Operating manual

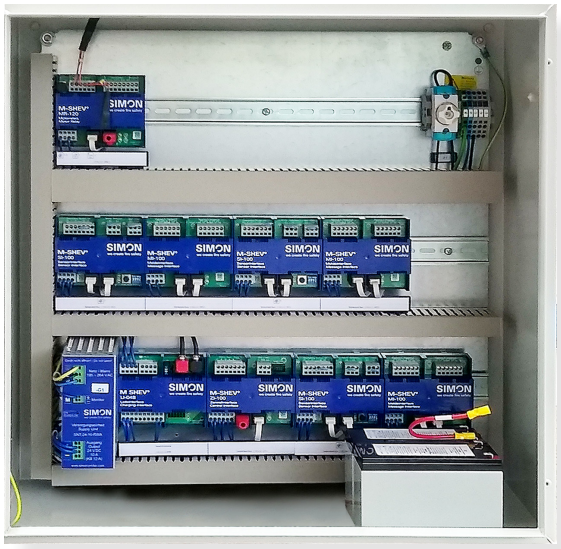
Modular control panel of the M-SHEV product family

SIMON
we create fire safety

M-SHEV-12-AP (ECO) M-SHEV-12/-24/-48 (ECO)

For further information please visit our product-website:

short.simon-protec.com/msheven



SIMON LINK

DIN EN 12101-10

ISO 21927-9

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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1. General

1.1. Validity of the manual

INFORMATION

This manual applies to M-SHEV module control panels from January 2020 and SIMON LINK Software version 2.2.0 or higher.

1.2. SIMON LINK

INFORMATION

Functions that can be configured or enabled with SIMON LINK are marked with the SIMON LINK logo!

You can find more information about SIMON LINK on our website

short.simon-protec.com/slen

1.3. SIMON PLUS

INFORMATION

SIMON PLUS are extra features, available at an additional charge, which must be enabled ex works or on site by a SIMON service technician.

For more information, please contact our technical sales department.

1.4. M-SHEV ECO

INFORMATION

The here described factory configuration for control units of the ECO product class cannot be changed via SIMON LINK.

Status messages can be read out.

1.5. Functional description

The modules of the electrical control system M-SHEV use BUS technology to communicate with each other. In case of an ALARM-triggering or during daily ventilation operations, the M-SHEV controls the connected opening actuators. The ventilation functions also serve as a regular function check of the SHEV system.

Smoke and heat extraction systems belong to the field of preventive fire protection. Their installation can save lives in an emergency. The building permit authority decides whether and how the smoke control system must be installed in the building.

Before proceeding with the installation, please check once again if the size of the SHEV system is compliant with the official regulations in order to ensure sufficient system functionality.

The control systems of the M-SHEV product family consist of four components (optionally up to six):

- Power supply
  (switching power supply, charging device and battery)
- Central interface ZI-100
- Sensor interface SI-100
- Motor relay MR-120
- Message interface MI-100
  (**optional** / not included in the standard scope of delivery)
- Bus interface BI-100
  (**optional** / not included in the standard scope of delivery)

All components are equipped with tension spring terminals (0.5 mm² – 2.5 mm²).

Table 1: Mechanical properties M-SHEV-12-AP

Dimensions (W × H × D)	400 × 516 × 155 mm
Weight (including battery)	14.3 kg
Protection rating	IP20 according to EN 60529
Housing	Steel sheet (powder-coated)
Colour	RAL 9010

Table 2: Mechanical properties M-SHEV

Dimensions (W × H × D) (1)	• M-SHEV-12: 400 × 600 × 200 mm • M-SHEV-24: 500 × 500 × 200 mm • M-SHEV-48: 600 × 600 × 250 mm
Protection rating (2)	IP66 according to EN 60529
Housing	Steel sheet (powder-coated)
Colour	RAL 7035

(1) Standard sizes; dimensions may vary according to customer requirements.
(2) If suitable cable glands are used.

Table 3: Connection and operation

Connection	see chapter 4: “Electrical connection” on page 20
Actuator cut-off in every position (STOP command)	yes (1)
Deadlock function according prEN 12101-9/ISO 21927-9 (re-triggering)	Deadlock enabled (can be activated/deactivated via SIMON LINK on the MR-120)
Maximum cable length between control unit and actuator	See chapter “Electrical connection” in supplementary sheet “Safety instructions and warranty conditions”!
Maintenance	See supplementary sheet “Safety instructions and warranty conditions”!

(1) Only in ventilation mode, without dead man's function.

Table 4: Installation and ambient conditions

Operating temperature	-5 to 40 °C (1)
Storage temperature	
Suitable for external installation	Only with special types of housings – in case of doubt, please contact our technical sales department.

(1) This temperature range applies to all components of the M-SHEV System (incl. battery).

Table 5: Approvals and certificates

EU compliant	In accordance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU
Power supply	EN 12101-10 (Smoke and heat control systems — Part 10: Power supplies)
Control panel	prEN 12101-9 (Smoke and heat control systems - Part 9: Control panels) / ISO 21927-9 (Smoke and heat control systems — Part 9: Specification for control equipment)

2. Components

2.1. Power supply

The power supply of the M-SHEV product family comprises three components:

- Switching power supply (SPS)
- Charging device
- Lead battery

The power supply varies for the different power variants in the choice of the switching power supply and the corresponding charging interface with battery. For power supplies above 48 A several power supply units (switching power supply / charging interface / battery) are used in cascade. The following illustrations may vary depending on the housing size and number of modules.

According to DIN EN 12101-10, both primary (power supply unit) and secondary (rechargeable batteries) power supplies are designed to independently provide the output power as specified in the technical data.

