Instruction manual

EV-301 / EV-301-P / EV-601
Smoke Ventilation AOV Control Panel

SCS   BA   EV-301 / EV-301-P / EV-601

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Subject to technical changes and errors. All figures are exemplary.

The supplementary sheet "Safety instructions and Warranty conditions" contains general and product-specific warnings and the intended use.

This document is invalid without the supplement!

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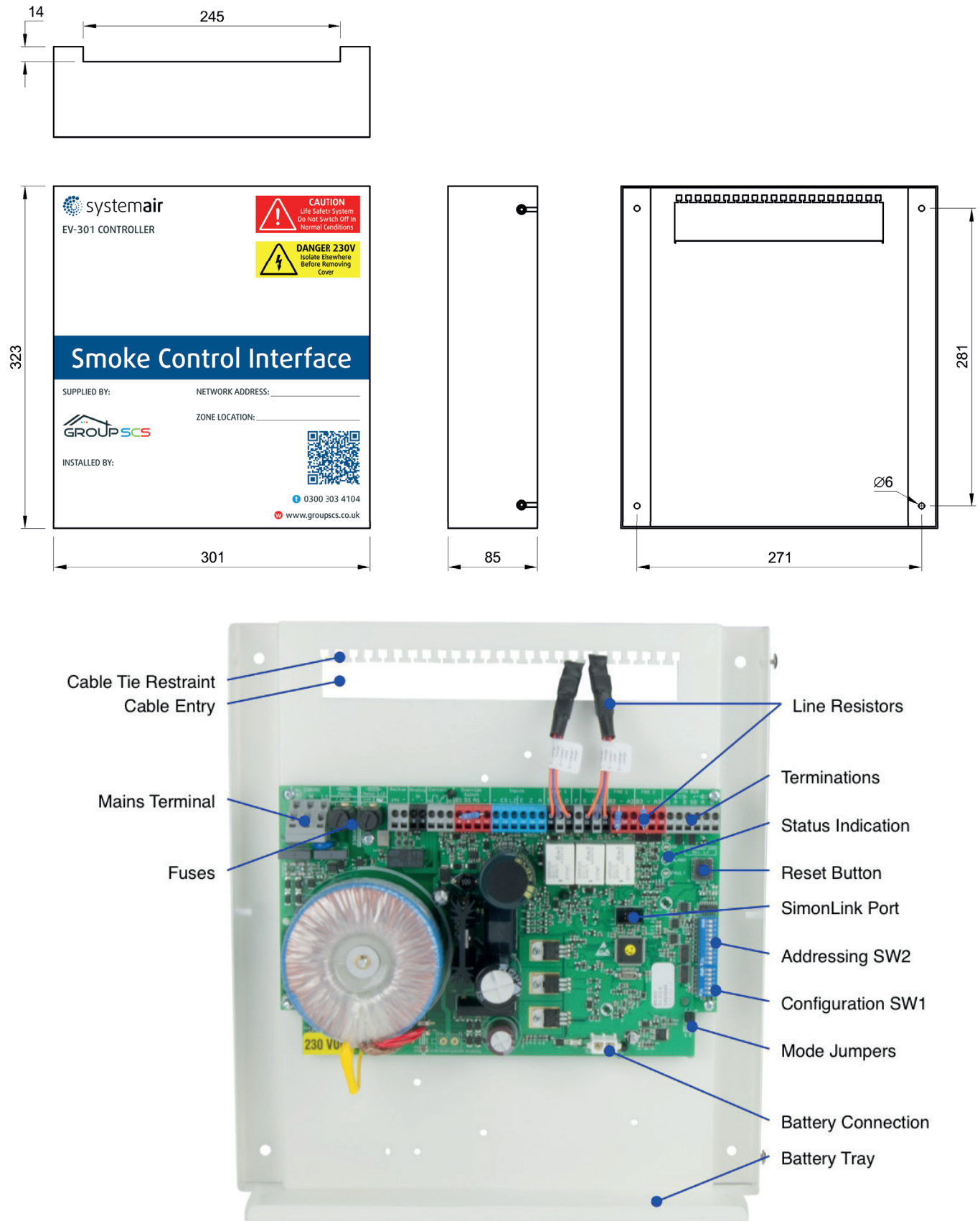
Dimensions

1.2. EV-301-P interface panel

Cable Entry
Cable Tie Restraint
Mains Terminal
Fuses
Pressure Sensor

Line Resistors
Terminations
Status Indication
Reset Button
SimonLink Port
Addressing SW2
Configuration SW1
Mode Jumpers
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1.3. EV-601 interface panel

CAUTION
Life Safety System
Do Not Switch Off In
Normal Conditions

DANGER 230V
Isolate Elsewhere
Before Removing
Cover

systemair
EV-601 CONTROLLER

Smoke Control Interface

SUPPLIED BY:

NETWORK ADDRESS: _____

ZONE LOCATION: _____

GROUP SCS

INSTALLED BY:

0300 303 4104
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14

245

444

301

85

402

271

∅6

Cable Entry
Cable Tie Restraint

Line Resistors

Mains Terminal

Terminations

Fuses

Status Indication

Reset Button

SimonLink Port

Addressing SW2

Configuration SW1

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2.   Technical information

2.1.   Power supply information

Nominal voltage (long-term usage)	230 V AC
Permitted voltage range (short-term usage)	195 V to 264 V
Power consumption[1]	0.56 A (EV-301) 1.12 A (EV-601)
Min. series fuse (on site)	≥ C 16 A
Connected load	103 VA (EV-301) 206 VA (EV-601)
Inrush current	approx.10 A (EV-301) approx. 20 A (EV-601)
Frequency range	47 Hz to 63 Hz
Main fuse (internal)	Fuse characteristic Type T 1.25 A
Power supply line cross section	at least 1.5 mm²
Clamp format	0.5 mm² - 2.5 mm²

(1)   Power consumption during maximum load of the supply system

2.2.   Output information for motor channels

switch-on duration	30% (ON: 3 min / OFF: 7 min)
Output voltage mains operation (nominal)	24 V DC
Permitted voltage range (mains operation)	23.0 V DC to 24.5 V DC
Output voltage battery operation (nominal)	24 V DC
Permitted voltage range (battery operation)	21 V DC to 28.6 V DC
Output current I_{out} (short-term operation) ($I_{out} = I_{mot1} + I_{mot2}$)	3 A (EV-301) 6 A (EV-601)
Power output (non-stop operation)	50 W (EV-301) 100 W (EV-601)
Power output (short-term operation)	73.5 W (EV-301) 145 W (EV-601)
Output fuse for actuators	Type T 3.15 A (EV-301) Type T 6.3 A (EV-601)
Ripple of the output voltage Vpp ($0 A < I_{out} < 3 A$)	≤ 500 mVpp
Power outage bridge-over time[1]	10 ms
Return current in emergency power operation (battery stress by the EV-x01)	19 mA
Clamp format	0.5 mm² - 2.5 mm²

(1)   Input voltage 195 VAC; load current 3 A / 6 A

2.3.   Standards and certifications

EN compliant	As per EMC directive 2014/30/EU and the low voltage directive 2014/35/EU
UK compliant	As per Electromagnetic Compatibility Regulations 2016 and Electrical Equipment (Safety) Regulations 2016
Additional registrations, certificates[1]	prEN 12101-9 BS ISO 21927-9 BS EN 12101-10
Classification as per EN 12101-9	Class D
Classification as per EN 12101-10	Class A
Environmental class as per EN 12101-10	1

2.4.   Connection information for Override Switch (EV-HE077)

Maximum number of main emergency switch (EV-HE077)		2
Output voltage range (B1)	Clamp 8	17.5 V DC to 18 V DC
Current carrying capacity (B1)	Clamp 8	max. 120 mA
Monitoring current (OK- range)	Clamp 8	100 µA to 5 mA
Output voltage range (OK at S1)	Clamp 9	16 V DC to 20 V DC
Output voltage range (Failure at S1)	Clamp 9	11 V DC to 15 V DC
Output voltage range (Alarm at S1)	Clamp 9	6 V DC to 10 V DC
Current carrying capacity (S1)	Clamp 9	max. 100 mA
Input voltage range (A1)	Clamp 10	15 V DC to 30 V DC

2.5.   Override Switch EV-HE077

Operating time Reset	Close-switch	Press > 5 Seconds
Operating time override	Close-switch	Press 2 - 5 Seconds
Rated voltage range (B1)		5 V DC to 28.2 V DC
Current consumption Condition (OK)	Clamp B1	0.5 mA to 5 mA
Current consumption Over-ride	Clamp B1	8 mA to 12mA
Current consumption Alarm	Clamp B1	28 mA to 32 mA
EOL resistor	Clamp B1 Clamp "-"	27 kΩ ± 5%
Current consumption in mains failure mode	Clamp S1	3 mA
Mute mode		ca. 24 h
Piezo buzzer (sound pressure, measure distance 1 m, without housing)		65 to 70 dB(A)

2.6.   Connection information for Fire Alarm System (FAS)

Output voltage range (B3)	Clamp 28	17.5 V DC to 18 V DC
Current carrying capacity (B3)	Clamp 28	max. 120 mA
Monitoring current (OK-range)	Clamp 28	100 µA to 5 mA
Reset time after SHEV - reset (by disconnecting from mains B3)	Clamp 28	3 sec
Input voltage range (A3)	Clamp 30	15 V DC to 30 V DC

2.7.   Connection information for smoke detector EV-SD

Maximum number		2 × EV-SD
Output voltage range (B2)	Clamp 25	17.5 V DC to 18 V DC
Current carrying capacity (B2)	Clamp 25	max. 120 mA
Monitoring current (OK range)	Clamp 27	100 µA to 5 mA
Reset time after SHEV-reset (by disconnecting from mains B2)	Clamp 25	3 sec
Autoreset when triggered by smoke detector		30 min
Input voltage range (A2)	Clamp 27	15 V DC to 30 V DC

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2.8. Connection information for wind-, rain-detector (EV-WRS)

Maximum number		1
Output voltage range (ES)	Clamp 13	23.0 V DC to 24.5 V DC
Current carrying capacity (ES)	Clamp 13	max. 150 mA
Input voltage range (LZ)	Clamp 14	15 V DC to 30 V DC

2.9. Connection information for ventilation switch

Output voltage range (E)	Clamp 15	23.0 V DC to 24.5 V DC
Current carrying capacity (E)	Clamp 15	max. 15 mA
Input voltage range (Z)	Clamp 16	15 V DC to 30 V DC
Input voltage range (A)	Clamp 17	15 V DC to 30 V DC

