Lester Control Systems Ltd

Unit D, 18 Imperial Way, Croydon, Surrey, CR0 4RR.
Tel: **020 8288 0668**
Email: info@lestercontrols.co.uk
Web: www.lestercontrols.co.uk
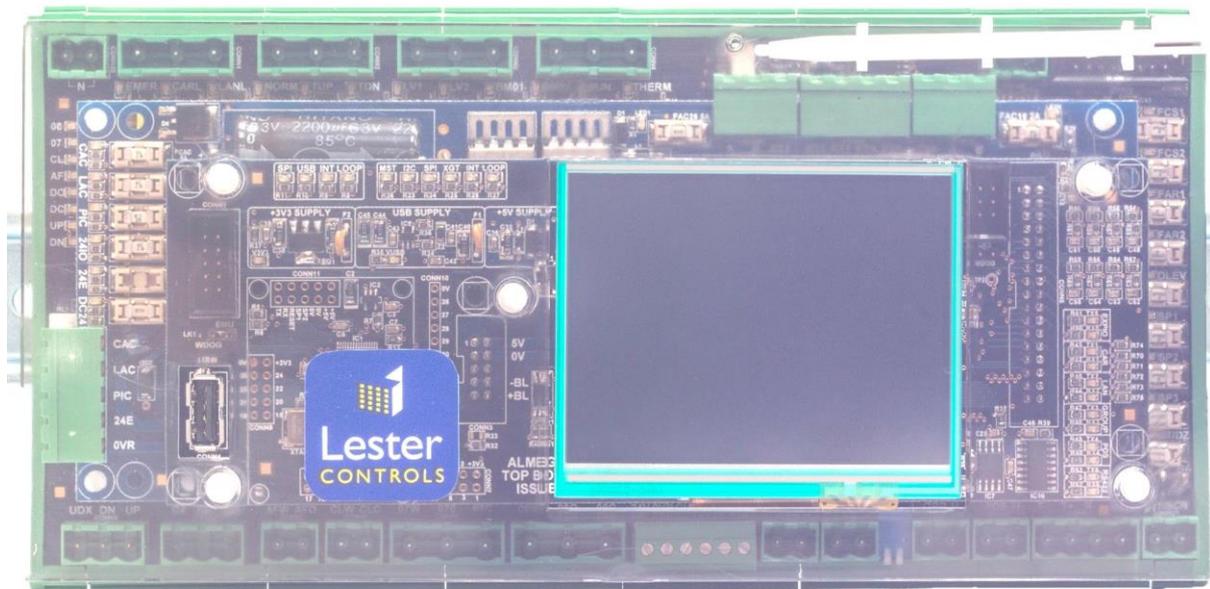
ALMEGA 2 ESCALATOR QUICK GUIDE
ISSUE: 3
Date: 06/11/2023

Contents

1. Controller Overview

1.1. MAIN MENU

To Select press the MAIN MENU (BLUE) button. A list of further buttons will be displayed as below.
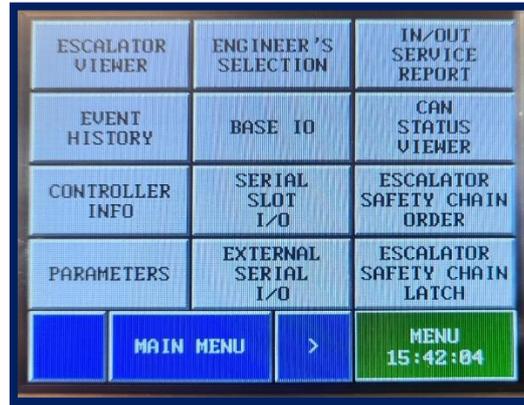
Image 1: Main Menu

1.1.1. ESCALATOR VIEWER

To Select press the ESCALATOR VIEWER button and the screen will be displayed as below.
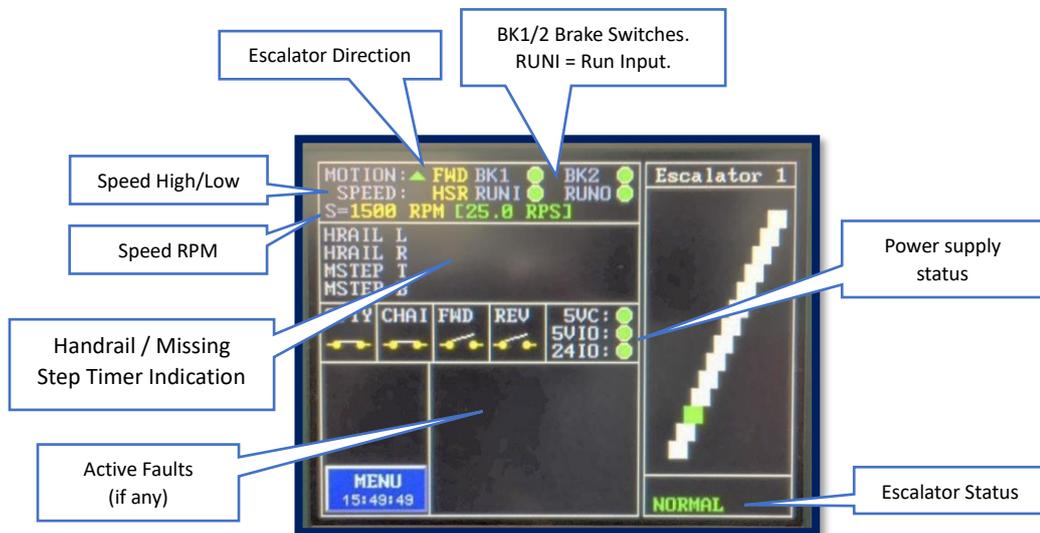
Image 2: Escalator Viewer