Figure 1: M-SHEV-12-AP power supply

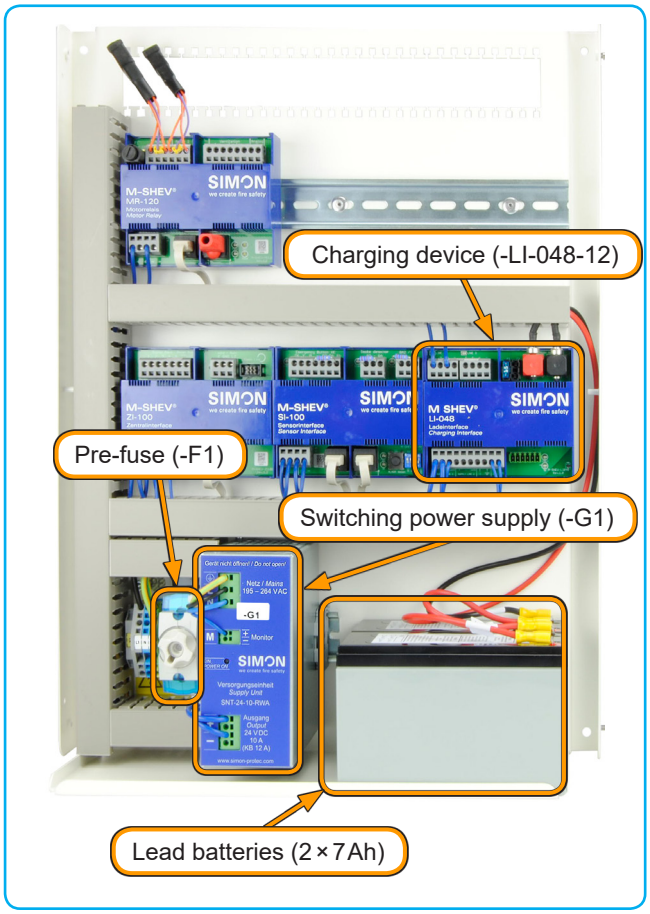


Figure 2: M-SHEV-12 power supply

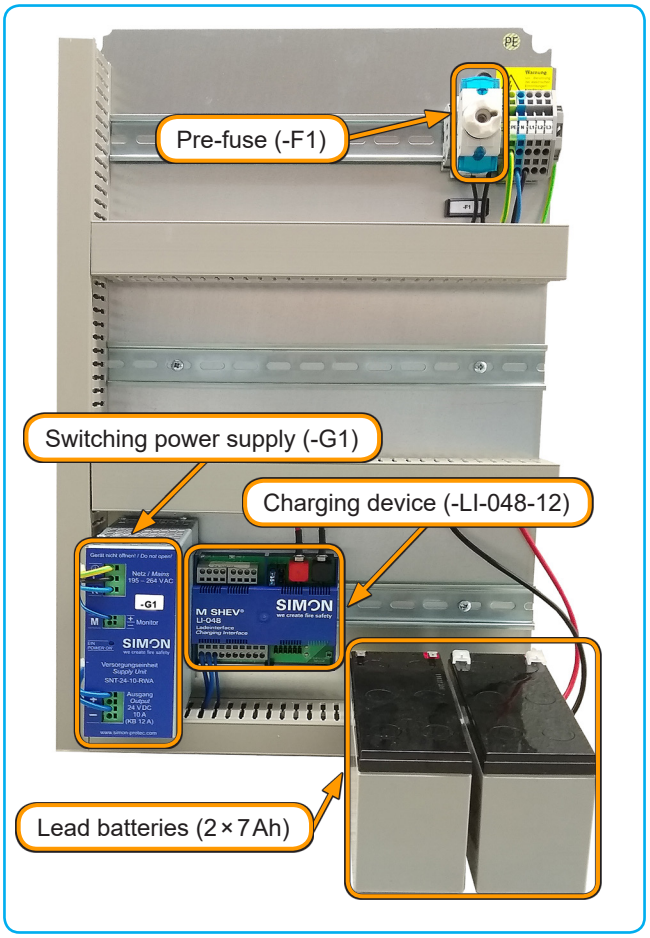


Figure 3: M-SHEV-24 power supply

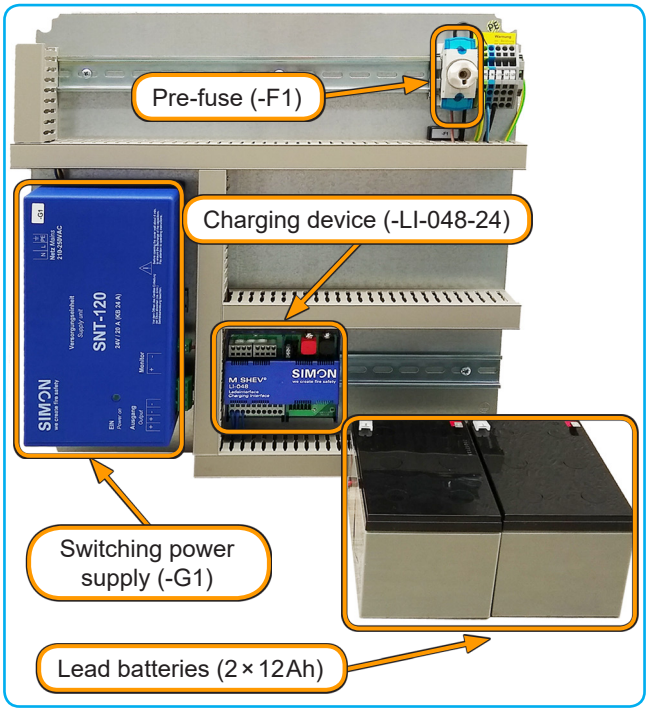
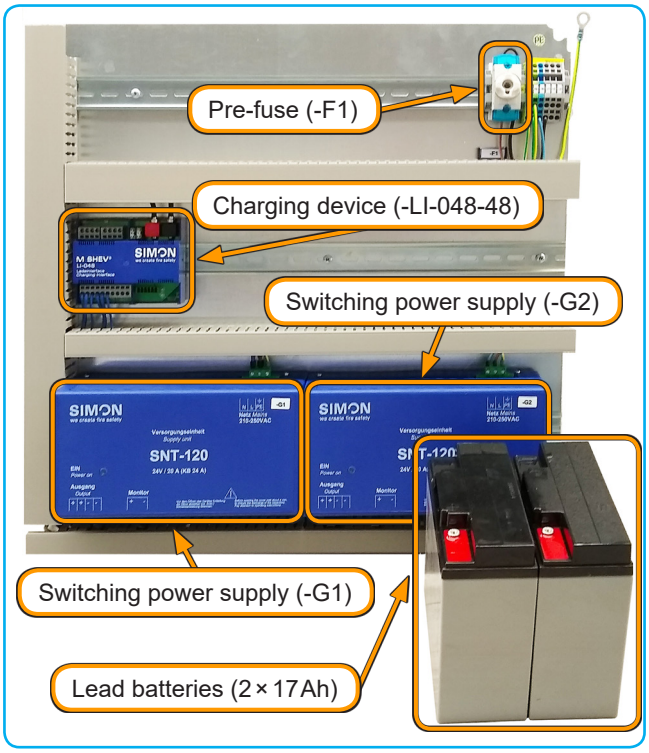


Figure 4: M-SHEV-48 power supply



2.1.1. Emergency power supply

The emergency power supply of the M-SHEV product family is ensured by two 12 V lead batteries. Only lead batteries approved by the system manufacturer with explicit VdS approval are permitted.

Switching between the operating states mains and emergency power operation is done automatically if necessary.

2.1.2. Regulating the I/U charge

The lead batteries are charged according to the requirements of EN 12101-10. The non existance of the lead battery, deep discharge or a defect is detected by the control unit (self-diagnosis) and generates a fault message at the SHEV emergency button (yellow LED) and at the central interface (yellow LED).

2.1.3. Monitoring the monitor input for sequential control (mains/emergency operation)

In the case of a mains failure or undervoltage of the power supply or a fault in the primary power supply, the charging interface switches to emergency power supply (monitor function).

2.1.4. Technical data (rated values)

Table 6: Mains connection data

Operating voltage (continuous operation)	230 V AC
Permissible voltage range (short-time operation)	195 V AC – 264 V AC
Power consumption(1)	1.5 A (M-SHEV-12) 4.4 A (M-SHEV-24) 8.8 A (M-SHEV-48)
Pre-fuse for mains isolation (-F1)	D01 16 A (gL/gG)
Connection power	396 VA (M-SHEV-12) 1012 VA (M-SHEV-24) 2024 VA (M-SHEV-48)
Inrush current	< 30 A (per SPS) < 40 A (M-SHEV-12)
Frequency range	47 Hz – 63 Hz
Power supply conductor cross-section	at least 1.5 mm²
Terminal design	0.5 mm² – 2.5 mm²
Protection class	I

(1) Power consumption at maximum output load.

Table 7: Technical data for switching power supply 12 A (-G1)

Input voltage	195 – 264 V AC
Output voltage	24 V DC (±5%)
Output voltage ripple	< 100 mV_{pp}
Output power (permanent operation)	0 – 10 A/240 W
Output power (short-time operation)	0 – 12 A/288 W

Table 8: Technical data for switching power supply 24 A (-G1/-G2)

Input voltage	195 – 264 VAC
Output voltage	24 V DC (±5%)
Output voltage ripple	< 100 mV_{pp}
Output power (permanent operation)	0 – 20 A/480 W
Output power (short-time operation)	0 – 24 A/576 W

Table 9: Power supply

Power supply	Short-time load (3 minutes)	Continuous load (mains operation)
M-SHEV-12	12 A	10 A
M-SHEV-24	24 A	20 A
M-SHEV-48	48 A	40 A

Figure 5: LI-048 charging device

Table 10: Technical data for the charging device (LI-048)

Voltage output (mains operation)	23.6 V DC – 24.8 V DC
Voltage output (emergency operation / output voltage lead battery)	21 V DC – 28.2 V DC
Power fuse F1 (SNT1) Fuse character type T	15 A at 12 A 25 A at 24 A
Power fuse F2 (SNT2) Fuse character type T	25 A at 24 A
Charging fuse (internal) Fuse character type T	3.5 A
Charging voltage	26.7 V DC – 27.9 V DC
Charging current depending on battery type	7 Ah: 500 mA 12 Ah: 650 mA 17 Ah: 800 mA
Interruption time	none

Table 11: Display operating states charging device (LI-048)

	LED green	LED yellow		Meaning
Emergency power operation	OFF	flashing	1×	emergency power operation – mains failure
	OFF		2×	emergency power operation – outage monitor 1
	OFF		3×	emergency power operation – outage monitor 2
	OFF		4×	emergency power operation – primary input voltage < 18 V DC
Mains operation	ON	OFF		mains operation – battery is charging / trickle charging
	blinking	OFF		mains operation – no battery or battery faulty
	blinking	ON		mains operation – battery deep discharged
Failure	ON	ON		mains operation – failure charging unit
	ON	ON		mains operation – overload H OUT
	ON	ON		mains operation – overload mains OK OUT
	ON	blinking		mains operation – external failure (H IN)
	ON	blinking		emergency power operation of monitored charging interface (Mains OK IN)

Table 12: Technical data for the M-SHEV-12 (-AP) lead battery

Maintenance-free lead battery	2 pieces
Dimensions (L × W × H) (mm)	151 × 65 × 97.5
Weight (per battery)	2.2 kg
VdS approval	G189099
Output voltage per battery	10.5 V DC – 14.1 V DC
Total output voltage (through series connection)	21.0 V DC – 28.2 V DC
Rated capacity (total)	7 Ah
Service life	approx. 4 years

Table 13: Technical data for the M-SHEV-24 lead battery

Maintenance-free lead battery	2 pieces
Dimensions (L × W × H) (mm)	151 × 98 × 97.5
Weight (per battery)	4.05 kg
VdS approval	G189170
Output voltage per battery	10.5 V DC – 14.1 V DC
Total output voltage (through series connection)	21.0 V DC – 28.2 V DC
Rated capacity (total)	12 Ah
Service life	approx. 4 years

Table 14: Technical data for the M-SHEV-48 lead battery

Maintenance-free lead battery	2 pieces
Dimensions (L × W × H) (mm)	181 × 76 × 167
Weight (per battery)	6.10 kg
VdS approval	G197022
Output voltage per battery	10.5 V DC – 14.1 V DC
Total output voltage (through series connection)	21.0 V DC – 28.2 V DC
Rated capacity (total)	17 Ah
Service life	approx. 4 years

2.2. Fault mode

There are two fault modes into which the control can fall due to impairment of the power supply:

- mains failure
- battery faulty / missing

If the control unit is in the fault mode “mains failure”, the acceptance of new ventilation commands is refused (also the closing via the wind & rain detector). Already existing ventilation commands are kept for 3 minutes, then the outputs of the MR-120 are disconnected from the power supply.