2.10. Connection information for feedback input

Input voltage range (F)	Clamp 21	15 V DC to 30 V DC

2.11. Connection information for volt-free contacts "NO/C/NC"

Voltage capacity of switching contact 1 (C - NO)	Clamp 6 on Clamp 5	max. 30 V DC
Voltage capacity of switching contact 1 (C - NC)	Clamp 6 on Clamp 7	max. 30 V DC
Current carrying capacity (C - NO resp. C - NC) – Resistive load		max. 2 A DC
Voltage capacity		60 W 62.5 VA

2.12. Mechanical features

Size EV-301-MC	323 × 301 × 85 mm (h × w × d)
Size EV-301-MC-P	
Size EV-301-MC-L	444 × 301 × 85 mm (h × w × d)
Size EV-601-MC	
Weight (without battery)	4.40 kg (EV-301) 5.30 kg (EV-301-P) 6.60 kg (EV-601) 5.20 kg (EV-301-MC-L)
Ingress rating	IP42[1]
Housing	metal case
Colour	Pure white RAL 9010
Protection class	I

(1) In mounted state

2.13. Connection and operation

Connection	see chapter 8.3: "Wiring Diagrams" on page 20
Terminal clamps	Spring clamp type 0.5 mm² - 2.5 mm² (max.)
Switching off the actuators in any position	yes[1]
Maximum wire length between control unit and actuator	see "Safety instructions and Warranty conditions"
Opening/closing process	Pole reversal of the operating voltage
Pause time during direction change	200 ms
Maintenance	see "Safety instructions and Warranty conditions"

(1) Only during ventilation operation

2.14. Installation and environmental requirements

Ambient temperature[1]	-5 to 40 °C
Storage temperature[1]	-5 to 40 °C
Suitable for outdoor installation	No

(1) this temperature range applies to all components of the EV-x01 system (including battery)

2.15. Control time of the analogue and digital inputs

Input digital (LZ, Z, A, F, A1, A2, A3)	500 ms
Input analog (B1, B2, B3) during mains operation	500 ms
Input analog (B1, B2, B3) during emergency power operation	2500 ms

2.16. Technical information for lead acid batteries

Maintenance-free lead acid battery 3.2 Ah (2 needed)	
Dimensions (h × w × d)	64 × 134 × 67 mm
Weight	1.10 kg
VdS registration	G118039
Output voltage per battery	10.5 V DC to 14.1 V DC
Output voltage total (series connection)	21.0 V DC to 28.2 V DC
Rated capacity (total)	3.2 Ah
Life span	approx. 4 years

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3. Product description

3.1. Interface panel EV-301 / EV-601

The interface panels monitor and control smoke control ventilators and interface devices. With configurable modes they can operate as a standalone AOV control panel or as a natural shaft system or as part of a networked mechanical solution. The panels are addressable and communicate to a shaft control panel providing status and diagnostics features via user interface.

It provides powered outputs for smoke vents / dampers and door actuators with a separate output for dedicated environmental ventilators.

Interfaces with smoke detectors, fire alarm interfaces, override switches and environmental sensors with line monitoring of all critical input and output cabling for faults.

3.2. Interface panel EV-301-P

The EV-301-P interface panel monitors and powers smoke control ventilators and interface devices.

With an integral differential pressure sensor this panel serves zones requiring pressure control as part of an addressable mechanical solution. The panel is addressable and communicates to a shaft main control panel providing status and diagnostics features via user interface.

It provides powered outputs for smoke vents / dampers and door actuators with a separate output for dedicated environmental ventilators.

Interfaces with smoke detectors, fire alarm interfaces, override switches and environmental sensors with line monitoring of all critical input and output cabling for faults.

4. Functional specifications

The EV-x01 represents the compact control panel system in the SHEV range. In the standard version, it is housed as a compact assembly with a single control board in a surface-mounted housing.

Mainly AOV's and smoke shafts are fitted with EV-x01 panels.

There are requirements for optional devices to be connected such as:

- Smoke detector or Fire alarm signal
- EV-HE077 Override Switches
- SHEV actuators

The EV-x01 essentially consists of three components:

1. Power supply
2. Emergency power supply
3. Control electronics

4.1. Power supply

If the EV-x01 is connected to the mains and supplies the necessary power from the mains, then this is considered normal operations (mains operation). The power supply is designed in such a manner that it can meet the power demand of the control technology, the battery charging and can provide power for the connected actuators. It is built as a switching power supply (SNT).

The power supply is sustained short circuit-proof, sustained no-load running-proof and is safeguarded by a complying fuse. The power supply is exclusively cooled by natural air cooling.

4.2. Emergency power supply

The emergency power supply of the EV-x01 is ensured by two 12 V lead acid batteries, that are series connected.

During emergency power operation, these take over the power supply of the control electronics and the connected actuators. The battery capacity is adjusted to the power supply output range and is regulated by the individual discharge phases (BS EN 12101-10). The switching between the two operation states is automated. The load output for the SHEV-actuators is represented by two heavy load relays that operate using the pole reversal technique to ensure the OPEN / CLOSE control. The outputs are protected by a corresponding fuse.

During the emergency power operation, appropriate currents are to be supplied in various phases.

Upon conclusion of this discharge, the discharge threshold voltage and the under-voltage limit must not be reached.

⚠️ **ATTENTION**

If mains is not permanently guaranteed after installation, there is a big risk of deep discharge of batteries! This will lead to damage to the battery.

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4.3. Control electronics

The complete control of the EV-x01 is by a microcontroller.

The control functions consist of:

- the control of the I/U-charge
- the monitoring and switching of the power supply source (mains-/emergency power supply operation)
- the inspection of the monitored functions (detection loops, fuse, overload, etc.)
- the activation of the load output
- the activation of the volt-free contact
- the activation of the operational status indicator (OK, ALARM and FAULT)

4.3.1. Mains/emergency power switching

In case of power outage or under-voltage of the power supply or error within the power supply, the EV-x01 will switch to the emergency power supply. This is done with the help of monitoring (monitor function). With this, the control electronics can switch to emergency power operation at an early stage and avoid an output voltage disruption.

4.3.2. Override Switch EV-HE077

The override switch EV-HE077 was especially designed for this system and requires only 3 wires.

There are two buttons for OPEN(Boost) and CLOSE (Reset).

For visualization of the operation conditions there are three LED's and an audible signal (buzzer). There is a mute function for a certain time for the buzzer in case of failure. After this time the buzzer will be active.

Visualization of the operation conditions:

- **OK**: green LED is on – system ready
- **ALARM**: red LED in on – buzzer is active
- **FAULT**: yellow LED is blinking – buzzer is active

4.3.3. Motor outputs on emergency power

All EV-x01 outputs are equipped with overload protection.

During emergency power operation all relays deenergize after 3 minutes (maker opens again and breaker closes).

4.3.4. Signal contact on emergency power

During emergency power operation all relays deenergize (maker opens again and breaker closes).

4.3.5. Operational status indicators (OK, ALARM and FAULT)

Three onboard coloured LED's indicate the status of the panel and is repeated on the local EV-HE077 override switches.

LED	State	Buzzer	Condition
OK (Green)	Off	On	Panel fault
	On	Off	Panel healthy
	Flashing	Muted	Panel is in test mode
ALARM (Red)	Off	Off	No alarms active
	On	On	In an alarm condition with vent output open
	Flashing	On	In an alarm condition with vent output closed
FAULT (Amber)	Off	Off	No fault or warning conditions
	On	Off	In programming mode
	Flashing	On	A fault is active. Morse code flashing identifies the fault condition*

The FAULT LED consist of a series of short (•) and long (—) flashes with a long pause before the sequence is repeated.

Flashing Sequence	Fault condition
• — — •	Primary supply mains failure
— — —	Motor output in overload
• •	Service due timer expired
• —	Power supply or battery failure
• • — •	Motor fuse fault
• — — — —	Line fault on motor 1
• • — — —	Line fault on motor 2
— • • —	Override switch input B1 in alarm
— • — —	FAS1 input B2 in alarm
— — • •	FAS2 input B3 in alarm
— — •	Gap open ventilation timer programming mode
— • — •	Automatic close ventilation timer programming mode
• — —	Master communication failure
— •	Configuration or addressing error
• — • •	Lockout mode

4.3.6. Addressing

The panel has a Databus interface and the panel address can be set between the range of 1 – 255 by switch SW2 in a binary format.

SW2	ON	OFF	Function
10	Standalone/SP-mode	Network	Operation mode
9	Enable	Disable	Alarm link monitoring
8	+128	0	Address Value 128
7	+64	0	Address Value 64
6	+32	0	Address Value 32
5	+16	0	Address Value 16
4	+8	0	Address Value 8
3	+4	0	Address Value 4
2	+2	0	Address Value 2
1	+1	0	Address Value 1

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5. General Functions

The panel function is configurable by the jumper links JP1.

Jumper	Removed	Default setting
JP1−1 MODE	SP Mode	EV Mode
JP1−2 BAT	Battery Enabled	Battery Disabled

In SP Mode the panel functions as a basic natural AOV panel like the legacy SP-300 panels.

In EV mode the panel functions as an addressable interface panel for the advanced shaft system accepting Databus commands from a master panel.

5.1. Battery Back-Up

Jumper JP1−2 selects if batteries are installed and connected.

- When enabled the charging unit will automatically manage and recharge the batteries. The charging unit will monitor and indicate any faults or warnings with the power supply and batteries.
- When disabled the battery back-up monitoring and any associated faults are disabled.

5.2. Sleep Mode

When operating on batteries in the event of a mains failure the panel will go into a sleep mode function to preserve battery life. In sleep mode the panel will disable daily ventilation functions and close the vents before switching off the vent output power and sensor supply terminal ES.

During sleep mode the Databus interface will stay alive and continue to communicate.

Once the mains power supply returns healthy the panel will automatically resume back to normal operation and restart daily ventilation functions.

Sleep mode will be activated after a 'Ventilation time after mains failure' delay period following a mains failure. If the vent is open for daily ventilation the vent output power will automatically close the vent for 2 minutes before entering sleep mode. The timer is programmable via SIMON LINK.

If an alarm or override condition is triggered during sleep mode, sleep mode is cancelled, and all the outputs energise and operate to the alarm condition as required.

