct, it will display “login” when “Enter” key is pressed. If the password is incorrect, it will still be in password entering state when “Enter” key is pressed. You can press “ESC” key to exit this state.

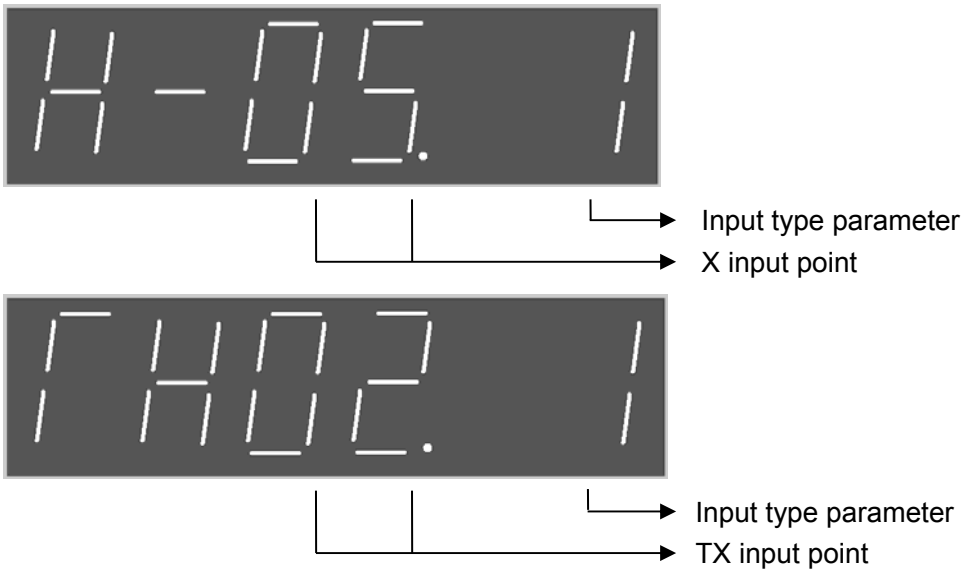
Note: You can only view the status and parameters of the escalator before login. You are only granted the privilege to modify the parameters after login.

7 Setting of F parameters

Because there are a lot of F parameters, the parameter number is shown in 3 digits. Besides, the parameter itself is shown with multiple digits. Therefore, it is designed to show F parameters with alternative display. The detailed operation is as follows: Press “Up” or “Down” key to choose the parameter you want to view, such as F5, it will show “F-005” as the above picture. After a second, it will show the value of the parameter F5, i.e. 300, as the above picture, and you will see “300”. After that, “F-005” and “300” will be displayed alternatively with 1 s for each one. Press “Enter” and the lowest digit will flash. Press “Up” or “Down” key to choose a number for this digit. Press “Left” or “Right” key to choose the digit to enter number. The chosen digit will flash to indicate it enters number entry state. Press “Up” or “Down” key again to choose the desire number. Press “Enter” to complete the modification. The chosen digit will stop flashing.

You must have login access to modify F parameter. If you have not logged in, it will go to “Login” menu when you press “Enter” to try to modify the parameters.

8 Input type



Press “Up” and “Down” to choose X or TX input point to modify. Press “Enter” and the parameter begins to flash. Press “Up” and “Down” to set the parameter. Press “Enter” to confirm. “1” means NC input. “0” means NO input.

You must have login access to modify input type. If you have not logged in, it will go to “Login” menu when you press “Enter” to try to modify the parameters.

9 Control parameter reset

This menu is used for F0 – F199 control parameter reset. Note: the control parameter reset is only valid when the login level is higher or equal to level 2. If the login level is not sufficient, it will not have any effect when “Enter” is pressed; If the login level is sufficient, press “Enter” to enter authentication code entry menu (the authentication code is used to prevent mis-operation. The code is fixed to 5678). If the authentication is correct, press “Enter” and the control parameter is reset.

10 Drive parameter reset

This menu is used for F200 – F255 drive parameter reset. Note: the control parameter reset is only valid when the login level is higher or equal to level 2. If the login level is not sufficient, it will not have any effect when “Enter” is pressed; If the login level is sufficient, press “Enter” to enter authentication code entry menu (the authentication code is used to prevent mis-operation. The code is fixed to 5678). If the authentication is correct, press “Enter” and the drive parameter is reset.