ATTENTION

In emergency power mode, the connected actuators can only be closed by pressing the **RESET button** on a manual release button.

INFORMATION

It is possible to activate the function “WTS signal on mains failure” (wind & rain detector signal CLOSE) at the central interface (ZI-100). This causes the connected actuators to close automatically in case of mains failure (closing time max. 3 minutes). For this purpose, the WTS function must be activated via SIMON LINK at the desired outputs (MR-120) in the “Ventilation” subfolder.

If the control unit is in the fault mode “Battery faulty”, the fault is indicated on the central interface ZI-100 and on the main emergency switch (manual release button). The ventilation functions are not affected by this fault.

2.3. Internal BUS-Connection

The individual modules are connected to each other via the BUS connections (RJ45 sockets).

2.3.1. Terminal plugs AS-110

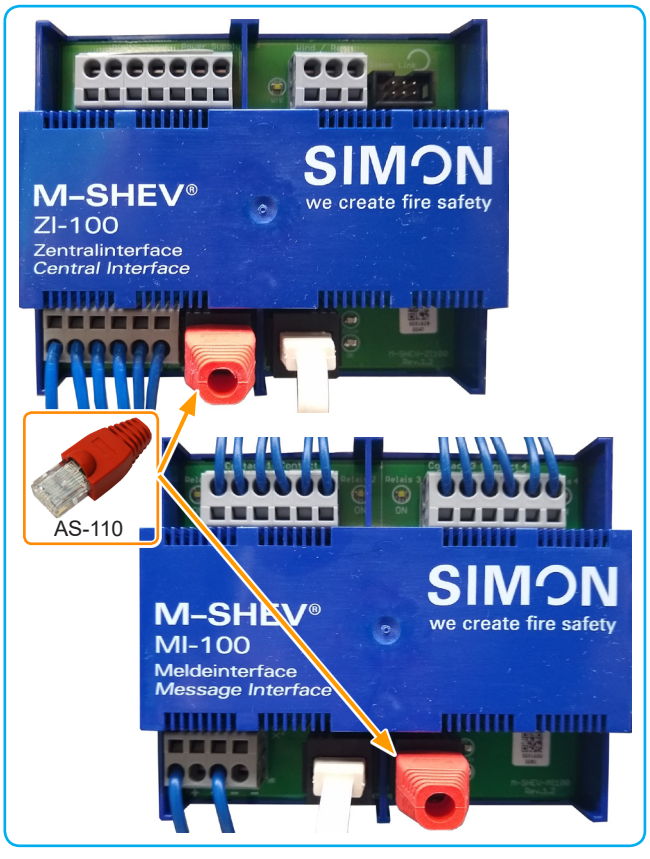
The terminating plugs AS-110 are necessary for safe operation of the BUS connection and must be plugged in at the BUS ends (first and last module).

ATTENTION

Do not remove the AS-110 terminal plugs.

Removing the BUS terminating plugs leads to failure of the BUS connection and thus of the entire control system!

Figure 6: AS-110 terminal plug



2.4. Central Interface – ZI-100

The ZI-100 is the central module of the M-SHEV modular control panel.

The ZI-100 performs the following tasks:

- Control of the connected bus participants
- Interface for SIMON LINK

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- Interface for a remote maintenance module via mobile communication (GPRS)
- Wind & rain detector connection (WTS)
- Digital input (e. g. for central ventilation system)
- Visual indicators:
  - white LED – “WTS triggered”
  - yellow LED – operating state “Failure” (“Fault”)
  - green LED – operating state “OK”

2.4.1. General functions

If secondary power supply is active (batteries), the yellow LED on the ZI-100 flashes.

2.4.2. Ventilation

2.4.2.a. Wind & Rain Detector (WTS) connection

The wind & rain detector (WTS) automatically closes the flaps / windows opened for ventilation. The signal of the wind & rain detector is only overridden by ALARM triggering. For this purpose WTS must be enabled on the corresponding motor relay MR-120 in the subfolder “Ventilation”.

INFORMATION

SIMON LINK

The WTS function can also be used for safe closing in case of mains failure. See chapter 2.2: “Fault mode” on page 9.

2.4.2.b. Global ventilation button

SIMON LINK

Global ventilation buttons can be connected and-configured at the digital inputs. At the MR-120 modules it is possible to set whether and how to react to this these buttons (ZI-100 digital inputs).

2.4.3. Digital inputs

SIMON LINK

There are 5 digital inputs that can be assigned various functions, such as timer signals. They can be evaluated independently as normally open or normally closed. Two 24 V DC terminals (mains / backup) are available to connect the inputs. The respective functions are shown in the customer-specific connection plan according to customer requirements. In case of change requests, please contact our technical sales department.

2.4.4. Maintenance counter

SIMON LINK

The control panels of the M-SHEV product family have a maintenance counter that optionally outputs a fault after a set time if no maintenance is performed. This function is switched off by default.

2.4.5. Technical data ZI-100 (-ZI1)

Permissible input voltage range	21 – 28.2 V DC
Power consumption	max. 30 mA
Wind & rain detector (WTS) connection	see chapter 4.2: “Central Interface – ZI-100” on page 21
Output voltage range (WTS – terminal E / mains operation)(1)	23.6 – 24.8 V DC
Current rating WTS	max. 150 mA
Digital input connection	see chapter 4.2: “Central Interface – ZI-100” on page 21
Output voltage range (digital input – 24 V DC mains)(2)	23.6 – 24.8 V DC
Output voltage range (digital input – 24 V DC backup)(3)	21 – 28.2 V DC
Current rating	max. 150 mA
SIMON LINK connection	6-pin
LED indicator	white: “WTS” yellow: “Failure” (“Fault”) green: “OK”

(1) Switched off in emergency power mode
(2) Switched off in emergency power mode
(3) Remains steady even during emergency operation

2.5. Sensor Interface – SI-100

The triggering components – emergency button, smoke detector and on-site fire alarm system – are connected to the sensor interface.

A sensor interface (SI-100) defines an ALARM group within a SHEV system. Any number of motor outputs (MR-120) can be freely assigned to the sensor interface (SI-100). These motor outputs then react with closing or opening operations according to the commands generated by the SI-100. The functions are factory-set on the SI-100 and MR-120 according to prEN 12101-9/ISO 21927-9, unless other default settings are made in the factory on customer request.

INFORMATION

SIMON LINK

The respective triggering behavior can be adjusted via SIMON LINK on the MR-120 (see chapter 2.6.2: “ALARM functions” on page 13).

2.5.1. Trigger or indicating lines (line monitored)

Three different triggering units can be connected to a SI-100:

- Emergency button type HE (first detection line B1)
- Smoke detector type RM (second detection line B2)
- On-site dry contact, e. g. a fire alarm system (third detection line B3)

The electrical connection of the respective release device is made according to the diagram on page 21 of this manual. The three detection lines (B1, B2 and B3) have the same triggering priority by default.

The outputs to these triggering units are monitored for short circuit and line interruption according to prEN 12101-9/ISO 21927-9.

In the event of a short circuit or power interruption in the connection line, the SI-100 and the control system will switch to ALARM mode. All allocated MR-120 are triggered – the connected actuators move to the intended ALARM position.

2.5.2. Indicators

The SI-100 is provided with the following indicators:

- Indicating line is triggered (separate for B1, B2 and B3) – red
- “Failure” (faults of the SI-100) – yellow
- “OK” operating state – green

2.5.3. ALARM mode reset

After an SI-100 has switched to ALARM mode it is set back to standby mode by a RESET command. This is only possible if all monitored trigger criteria (e. g. triggered smoke detector) have been reset. The RESET command can be given by the RESET button of the

- Emergency button
- SI-100

For further information about the Reset function, see chapter 2.5.5: “Reset function”.

2.5.4. DIP switches

The SI-100 has four DIP switches with the following functions:

- DIP switch 1: Activates / deactivates detection line B1
- DIP switch 2: Activates / deactivates detection line B2
- DIP switch 3: Activates / deactivates detection line B3
- DIP switch 4: Activates / deactivates auto-reset function of detection line B3 (FAS)

Figure 7: SI-100 DIP switch

2.5.5. Reset function

The ALARM signal can be reset on the emergency button or at the sensor interface as described in chapter 2.5.3 “ALARM mode reset“. When you press the RESET button for the first time, only the ALARM signal is reset. The opening actuators stay in the intended ALARM position.

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If the **RESET button** is pressed for the 2nd time, a ventilation signal CLOSE is generated. If this signal is to be considered on MR-120, *SIx/Reset* must be activated on MR-120 as ventilation source.