When an alarm or override condition is reset when operating on batteries the vent output power will automatically close the vent for a 'Ventilation time after reset' period before entering sleep mode. The timer is programmable via SIMON LINK.

Programmable Parameter	Range	Default setting
Ventilation time after mains failure	0..3600 sec	30 sec
Ventilation time after reset	0..180 sec	70 sec

5.3. FAS Input Signal

A fire alarm signal on FAS1 and FAS2 is detected by an open circuit across the terminating resistor. Detecting a fire alarm signal by short circuit across the terminating resistor is programmable via SimonLink to indicate a fault condition only. The input signal is reset when the terminating resistance is measured within a tolerance.

Programmable Parameter	Range	Default setting
Fault only on wire break	Yes / No	No

5.4. Open Vent Delay

An OPEN command delay time is programmable before switching on the open vent output power. When an OPEN command is triggered the vent output power switches off until the 'Open Delay' time expires. The delay time is programmable via SimonLink. When set to zero the delay timer defaults to 0.5 seconds to break the vent output power as a safeguard when switching the output polarity.

Programmable Parameter	Range	Default setting
Open delay	0..3600 sec	0 sec

5.5. Close Vent Delay

A CLOSE command delay time is programmable before switching on the close vent output power. When a CLOSE command is triggered the vent output power switches off until the 'Close Delay' time expires. The delay time is programmable via SimonLink. When set to zero the delay timer defaults to 0.5 seconds to break the vent output power as a safeguard when switching the output polarity.

Programmable Parameter	Range	Default setting
Close delay	0..60 sec	0 sec

5.6. Vent Output Retriggering

When the vents OPEN in an alarm or override condition the vent output power can be cycled open then close several times to help release sticking vents before continuously opening. This function is programmable via SIMON LINK.

Programmable Parameter	Range	Default setting
Retriggering	Yes / No	No

5.7. Signal Contact

The relay signal contact has separate operating functions for EV mode and SP mode programmable via SIMON LINK. Factory default settings are:

- SP Mode (Alarm triggered) – Relay operates when panel is in alarm
- EV Mode < remote control > – Relay operates on Databus Relay command

Programmable Parameter	Range	Default setting
Delay	Off..1 hour	Off
Holding time	Unlimited..1 hour	Unlimited
Inverse logic	Yes / No	No

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General Functions

5.7.1. List of Operating Conditions

Condition	Definition
< remote control >	Relay controlled by the data bus (master panel).
Alarm	Operating in an alarm condition
AlarmB_1	Override switch alarm activated
AlarmB_2	FAS1 alarm activated
AlarmB_3	FAS2 alarm activated
AlarmBus	Alarm triggered from the data bus (master panel)
AlarmClose	Closed in alarm condition
AlarmOvr	Override closed condition
AlarmRA_1	Alarm signal on Override Switch input A1 detected
AlarmRA_2	Alarm signal on FAS1 input A2 detected
AlarmRA_3	Alarm signal on FAS2 input A3 detected
AutoClose	SP Mode: Daily Vent automatic close command active
AutoReset	SP Mode: Fire alarm automatic reset enabled
BatChg	Battery charging
BatFault	Battery failed or disconnected
BatLow	Battery fully discharged
BatOn	Battery mode enabled (BAT jumper ON)
BatTrick	Battery trickle charging
BatUV	Battery voltage low
BusCfg	Invalid panel address set
BusFault	Data bus communication error or disconnected
CmdClose	Vent output closing
CmdOpen	Vent output opening
FASClose	Close vent on alarm enabled (SW1-5 set ON)
Fault	A fault condition is active
FaultM_1	Motor 1 output has a line fault
FaultM_2	Motor 2 output has a line fault
FuseM	Motor output fuse fault
GapLock	Gap ventilation open output stopped
GapVent	Daily vent gap ventilation mode (partial opening)
InputB_1	Override switch input B1 in alarm
InputB_2	FAS1 input B2 in alarm
InputB_3	FAS2 input B3 in alarm
InputF	Input F signal on
InputLZ	Input LZ (Wind/Rain sensor) signal on
InputA	Input A (Daily vent open) signal on
InputZ	Input Z (Daily vent close) signal on
LoadB_1	Overload detected on Override Switch input B1
LoadB_2	Overload detected on FAS1 input B2
LoadB_3	Overload detected on FAS2 input B3
Local	In standalone mode (SW2-10 set ON)
Lockout	SP Mode: Panel in lockout condition

Condition	Definition
Mains	Mains power supply fault
MainsVentOff	SP Mode: Daily ventilation disabled on mains failure
MainsVentOn	SP Mode: Daily ventilation time after mains failure active
Maint	Maintenance timer has expired
ModeEV	Operating in EV Mode (Mode Jumper set ON)
ModeSP	Operating in SP Mode (Mode Jumper set OFF)
Mute	HE-077 Override Switch buzzer muted
OpenB_1	Open circuit detected on Override Switch input B1
OpenB_2	Open circuit detected on FAS1 input B2
OpenB_3	Open circuit detected on FAS2 input B3
ProgClose	SP Mode: In automatic closing programming mode
ProgGap	SP Mode: In gap ventilation programming mode
Relay	Signal relay contact energised
RelayOn	Signal relay operating condition is true
Reset	Internal reset button pressed
ResetOvr	HE-077 Override switch close/reset button pressed
ShortB_1	Short circuit detected on Override Switch input B1
ShortB_2	Short circuit detected on FAS1 input B2
ShortB_3	Short circuit detected on FAS2 input B3
VentOff	Daily ventilation mode disabled
VentReset	SP Mode: Vent output closing after reset
Watchdog	Panel waiting for watchdog reset from data bus (master panel)

5.8. Service Timer

A service timer can be programmed to countdown in days and when the timer expires the panel indicates a fault. The timer is programmable and reset via SIMON LINK.

Programmable Parameter	Range	Default setting
Maintenance counter	Yes / No	No
Remaining days	1..1460 days	365 days

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6. SP Mode Functions

6.1. Alarm Functions

In the event of a fire alarm or override condition the panel will enter an Alarm mode. Alarm modes take priority disabling sleep modes and all daily ventilation functions. There are 3 alarm conditions: FAS Alarm, override, and lockout.

In alarm the vent output will continuously power the vent to its alarm position. The panel will output an alarm signal on Override Switch A1 terminal signalling linked panels to lockout or operate. The A1 terminal is a bidirectional 24V bus for signalling and monitoring alarms between panels.

The default alarm position and behaviour is set by SW1.

Table 1: Switch SW1 – Alarm Functions

SW1	ON	OFF	Function
6	Auto reset	Manual Reset	FAS reset behaviour. Automatic reset when FAS input returned healthy. When set to off a manual reset from override switch is required.
5	Close	Open	Vent output default position on FAS Alarm.

6.1.1. FAS Alarm

An FAS alarm is triggered by the smoke detector or fire alarm inputs when no other alarms are active. The vent output will automatically power to its default alarm position. The alarm position is set by switch **SW1-5**.

FAS Alarm conditions are:

- Smoke detector FAS1 – input B2 detects a line fault
- Fire alarm FAS2 – input B3 detects a line fault
- Remote alarm signal detected on FAS2 input A3

6.1.2. Override

- By pressing the EV-HE077 override switch OPEN button for >0.5 seconds when in normal operation with no alarms active.
- When the Override Switch input B1 detects a line fault (short or open circuit condition across the terminating resistor)

When in alarm pressing the EV-HE077 override switch CLOSE/RESET button for >0.5 seconds will trigger an override close command. By pressing the OPEN button for >0.5 seconds will trigger an override open command. The vent output will respond to the last override open or close command if permitted.

All override commands are ignored when in Lockout.

6.1.3. Lockout

When an alarm signal is received on Override Switch A1 terminal from a linked panel it will enter Lockout mode and indicate a fault. Daily ventilation functions are disabled and the vent ouput will automatically close and ignore any open commands.

6.1.4. Alarm Link Monitoring

This function is enabled by SW2-9.

The critical alarm link between panels is monitored by the Analog IN + terminal. If the link cable is disconnected the panel will automatically enter Lockout mode and indicate a fault. Daily ventilation functions are disabled and the vent ouput will automatically close and ignore any open commands.

6.2. Alarm Reset

The panel can be reset when all these conditions are met:

- Override Switch – input B1 line is healthy (terminating resistor in circuit)
- Smoke detector FAS1 – input B2 line is healthy (terminating resistor in circuit)
- Fire alarm FAS2 – input B3 line is healthy (terminating resistor in circuit).
- Remote alarm signal on FAS2 – input A3 is off
- Linked remote panels to Override Switch A1 terminal are not in FAS alarm
- Databus Open & Close commands are off

If an alarm condition still exists following a reset the respective alarm will retrigger.

A manual reset command is triggered by pressing the EV-HE077 override CLOSE/RESET or the onboard RESET button for >5 seconds. A reset is also be triggered when a Databus Reset command is received.

The automatic reset function can be set by switch **SW1-6**.

A reset is automatically triggered when all the reset conditions are met following an alarm condition.

With a smoke detector FAS1 input reset the automatic reset function will trigger after 30 minutes.

With a fire alarm FAS2 input reset the automatic reset function will trigger immediately.

A reset function will cycle the power to FAS1-B2 & FAS2-B3 terminals for 3 seconds to reset smoke detectors. If the smoke detector fails to reset the system will retrigger the FAS alarm.

A reset will automatically power the vent ouput closed for the set ‚Closing time after reset'. This timer can be adjusted by SIMON LINK.

When the timer expires the vent output switches off and ventilation functions are enabled.

When a dead-man close ventilation function is enabled the automatic closing after reset function can be disabled by SIMON LINK. If disabled the vent output will switch off and will remain in its last alarm position on reset and may need to be closed manually.

Programmable Parameter	Range	Default setting
Closing time after reset	0.. 180 seconds	70 seconds
Automatic-close at Dead-man	Yes / No	Yes

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6.3. Daily Ventilation Mode

The panel will automatically default to Daily Ventilation mode on start-up or after an alarm reset if all the following conditions are met:

- No alarm, override or lockout conditions exist
- Mains power supply is healthy
- Setting **SW1** to Ventilation function enabled

Daily ventilation functions are configured by setting the **SW1 switches 1-4**.