11 Fault code reset

This menu is used for fault code reset. Note: the control parameter reset is only valid when the login level is higher or equal to level 2. If the login level is not sufficient, it will not have any effect when “Enter” is pressed; If the login level is sufficient, press “Enter” to enter authentication code entry menu (the authentication code is used to prevent mis-operation. The code is fixed to 5678). If the authentication is correct, press “Enter” and the fault code is reset.

12 Driver version

This menu displays the program version of the driver part of the integrated controller. After one second, it will display the program version 30.03 as the above picture. After that, “VER1” and “30.03” will be displayed alternatively with about one second for each.

13 Control program version

This menu displays the program version of the control part of the integrated controller. After one second, it will display the program version E02 as the above picture. After that, “VER2” and “E02” will be displayed alternatively with about one second for each.

4.4 Legend of number and letter displayed on LED

Restricted by the structure of LED, it is hard to understand the displayed number and letters. So a look-up table of pattern and meaning is provided below.

Look-up Table of Pattern and Their Meaning

Display	Meaning	Display	Meaning	Display	Meaning	Display	Meaning
	1		2		3		4
	5		6		7		8

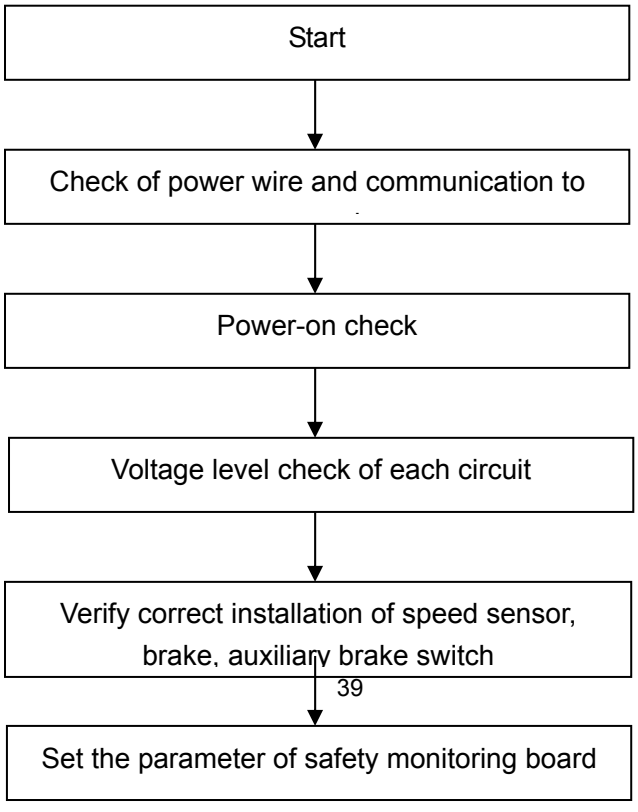
	9		0		A		B

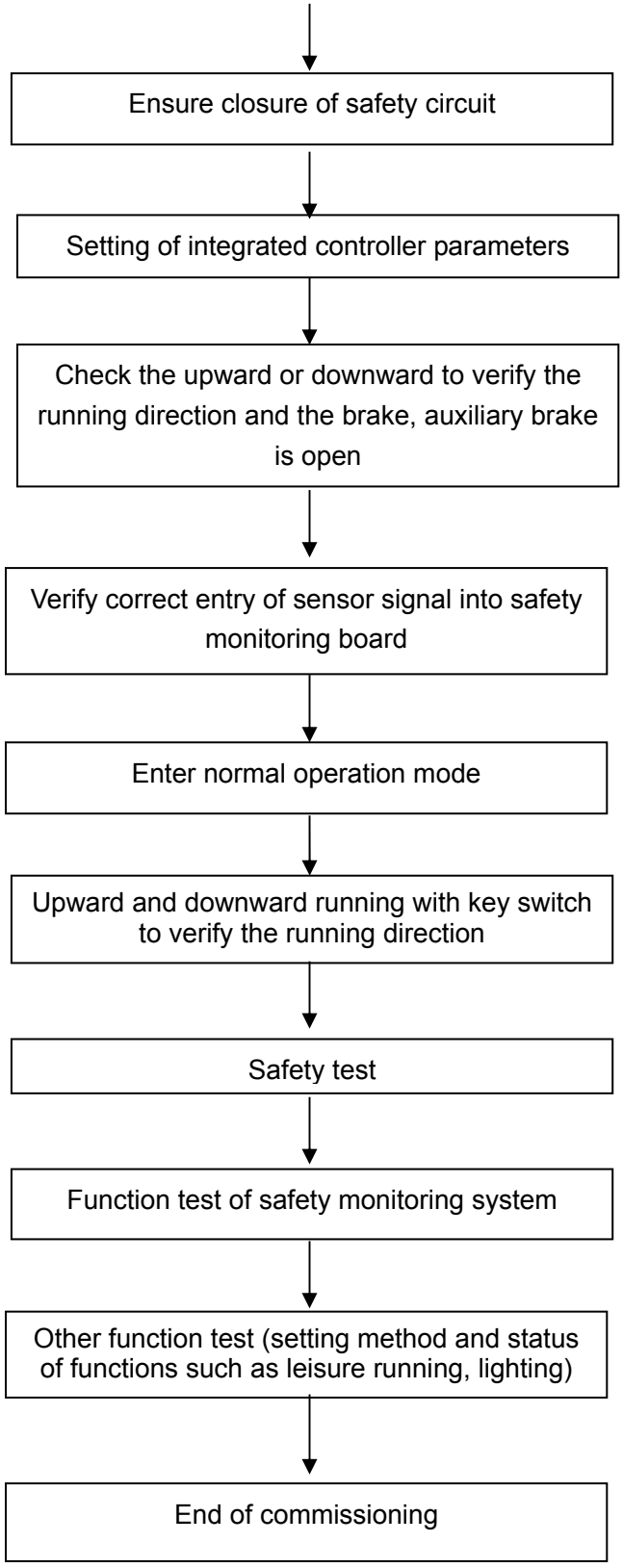
Look-up Table of Pattern and Their Meaning

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

VIII Application and Commissioning

1 Commissioning step





2 Check before power-on

After the completion of electrical installation of control system, electrical part has to be checked:

1. According to user manual and electrical schematics, check correct connection of each part.

2. Check if there is correlation between high current part and weak current part. Check the resistance between different voltage circuits with multi-meter. The resistance to ground should be ∞.
3. Carefully check the correct connection of incoming line of control cabinet and motor wiring to avoid damage to the integrated drive controller upon energization.
