Smoke and Heat Ventilation
Pneumatic - Electronic
Control Systems

Installation and Operation Instructions

Version 1/15

SHEVS Control Centre

RWZ 2 f

RWZ 2f

RWZ 2f-MT

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7 Terminal and layout diagrams ..... from **A - 1**

Please read all information given in these instructions very carefully.

Only skilled personnel are permitted to work on the Control Centre!

Key to pictograms:

OK = trouble-free operation	△ = button / travel command OPEN	= wind
= alarm	▽ = button / travel command CLOSE	= rain
⚠ = malfunction		
= maintenance	= ventilation position	= ventilation time
= automatic fire detector	= manual call point	F = Fire Alarm Control Panel (FACP)

1 Concept of Control Centre

- Smoke and Heat Exhaust Ventilation System (SHEVS) Control Centre with output for the connection of 24 V-actuators
- One SHE group, two signal lines:
  - Line : Automatic fire detectors or Fire Alarm Control Panel (FACP)
  - Line : Manual call points **RT 3** (main alarm point) with indicators operation OK, alarm , malfunction ⚠ and button *Reset*
- Reset the alarm / detector using the button in the main alarm point or in the Control Centre
- Selectable functions:
  - "Auto close" (automatic closure after resetting an alarm)
  - "Malfunction = Alarm" (alarm upon malfunction of a signal line)
  - "Automatic OFF" (automatic travel commands - apart from the alarm - are disabled)
  - "Thermal alarm" (alarm on exceeding an enclosure inside temperature of 70 °C)
- Possibility of connecting ventilation buttons, also with indication of position OPEN
- Adjustable ventilation position and ventilation time
- Possibility of connecting an external Wind and Rain Control (WRC), e.g. type **WRS**
- Internal service display for detailed status information for installation and maintenance
- Plug-in connection terminals (apart from actuator output)
- The use of K + G / Grasl actuators is recommended. When driving third-party actuators, compatibility is to be checked! Also note Section 6 "Technical data"
- Actuator specification: 24 V actuators, travelling time for full stroke at rated load (total travelling time) < 4 min.
- Actuators must be suitable for the repetition of OPEN and / or CLOSE cycle (see 3.4.2 / 3.6)
- Upon direct change of the sense of travel, the actuators are briefly stopped before changing the sense
- The travelling current for the actuators is supplied from the Control Centre's accumulators
- Sheet steel enclosure, light grey (RAL 7035)

1.1 Options

- **PK:** One potential-free contact (PFC) each for alarm / malfunction forwarding
- **MT:** Enclosure door with integrated manual call point, ventilation button and indication of position

2 Putting into service / putting out of service

Work at the Control Centre may be performed only by qualified personnel!
Before starting any work it is mandatory to deflect static charge!
We do not assume any guarantee or liability for defects caused by faulty connection.

ℹ *Planning and installation of SHEVS require observation of the following rules, as far as applicable: national building codes / model building code and regulations of the local building and fire safety authorities, VDE regulations (particularly VDE 0100, 0108 and 0833), VdS Guidelines 2098 and 2221, DIN 18232 and EN 12101, DIN 4102, model line systems policy.*

2.1 Installation / putting into service

❗ *Perform work at the Control Centre only in deenergised condition!*

Actuators may not be driven with external power supply (e.g. external accumulators), if they are already connected to the Control Centre. This can lead to defects in the power output of the Control Centre.

- Fasten the enclosure securely using suitable mounting material. Pass the connection cables through the holes provided.
- Perform the functional setting (see 3.2) and wire the Control Centre according to the terminal diagrams.
- Turn on line voltage. The indicators and the service display light up briefly. Afterwards the indicator ⚠ flickers for about 15 s (calibration process). If the indicator ⚠ is permanently lit, there is a malfunction in a signal line (see 5). The service display remains on for 120 s.
- Insert the accumulators in the enclosure and connect them as illustrated on the "Line voltage, mounting, accumulators" plan.
- The indicator OK lights up, the indicator ⚠ extinguishes, the system is ready for operation. If malfunction is still displayed, follow the instructions in Section 5 "Detection of fault / troubleshooting". If necessary, put the Control Centre out of service once again (see 2.2).

- While putting into service, check all functions and indicators of the Control Centre and its components. The individual functions are described in Section 3 (also simulate malfunctions and check detection, see 5).
- Following putting into service completely close all actuators (if necessary, press button ▽).

ℹ *After about 24 hours continuous operation without mains failure, the accumulators are sufficiently charged to achieve the full standby time during mains failure.*

2.2 Putting out of service

- Disconnect accumulators from Control Centre (e.g. remove accumulator connection line or fuse F2).
  ℹ *Charged accumulators have a shelf-life of about 6 months. For longer storage, they must be recharged.*
- Turn off the line voltage.