2.5.6. FAS auto-reset function

Generally SHEV alarms must be reset manually by pressing the **RESET button** (on SI-100 / on the main emergency switch). For detection line 3 (FAS – fire alarm system), the FAS auto-reset function can be activated which, after resetting the FAS (cancelling the ALARM triggering), also simultaneously resets the M-SHEV control center and, if necessary, controls the motor outputs in CLOSE direction.

SIMON LINK To generate an additional ventilation command CLOSE on the MR-120, the ventilation source *SIx/Autoreset* must be enabled on the MR-120.

2.5.7. Fault triggered only on power outage

SIMON LINK If this function is enabled, a fault is indicated at the central interface, sensor interface and emergency button only if there is a line interruption at the indicating lines 1 – 3.

ATTENTION

If this function is activated, no ALARM is triggered on the respective indicating lines 1 – 3.

2.5.8. Fireman's override switch / SI-100-MASTER

This gives the fire brigade top priority and enables it to close windows that have already been opened in the event of an alarm, even if alarms are present. For this function a SI-100-MASTER module is required. A suitable emergency button (optional) is recommended for control. Make sure that the specified current values are not exceeded (see Table 15: "Connection data for manual release button (HE button)") .

SIMON LINK To be able to use the connected emergency button as "firemans override switch", the functions "Firemans button" and "RZ triggers alarm override" must be activated in the SI-100-MASTER module. The SI-100-MASTER must be assigned to the MR-120 and the "Accept firemans override commands" function must be activated.

2.5.9. SI-100-SP & SP-100

This variant of the SI-100 module enables the connection of emergency buttons with 3-wire technology (level monitoring) such as HE-077 or HE-083. For further information, please contact our technical sales department.

2.5.10. Technical data SI-100 (-SI1)

Permissible input voltage range	21 – 28.2 V DC
Power consumption (standby mode)	10 – 20 mA
Power consumption (ALARM mode)	max. 80 mA
Emergency button connection	7 terminals (OK / Y / M / – / RZ / RA / B1)
Smoke detector connection	3 terminals (B2 / – / RA)
Fire alarm system connection	3 terminals (B3 / – / RA)
DIP switch position (default / delivery condition)	1 – 3: ON 4: OFF
LED indicator	red: "ALARM-release" (3x) yellow: "Failure" ("Fault") green: "OK"

Table 15: Connection data emergency button (HE button)

Maximum number main emergency switch	1
Maximum number off side switch	7
Output voltage range (B1)	17.5 V DC – 18 V DC
Current rating (B1)	max. 120 mA
Current monitoring window (OK range)	100 µA – 5 mA
Output voltage range (OK)	21 V DC – 28.2 V DC
Output voltage range (Y)	21 V DC – 28.2 V DC
Output voltage range (M)	21 V DC – 28.2 V DC
Input voltage range (RA)	15 V DC – 30 V DC
Input voltage range (RZ)	15 V DC – 30 V DC
Current rating (OK)	max. 80 mA
Current rating (Y)	max. 80 mA
Current rating (M)	max. 80 mA

Table 16: Connection data SP-100 (HE-Button)

Maximum number main emergency switches	2
Output voltage range (B1)	17.5 V DC – 18 V DC
Current rating (B1)	max. 120 mA

Table 17: Connection data smoke detector (RM 3000 / RM 2860) or thermo detector (TH 4860)

Maximum number	8 × RM 3000 (VdS approval: G203036)
	6 × RM 2860 / TH 4860 (VdS approval: G200017 / G200060)
Output voltage range (B2)	17.5 V DC – 18 V DC
Current rating (B2)	max. 120 mA
Current monitoring window (OK range)	100 µA – 5 mA
Reset time after ALARM reset (by disconnecting power supply B2)	3 sec
Input voltage range (RA)	15 V DC – 30 V DC

INFORMATION

The smoke detector types offered by us and listed in Table 17 have been tested and approved for unrestricted functionality with the M-SHEV product family by SIMON PROtec. We cannot guarantee that the M-SHEV product family works with other smoke detectors.

Table 18: Connection data fire alarm system (FAS)

Output voltage range (B3)	17.5 V DC – 18 V DC
Current rating (B3)	max. 120 mA
Current monitoring window (OK range)	100 µA – 5 mA
Reset time after ALARM reset (by disconnecting power supply B3)	3 sec
Input voltage range (RA)	15 V DC – 30 V DC

2.6. Motor Relay – MR-120

The MR-120 provides the output voltage for the actuators. The output at terminals “S” and “O” is designed in pole changing technique.

OPEN: S = “+” O = “–”

CLOSE: S = “–” O = “+”

At the MR-120, you can find:

- 10 A fuse for the motor outputs
- two interfaces for actuators including separate line monitoring
- two contacts for ventilation function (e. g. button / thermostat)
- analog input (0 – 10 V DC / 4 – 20 mA) for sequential triggering of actuators for ventilation purposes
- visual indicators:
  - white LED – triggering in direction “OPEN”
  - white LED – triggering in direction “CLOSE
  - yellow LED – “Failure” (“Fault”)
  - green LED – “OK”

2.6.1. Triggering of the load relays (“S” and “O” terminals)

The load output for the SHEV actuators is represented by two power relays, which operate in pole changing technique to ensure the OPEN / CLOSE triggering. The motor outputs of the M-SHEV are fitted with overload protection. In emergency power mode, the relays drop out as described in chapter 2.2: “Fault mode” on page 9. They are only reactivated when an ALARM is triggered.

2.6.2. ALARM functions

INFORMATION

The triggering priorities and other functions can be modified on request using the SIMON LINK configuration software.

2.6.2.a. Open delay in alarm mode

The MR-120 allows you to set a start delay for certain applications (e. g. in combination with sun protection systems in front of windows). This ALARM triggering will be displayed immediately, received and processed and can be indicated by an MI-100 message interface. After the intended ALARM start delay time has been elapsed, the actuators move to the intended ALARM position.

ATTENTION

This function can affect standard-compliant processing of alarm signals.Please check this function with the approval authorities.

INFORMATION

If you change a setting at this point, please remember to apply a functionally identical setting to the ventilation functions (see chapter 2.6.3.c “Open delay in vent mode” on page 14).

2.6.2.b. Priority function (Basic)

The MR-120 module operates by default with 3 priority levels for detection lines 1 (HE button), 2 (smoke detector) and 3 (BMZ). When an assigned sensor interface is triggered, it reacts by operating the opening units in direction OPEN. Only one common group of SI modules can be configured for all priority levels.

This function allows you to set any priority order for the detection lines. In addition, any triggering can be inverted. With this setting, the ALARM triggering causes the assigned opening units to move in direction CLOSE instead of the usual direction OPEN.

2.6.2.c. Priority function (Extended)

The extended priority function allows to configure an individual SI-100 group for each priority level.

INFORMATION

If the ALARM triggering on the FAS detection line is inverted (set to CLOSE), the use of the “FAS Autoreset” setting on the SI-100 is recommended (see chapter 2.5.6: “FAS auto-reset function” on page 12)!

This has the advantage that the FAS-ALARM is automatically deleted after finishing the triggering by the FAS and the ventilation function is available again via the ventilation button.

2.6.2.d. Retriggering function (deadlock)

The M-SHEV product family meets the requirements of prEN 12101-9/ISO 21927-9 for deadlock, e.g. frozen NSHEVs (natural smoke and heat exhaust ventilation). This means that after an ALARM triggering, the actuators are actuated 15 times in the OPEN direction. A new start attempt is made with initial short closing for 3 seconds in the CLOSE direction (to protect actuators without restart interlock) at intervals of 2 minutes. A waiting time of 500 ms is observed between each change of direction. After 30 minutes the triggering OPEN remains active.

SIMON LINK The retriggering function is switched off by default and can be individually enabled for each MR-120.

2.6.2.e. Alarm ONLY with analog input (optional) — Dependency logic

+SIMON PLUS This function uses the analog input by means of an external analog circuit as an additional condition for the execution of an ALARM function (dependency logic). For this purpose, a permanent check of the analog input (terminal "**+**") for a continuous signal (min. 0.8 mA) takes place. As long as this signal is present, an ALARM function can be performed. If this is not the case, none of the connected actuators will be electrically controlled.

ATTENTION

The continuous signal is detected only from 0.8 mA. The maximum current at the input must not be exceeded!

2.6.3. Ventilation functions

The ventilation functions are only enabled in mains operation. If the system switches to emergency power operation, no new ventilation commands are accepted. Pre-existing ventilation commands are kept for 3 minutes.

INFORMATION SIMON LINK

The ventilation functions can be modified on request using the SIMON LINK configuration software.

2.6.3.a. Connection ventilation button / input ventilation signals

Two ventilation buttons or comparable ventilation signals can be connected in parallel to the M-SHEV. The behaviour of the ventilation function is influenced by the triggering type and duration.

SIMON LINK It is possible to use input signals from other modules.