4. Check the safe and reliable grounding of control cabinet housing, motor housing, safety circuit ground wire to ensure personal safety.

▲Note: the cabinet housing and motor housing should be grounded at the same point.

3 Energization and check

3.1 Confirmation before energization

1. Short-circuit check of control cabinet to ground before energization:
   (1) 3 phases of feeding power line to ground
   (2) Three phases of motor wire to ground
   (3) Terminal 220 V to ground
   (4) Communication wire to ground

Any short circuit in the above items should be eliminated.

Grounding check: (Verify reliable grounding of following items)

   (1) Control cabinet grounding
   (2) Motor grounding

Check the wiring of communication line encoder wire and power line: (Verify the following requirements are met on site. If not, perform correction accordingly)

   (1) Twisted pair is used for communication line with twist pitch <35cm
   (2) Communication line and power line are routed in trunking separately

3.3 Check after energization

1. Close the main power switch. If the green light on the phase sequence relay KAP is on, it means the phase sequence is correct. If the green light is not on, turn off the main power and power on again after switchover of any two phases.
2. Check if the voltage of each terminal of isolation transformer TCO in the control cabinet is within their rated range.
3. Perform the following steps on the condition that the above steps are correct:

(1) Close fuse **FUn** (n=1，2，3……);

(2) Close the control switch of switching power supply; The switching power TPB is energized and the mainboard is energized to work.

The voltage of terminals of switching power supply is as follows:

Table 8.1 Voltage of Terminals of Switching Power Supply

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

Note:

1. Before the setting of parameters, make sure sensors are in place and secure and the signal is valid (ES.11/A X0-X6 input point) according to corresponding drawings.

2. Verify correction installation of brake switch, auxiliary brake switch and the validity of the signal

(ES.11/A X11-X14 input point).

Note: See "FSCS Function Safety Monitoring System User Manual" for the installation method of sensors.