1.1.2. CONTROLLER INFO

Press the CONTROLLER INFO button. Details of the Controller info and software versions will be displayed as below.
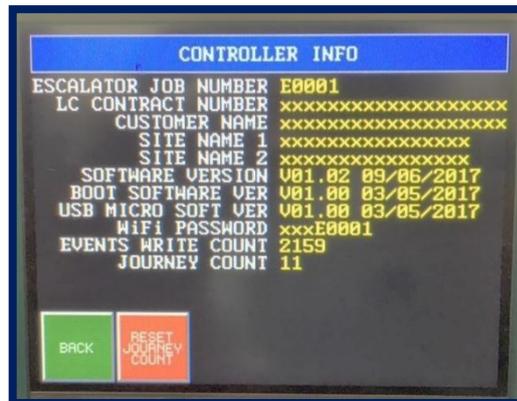
Image 3: Controller Info

1.1.3. EVENT HISTORY

Press the EVENT HISTORY button and the event log will be displayed in list format as below. The most recent event is at the end of the list.

Image 4: Event History

1.1.4. EVENT HISTORY DETAIL

Press on an individual event to obtain a full description of the Event.
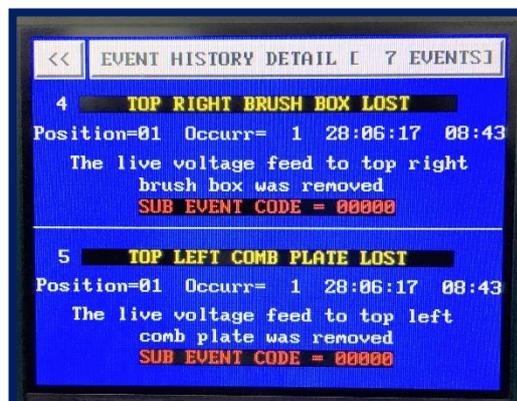
Image 5: Event History Detail

1.1.5. BASE IO VIEWER

To Select press the BASE IO button. This will display the input/output status of all the Base IO as below. RED indicates the input is ON, otherwise BLACK indicates the input is OFF. Also, the power supply status is GREEN when healthy and BLACK when not healthy.

Image 6: Base IO Viewer

1.1.6. SERIAL SLOT IO VIEWER

To Select press the SERIAL SLOT IO button. This will display the input/output status of all the Serial Slot IO (IO modules) as below. RED indicates an input and GREEN indicates an output. When the input/output is ON the colour changes to HIGHLIGHTED RED / GREEN.

Image 7: Serial Slot IO Viewer

1.2. PARAMETERS

To Select press the MAIN MENU (BLUE) button and then the PARAMETERS button. A list of further buttons will be displayed as below.
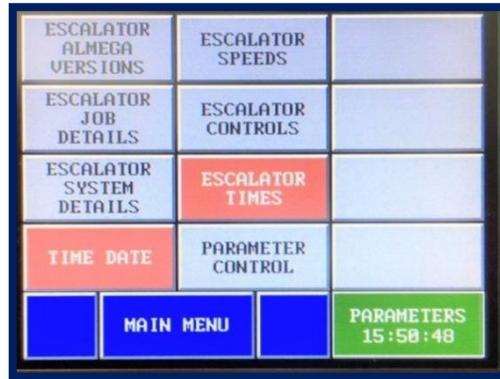
Image 8: Parameters

1.2.1. ESCALATOR SYSTEM DETAILS

To Select press the ESCALATOR SYSTEM DETAILS. A list of parameters will be displayed. Many of the parameters are not accessible to change.
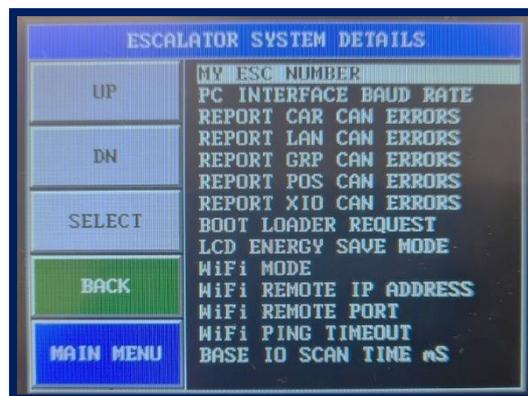
Image 9: Escalator System Details

1.2.2. ESCALATOR JOB DETAILS

To Select press the ESCALATOR JOB DETAILS. This section contains a list of job reference parameters. Most of these parameters are read-only, meaning they can be viewed but not modified.
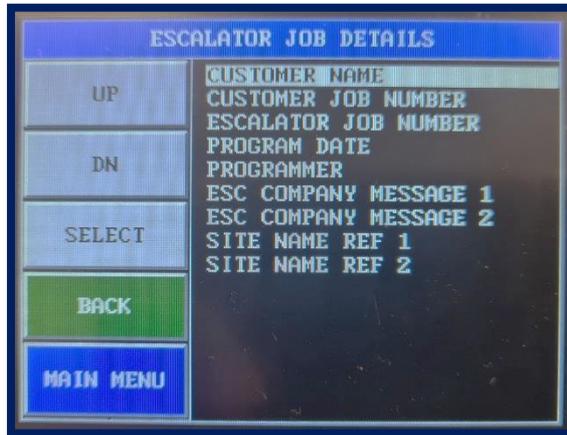
Image 10: Escalator Job Details

1.2.3. ESCALATOR TIME DATE

To select, press the ESCALATOR TIME DATE button. The button allows access and adjustment of the date and time settings for the escalator system.