2.6.3.b. Action behaviour of ventilation buttons

The dead man's function activates automatically if the ventilation button is pressed for more than three seconds (auto dead man's function). The dead man's function is a safety function in which the actuators only move as long as the respective direction button is pressed. The actuators stop as soon as the button is released.

If the ventilation button is touched only briefly, the ventilation command is switched to continuous triggering. A stop function is achieved by briefly re-pressing the ventilation button in the OPEN direction, e.g. when opening (tip-stop function).

SIMON LINK Each motor relay can be readjusted per ventilation button connection (LT1/LT2, mode open/close) as follows:

- auto dead man + tip-stop
- auto dead man
- no dead man + tip-stop
- no dead man
- dead man only

2.6.3.c. Open delay in vent mode

SIMON LINK The MR-120 allows you to set a start delay for certain applications (e.g. in combination with sun protection systems in front of windows). This ventilation triggering will be displayed immediately, received and processed and can be indicated by a MI-100 signal interface. After the intended ventilation start delay time has been elapsed, the actuators move to the intended ventilation position.

INFORMATION

If you change a setting at this point, please remember to apply a functionally identical settings to the ALARM functions (see chapter 2.6.2.a "Open delay in alarm mode" on page 13).

2.6.3.d. WTS (wind/rain detector)

SIMON LINK For each motor relay it can be defined whether it should react to the central WTS signal (ZI-100).

2.6.3.e. Gap ventilation

SIMON LINK The gap ventilation function allows the user to open the smoke and heat exhaust/vents up to any defined stroke. The gap ventilation function and the gap ventilation time can be set with SIMON LINK. When the ventilation button is pressed, the actuators open to the set position or to the full opening stroke in ALARM mode.

ATTENTION

A new OPEN command is only accepted by the MR-120 after the CLOSE gap ventilation time has fully elapsed.

2.6.3.f. Automatic close

SIMON LINK This function closes the opening units automatically following a freely adjustable ventilation time. This function is used to set the waiting time after which the actuators are to be closed automatically. This setting can be parameterized in seconds (s), minutes (min) or hours (h) up to a maximum of 24 hours.

2.6.3.g. Eco mode — ventilation

SIMON LINK

If this function is activated, the motor outputs are de-energised 3 minutes after receipt of the last ventilation command.

2.6.3.h. Time until next thermostat query

SIMON LINK

If a connected thermostat is overridden by a manual command (e.g. by desired intermittent ventilation through a connected ventilation button), it must be determined how long the control system must wait before sending a new query to the thermostats. This waiting time can be set from 10 seconds to 12 hours.

To be able to use this function, at least one button under the ventilation sources must be assigned with “T” for thermostat.

2.6.3.i. Ventilation ONLY with analog input (optional) — Dependency logic

SIMON PLUS

With this function, the analog input is used with the aid of an external analog circuit as an additional condition for the execution of a ventilation function (dependency logic). For this purpose, the analog input (terminal “**+**”) is permanently checked for a continuous signal (min. 0.8 mA). As long as the signal is present, a ventilation function can be performed. If this is not the case, none of the connected actuators is electrically controlled.

ATTENTION

The continuous signal is only detected from 0.8 mA. The maximum current at the input must not be exceeded!

2.6.4. Analog input (optional)

SIMON PLUS

This input allows a gap or partial ventilation to be controlled. For example, this control signal can come from a building control system.

For this purpose the total opening and closing times must be measured and then entered on site. The connected actuators then move to the required position, proportional to the applied supply voltage or current. To ensure that this opening mechanism works properly, the actuators must be closed completely at least once daily.

ATTENTION

SIMON LINK

Before connecting the type of the input signal (current/voltage) must be determined via SIMON LINK. The analog input is deactivated by default.

2.6.5. Technical data MR-120 (-MR1)

Permissible input voltage range	21.0 – 28.2 V DC
Power consumption (standby mode)	5 mA – 20 mA
Power consumption (ALARM mode)	max. 12 A
Actuator connection	2 × 3 terminals (S/G/O)
Ventilation connection	2 × 3 terminals (E/Z/A)
Analog input connection	1 × 2 terminals (+/–)
LED indicator	yellow: “Failure” (“Fault”) green: “OK” white: “OPEN” white: “CLOSE”

Table 19: Motor channel output data

Switch-on duration	SD 30%
Permissible voltage range (mains operation)	23.0 V DC – 24.5 V DC
Permissible voltage range (battery operation)	21.0 V DC – 28.2 V DC
Continuous operation: Output current (I_{out}) ($I_{out} = I_{mot1} + I_{mot2}$)	10 A
Short-time operation: Output current (I_{out}) ($I_{out} = I_{mot1} + I_{mot2}$)	12 A
Pause time between change of direction	500 ms
Output fuse for actuators Fuse character type T (delayed)	10 A
Output voltage ripple (0 A < I_{out} < 10 A)	< 500 mV_{pp}

Table 20: Connection data ventilation connections

Output voltage range (E)	23.0 V DC – 24.5 V DC
Current rating (E)	max. 150 mA

Table 21: Connection data analog input

Permissible voltage range	0 V DC – 10 V DC
Permissible current range	4 mA – 20 mA

2.7. Message Interface MI-100 (optional)

The MI-100 is an optional alarm module. If an MI-100 is supplied with this controller, the dry contacts (relay: NO/C/NC) are assigned by default as follows:

- Contact 1 – ALARM mode
- Contact 2 – OK indication
- Contact 3 – WTS triggered
- Contact 4 – Mains operation

This assignment may differ from the standard due to customer requirements.

INFORMATION

The pin assignments can be configured with SIMON LINK

The MI-100 has following additional visual indicators:

- white LED – “Relay ON” (for each signal relay)
- yellow LED – “Failure” (“Fault”)
- green LED – “OK”

ATTENTION

To add an MI-100, it is essential to match the hardware and software versions of the controller. For further information please contact our technical sales department and keep the serial number of the control system at hand!

INFORMATION

An example video for retrofitting an M-SHEV module can be found on our Youtube channel

short.simon-protec.com/mi100video

2.7.1. Triggering the dry signal contacts

During emergency power operation, all messages except the “OK” and “Mains” messages remain active. Depending on the settings of the MI-100 the status can be output via the dry contacts.

INFORMATION

The automatic relay drop-out during emergency power operation can be set via SIMON LINK.

2.7.2. Assigning parameters to the dry signal contacts

For each contact (relay) the following parameters can be set:

- **Condition** (logical operation)
- **Switching delay:** 0 seconds (Off) to 1 hour
- **Hold time:** 0 seconds (unlimited) / 1 second to 1 hour

2.7.3. Condition (logical operation)

The logical operators NOT, AND, OR and enclosing brackets can be used to parameterize the dry contacts. A statement always consists of three elements:

– **a logical statement** (no entry = “statement is true” or NOT = “the statement is negated”)

– the **origin of the statement**

– and the **statement**

Origin of the statement

Various sources are available as the origin of the statement (the names of the sources correspond to the respective module identifier):

– “*”: all modules of the control system

– “SI*”: all SI-100 of the control system

– “MR*”: all MR-120 of the control system

– “ZI1”: the ZI-100 of the control system

– “SI1”: the first SI-100 of the control system

– “SI2”: the second SI-100 of the control system

...

– “MR1”: the first MR-120 of the control system

– “MR2”: the second MR-120 of the control system

...

– “MI1”: the first MI-100 of the control system

– “MI2”: the second MI-100 of the control system

...

Statement

Various meaningful values are possible, depending on the source of the statement (subject to SIMON LINK updates):

- *: Failure
- **ZI**:
  - Failure
  - Mains failure
  - WTS close on wind/rain
  - Signal 1/2/3/4/5 (digital input)
- **SI/SI***:
  - Failure
  - ALARM triggered
  - ALARM on line 1/2/3
  - Reset signal
- **MR/MR***:
  - Failure
  - ALARM triggered
  - Command Open
  - Command CLOSE
- **MI**:
  - Failure
  - Relay on 1/2/3/4

Logical operation

The relays only differentiate between ON and OFF and in the same way the logic operations only differentiate between YES and NO. This means:

NOT(NOT(statement)) = statement

Logical operators are defined as follows:

- **NOT**:

Statement is true	Statement is **NOT** true
Yes	No
No	Yes

- **AND**:

Statement1 is true	Statement2 is true	Statement1 **AND** Statement2 are true
Yes	Yes	Yes
Yes	No	No
No	Yes	No
No	No	No

- **OR**:

Statement1 is true	Statement2 is tru	Statement1 **OR** Statement2 is true
Yes	Yes	Yes
Yes	No	Yes
No	Yes	Yes
No	No	No

Examples

- The statement “ALARM from indicating line 1” on the SI-100 is to be evaluated:

  SI*: Alarm_on_Line_1

- The system is in OK operating state:

  NOT(*:Failure)

- The statement “ALARM from indicating line 2” of the first SI-100 and not on the second SI-100 is to be evaluated:

  SI1: Alarm_on_Line_2
  AND
  NOT SI2: Alarm_on_Line_2

- The statement “ALARM from indicating line 1” of the first SI-100 and not from the other two indicating lines is to be evaluated:

  SI1:Alarm_on_Line_1
  AND
  NOT(SI1:Alarm_on_Line_2
  OR
  SI1:Alarm_on_Line_3)

2.7.4. Switching delay

SIMON LINK After reaching the condition (logical statement is true), the dry contact (relay) is switched either as long as the condition remains true or for a preset time (1 second to 1 hour).