SW1-1	SW1-2	SW1-3	SW1-4	Daily Ventilation Function
OFF	OFF	OFF	OFF	Continuous (Fully) Open & Close output
ON	OFF	OFF	OFF	Dead-man Open & Close (Move only when button pressed)
OFF	ON	OFF	OFF	Dead-man Open, Continuous Close
ON	ON	OFF	OFF	Continuous Open, Dead-man Close
OFF	OFF	ON	OFF	Gap ventilation. Open for a programmed time.
ON	OFF	ON	OFF	Timed ventilation. Automatically closes after programmed time
OFF	ON	ON	OFF	Combined Gap & Timed ventilation (Modes 5 & 6)
OFF	OFF	ON	ON	Gap ventilation programming mode
ON	OFF	ON	ON	Timed ventilation programming mode
ON	ON	ON	ON	Ventilation function disabled

In daily ventilation mode the vent output responds to daily ventilation commands and the functions set.

A daily open command can be triggered by activating Input A for >0.5 seconds or receiving a Databus DailyOpen command.

A daily close command can be triggered by activating Input Z for >0.5 seconds or receiving a Databus DailyClose command.

On receipt of both Open & Close commands together the vent will switch off the output power and stop the vent.

6.3.1. Continuous Vent function

When operating in continuous the power output is held on to fully open or close the vent on trigger of an open/close command.

6.3.2. Dead-man Vent function

When operating in dead-man the open/close output power is only switched on only whilst the respective open or close command is active. Release of the command will remove power and stop the vent.

6.3.3. 2-Wire Ventilation

The 2-Wire ventilation function monitors Input A to trigger a daily open & close command.

A daily open command is triggered when Input A is activated. A daily close command is triggered when Input A is reset.

2-Wire ventilation function is programmable by SIMON LINK.

This function is not available when a Dead-man function is enabled.

Programmable Parameter	Range	Default setting
2-Wire ventilation	Yes / No	No

6.3.4. Gap Ventilation function

Gap ventilation partially opens the vent by limiting the open stroke by a timer. The open output power is switched on only for the programmed time following a daily ventilation OPEN command. The dead-man open function is disabled in this mode. The timer can be adjusted by a programming sequence or by SIMON LINK.

Programmable Parameter	Range	Default
Gap ventilation	3..255 seconds	3 seconds

6.3.4.a. Gap Ventilation programming sequence

Before the programming sequence can only be performed the panel must be in the following state:

- No alarm, override or lockout conditions exists
- Mains power supply is healthy
- Vent in the fully closed position

When all preconditions are met follow this sequence:

➢ Set daily function **SW1** to Gap Ventilation Programming mode.

↳ The onboard FAULT LED will flash to confirm the programming mode is active.

➢ Start the programming time by triggering an open command on input A and the vent starts to open.

➢ Once the vent reaches the desired gap open position or open time trigger a close command on input Z to stop the vent. The time must be between 3 - 255 seconds.

➢ Set daily function **SW1** to a different function to save the time and end the programming sequence.

The programming sequence can be cancelled at any-time by selecting a different function. A cancellation before the sequence is completed will retain the previous saved time. In the event of an invalid programming sequence the timer will reset to the default setting.

6.3.5. Timed Ventilation function

Timed ventilation will automatically close the vent after the programmed time following a daily ventilation OPEN command. Recycling the OPEN command will reopen the vent and restart the timer. The timer can be adjusted by a programming sequence or by SIMON LINK.

Programmable Parameter	Range	Default
Automatic close	10 minutes..18 h	10 min

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6.3.5.a. Timed Ventilation programming sequence

Before the programming sequence can only be performed the panel must be the following state:

- No alarm, override or lockout conditions exist

- Mains power supply is healthy

- Vent in the fully closed position

When all preconditions are met follow this sequence:

➢ Set daily function **SW1** to Timed Ventilation Programming mode.

↘ The onboard FAULT LED will flash to confirm the programming mode is active.

➢ Start the programming time by triggering an open command on input A and the vent opens.

➢ Once the vent is open for the desired time trigger a close command on input Z. The time must be between 10 minutes – 18 hours.

➢ Set daily function **SW1** to a different function to save the time and end the programming sequence.

The programming sequence can be cancelled at any-time by selecting a different function. A cancellation before the sequence is completed will retain the previous saved time. In the event of an invalid programming sequence the timer will reset to the default setting.

6.3.6. Weather Sensor

A wind or rain condition can be detected on Input LZ. When Input LZ is active the vent output will automatically close. The output will be a continuous close taking priority over a dead-man close function.

When Input LZ has been reset and a daily open command is active the vent output will reopen accordingly to the function configured with timed functions restarting.

In the event of a mains power failure the sensor power output ES will automatically switch off to preserve battery life and disable the weather sensor function.

6.3.7. ECO Mode

ECO mode will automatically switch off the vent output power after 180 seconds to save energy whilst operating in daily ventilation mode.

ECO mode is programmable via SIMON LINK.

Programmable Parameter	Range	Default
Eco mode	Yes / No	No

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7.   EV Mode Functions

7.1.   Start-up

On start-up any panel operation is locked out until a valid Databus watchdog signal is received from the Master panel. In a start-up lockout condition the following occurs:

- Vent outputs will be switched off.
- All FAS alarm and EV-HE077 override inputs shall be ignored.
- Relay will be in last known state before power-up or condition set in SIMON LINK.
- The EV-HE077 will indicate fault condition.

7.2.   Lockout

When a valid Watchdog signal is received from a Master panel the Databus commands are enabled. This permits the panel to start responding to the Databus commands received and all FAS alarms & EV-HE077 override inputs become active.

If a valid Watchdog signal is not received within 60 seconds in any condition the panel will enter a lockout mode:

- Vent outputs will remain in their last position.
- All FAS alarm and EV-HE077 override inputs shall be ignored.
- Relay will remain in its last position or condition set in SIMON LINK.
- The EV-HE077 will indicate a fault in normal conditions or remain in alarm in emergency conditions.

7.3.   Standalone Mode

Standalone mode is selected when SW2-10 is ON. This mode is used for isolated commissioning and maintenance activities. In standalone mode all Databus commands are ignored except for the Reset command. The panel will operate in SP mode responding to local FAS alarm inputs and EV-HE077 override commands only. An alarm can be reset by a Databus reset command. The watchdog monitoring is ignored so power-up and watchdog lockout conditions are disabled.

7.4.   Alarm Functions

In the event of a fire alarm or override condition the panel will enter an alarm mode. Alarm modes take priority and will disable all daily ventilation functions.

In alarm the vent output will continuously power the vent to its position and shall not switch off. If an OPEN & CLOSE command is received simultaneously the last command takes priority.

SW1	ON	OFF	Function
6	Auto reset	Manual Reset	FAS reset behaviour: Automatic reset when FAS input returned healthy. When set to off a manual reset from override switch is required.
5	Close	Open	Vent default position on FAS Alarm.

7.5.   FAS Alarm

An FAS alarm is triggered by a smoke detector or fire alarm input when in normal operation with no other alarms active. For head of stair and head of shaft panels an alarm is triggered when a signal is received from a remote panel. The vent output will automatically OPEN or CLOSE according to **SW1-5** switch selection.

FAS Alarm conditions are:

- Smoke detector FAS1 input B2 detects a line fault
- Fire alarm FAS2 input B3 detects a line fault
- Remote alarm signal detected on FAS2 input A3

7.6.   Override

An override alarm can be triggered by one of the following conditions:

- By pressing the EV-HE077 override OPEN button for >0.5 seconds when in normal operation with no alarms active.
- When the Override Switch input B1 detects a line fault (short or open circuit condition across the terminating resistor)
- Receipt of a Databus override Open or Close command

The vent output to automatically OPEN on an override alarm except for a Databus override CLOSE command when the vent output will CLOSE in alarm.

When in alarm pressing the EV-HE077 override switch CLOSE button for >0.5 seconds will trigger an override close command. By pressing the OPEN button for **>0.5** seconds will trigger an override open command. The vent output will respond to the last override open or close command if permitted.

The last Databus override Open or Close command received will take priority.

7.7.   Alarm Reset

The panel can be reset when all these conditions are met:

- Override Switch input B1 line is healthy (terminating resistor in circuit)
- Smoke detector FAS1 input B2 line is healthy (terminating resistor in circuit)
- Fire alarm FAS2 input B3 line is healthy (terminating resistor in circuit).
- Remote alarm signal on FAS2 input A3 is off
- Linked remote panels to Override Switch A1 terminal are not in FAS alarm
- Databus Open & Close commands are off

If any alarm condition is present following a reset the active alarm will retrigger.

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A manual reset command is triggered by pressing the EV-HE077 override CLOSE (RESET) or the onboard RESET button for >5 seconds. A reset is also be triggered when a Databus Reset command is received.

The automatic reset function can be set by switching on switch **SW1–6**.

A reset is automatically triggered when all the reset conditions are met following an alarm condition:

- With a smoke detector FAS1 input reset the automatic reset function will trigger after 30 minutes.

- With a fire alarm FAS2 input reset the automatic reset function will trigger immediately.

A reset function switches off the power to FAS1–B2 & FAS2–B3 terminals for 3 seconds to reset smoke detectors. If the smoke detector fails to reset the system will retrigger an FAS alarm.

When the daily ventilation function is set to Continuous Close the vent output will automatically CLOSE after an alarm reset.

When the daily ventilation function is set to Dead-man Close the vent output will remain open after an alarm reset. The vent must be manually closed by one of the following commands:

- Press and hold the EV-HE077 CLOSE (Reset) button until vent closed

- Daily close Input Z held on until vent closed

- Databus DailyClose command held on until vent closed

7.8. EV-HE077 Commands

The local EV-HE077 override buttons provide override & reset commands which the Master panel monitors and responds to. The commands monitored are:

- Momentary pressing the OPEN (BOOST) button for >0.5 seconds triggers an override open command

- Momentary pressing the CLOSE (RESET) button for >0.5 seconds triggers an override close command

- Hold the CLOSE (RESET) button for >5 seconds triggers a reset command

- Press the OPEN (BOOST) button momentary for 1-4 seconds whilst the zone vent is open and the fans are running to boost the fans to the firefighting speed. Press again to toggle back to means of escape speed. Only applicable for mechanical smoke shafts systems configured for firefighting application. Not applicable for head of stair switches.

Only one override/reset command shall be present at a time and the last command will take priority.

7.9. Gap Ventilation

Gap ventilation partially opens the vent by limiting the open stroke by a timer. The open output power is switched on only for the programmed time following a daily ventilation open command. The dead-man open function is disabled in this mode. The timer is adjusted by the read/write dailytime register set in seconds. When set to zero the daily ventilation function is disabled (continuous open time).