Image 11: Escalator Time Date

1.2.4. ESCALATOR SPEEDS

To Select press the ESCALATOR SPEEDS button. A list of parameters will be displayed.
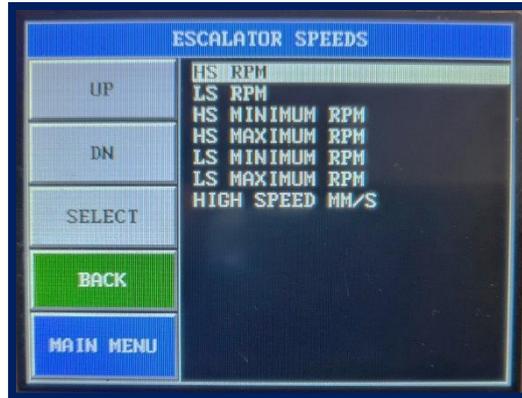
Image 12: Escalator Speeds

	ESCALATOR SPEEDS	Min	Max	Default	Unit
1	**HS RPM** High-Speed RPM Value	1	20000	1500	rpm
2	**LS RPM** Low-Speed RPM Value (if applicable, e.g. VF Drive)	1	20000	1100	rpm
3	**HS MINIMUM RPM** Minimum RPM (HS) that will be accepted before the Escalator Trips when SPEED MONITORING is enabled. A 20% tolerance recommended.	1	20000	1400	rpm
4	**HS MAXIMUM RPM** Maximum RPM (HS) that will be accepted before the Escalator Trips when SPEED MONITORING is enabled. A 20% tolerance is recommended.	1	20000	1600	rpm
5	**LS MINIMUM RPM.** Minimum RPM (LS) that will be accepted before the Escalator Trips when SPEED MONITORING is enabled. A 20% tolerance is recommended.	1	20000	1000	rpm
6	**LS MAXIMUM RPM** Maximum RPM (LS) that will be accepted before the Escalator Trips when SPEED MONITORING is enabled. A 20% tolerance recommended.	1	20000	1200	rpm
7	**HIGH SPEED MM/S** Speed of the escalator in mm per second. This value will be used for missing step monitoring calculation.	1	1500	500	mm/s

Table 1: Escalator Speed Parameters

1.2.5. ESCALATOR TIMES

To Select press the ESCALATOR TIMES button. A list of parameters will be displayed.
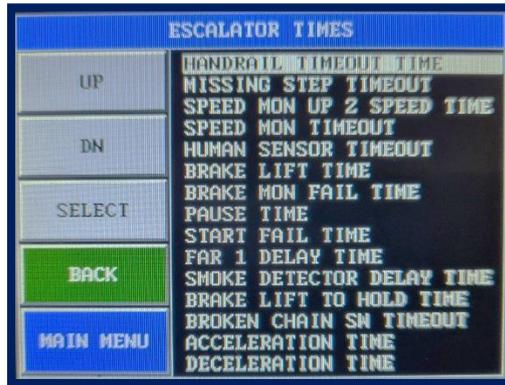
Image 13: Escalator Times Parameters

	ESCALATOR TIMES	Min	Max	Default	Unit
1	**HANDRAIL TIME OUT**	1	10	5	seconds
2	**MISSING STEP TIMEOUT TIME** This is the duration required for a single step to cross the sensor. Please refer section 3.1.5 for recommended values.	0	3000	300	milliseconds
3	**SPEED MON UP 2 SPEED TIME** Time allowed for the escalator to reach its target speed, i.e. when starting up to high speed or when changing speed from high speed to low speed	1	10	5	seconds
4	**SPEED MON TIMEOUT** Time delay before tripping a fault due to speed being out of range of min/max	0	3000	1000	milliseconds
5	**HUMAN SENSOR TIMEOUT** The time delay before reducing the speed to a lower speed in the event no human has been detected.	0	1200	300	seconds
6	**BRAKE LIFT TIME** Time delay before Brake Resistor Output (economy Brake Resistor) is energised.	0	3000	200	milliseconds
7	**BRAKE MON FAIL TIME** The time delay before a Brake Switch Fault is asserted when the escalator has stopped and checking the status of the Brake Switches.	1	10	4	seconds
8	**PAUSE TIME** The time delay before the Escalator can start again after just stopping.	0	10	1	seconds
9	**START FAIL TIME** Time Delay for Reporting a Start Failure Fault During Escalator Startup. This is monitored through the RUN input. A Start Failure is reported if the RUN input is not asserted within this predefined time. When four consecutive failures occur, it will result in a start abort or failure.	0	10	5	seconds
10	**FAR 1 DELAY TIME** Denotes the permissible duration for the system to continue its operation following the detection of a fire alarm.	0	600	0	seconds
11	**SMOKE DETECTOR DELAY TIME** Denotes the permissible duration for the system to continue its operation following the detection of smoke.	0	600	0	seconds

12	**BRAKE LIFT TO HOLD TIME** The duration within which the Brake Hold output activates the brake hold function by creating a short circuit in the main brake rectifier.	0	3000	1000	milliseconds
13	**BROKEN CHAIN SW TIMEOUT** The Debounce Time for Broken Chain Sensor Detection	0	3000	500	milliseconds
14	**ACCELERATION TIME** The duration it takes for the escalator to transition from a standstill (0 speed) to its highest operating speed.	1	10000	5000	milliseconds
15	**DECELERATION TIME** The duration it takes for the escalator to transition from its highest operating speed to the lower speed setting. It is recommended to use 50% of Acceleration time	1	10000	2500	milliseconds
16	**STOPPING DISTANCE TIME** The maximum time allowed for movement after coming to a halt. Needs to be set to correspond to >=20% of the escalator travel.	1	30	3	seconds
17	**STAR DELTA TIME** The duration for which the motor runs in the star configuration before transitioning to the delta configuration.	0	3000	500	milliseconds

Table 2: Escalator Times Parameters

1.2.6. ESCALATOR CONTROLS

To Select press the ESCALATOR CONTROLS button. A list of parameters will be displayed.
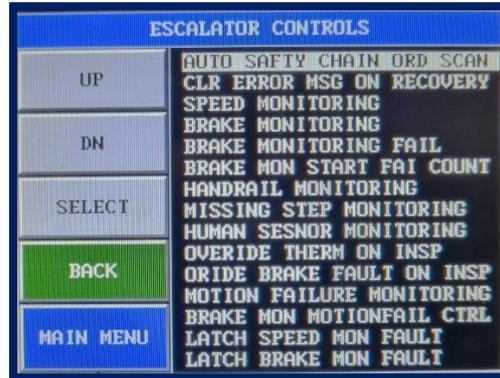
Image 14: Escalator Controls Parameters