4 Basic system parameter setting

4.1 Safety monitoring board parameter setting

This system is connected with safety circuit with safety monitoring board, so, before commissioning, you have to make sure the safety monitoring board is working normally. The safety circuit can only be connected when the there is no fault on the safety monitoring board and Y0, Y1, Y2, Y3 have output. As a result, the parameters of safety monitoring board must be set first;

The basic system parameters listed in Table 8.2 should be correctly set first with special handheld LCD operator (see chapter 5 for operation method of handheld operator). And then all the commissioning tasks described in following chapters can be performed. For each new system, before the setting of parameter, it is recommended to perform parameter reset using special handheld LCD operator.

The parameter reset method is as follows:

a) The escalator is in stop state;
b) Find the interface with "Parameter Reset" command on the handheld operator;
c) Put the cursor on the "Parameter Reset" command and press Enter key, the system will complete parameter reset in an instant.

After the parameter reset, all the parameters become the default value. After basic parameters are set on this basis, the other parameters not set are default values, thus to ensure normal operation of the system.

-F00：Determine NO/NC of input point X0-X15 according to drawings. Note: the X13 brake detection input must be NC point;

-F01：Determine NO/NC of input point X16-X31 according to drawings;

-F02：Rated speed 1, set the rated speed of the escalator according to rated speed setting from the factory;

-F03：This parameter is used when there are two rated speed. This parameter is set for second rated speed. When there is no second rated speed, F03 and F02 can be set to the same value;

-F04：This parameter is set to the speed of escalator at service;

-F05：This parameter is set to the speed of the escalator when there is leisure speed. When leisure speed is not available, the setting of the parameter is the same as rated speed;

-F06：Pulse per cycle. This parameter is set to the gear number of the main driving wheel of the escalator **(the setting must be consistent with actual gear, or false fault will be generated);**

-F07：This parameter is set to the outer circle perimeter of main driving wheel of the escalator **(the setting must be consistent with actual perimeter, or false fault will be generated);**

-F08：This parameter sets the distance detected between two steps by the step sensor **(the setting can be larger than actual distance);**

-F09：**This parameter sets the perimeter of the handrail wheel.** (the setting must be

consistent with actual perimeter, or false fault will be generated);

-F10：Speed measurement delay. This parameter is used for the acceleration and deceleration of the escalator. In frequency conversion of the escalator, it is normally set to the acceleration time of the frequency converter; For escalator driven by power frequency, it is normally set after star-delta conversion;

-F11：This parameter is used for soft stop when operation signal is released in delay and can be set according to the delay time;

When the parameters are set, press reset key to perform operation reset; When Y0, Y2 output is normal, the following safety circuit check can be performed;

Check the following circuit:

ii. Verify normal output of safety monitoring board;

iii. Check if the safety circuit is normal;

iv. The escalator operation status should show "**Service**" on the handheld programmer inserted in the mainboard;

Perform corresponding check and correction in case of any abnormal cases.

Note:

Before commissioning, the above basic parameters must be set correctly; Basic motor parameters can be set referring to nameplate; According to actual field conditions, see chapter 7 for setting method and detailed definition.

4.2 Integrate controller parameter setting

After the confirmation that the parameters of ES.11/A safety monitoring board are set and output is available on safety monitoring board and the safety circuit is connected (**If not connected, verify the connection of the safety circuit or ES.11/A safety monitoring board parameters are proper**), insert the operator into the operator interface of AS330 integrated controller and perform the basic parameter setting;

The basic parameters to be set are as follows:

No.	Name	Default Value	Range	Unit	Comment
F0	Driving mode	1	0~1		0 complete frequency conversion 1 bypass frequency conversion star-delta 2 bypass frequency conversion only star-delta (when frequency converter is in fault, it can be set to 2, the port definition is the same as mode 1 now)
F3	Rated speed	700	100~3000	0.001m/s	
F4	Service speed	300	10~3000	0.001m/s	
F5	Leisure speed	150	10~3000	0.001m/s	
F6	Normal additional brake release time	50	0~1000	0.1s	
F12	Function enable	0	0~65535		