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8.   Commissioning Instructions

⚠ **DANGER**

Disconnect both mains supply poles before connecting any device to the interface panel.

⚠ **ATTENTION**

Never connect the battery during installation!

⚠ **ATTENTION**

If mains is not permanently guaranteed after installation, there is a big risk of deep discharge of batteries! This will lead to damage to the battery.

⚠ **ATTENTION**

The control board is sensitive to electrostatic discharge causing damage to components. Do not remove or handle the board, this may invalidate the warranty.

8.1.   Commissioning EV-x01

The interface panel should be located outside the fire zone and positioned to be easily accessible for maintenance purposes.

➢ Remove the lid by loosening the two screws on the right-hand side of the panel and pivot from the locating pin on the left. Disconnect the lid earth cable if required. Do not allow the lid to hang on the earth cable.

➢ Position the interface panel and then mark the fixing holes (see figures 3, 4, 5 ❶).

➢ Drill suitably sized fixing holes and insert wall plugs for 5mm screws then fix the box to the wall.

➢ Bring the required cables from the top or bottom into the rear of the panel through the cable entry (see figures 3, 4, 5 ❷).

➢ Secure the cables using the cable ties against the cable entry teeth.

➢ Fasten the interface panel with four subsurface suitable screws through the housing bottom (fastenings are not included with delivery).

➢ Connect the cabling as per the relevant diagrams shown in the Wiring Details section.

➢ EV-301-P: Bring the pressure tubing from the top in to the rear of the panel through the cable entry shown in figure 1 (2). Sleeve the tubing to insulate from the PCB board then push in to the fittings (see figure 4 ❹).

➢ Remove the terminating resistors of the SHEV-switch, smoke detector and the FAS-contact from the clamps of the central unit and connect to the triggering devices.

➢ Set the configuration DIP switches and jumpers

⚠ **ATTENTION**

Only batteries approved by the panel manufacturer should be connected. Use of alternative batteries may void the warranty

➢ Place batteries on the battery tray (see figures 3, 4, 5 ❸) and connect them to the board (battery connector X15) with the supplied connection set.

Figure 1: Connection set

➢ Replace the lid by locating the pin on the left hand-side and secure by tightening the two screws.

➢ Mark unit address and location on the front panel label provided.

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Figure 2: EV-301 fastening points
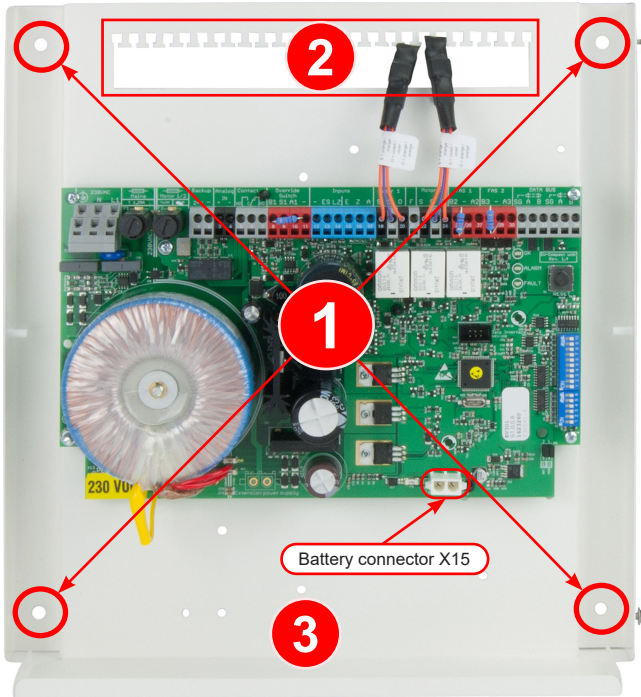
Figure 3: EV-301-P fastening points
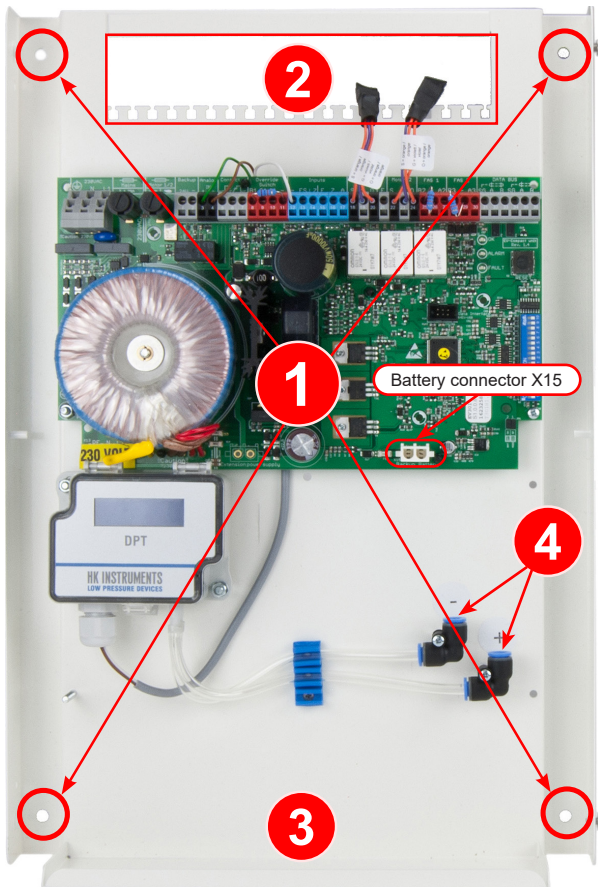
Figure 4: EV-601 fastening points
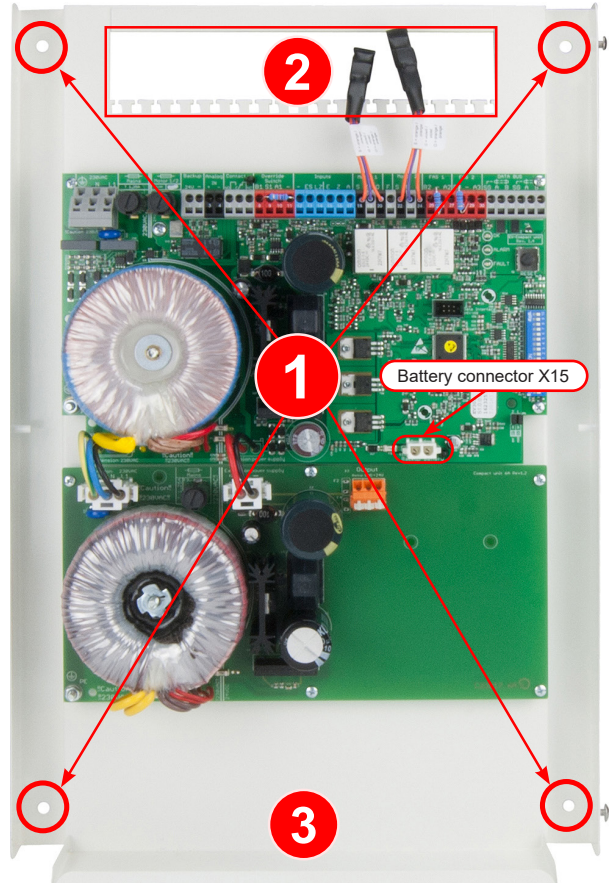
8.2. Commissioning EV-301-P pressure sensor

Figure 5 : Pressure sensor
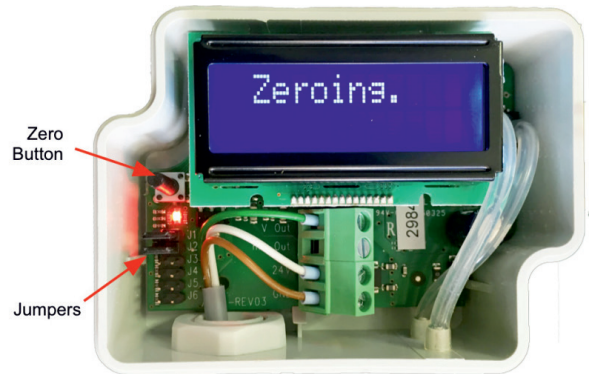
The pressure sensor is accessible by removing the panel cover and lifting the lid of the pressure sensor.
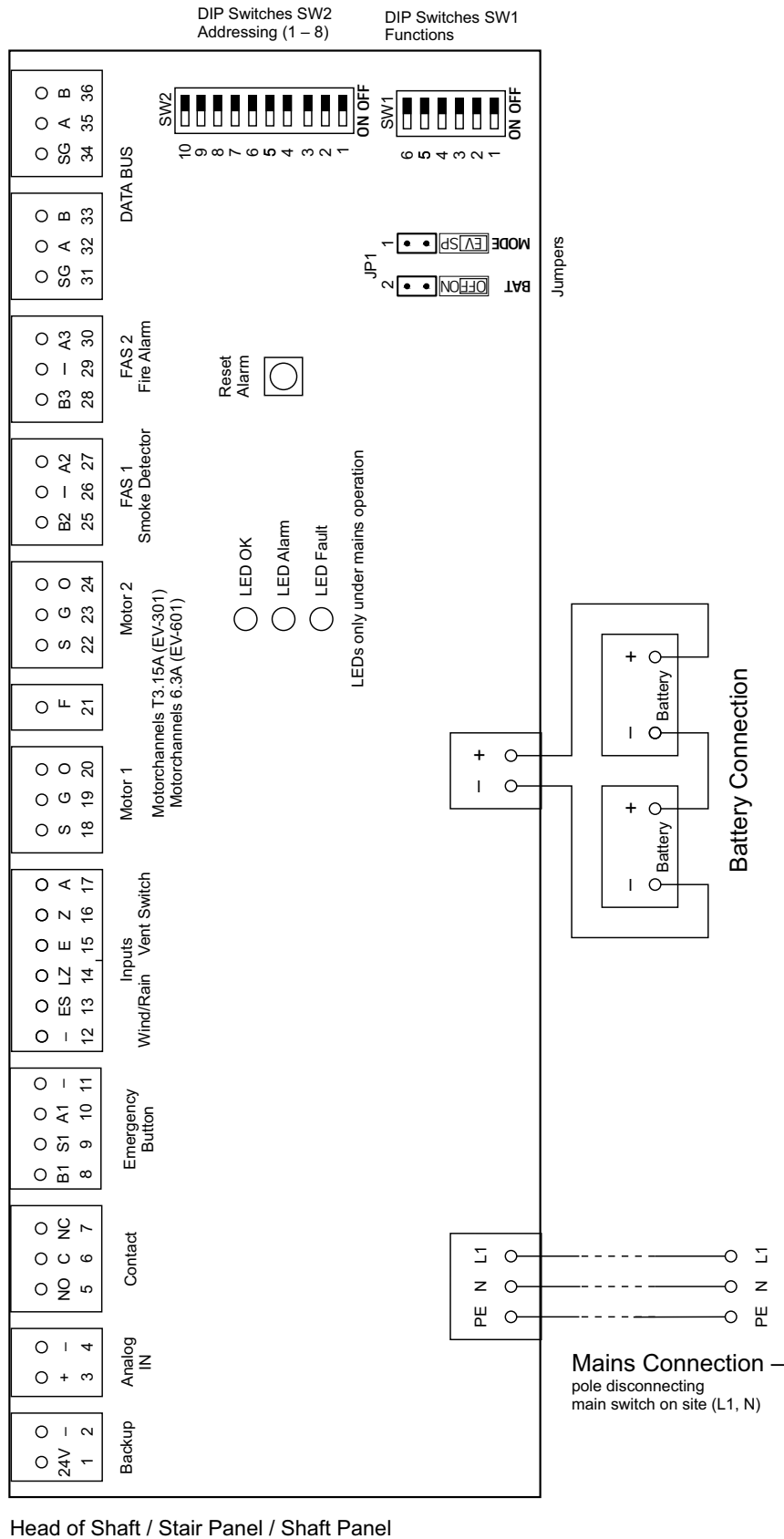
Zeroing:

- ➤ Check jumper links are set in position J1 and J2 for a range of -100 to +100 Pa.
- ➤ Close lobby vents and head of stair vents.
- ➤ Hold open the stair door to equalise pressure.
- ➤ Push down the pressure sensor zero button. Release the button when the red LED light is lit with "zeroing" displayed.
- ➤ When finished the sensor will return reading zero pressure.

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8.3. Wiring Diagrams

Figure 6: Overview connectors / DIP-switches / jumpers (simplified representation)

Head of Shaft / Stair Panel / Shaft Panel

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8.4. Basic Natural Ventilation Single Line Diagram (SP Mode)
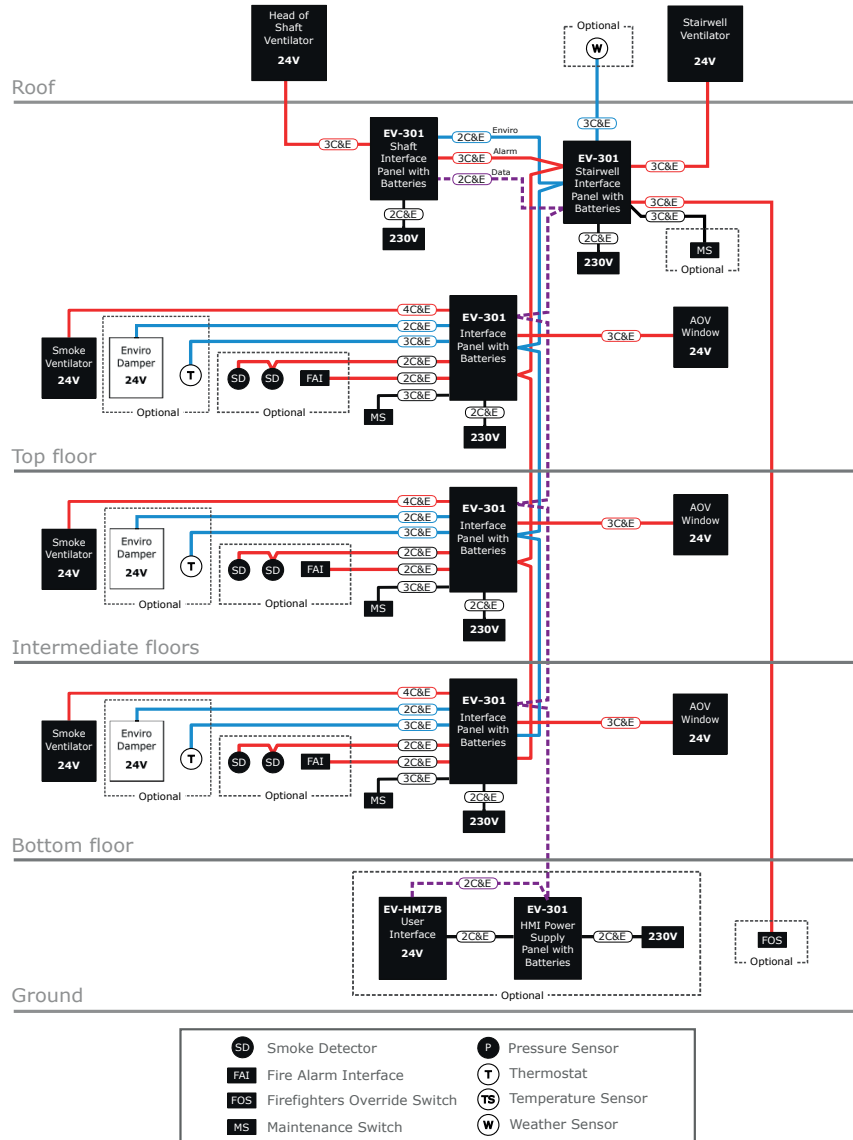
8.4.1. SP Mode Example Wiring Diagram
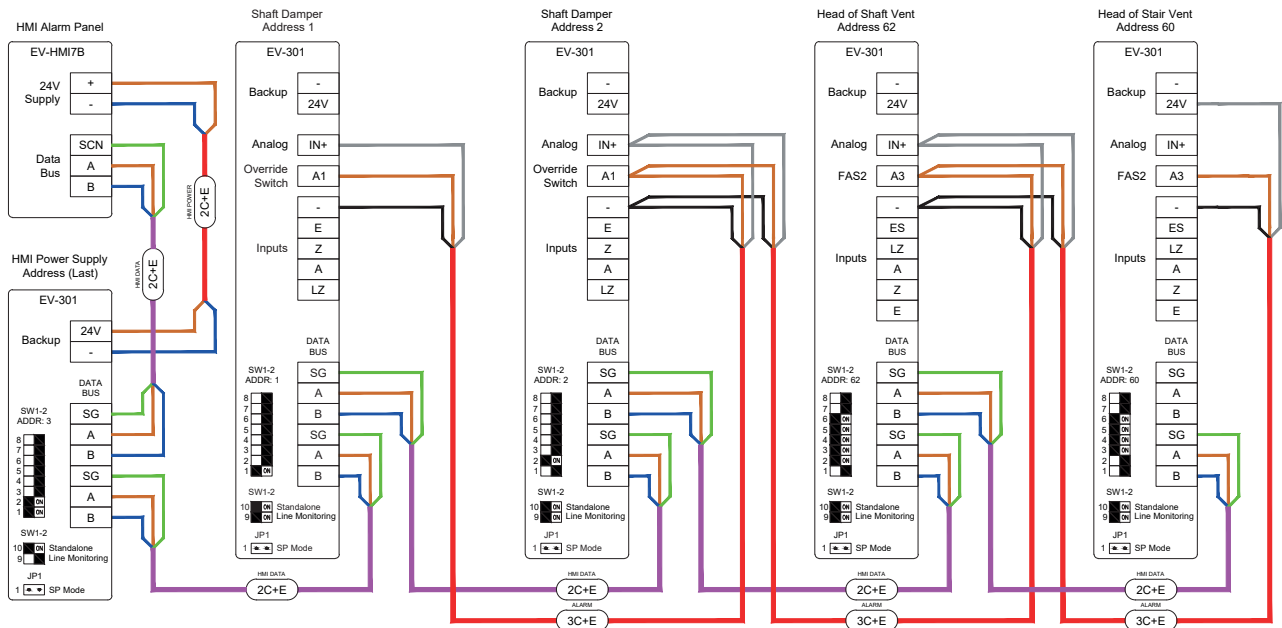
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8.4.2.   Wiring Details SP-Mode

Figure 7: Smoke Detectors (SP-mode)
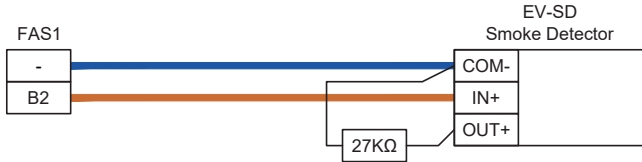
Figure 8: Fire Alarm Interface (SP-mode)
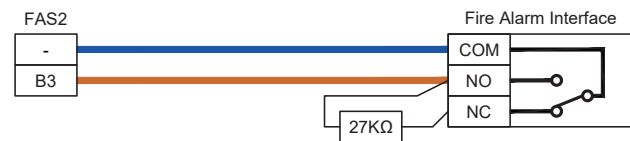
Figure 9: Override Switches (SP-mode)

Figure 10: Smoke Shaft Damper
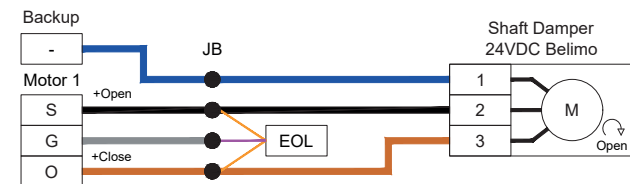
Figure 11: Door Opener

Figure 12: AOV / Window Actutator
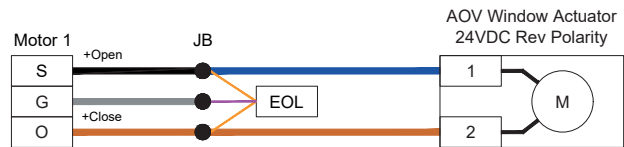
Figure 13: Head of Stair / Shaft Vent
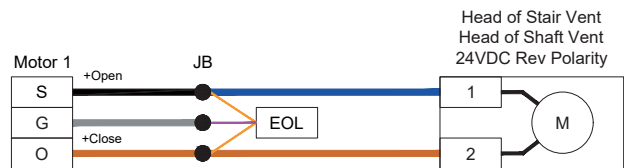
Figure 14: Thermostat (SP-mode)

Figure 15: Wind / Rain Sensor (SP-mode)

Figure 16: Daily Ventilation Switch (SP-mode)