	ESCALATOR CONTROLS	Range	Default
1	**AUTO SAFTY CHAIN ORD SCAN**	YES/NO	YES
	The parameter enables the escalator processor to autonomously ascertain the scanning sequence of Safety Chain Inputs. This is done to guarantee the accurate reporting of safety chain events in their intended order. The scan order is determined based on how the inputs are physically connected to the Base IO and Slot IO.		
2	**CLR ERROR MSG ON RECOVERY**	YES/NO	NO
	When this is enabled, the message displayed on the Remote Display will be automatically cleared once the fault is resolved. Otherwise, the message will persist until the escalator is restarted.		
3	**SPEED MONITORING**	YES/NO	YES
	When enabled, the escalator's speed monitoring relies on the ST/DZ input, which measures RPM (Revolutions Per Minute). It is advisable to use a sensor-actuator of at least 10mm, such as a 10mm bolt, to ensure dependable RPM monitoring within the range of 600-3000 RPM.		
4	**BRAKE MONITORING**	YES/NO	NO
	Enable/Disable the monitoring of the Brake Switches.		
5	**BRAKE MONITORING FAIL**	YES/NO	NO
	The processor sets this to YES when monitoring of the Brake Switches has failed. This can only be reset by setting it to NO within this menu or in MAIN MENU→ENGINEERS SELECTION → BRAKE MONITORING FAIL. Note: Cycling the Escalator Power will not reset the fault!		
6	**BRAKE MON START FAI COUNT**	1-4	3
	This parameter determines the number of consecutive failures allowed when starting, before a Brake Fault is latched.		
7	**HANDRAIL MONITORING**	YES/NO	YES
	Enable/Disable Handrail monitoring		
8	**MISSING STEP MONITORING**	YES/NO	YES
	Enable/Disable missing step monitoring. See section 11 for additional setup requirements.		
9	**HUMAN SENSOR MONITORING**	NONE HIGH-LOW HIGH-STOP HIGH-LOW-STOP	HIGH-LOW
	Enable/Disable Human Sensor monitoring (photo-cell detection).		
10	**OVERRIDE THERM ON INSP**	YES/NO	YES
	Enable/Disable Override Thermistor Input when on Inspection		

11	**ORIDE BRAKE FAULT ON INSP** Enable/Disable Override Brake Fault when on Inspection	YES/NO	NO
12	**MOTION FAILURE MONITORING** Enable/Disable the ability to identify Motion Failure through the RUN input. When the RUN input is lost, it signifies a loss of motion.	YES/NO	YES
13	**BRAKE MON MOTIONFAIL CTRL** Monitors the Brake Switches at start, stop and when moving. Options include NONE (turned off), WARNING (generates warning events in the fault logger), and FAULT (generates events and halts the escalator upon activation). Once tripped, the fault will need to be reset in BRAKE 'MONITORING FAIL'.	NON WARNING FAULT	FAULT
14	**LATCH SPEED MON FAULT** Enable/Disable the latching of Speed monitoring fault.	YES/NO	YES
15	**LATCH BRAKE MON FAULT** Enable/Disable the latching of the Brake monitoring fault.	YES/NO	YES
16	**LATCH HANDRAIL FAULT** Enable/Disable the latching of the handrail monitoring fault.	YES/NO	YES
17	**LATCH MISSING STEP FAULT** Enable/Disable the latching of missing step monitoring faults.	YES/NO	YES
18	**LATCH DRIVE FAULT** Enable/Disable the latching of drive fault.	YES/NO	YES
19	**HUMANSEN MON RE-STRT DIR** Configure the restart direction for resuming human sensor monitoring after a halt.	FORWARD REVERSE AUTO	FORWARD
20	**SAFETY CHAIN LATCH ENABL** Enable/Disable the safety circuit trip latching feature. Up to 30 inputs can be configured to latch in the MAIN MENU under ESCALATOR SAFETY CHAIN LATCH.	YES/NO	NO
21	**SAFETY CHAIN LATCH FAULT** The processor sets this to YES when monitoring of the safety chain has failed with the latch enabled. This can only be reset by setting it to NO within this menu or in MAIN MENU→ENGINEERS SELECTION → SAFETY CHAIN LATCH FAULT. Note: Cycling the Escalator Power will not reset the fault!	YES/NO	NO
22	**SAFETY CHAIN LATCHED IP** This is a read-only parameter which will be set by the processor to indicate the failed safety chain input.	Safety chain inputs	Read-only
28	**SPEED MON FAULT FAIL** The processor sets this to YES when monitoring of speed has failed with the latch enabled. This can only be reset by setting it to NO within this menu or in MAIN MENU→ENGINEERS SELECTION → SPEED MON FAULT FAIL. Note: Cycling the Escalator Power will not reset the fault!	YES/NO	NO
29	**HANDRAIL FAULT FAIL** The processor sets this to YES when monitoring of the Handrail has failed with the latch enabled. This can only be reset by setting it to NO within this menu or in MAIN MENU→ENGINEERS SELECTION → HANDRAIL FAULT FAIL. Note: Cycling the Escalator Power will not reset the fault!	YES/NO	NO
30	**MISSING STEP FAULT FAIL** The processor sets this to YES when a missing step has been detected with the latch enabled. This can only be reset by setting it to NO within this menu or in MAIN MENU→ENGINEERS SELECTION → MISSING STEP FAULT FAIL. Note: Cycling the Escalator Power will not reset the fault!	YES/NO	NO
31	**DRIVE FAULT FAIL** The processor sets this to YES when a drive fault has been detected with the latch enabled. This can only be reset by setting it to NO within this menu or in MAIN MENU→ENGINEERS SELECTION → DRIVE FAULT FAIL. Note: Cycling the Escalator Power will not reset the fault!	YES/NO	NO