3 Features and Controls

Before touching the control elements in the Control Centre it is mandatory to deflect static charge!

3.1 Indicators / control elements of the Control Centre

- **Indicators on the main board:**
  - OK (green): **Trouble-free operation**. Extinguishes when a malfunction is detected.
  - (red): **Alarm**.
  - ⚠ (yellow): **Malfunction**.
  - (blue): **Wind- and Rain Control** is active.
  - (blue): **Maintenance is due** (flashes) or **Maintenance mode enabled** (is lit).
  - 8 (red): **Service-Display**, see 5.2.
  - △ / ▽ (blue): Travel command active in OPEN or CLOSE direction.
- **Control elements on the main board:**
  - **Button *Reset***: Reset the alarm function.
  - **Button *SD*:** Activate the service display, see 5.2.
  - **Button** (ventilation position) and **potentiometer** (ventilation time): see 3.5.2 and 3.5.3.
  - **Button *µC-Reset*:** Only for servicing purposes.

3.2 Selectable functions

- **“Auto close”** DIP switch **1**:
  In position ON, the actuators are automatically closed after resetting a pending alarm. It cannot be ventilated up to 4 minutes during response of the function.
  Factory setting: ON (automatic closure is enabled).
- **“Malfunction = Alarm”** DIP switch **2**:
  In the ON position, the alarm function (see 3.4) is activated upon malfunction of a signal line. After eliminating the malfunction, the alarm is reset by pressing the button *Reset* in a main alarm point or the Control Centre.
  Factory setting: OFF (no alarm in case of malfunction).
- **„Automatic OFF“** DIP-Schalter **3**:
  In position ON, the following automatic functions are disabled: Auto Close, ventilation position and ventilation time, repetition of CLOSE cycle and closing on mains failure or active wind and rain control. Actuators operate during ventilator operation only as long as a button △ / ▽ is pressed.
  Factory setting: OFF (Automatic enabled).

  ℹ *Upon deactivation the function “automatic OFF” the actuators will close automatically. It cannot be ventilated up to 4 minutes.*
- **“Thermal alarm”** DIP switch **4**:
  In position ON, the alarm function (see 3.4) will be activated when exceeding an enclosure inside temperature of 70 °C.
  Factory setting: OFF (no alarm when exceeding 70 °C).

3.3 Indicators / functions of the manual call points

- For activation and reset, see 3.4.
- **Indicators:**
  - OK (green): **Trouble-free operation**. Extinguishes when a malfunction is detected.
  - (red): **Alarm**.
  - ⚠ (yellow): **Malfunction** (see also 5).
- **Button *Reset***: Resetting the alarm function (accessible after opening the door with a key).

3.4 Alarm functions

During the execution of an alarm function the ventilation functions are disabled.

Alarm function: Upon detection of an alarm, the actuators are completely opened and indicators show the alarm condition.

Resetting the alarm function: Resetting is done by briefly pressing the button *Reset* in a main alarm point or the Control Centre. Then the indicators will be switched off.

Further alarm functions ("Auto close", "Malfunction = Alarm", "Thermal alarm"), see 3.2, forwarding alarm / malfunction message, see 3.8.

If it is closed after reset of an alarm by pressing the button ▽, it can be manually ventilated again only after up to 4 minutes.

3.4.1 Manual call points, automatic fire detectors and Fire Alarm Control Panel

- **Manual call points:** For manual alarming, break open the glass of the manual call point and press the control button until the indicator confirms the detection of the alarm.
  For maintenance work, the door of the manual call point can be opened with a key.
- **Automatic fire detectors:** The alarming takes place automatically based on smoke and / or heat detection depending on the detector type.
  After resetting, if an automatic fire detector responds again, repeat the reset step (smoke particles may still be present in the detector).
- **Fire Alarm Control Panel (FACP):** When the FACP generates an alarm, the alarm function is activated. Resetting of the alarm is done at the FACP.

3.4.2 Repetition of OPEN cycle in case of alarm

- The OPEN command is executed over a period of 30 minutes as follows to ensure opening of the actuator in case of alarm, even at adverse circumstances (e.g. frozen seals):
  The actuators travel in the OPEN direction for 2 minutes, briefly in the CLOSE direction and following for 2 minutes in the OPEN direction once again, and so on.

3.5 Ventilation functions

The ventilation position, the ventilation time and the wind and rain control are disabled if the function "Automatic OFF" is enabled (see 3.2). Actuators only operate as long as a button △ / ▽ is pressed.

When performing ventilation functions, do not exceed the duty cycle of the actuator output and the actuators.