2.7.5. Holding time

SIMON LINK After reaching the condition (logical statement is true), the dry contact (relay) is switched either as long as the condition remains true or for a preset time (1 second to 1 hour).

Even if the condition changes during the hold time, the relay remains switched until the hold time has elapsed. Only after the holding time has elapsed the relay is released and reacts again to status changes of the condition.

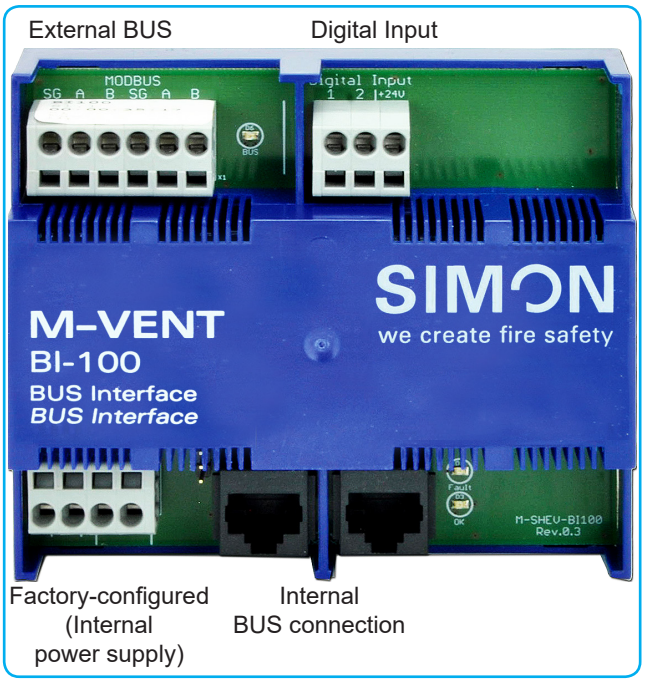
2.7.6. Technical data MI-100 (-MI1)

Permissible input voltage range	21.0 – 28.2 VDC
Power consumption	37 mA–100 mA
Connection of DRY contacts 1 and 2	2×3 terminals (NO/C/NC)
Connection of DRY contacts 3 and 4	2×3 terminals (NO/C/NC)
LED indicator	white:“Relay ON” (4x) yellow:“Failure” (“Fault”) green: “OK”

Table 22: Connection data for dry signal contacts “NO / C / NC”

Voltage rating of the switching contacts (C–NO)	max. 30 VDC
Voltage rating of the switching contacts (C–NC)	max. 30 VDC
Current rating of the switching contacts (C–NO)	max. 1 A
Current rating of the switching contacts (C–NC)	max. 1 A
Switching capacity per switching contact	30 W

2.8. BUS Interface BI-100 (optional)



The BI-100 is an optional BUS interface.

The BI-100 supports 32 virtual ventilation buttons that can be assigned to the individual MR120 modules as ventilation sources using SIMON LINK. These virtual ventilation buttons can be controlled via the external bus.

Ventilation commands like

- OPEN
- CLOSE
- STOP
- OPEN with programmable time limit

can be executed.

The module also has two digital inputs that can be evaluated through the external bus.

In addition, the BI-100 provides an overview of the entire system. Detailed states of individual modules can be queried.

The optional watchdog enables the monitoring of the communication flow and in the event of a bus communication failure, it can also stop the ventilation function and report a fault.

The BI-100 has the following additional visual indicators:

- green LED (next to the BUS terminal block)
- yellow LED – “Failure“ (“Fault“)
- green LED – “OK“

ATTENTION

To add a BI-100, hardware and software versions of the controller have to be synchronised. For further information, please contact our technical sales department and keep the serial number of the control system at hand!

INFORMATION

An example video for retrofitting an M-SHEV module can be found on our Youtube channel:

short.simon-protec.com/mi100video

2.8.1. MODBUS

SIMON LINK

The BI-100 provides an EIA-485 RTU-MODBUS TP interface (TP = twisted pair) and SG/A/B terminals (SG = signal ground). The communication speed is adjustable from 300 bps to 57600 bps. It is also possible to set the parity, stop bits and a watchdog function. If the MODBUS communication is lost, the BI-100 goes into fault mode.

2.8.2. Digital inputs

SIMON LINK

There are 2 digital inputs. A 24 VDC terminal (mains) is available to connect the inputs. Central ventilation commands (e.g. time control signals) can be connected to the digital input of the BI-100. These are shown in the connection plan according to customer requirements. Should you require any changes, please contact our technical sales department.

2.8.3. Technical data BI-100 (-BI1)

Permissible input voltage range	21.0 – 28.2 VDC
Power consumption	max. 30 mA
MODBUS connection	2 × 3 terminals (SG(1)/A/B)
Digital input connection	see chapter 4.6: “BUS Interface – BI-100 (optional)” on page 23
Output voltage range (digital input – 24 VDC mains)(2)	23.6 – 24.8 VDC
Current rating	max. 150 mA
LED indicator	green: “BUS” yellow: “Failure” (“Fault”) green: “OK”

(1) Signal Ground
(2) Drops in emergency operation

3. Mechanical connection

ATTENTION

The openings of the battery cells (round lids on top of the batteries) must not point downwards, because this can lead to a leak out of the battery!

ATTENTION

Do not connect the battery during installation!

3.1. M-SHEV-12-AP

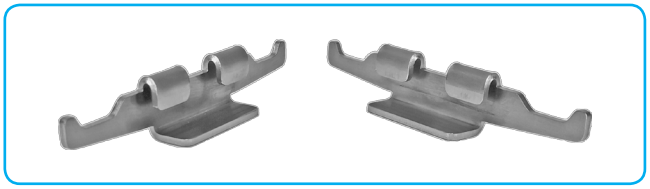
- Mark the positions of the mounting points of the M-SHEV-12-AP.
- Drill the holes.
- Fasten the M-SHEV-12-AP through the bottom of the housing using four screws suitable for the respective mounting surface (not supplied).

Figure 8: Mounting points

3.1.1. Installation bracket AP-MOUNT

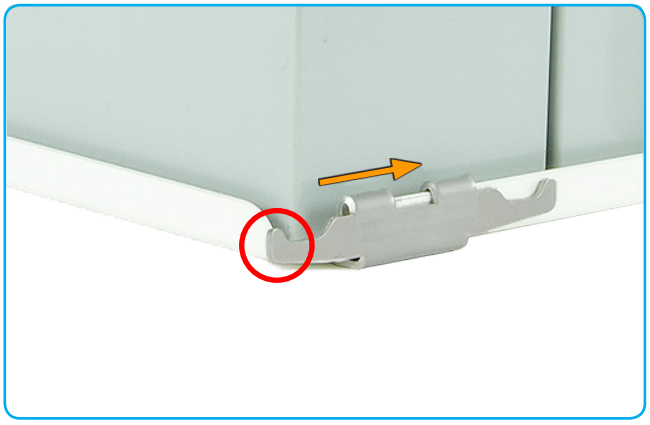
The AP-MOUNT installation bracket (not included in delivery) is used to safely store the cover during wall mounting, maintenance or commissioning. It can be permanently attached to both sides of the control panel or used individually.

Figure 9: Installation bracket AP-MOUNT



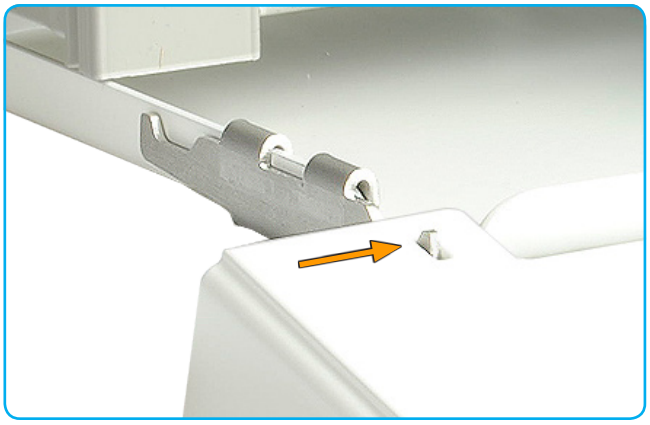
- Push the two installation brackets laterally onto the housing so that the hooks protrude.

Figure 10



- The cover can now be hung onto the two hooks using the additional retaining holes (left and right).

Figure 11



- Before placing the cover onto the housing, the installation brackets can either be pushed in completely for permanent use or removed again for individual use.