32	**LATCH BROKEN CHAIN SW FLT** Enable/Disable the latching of broken chain switch fault.	YES/NO	NO
33	**LATCH TRAP DOOR SW FLT** Enable/Disable the latching of the door switch fault.	YES/NO	NO
34	**BROKEN CHAIN SW FLT FAIL** The processor sets this to YES when the broken switch fault has been detected with the latch enabled. This can only be reset by setting it to NO within this menu or in MAIN MENU→ENGINEERS SELECTION → BROKEN CHAIN SW FAULT FAIL. Note: Cycling the Escalator Power will not reset the fault!	YES/NO	NO
35	**TRAP DOOR SW FLT FAIL** The processor sets this to YES when the broken switch fault has been detected with the latch enabled. This can only be reset by setting it to NO within this menu or in MAIN MENU→ENGINEERS SELECTION → TRAP DOOR SW FAULT FAIL. Note: Cycling the Escalator Power will not reset the fault!	YES/NO	NO
36	**SHOW LAST DIR ECO MODE** Enable to display the escalator direction when it's in Eco mode	YES/NO	NO
37	**MOTION FAIL COUNT** The maximum permissible number of motion failures before a restart is required. The restart can be initiated using the FWD or REV button as a relay trap inserted into the starting circuit, ensuring the escalator cannot restart.	1-4	1
38	**STEP GAP SIZE** Normally, this is determined as the length of the step when missing step detection relies on the roller. Otherwise, it corresponds to the gap between the two steps.	20-1000 mm	100
39	**STOPPING DIST MONITORING** Enable/disable the function for detecting and notifying when the escalator surpasses the allowable distance of travel after coming to a stop.	YES/NO	NO
40	**LATCH STOPPING DIST FAULT** Enable/Disable the latching of stopping distance fault.	YES/NO	NO
41	**STOPPING DIST FAULT FAIL** The processor sets this to YES when the stopping distance fault has been detected with the latch enabled. This can only be reset by setting it to NO within this menu or in MAIN MENU→ENGINEERS SELECTION →STOPPING DISTANCE FAULT FAIL. Note: Cycling the Escalator Power will not reset the fault!	YES/NO	NO
42	**ENABLE MISSING STEP VER 2** Enable/disable the missing step calculation feature for identifying missing steps during both the acceleration and deceleration phases. For additional necessary configurations, please refer to Section 3.1	YES/NO	NO
43	**NO ENTRY ON STATIONARY** Activate/Deactivate the display of a "No Entry" symbol on the screen when the escalator is idle and not in ECO mode stop.	YES/NO	YES
44	**BRAKE MON MOT FAIL COUNT** This parameter specifies the maximum number of consecutive failures permitted during the run before a Brake Fault is latched.	1-4	4

Table 3: Escalator Controls Parameters

2. Configuration Guide b

2.1. BASE IO Scan Time

Monitoring functions, like Missing Steps, rely on inputs from the base IO. Adjusting this parameter directly impacts the input's scan time and the sensitivity and accuracy of the detection.

Please note that the scan time for the Serial Slot IO is fixed at 20 milliseconds and cannot be modified.

This parameter is measured in milliseconds, with a range of 1 to 20, and a default value of 1.

Image 15: Escalator IO Scan Time

To modify the scan time, follow these steps:
a. Navigate to MAIN MENU→PARAMETERS→ESCALATOR SYSTEM DETAILS→BASE IO SCAN TIME mS
b. Use the selection wheels to set the parameter value, then press "OK".

Note: To restore to default, press "DEFAULT" and then OK.

2.2. Invert Inputs

All inputs are set up as open, and close to operate. In some cases, brake lift switches especially, are closed and will open when the brake lifts. To reverse or invert the inputs proceed as follows.

Example 1: Invert LH BRAKE

c. Navigate to MAIN MENU→BASE IO→24V INPUTS→ LH BRAKE
d. Select Inverted and press OK.

GREEN = INVERTED
BLACK = NOT INVERTED
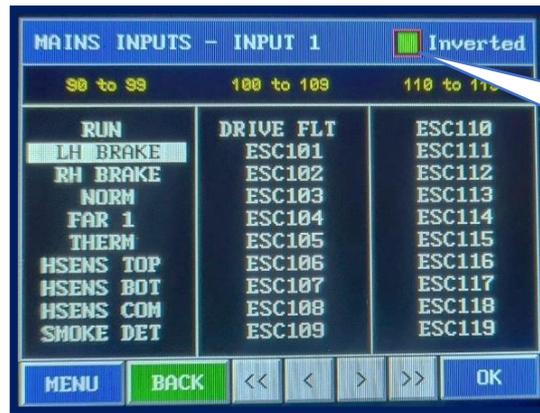
Image 16: LH BRAKE Inverted

Example 2: Invert FAR1

    a.   Navigate to MAIN MENU→SERIAL SLOT IO→FAR1→ SELECT FAR1 from inputs 1-8

    b.   Select Inverted and Press OK.