Figure 17: Environmental Damper

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8.5. Addressable Shaft System Single Line Diagram (EV Mode)
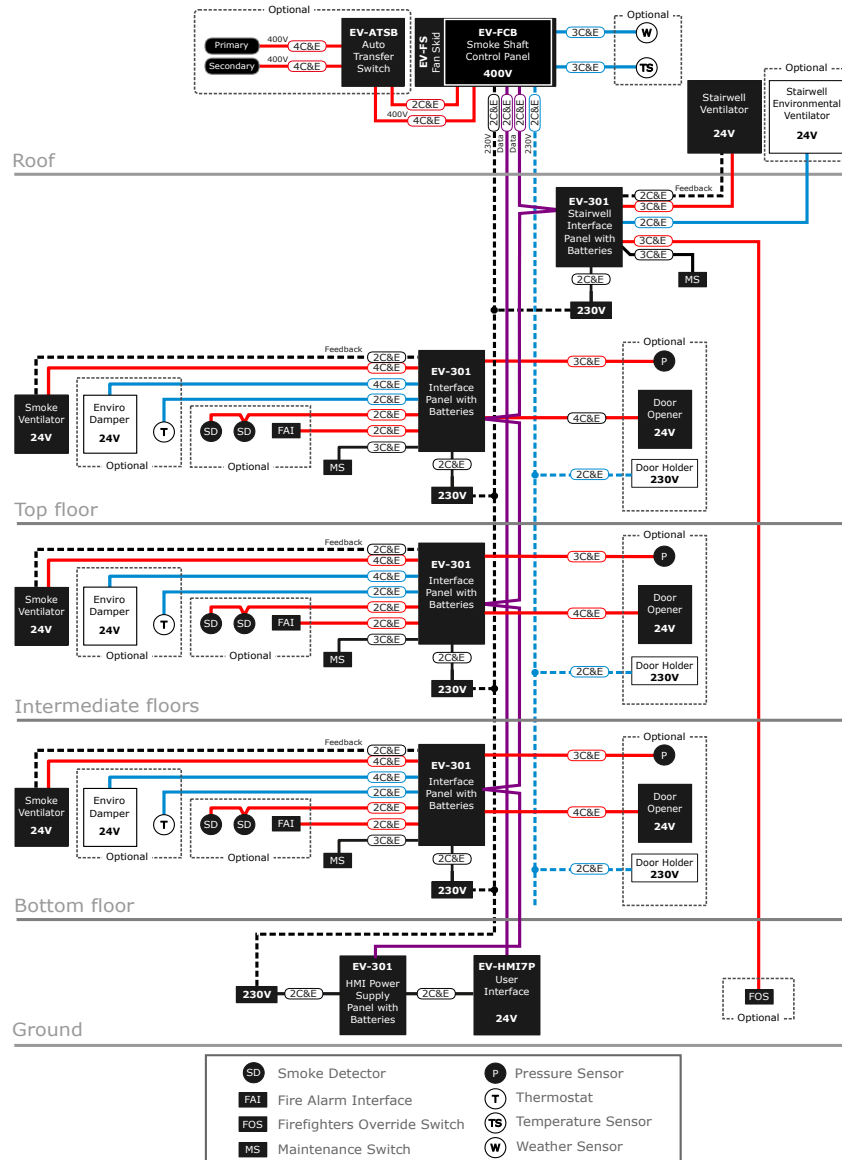
8.5.1. EV Mode Data Bus Wiring Diagram

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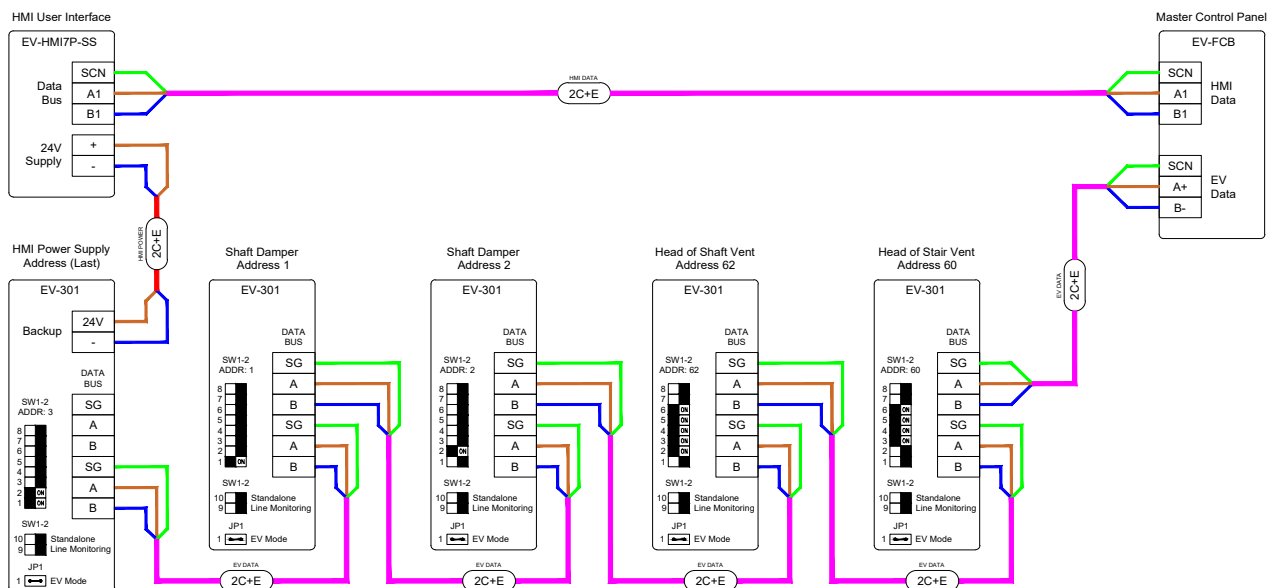
8.5.2.   Wiring details EV-Mode

Figure 18: Smoke Detectors
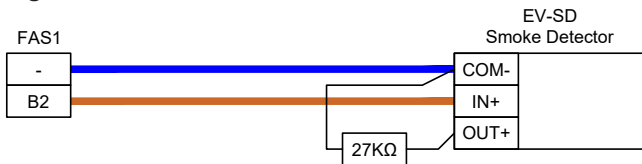
Figure 19: Fire Alarm Interface
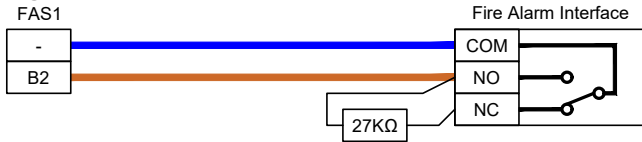
Figure 20: Override Switches
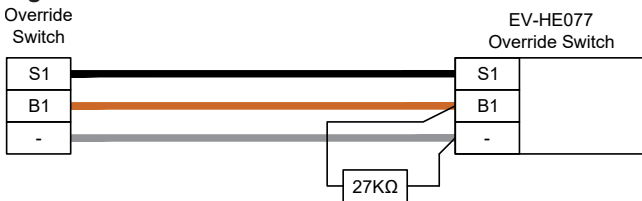
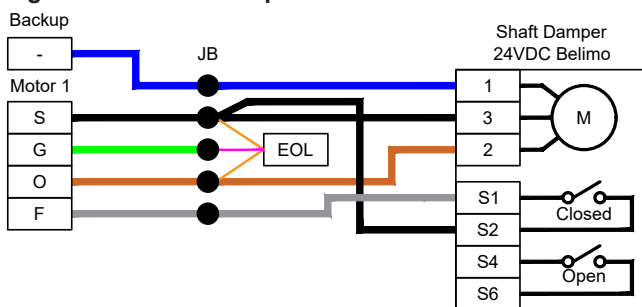### Figure 21: Smoke Shaft Damper with Feedback
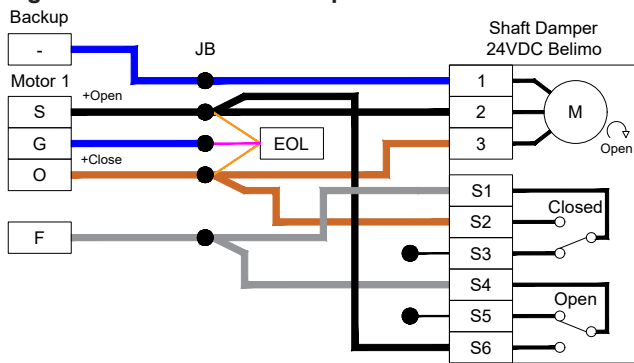
Figure 22: Smoke Damper

Figure 23: Smoke Detectors – Reverse Fans
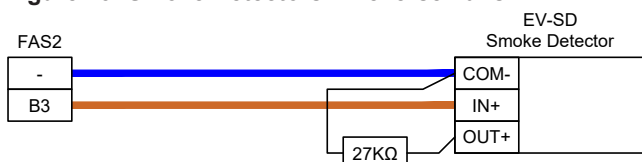
Figure 24: Door Opener with Feedback
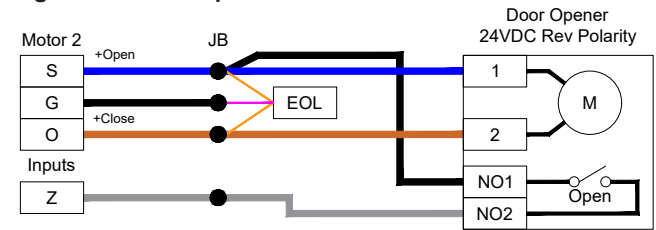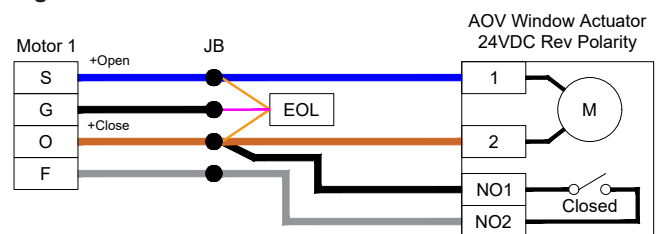