3.2. M-SHEV

- Remove the 4 plastic caps on the back of the M-SHEV housing.
- Mark the positions of the housing's direct mounting points for the M-SHEV or mount the four wall fixing lugs (see Figure 13) supplied to the housing and then mark the positions of the mounting holes to be drilled (see Figure 12).
- Drill the holes.
- Fasten the M-SHEV with four suitable screws (not included in delivery) through the bottom of the housing or, if used, with the aid of four wall fixing lugs.

Figure 12: Mounting points (back of housing)

Figure 13: Wall fixing lugs

4. Electrical connection

DANGER

The system must be mounted by specialist personnel (qualified electricians) only. All relevant national safety regulations and directives apply to mounting, installation and commissioning.

Improper mounting can create a risk of electric shock. All safety regulations must be complied with. Follow the current assembly instructions. Wrong mounting can lead to serious injury.

DANGER

Disconnect the connection cable completely (all-pole) from the mains. No voltage must be present when connecting the M-SHEV!

DANGER

The testing of systems must be carried out in accordance with the applicable national regulations (in Germany among others DIN VDE 0100 Part 600). Make all necessary preparations for this: e.g. connect the PE connection to the housing cover.

- Insert the connection cable.
- Connect the cables according to the connection plan.
- Where applicable, attach the strain relief to the cable comb using cable ties.
- Remove the termination resistors of the emergency buttons, smoke detectors and FAS contacts from the terminals of the control panel and connect them to the last triggering units.

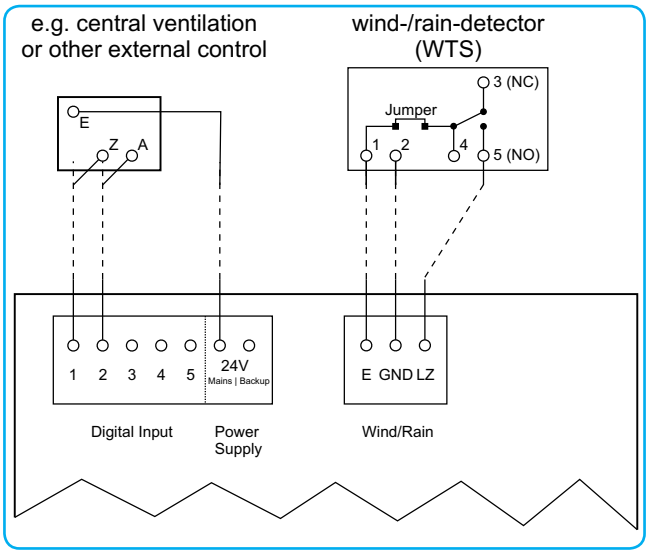
4.1. 230 V AC connection (-x1)

- Connect the cables according to the connection plan.

4.2. Central Interface – ZI-100

➢ Connect the cables according to the connection plan.

Figure 14: Connection example ZI-100



4.3. Sensor Interface – SI-100

➢ Connect the cables according to the connection plan.

Figure 15: Typical connection SI-100

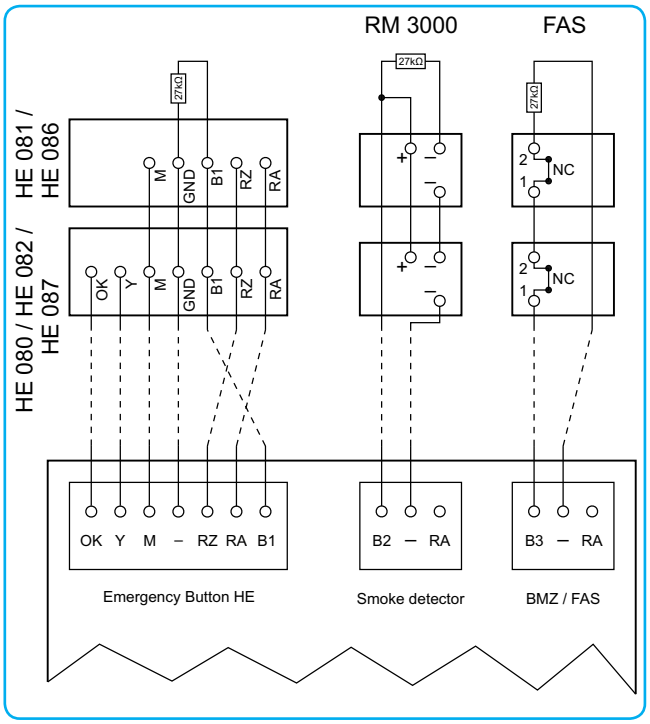


Figure 16: SI-100 with RM 2860 / TH 4860

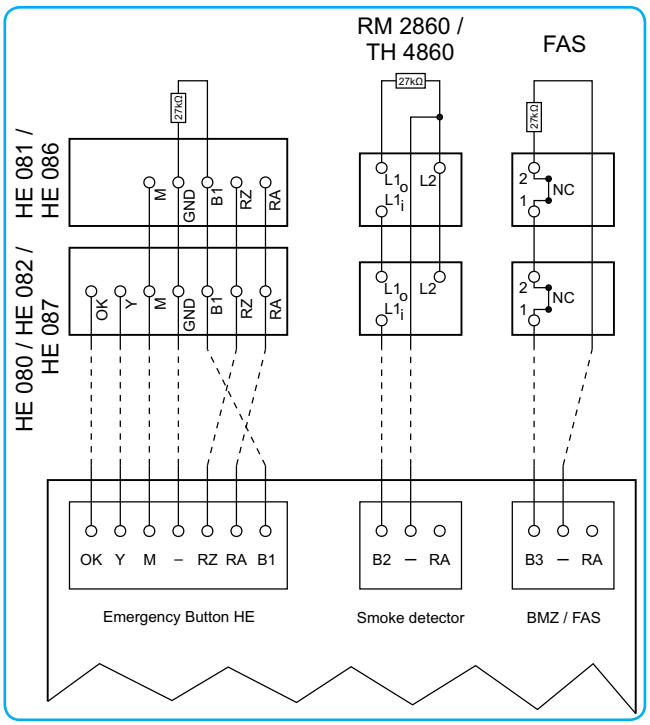
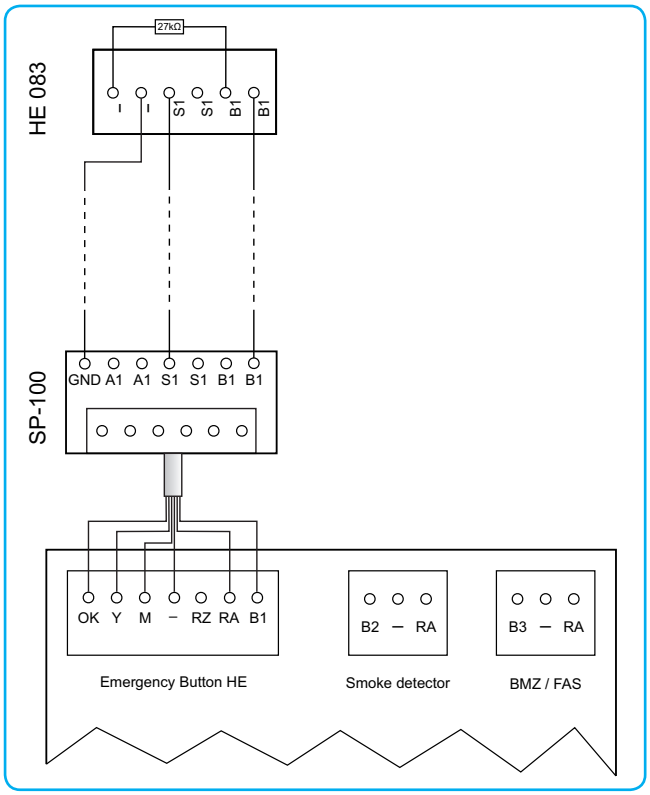


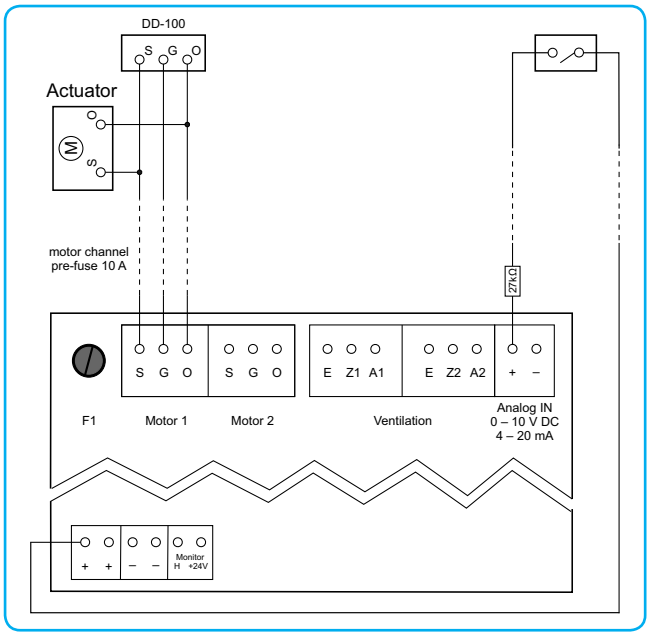
Figure 17: SI-100 with SP-100



4.4. Motor Relais – MR-120

➢ Connect the cables according to the connection plan.