No.	Name	Default Value	Range	Unit	Comment
F15	Input type X0 –X15	0	0～65535		
F16	Input type X16-X31	0	0~65535		
F17	Input type X32-X47	0	0~65535		
F18	Input type TX0-TX15	0	0~65535		
F19	Input type TX16-TX31	0	0~65535		
F20	Input type TX32-TX47	0	0~65535		
F202	Motor type	0	0~1	-	
F203	Rated power of motor	-	0~65535	0.01kW	
F204	Rated current of motor	-	0~65535	0.1A	
F205	Rated frequency of motor	50.00	0~65535	0.01Hz	
F206	Rated speed of motor	1460	0~65535	rpm	
F207	Rated voltage of motor	380	0~65535	V	
F208	Pole number of motor	4	0~65535	P	
F209	Rated slip frequency of motor	1.40	0~65535	0.01Hz	

The setting should be performed according to actual conditions. Attention should be paid to the following parameters:

-F0：Set according to actual driving mode (**note: because of the difference in main circuit between different driving modes, the error in, for example, driving mode setting could cause short circuit of power supply**);

-F12：**When auxiliary braking function is available, the bit function of F12 must be enabled or the auxiliary braking function is invalid; And F6 parameter should be set according to actual requirement;**

5 Service running

5.1 Service running and preparation before fast running

1. Confirmation before service running:

(1) Insert the service handle into control cabinet or service socket on the lower junction box (**note: upper and lower service handles cannot be both inserted into service socket, or the circuit interlock will prevent running**)

(2) Safety circuit is working normally. **Never short circuit the safety circuit**;

(3) Correct installation and normal connection of sensor;

(4) The display is normal after energization of integrated controller and check the correct setting of parameters of the integrated controller. The handheld programmer should display the operation status of the escalator as “service”;

(5) Correctly connect the brake line of traction machine to the terminal in the control cabinet;

(6) All the emergency stops are in normal position;

2. Service running

When the slow running conditions in the machine room are met, press the Upward (Downward) key on the service handle and the escalator should run in the set service speed upward (downward).

(1) When slowly running upward or downward, see if the running direction is correct. If not, check if the wiring of Upward, Downward buttons is correct first: JP2.1 of integrated controller mainboard should be connected with upward button signal, JP2.2 should be connected with downward button signal. If the wiring is correct, modify the motor phase sequence parameter F234 (change 0 into 1 or 1into 0);

(2) Watch the action of brake switch and auxiliary braking switch;

(3) When the escalator is slowly running upward or downward, watch closely the running state of the safety monitoring board and signal feedback of the sensors. In case of fault, the safety monitoring board will force cut off the safety circuit. Check the fault of safety monitoring board and process it according to fault processing method.

Note:

In commissioning, the safety monitoring board might be fault because of signal setting. The faults that usually occur and their solution are as follows:

1. **Brake switch fault: check if X13, X14 of safety monitoring board are consistent with NO/NC set by I/O in stop and running;**
2. **Auxiliary braking fault: check if auxiliary braking switch and contact is consistent with NO/NC set by I/O. When the function is not available, the blocking method is: connect Y1, Y3 into X11, X12 input point and connect the common terminal of Y1 and Y3 into the common terminal of input point;**
3. **Over-speed and under-speed: sensor installation problem. Adjust the sensor location to closer or farther.**

6 Normal operation

6.1 Fast running

When then slow running is normal, ensure the escalator meets the safety running conditions

and the fast test running can be performed. The steps are as follows:

1. Pull out the service handle of the escalator and insert the normal running plug into the service socket.
2. The handheld programmer displays “normal”, which means it enters into normal operation mode.
3. With upper and lower key switch, give upward and downward commands to make the escalator run. Watch the running direction of the escalator;

6.2 Safety test

1. Safety circuit

Test requirement: when the escalator stops, after the actuation of any safety switch and disconnection of safety circuit, the escalator cannot be started; In the service running of the escalator, after the actuation of any safety switch and disconnection of safety circuit, the escalator stops in emergency.