Figure 25: AOV / Window Actuator with Feedback

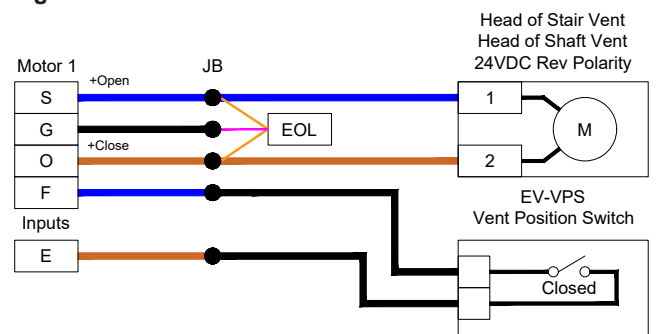### Figure 26: Head of Stair / Shaft Vent with Feedback
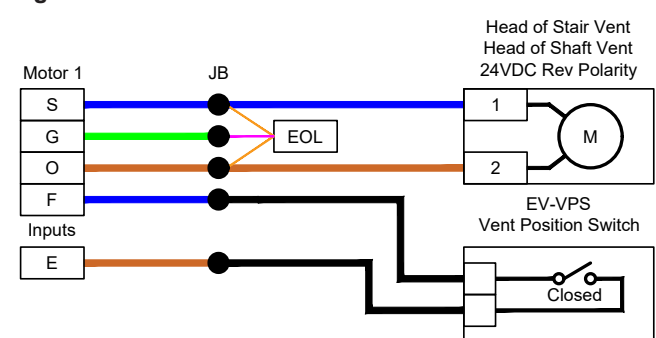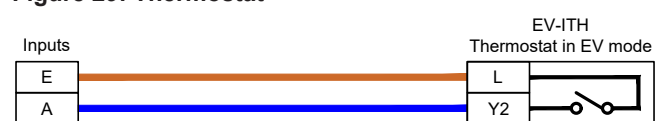

Figure 27: Head of Stair Vent

Figure 28: Head of Stair Vent Maintenance Access Switch

Figure 29: Thermostat

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Figure 30: Temperature Sensor

Figure 31: Environmental Damper with Feedback
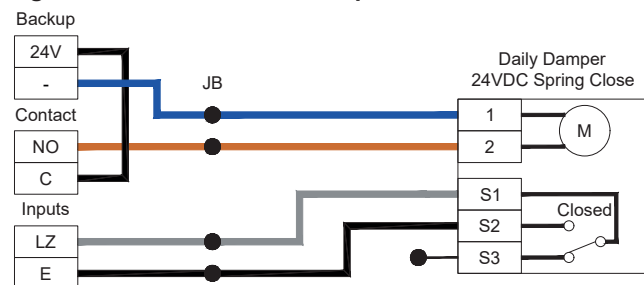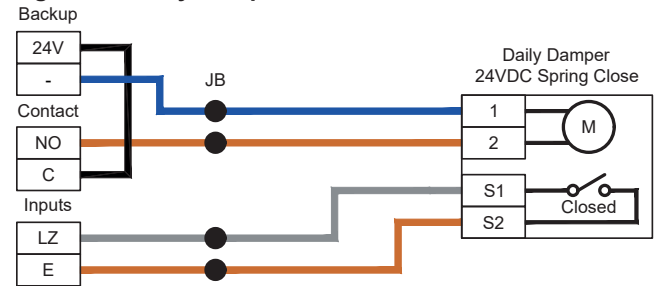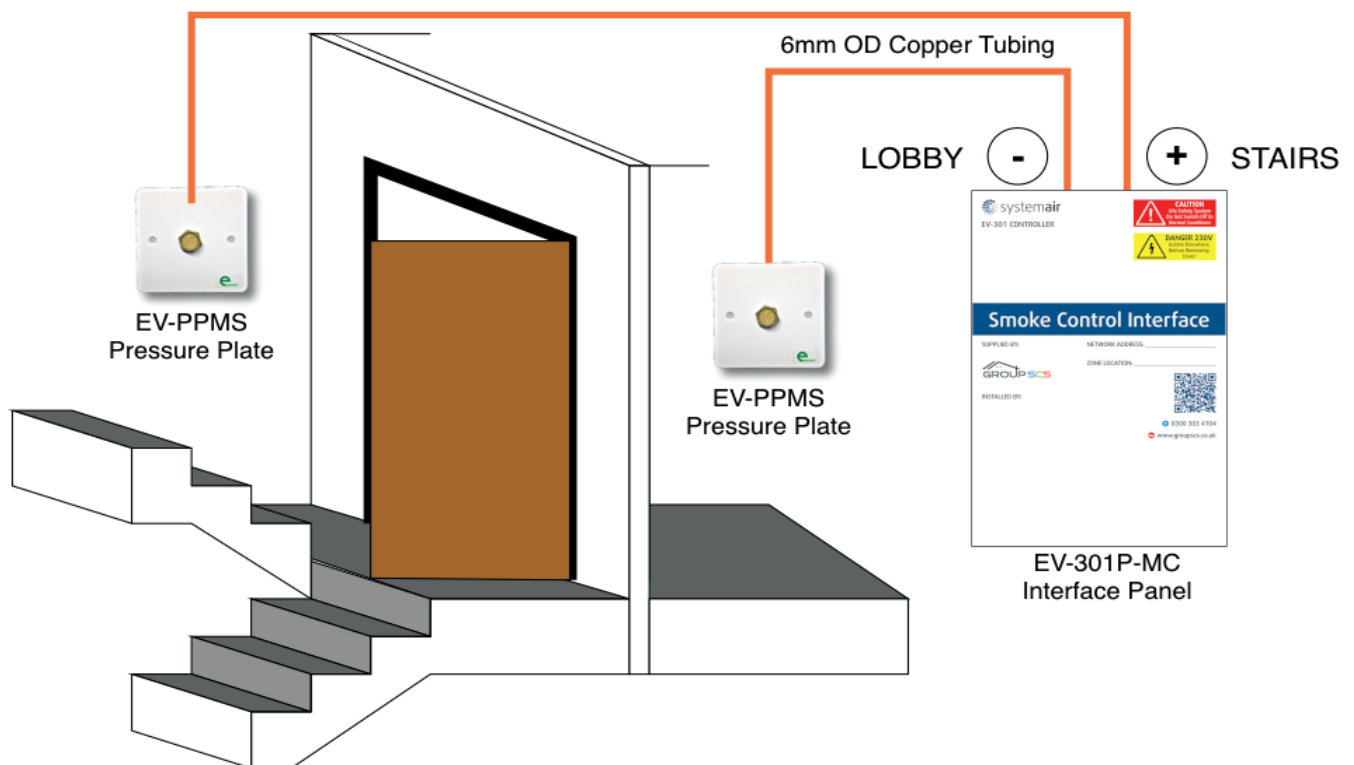

Figure 32: Daily Damper

8.5.3. EV-301-P Pressure sensor connections

The EV-PPMS pressure termination plates are located within the lobby and stairwell measuring differential pressure across the stair access door.

6mm OD copper tubing connects the termination plates to the interface panel via push-fit ports located inside the panel.

The ports are identified as (+) for stair tube connection and (-) for lobby tube connection.

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9. Troubleshooting

> ⚠️ **ATTENTION**
>
> Due to the low loop current, the insulation resistance of the monitored wires (B1, B2 and B3) must be checked! The insulation resistance must be = 20 MΩ/km (wire manufacturer specification), otherwise disconnections may be undetected.

> ℹ️ **INFORMATION**
>
> The EV-x01 indications are only visible with mains power connected.

> ℹ️ **INFORMATION** SIMON LINK
>
> The operational states of the EV-x01 can be visualized with SIMON LINK using a USB300-cable (only during mains operation).

For more information about the operational status see 4.3.5: "Operational status indicators (OK, ALARM and FAULT)" on page 10

10. Frequently asked questions

QUESTION: Why does the yellow LED (common fault) lights, although all recognizable and known causes have been eliminated?

ANSWERS:

- The maintenance counter is expired and must be set back, via SIMON LINK.
- Battery deep discharge: If the error-message can not be set back by pressing the RESET-button for more than 5 seconds the battery must be replaced.

QUESTION: Why do I not get a fault indication when the battery is not plugged in or the connection cables are disconnected? (yellow LED)?

ANSWER: The battery assessment is carried out in cycles and can last up to maximum 8 minutes. In the event of a battery fault, the yellow LED is set. A disconnected or defective battery will signal a fault immediately.

QUESTION: Why does the safe opening/closing not work during emergency power operation?

ANSWER: The initiated OPEN or CLOSE action of the function "secured closing" and "secured opening" of the smoke vents is only completed with a change to emergency power operation. When the system is in emergency power operation, the ventilator switch is disabled and the smoke-vents can only be operated by the SHEV-alarm opened.

QUESTION: Why does the yellow LED in EV-HE077 flash constantly during SHEV-triggering?

ANSWER: The flashing of the yellow LED during SHEV-alarm at the emergency button EV-HE077 is initiated by the switch itself and can not be changed.

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11. Appendix

11.1. Manufacturer's declaration EC

We hereby declare that the product complies with the applicable directives. The declaration of conformity can be read at the company's premises and will be sent to you upon request. This declaration certifies that the product complies with the mentioned directives, but does not represent any guarantee of the product's features. This declaration loses its validity, if the product is modified without seeking our prior authorisation.

11.2. EC manufacturer's declaration (distributor)

The installer is responsible for the correct assembly or commissioning, the preparation of the declaration of conformity in accordance with EU regulations and for affixing the CE marking. The CE marking must be positioned where it is visible.

11.3. Manufacturer's declaration UK

We hereby declare that the product complies with the applicable regulations. The declaration of conformity can be read at the company's premises and will be sent to you upon request. This declaration certifies that the product complies with the mentioned regulations, but does not represent any guarantee of the product's features. This declaration loses its validity, if the product is modified without seeking our prior authorisation.

11.4. UK manufacturer's declaration (distributor)

The installer is responsible for the correct assembly or commissioning, the preparation of the declaration of conformity in accordance with UK regulations and for affixing the UK marking. The UKCA marking must be positioned where it is visible.

11.5. Company address

11.5.1. System manufacturer (Germany)

SIMON
we create fire safety

SIMON PROtec Systems GmbH
Medienstraße 8
94036 Passau

Phone: +49 (0) 851 988 70 - 0
Fax: +49 (0) 851 988 70 - 70

E-Mail: info@simon-protec.com
Web: www.simon-protec.com

11.5.2. Group SCS

GROUP SCS | **systemair**

Group SCS
Capital Business Park
Parkway
Cardiff CF3 2PZ

Phone: 0300 303 4104
E-Mail: info@groupscs.co.uk
Web: www.groupscs.co.uk

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