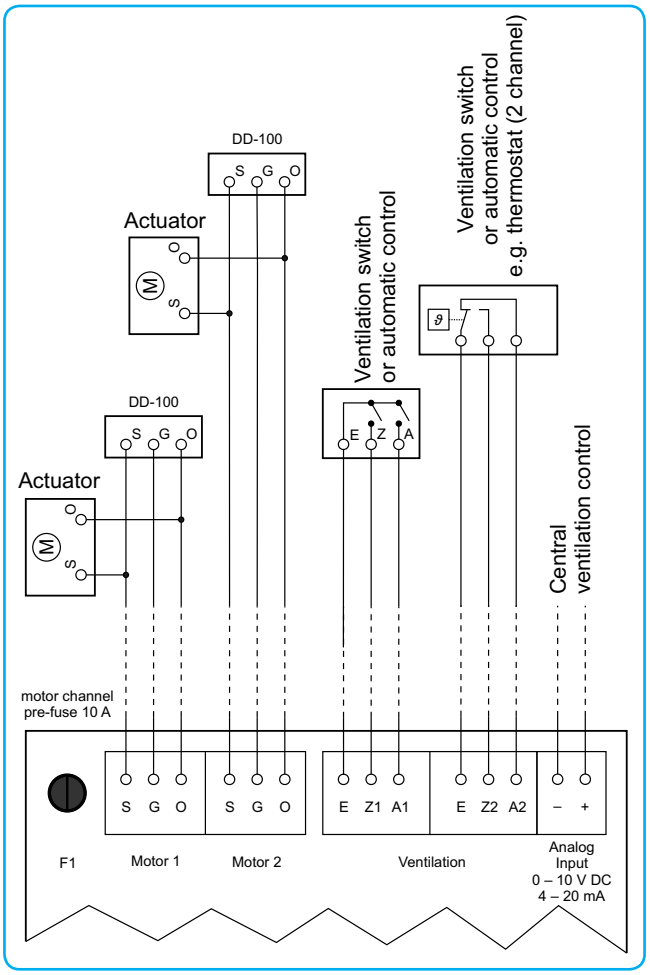
Figure 18: Connection example MR-120 — Dependency logic



INFORMATION

The function “dependency logic” is an additional function at an additional charge which allows you to use only the analog input as an additional external condition for the execution of an alarm / ventilation function. This function can be switched on or off separately with SIMON LINK.

Figure 19: Connection example MR-120



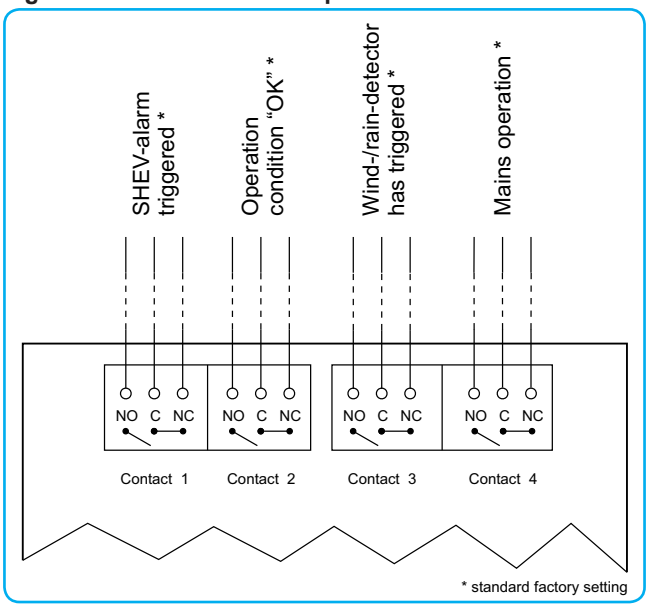
4.4.1. Line monitoring by DD-100

The **DD-100** diode terminators present at the motor outputs are used for line monitoring of the motor outputs. They need to be inserted in the motor junction box of the last actuator.

4.5. Message Interface – MI-100 (optional)

➢ Connect the cables according to the connection plan.

Figure 20: Connection example MI-100



INFORMATION

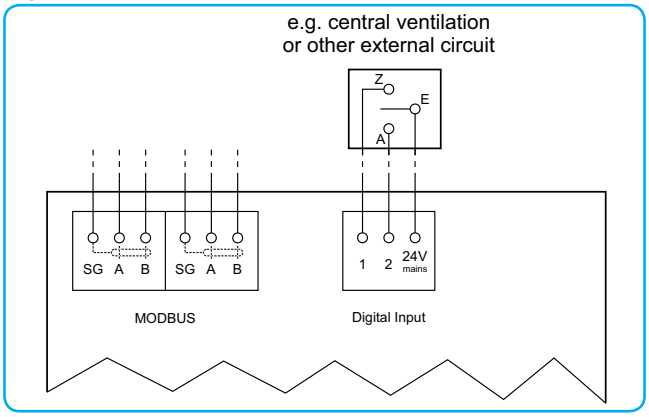
SIMON LINK

The assignments of the dry contacts / relays can be set with SIMON LINK.

4.6. BUS Interface – BI-100 (optional)

➢ Connect the cables according to the connection plan.

Figure 21: Connection example BI-100



5. Commisioning

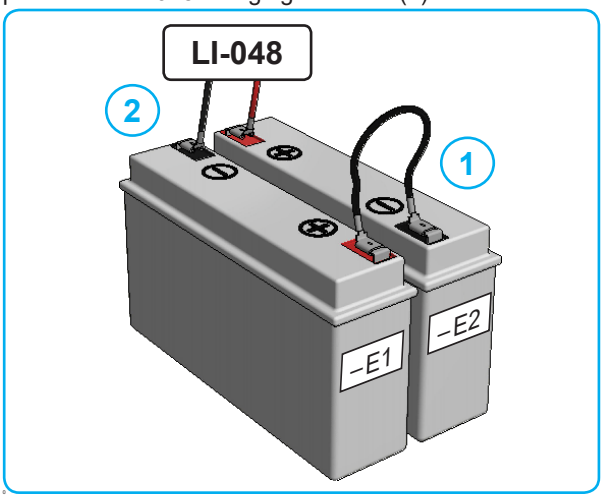
ATTENTION

The battery may only be connected when the on-site power supply / mains supply is permanently ensured.

If the mains supply is not permanently ensured during commissioning, there is a risk of total discharge. This will damage the battery.

➢ Place the battery pack on the bottom plate of the housing.

➢ First connect the two batteries with the short connection cable (1) from -E1 to -E2 and then connect the battery pack to the LI-048 charging interface (2).



5.1. M-SHEV-12-AP

➢ Connect the PE cable to the PE connection on the cover.

➢ Put on the cover and fix it with the two side screws.

➢ The cover has symmetrical fastening features, i.e. it can be used on the "right" or "left". The cover can alternatively be equipped with a lock.

6. Appendix

6.1. Care and Maintenance

See supplementary sheet “Safety instructions and Warranty conditions”!

short.simon-protec.com/sugen

6.2. General business and delivery terms

Deliveries and services are subject to the currently applicable terms for products and services of the electrical industry (green delivery terms), including the supplementary clause “Extended retention of title”. These are published by the German Electrical and Electronic Manufacturers’ Association (ZVEI), Frankfurt. If you are not aware of these, we will gladly send them to you. You can also download these agreements from

short.simon-protec.com/agben

The place of jurisdiction is Passau.

6.3. Company Addresses

6.3.1. System manufacturer

SIMON PROtec Systems GmbH
Medienstraße 8
94036 Passau

Tel.: +49 (0) 851 988 70 - 0
Fax: +49 (0) 851 988 70 - 70

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

6.3.2. Germany

SIMON PROtec Deutschland GmbH
Medienstraße 8
94036 Passau

Tel.: +49 (0) 851 379 368 - 0
Fax: +49 (0) 851 379 368 - 70

SIMON PROtec Deutschland GmbH
Fraunhoferstraße 14
82152 Planegg-Martinsried

Tel.: +49 (0) 89 791 70 11
Fax: +49 (0) 89 791 79 72

E-Mail: info@simon-protec.de
Internet: www.simon-protec.de

6.3.3. Switzerland

SIMON PROtec Systems AG
Allmendstrasse 38
8320 Fehraltorf

Tel.: +41 (0) 44 956 50 30
Fax: +41 (0) 44 956 50 40

E-Mail: info@simon-protec.ch
Internet: www.simon-protec.ch

6.3.4. Hungary

SIMON PROtec Systems Kft.
Sodras utca 1. fszt. 1
1026 Budapest

Tel.: +36 (0) 30 552 0424

E-Mail: info@simon-protec.hu
Internet: www.simon-protec.hu

7. Manufacturer’s declaration

CE 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.

8. EC manufacturer’s declaration (distributor)

The installer is responsible for the proper assembly or commissioning, the preparation of the declaration of conformity in accordance with EU directives and for affixing the CE marking. The CE marking must be affixed visibly!