2. Safety circuit relay adhesion protection

Test requirement: press the emergency stop of control cabinet to disconnect the safety circuit. And then with any method, force the safety circuit relay not to be released. The system should provide protection with no automatic reset;

3. Brake contactor adhesion protection

Test requirement: during stop, with any method, force the brake contactor not to be released. The system should provide protection with no automatic reset;

4. Normal output contactor adhesion protection

Test requirement: during stop, with any method, force the output contactor not to be released. The system should provide protection with no automatic reset;

5. Brake detection

Test requirement: during stop, with any method, force the brake switch not to be released or in operation, use any method to force the brake switch not to be opened. ES.11/A safety monitoring board should disconnect safety circuit and manual reset is needed;

7 Function test of safety monitoring board

7.1 Main drive speed test

1. Verify the function can work normally with no fault;
2. 120% over-speed: Using test equipment or other methods, adjust the motor speed to 120%. The safety monitoring board should report 120% over-speed fault and cut off safety circuit. The escalator stops in emergency;
3. 140% over-speed: Using test equipment or other methods, adjust the motor speed to 140%. The safety monitoring board should report 140% over-speed fault and cut off safety circuit and auxiliary braking power supply circuit. The escalator stops in emergency;
4. Reverse rotation: in operation, using test equipment or any other methods to reverse the phase sequence of the motor. The motor is now rotating in reverse direction. The safety monitoring board should report reverse AB phase fault and cut off safety circuit and auxiliary braking power supply circuit. The escalator stops in emergency;

7.2 Step speed measurement

1. Verify the function can work normally with no fault;
2. In service running, remove a step from upper or lower part and running the location of missing step to the lower part of the escalator;
3. Running the escalator upward or downward normally with key switch. When the location of missing step runs to and passes the step detection sensor, the safety monitoring board should report upper or lower step missing fault and cut off safety circuit. The escalator stops in emergency;

Note:

The function should meet the requirement of national standard and it shall not run out of comb plate and meet the requirement for braking distance. It is related to the installation location of the sensor and should be determined by the manufacturer of the escalator; This function is invalid in service.

7.3 Handrail speed measurement

1. Verify the function can work normally with no fault;
2. Using test equipment or other methods, decrease the handrail speed by more than 15% and make it last 15s. The safety monitoring board should now report left or right handrail speed fault and cut off safety circuit. The escalator stops in emergency;

Note: This function is invalid in service state.

8.3.7.4 Auxiliary braking function

1. Verify the function can work normally with no fault;
2. When 140% over-speed or reverse rotation occurs, the safety monitoring board should cut off the power supply circuit of safety circuit and auxiliary braking. The escalator stops in emergency;

8 Other function tests

8.1 Leisure running function

This function is only valid when photoelectric switch is available and connected into system. Determine the mode and time of leisure running by the adjustment of parameters of F1, F5, F23, F24, F25.

8.2 Lighting system

The system is provided with lighting system of AC 220V. The power is supplied by the connection of step or comb lamp into terminal. The function is valid in operation. For lighting power of other levels, please contact us.

IX Fault Solution

The fault code and analysis of the control system in dedicated integrated drive controller for AS330 series escalator is shown in Table 9.1.

Table 9.1 Fault Code of Control System

Code	Description	Reason Analysis
01	Frequency conversion contactor adhesion	In frequency conversion mode, contact adhesion occurs in running contactor 1, running contactor 2, brake contactor.
02	Frequency conversion	No adhesion or pick-up of frequency conversion contactor

	contactor fault	
03	Power frequency contactor fault	No adhesion or pick-up of power frequency contactor
04	Brake switch fault	Brake switch output inconsistent with detection
05	Safety contact fault	Safety circuit input point detection inconsistent with safety circuit contactor detection
06	Auxiliary brake switch fault	Auxiliary brake switch unable to open
		The fault is only held in case of 3 consecutive failure to open in start
		In running, the fault will be held for one failure
07	Auxiliary brake relay fault	Auxiliary brake relay input inconsistent with output
08	Temperature fault	Input available at temperature alarm
10	Frequency converter communication fault	Interference or disruption of communication
12	Oil level detection fault	Oil level is too low is oiling equipment
13	Low speed current too high	Low grid voltage
		Abnormal motor parameter setting
15	Outgoing line contactor 1 fault	Adhesion or no pick-up of outgoing line contactor 1
16	Outgoing line contactor 2 fault	Adhesion or no pick-up of outgoing line contactor 2
17	Abnormal mode switch-over	Automatic service switch-over in operation
22	Mechanical wear	Too much brake mechanical wear leads to actuation of wear detection switch
23	Water level fault	High water level in machine room leads to actuation of water level detection switch
24	Fault collection board no communication	Check correct wiring of fault collection board
69	Parameter no initialization	The parameter is not initialized

Table 9.2 Fault Code of Safety Monitoring Board

Code	Description	Reason Analysis
31	Real-time clock damaged	Internal fault of safety board.
32	Redundancy detection error	Internal fault of safety board.
33	Parameter CRC error	Internal fault of safety board.
34	Fault CRC error	Internal fault of safety board.
35	Improper parameter	Improper parameter setting.