GREEN = INVERTED
BLACK = NOT INVERTED
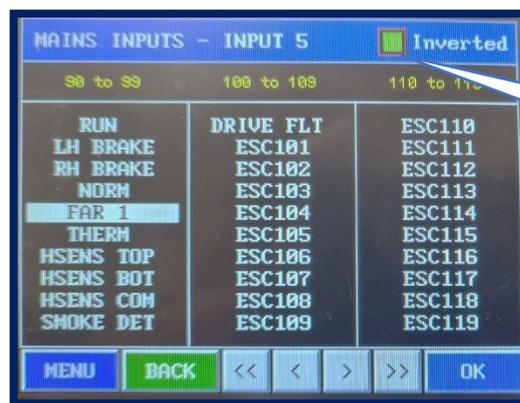
Image 17: FAR1 Inverted

2.3. Remote Screen Message

Image 18: Remote Display

To modify the text displayed on the remote screen when the escalator is operating normally, please follow these steps:

    a.   Go to MAIN MENU → PARAMETERS → ESCALATOR JOB DETAILS → ESCALATOR COMPANY MESSAGE 1 (& 2).

    b.   Adjust the text as needed.

    c.   Press OK to confirm the changes.

2.3.1. Clear fault on recovery

Normally, the remote display will continue to show the fault until the escalator resumes operation. However, it can be configured to clear the fault upon recovery by enabling "CLR ERROR MSG ON RECOVERY" in ESCALATOR CONTROLS.

a. Go to MAIN MENU → PARAMETERS → ESCALATOR CONTROLS → CLR ERROR MSG ON RECOVERY
b. Select 'YES' and Press OK to confirm the changes.

2.4. Adjust Safety Chain Inputs

To change any of the switches in the safety circuit from the original configuration, follow these steps:
a. Navigate to MAIN MENU → PARAMETERS → ESCALATOR SAFETY CHAIN ORDER.
b. Scroll to choose the switch that needs to be modified, and press SELECT.
c. Scroll to select the new switch and press OK.

2.5. Escalator Safety Chain Latch

To apply a fault latch, for instance, when the top drop step switch triggers but self-resets and to prevent the machine from restarting through the key switch, requiring a reset in the software, follow these steps:

Note: Latching can also be applied to other monitoring switches, such as those for missing steps, handrails, brake lift, and motor speed

2.5.1. Enable Safety Chain Latch
a. Navigate to MAIN MENU → PARAMETERS → ESCALATOR CONTROLS→ SAFETY CHAIN ENABLE
b. Select "YES" and press OK.

2.5.2. Configure Safety Chain Latch Inputs.
a. Navigate to MAIN MENU → ESCALATOR SAFETY CHAIN LATCH
b. Select input number and press SELECT. (1 = 1st latched fault)
c. Scroll to choose the Safety Chain Input.
d. Press OK.

2.5.3. Reset Latch Fault
When a latched safety circuit fault occurs, it must be reset in software using the following steps:
a. Navigate to MAIN MENU → ENGINEERS SELECTION→ SAFETY CHAIN LATCH FAULT
b. Select "NO" and press OK.

2.6. Setup using LCSLwin

The escalator parameters can be configured using the LCSLwin PC software.
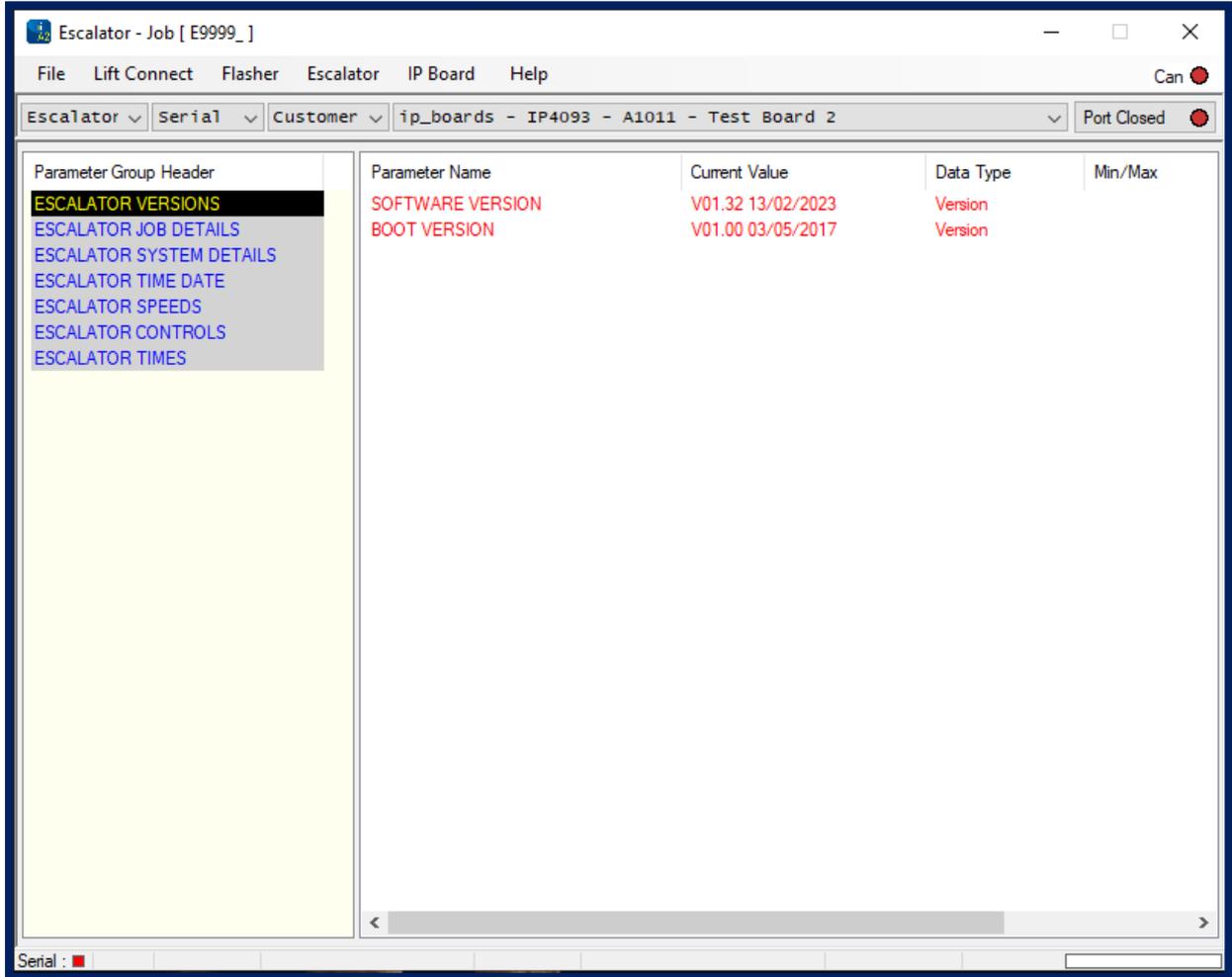
Image 19: LCSLwin Parameter Viewer

Monitoring of the escalator can be performed using the LCSLWin PC software. It can also be accomplished remotely via an internet connection board.
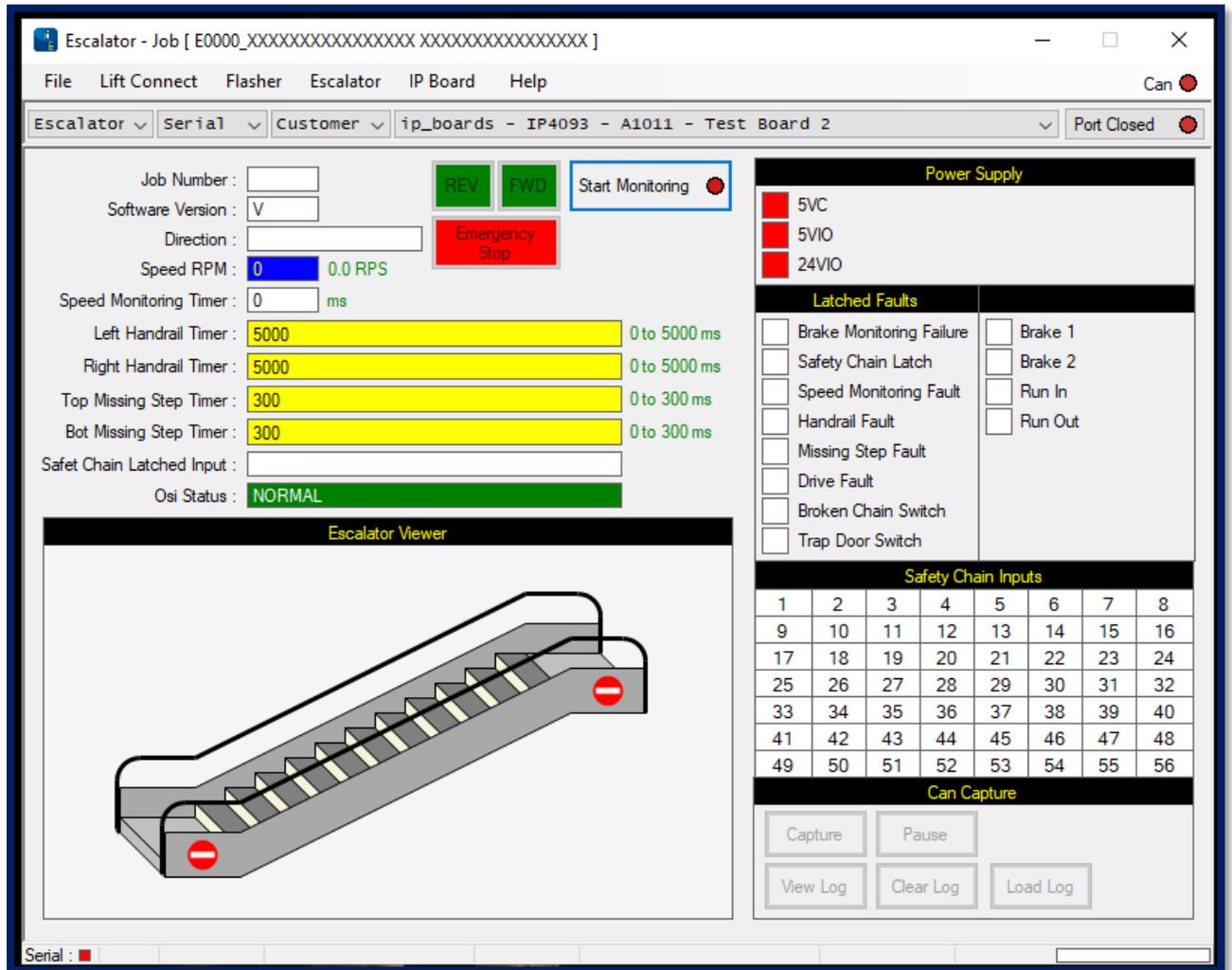
Image 20: LCSLWin Escalator Viewer

3. Safety Features

3.1. Missing Step Monitoring

3.1.1. Enable Missing Step Monitoring

MAIN MENU→ESCALATOR PARAMETERS→ESCALATOR CONTROLS→ MISSING STEP MONITORING

Select "**YES"** and press **OK.**

3.1.2. Enhancements in Missing Step Monitoring

Recent developments in escalator safety technology have led to significant improvements in missing step monitoring with the primary improvement being the speed of detection. Another noteworthy enhancement is the adjustment to the monitoring system, enabling it to identify missing steps during both the acceleration and deceleration phases. This addresses a previous limitation where detection occurred only after the up-to-speed timeout.

To take advantage of the newer and more robust version of missing step monitoring, specific parameters must be configured as below**.** These adjustments ensure the escalator's safety system can effectively identify any missing steps at various phases of operation, contributing to a higher level of passenger safety and escalator performance.

3.1.3. Missing Step Monitoring Version 2 Configuration.

Prerequisite: Escalator Software Version 02.00 or Later

a. Enable missing step monitoring version 2.
   MAIN MENU→ESCALATOR PARAMETERS→ESCALATOR CONTROLS→ ENABLE MISSING STEP VER 2
   Select "**YES"** and press **OK**.

b. Set gap size: Normally, this is determined as the length of the step when missing step detection relies on the roller. Otherwise, it corresponds to the gap between the two steps.