36	Voltage supply fault	Internal fault of safety board.
37	Safety relay fault	Internal fault of safety board.
38	120% over-speed	The escalator speed reaches 120% of rated speed
39	140% over-speed	The escalator speed reaches 140% of rated speed
40	Under-speed lower than 80%	The escalator speed reaches 80% of rated speed
41	Reverse AB phase	Phase A, B of the sensor are reverse
42	Abnormal speed reduction	In normal operation, the speed decreases to lower than 1/3 of leisure speed
43	Drive chain disruption	Actuation of drive chain disruption switch
44	Stopping distance too large	The stopping distance exceeds 1.2 times of max. braking distance
45	Auxiliary brake fault	The actuation of auxiliary brake contactor and auxiliary brake switch
46	Upper step missing	Step missing is detected by upper step missing sensor
47	Lower step missing	Step missing is detected by lower step missing sensor
48	Service cover missing	The escalator detects the service cover is open in normal running state (not service running)
49	Service cover switch fault	Actuation of two service cover switch is not consistent
50	Operation brake adhesion	The brake contactor is released , but the brake switch is not released
51	Operation brake unable to pick up	The brake contactor is actuated, but the brake switch is not actuated
52	Left handrail under-speed	The speed of left handrail reaches 80% of rated speed
53	Left handrail over-speed	The speed of left handrail reaches 120% of rated speed
54	Right handrail under-speed	The speed of right handrail reaches 80% of rated speed
55	Right handrail over-speed	The speed of right handrail reaches 120% of rated speed
56	Upward/downward inconsistent with running	Running signal is available with no upward/downward signal, or upward/downward signal is available with no running signal
57	Sliding at stopping	Within 30s of after stopping, the sliding distance is reached
58	Inconsistent IO of 2 channels	Internal fault of safety board
59	Phase failure of AB phase	Phase failure of speed measurement sensor phase A or phase B

The fault code and analysis of the driving system in dedicated integrated drive controller for **AS330** series escalator is shown in Table 9.3

Table 9.3 Fault Code of Driving System

Code	Display	Possible Cause	Solution
71	Module over-current protection	High voltage at DC terminal	Check grid supply. Check whether it is quick stop with high inertia load and no energy consumption brake
		Periphery short circuit	Check if there is short circuit in motor and output wiring and if there is short circuit to ground
		Output phase failure	Check loose wiring of motor and output
		Encoder fault	Check if the encoder is damaged or correct wiring
		Poor connection or damage of hardware	Contact specialist for maintenance
		Loose insert inside the frequency converter	Contact specialist for maintenance
		Improper slip setting of asynchronous motor	Adjust slip of asynchronous motor
		Improper no-load current coefficient setting	Adjust current coefficient with no load
		Fault in current sampling circuit	Replace control board
73	Overhead of sink	High ambient temperature	Reduce ambient temperature and enhance ventilation and thermal dissipation
		Air duct blockage	Remove foreign objects such as dust and cotton fiber
		Abnormal fan	Check the connection of fan power line or replace the fan with the same type
		Fault of temperature detection circuit	Contact specialist for maintenance
74	Braking unit fault	Damaged braking unit	Replace corresponding drive module
		Short circuit of external braking resistor connection	Check wiring of braking resistor
78	(In acceleration) Bus over-voltage protection	Abnormal input voltage supply	Check input power
		Quick start again in high speed rotation of the motor	Start again after the motor stops
	(In deceleration)	Too high inertia of load rotation	Use appropriate dynamic braking assembly

Code	Display	Possible Cause	Solution
	Bus over-voltage protection	Too short deceleration time	Increase deceleration time
		Braking resistor is too high or not connected	Connect appropriate braking resistor
	(In constant speed running) Bus over-voltage protection	Abnormal input power	Check input power
		Too high load rotation inertia	Use appropriate dynamic braking assembly
		Braking resistor is too high or not connected	Connect appropriate braking resistor
79	Bus under-voltage	Supply voltage lower than min. equipment operation voltage	Check input power
		Instantaneous outage	Check input power. Restart after reset when the input voltage is normal
		Too much variation in the voltage of input power	
		Loose terminal of power supply	Check input wiring
		Abnormal internal switching power	Contact specialist for maintenance
		High starting current load present in the same supply system	Change the power supply system to make it conform to specification
80	Output phase failure	Abnormal connection, omitted connection or broken wire at output of frequency converter	Check the wiring at output side of frequency converter and eliminate omitted connection or broken wire according to operation procedure
		Loose output terminal	
		Motor power is lower than 1/20 of max. applicable motor capacity	Adjust capacity of frequency converter or motor
		Output 3-phase imbalance	Check motor wiring
			Check after de-energization if characteristics of frequency converter output side and DC side terminal are consistent
81	Motor low speed over-current	Low grid voltage	Check input power
		Improper motor parameter setting	Set motor parameters correctly

Code	Display	Possible Cause	Solution
	(in acceleration)	Direct quick start during motor operation	Restart after the motor stops
	Motor low speed over-current (in deceleration)	Low grid voltage	Check input power
		Load rotation inertia is too high	Use appropriate dynamic braking assembly
		Improper motor parameter setting	Set motor parameters correctly
		Deceleration time is too short	Increase deceleration time
	Motor low speed over-current (in constant speed running)	Abrupt load change during operation	Decrease the frequency and extent of abrupt change of load
		Improper motor parameter setting	Set motor parameters correctly
91	Abc over-current (3-phase instantaneous value)	Short-circuit of single phase of the motor to ground	Check motor and output line circuit
		Drive board detection circuit error	Replace drive board
92	Brake detection fault	No actuation of output relay	Check relay control circuit
		Relay actuation brake is not on	Check loose wire or broken wire of brake power line
		No signal is detected by feedback element	Adjust feedback element
97	RMS current over-current	Too much is in overload state. The higher the load, the shorter the time	Stop operation for some time. if it occurs again after operation, check if the load is within allowable range
		Motor stall	Check motor or brake
		Short circuit of motor coil	Check motor
		Output short circuit	Check wiring or motor
99	Input phase failure	Abnormal voltage at input side	Check grid voltage
		Input phase failure	
		Loose terminal at input side	Check wiring at input side
101	Motor high speed over current	Low grid voltage	Check input power
		Abrupt change of load in operation	Decrease the frequency and extent of abrupt change of load

Code	Display	Possible Cause	Solution
		Improper motor parameter setting	Set motor parameters correctly
102	Grounding protection	Incorrect wiring	Fix incorrect wiring according to user manual
		Abnormal motor	Replace motor. Insulation to ground test must be performed first
		Leak current of output side of frequency converter to ground is too high	Contact specialist for maintenance
104	External fault	External input fault signal present	Check external fault cause
107	Fault of 3-phase sampling resistor of frequency converter	Drive board hardware fault	Contact specialist for maintenance
108	Braking resistor short circuit	Short circuit of external braking resistor line	Check wiring of braking resistor
109	Too high instantaneous current	Too high instantaneous 3-phase current alarm when Ia, Ib, Ic are not running	Contact specialist for maintenance
112	IGBT short-circuit fault	Periphery short circuit is present	Check if there is short circuit in motor and output wiring and if there is short circuit to ground
113	Frequency converter has no communicatio n	Loose internal inserts	Contact specialist for maintenance
		Poor connected or damaged hardware	Contact specialist for maintenance
114	Charging relay fault	Damaged charging relay	Contact specialist for maintenance
		Instantaneous 3-phase supply voltage dip exceeds 30V	Check the cause for input voltage dip
121	Abnormal operation output current	Abnormal operation output current	Check the cause for abnormal output current
122	Phase	Phase detector fault	Contact specialist for maintenance

Code	Display	Possible Cause	Solution
	detector fault		
123	Tracking timeout	Tracking timeout when delta operation changes to frequency conversion operation	Adjust parameter properly