   MAIN MENU→ESCALATOR PARAMETERS→ESCALATOR CONTROLS→ STEP GAP SIZE
   Set the size and press **OK**.

c. Set the missing step timeout. Please refer to section 3.1.5 for recommended values.
   MAIN MENU→ESCALATOR PARAMETERS→ESCALATOR TIMES→ MISSING STEP TIMEOUT TIME
   Set the time and press **OK**. Please refer to Table 1 for recommended values.

d. Set the Acceleration time. The duration it takes for the escalator to transition from a standstill (0 speed) to its highest operating speed.
   MAIN MENU→ESCALATOR PARAMETERS→ESCALATOR TIMES→ ACCELERATION TIME
   Set the time and press **OK**.

e. Set the Deceleration time. The duration it takes for the escalator to transition from its highest operating speed to the lower speed setting. It is recommended to use 50% of Acceleration time.
MAIN MENU→ESCALATOR PARAMETERS→ESCALATOR TIMES→ DECELERATION TIME
Set the time and press **OK**.

f. Set the contract speed of the escalator in mm per second.
MAIN MENU→ESCALATOR PARAMETERS→ESCALATOR SPEEDS→ HIGH SPEED MM/S
Set the speed and press **OK**.

3.1.4. Missing Step Monitoring Version 1 Configuration

a. Disable missing step monitoring version 2 (*Only for Escalator Software Version 02.00 or later*)

MAIN MENU→ESCALATOR PARAMETERS→ESCALATOR CONTROLS→ ENABLE MISSING STEP VER 2
Select "**NO"** and press **OK.**

b. Set the missing step timeout. Please refer to section 3.1.5 for recommended values.
MAIN MENU→ESCALATOR PARAMETERS→ESCALATOR TIMES→ MISSING STEP TIMEOUT TIME
Set the time and press **OK**.

3.1.5. Recommended Missing Step Timeouts

The diagrams below illustrate two types of missing step detection. Measure the detection gap size in accordance with the system installed on-site.

a. Type 1: : Detection is dependent on the step roller.
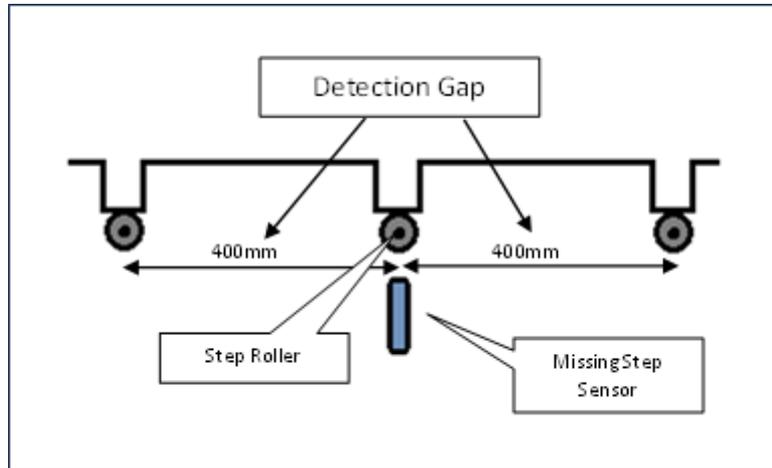
Image 21: System with step roller

b. Type 2 : Detection is dependent on the step.
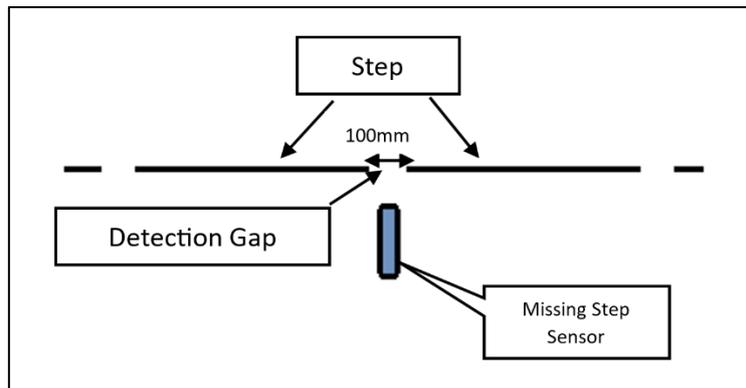
Image 22: System without step roller

Escalator Speed mm/s	Detection Gap Size mm	Recommended Missing step timeout. ms
700	70	200
	80	220
	90	260
	100	280
	110	320
	175	380
	200	420
	225	480
	350	760
	375	800
	400	860
	425	920
	450	960
600	70	240
	80	260
	90	300
	100	340
	110	360
	175	440
	200	500
	225	560
	350	880
	375	940
	400	1000
	425	1060
	450	1120
500	70	280
	80	320
	90	360
	100	400
	110	440
	175	520
	200	600
	225	680
	350	1060
	375	1120
	400	1200
	425	1280
	440	1320

Escalator Speed mm/s	Detection Gap Size mm	Recommended Missing step timeout. ms
400	70	360
	80	400
	90	460
	100	500
	110	560
	175	660
	200	760
	225	840
	350	1320
	375	1400
	400	1500
	425	1600
	450	1680
300	70	460
	80	540
	90	600
	100	660
	110	740
	175	880
	200	1000
	225	1120
	350	1760
	375	1880
	400	2000
	425	2120
	450	2260
200	70	700
	80	800
	90	900
	100	1000
	110	1100
	175	1320
	200	1500
	225	1680
	350	2620
	375	2820
	400	3000
	425	3180
	450	3380

Table 4: Recommended Missing Step Timeouts

4. Hardware Description

Refer to the Almega 2 Lift Technical manual.