If the energy in the accumulators becomes critical for the standby time, the ventilation function △ is blocked. Closing by / or a button ▽ is still possible. After sufficient charging of the accumulators, ventilation is released again. An alarm is not affected.

3.5.1 Manual ventilation

- After briefly pressing a ventilation button (△ / ▽), the actuators travel up to the end position or the set ventilation position (see 3.5.2). Pressing it again stops the actuators. By pressing the button for the reverse sense of travel, the travel direction is reversed after a short stop.
- When pressed longer (> 1 s), the actuators travel as long as the button is pressed. It can also be travelled up to the end position or the set ventilation position (see 3.5.2).

3.5.2 Setting the ventilation position

- Set the travel time toward OPEN and CLOSE to define the desired ventilation position.
  Factory setting: 15 s travel time OPEN, 30 s travel time CLOSE.

  ℹ *Disable / enable the ventilation position: Press button for longer than 3 s. The display will briefly show (disabled) or (enabled).*
  Return to factory settings: Press button for longer than 6 s. The display briefly shows .

- Setting the travel times: Briefly press button to enter programming mode (display:).
  - Open the actuators by briefly pressing the button or a ventilation button △. Press the button once more when desired ventilation position is reached.
  - Close the actuators by briefly pressing the button or a ventilation button ▽. Press the button once more when all actuators are completely closed. The display extinguishes.
  - The actuators automatically travel to the ventilation position for verification and then close again.

  ℹ *This setting can only be made when the system has no malfunctions and WRC is not active.*
  Initially, all actuators must be entirely closed and the travelling command ▽ switched off.
  Programming mode is cancelled automatically after 6 minutes without button activity or manually by double-clicking on the button SD.
  If a changeover contact is used for ventilation, the setting is performed only using the button .

3.5.3 Setting the ventilation time

- Use a screwdriver on potentiometer to set ventilation time to between 5 and 30 minutes. The actuators close automatically at the end of the set time. Turn left to disable ventilation time (= factory setting).

3.5.4 Indication of position in the ventilation button (LT 2-A) / in the enclosure door (option MT)

- The indicator above the button △ (LT 2-A / option MT) lights up when a travel command is executed toward OPEN.
  The indicator goes out after the closing time for a travel command toward CLOSED (up to 4 minutes).

ℹ *If the function "Automatic OFF" is enabled (see 3.2) the indicator is deactivated.*

3.5.5 External Wind and Rain Control (WRC)

- If the Wind and Rain Control responds, the actuators are automatically closed. The ventilation functions are disabled. The indicator on the main board lights up, until the WRC releases the ventilation functions once again. An alarm has priority.

3.6 Repetition of CLOSE cycle

- If not all actuators are properly closed (e.g. actuator overload cutoff activated by a gust of wind), the repetition of CLOSE cycle can be activated by briefly pressing the ventilation button ▽. The actuators are briefly opened and following the closing command activated once again.

  ℹ *Observe setting of the function "Automatic OFF" (see 3.2).*

3.7 Mains failure

- In case of mains failure, the accumulators cannot be charged, but provide the operating power for the stand-by time. The alarm functions are not affected by the mains failure.
  Actuators in ventilation position are closed and pressing the ventilation button △ is ignored. The mains failure must be corrected immediately to avoid deep-discharge disconnection, to recharge the accumulators and to ensure the safe operation of the system.

  ℹ *Observe setting of the function "Automatic OFF" (see 3.2).*

- **Deep-discharge disconnection:** in case of critical condition of the accumulators, the entire Control Centre including the indicators is **switched off**. However, a low quiescent current still flows (in addition to the natural self-discharge). Therefore, there is the risk of permanent damage to the accumulators without recharging after a few days already.

3.8 Alarm and malfunction forwarding (option PK)

- **PFC** (PFC alarm): The contact will be activated upon detection of an alarm. After resetting the alarm, the contact resets to its neutral position.
- **PFC** ⚠ (PFC malfunction): The contact is activated when a malfunction is detected (see 5). After eliminating the cause of malfunction, the contact resets to its neutral position.

ℹ *The contacts are not enabled during maintenance mode.*

4 Maintenance

- In the course of maintenance - unless other local regulations apply - check all functions and indicators of the Control Centre and its components at least once a year. This also includes the review of terminal points, connection cables, indicators and fuses, as well as the cleaning of various components, if necessary. Check mounting brackets, etc. for proper fitting. Lubricate actuators and SHE vents (domelights, flap ventilators, louvred ventilators etc.), if necessary.
  The individual functions of the Control Centre are described in section 3. Likewise, simulate malfunctions of the signal lines and power supply and check detection; see 5.
- **Display of due maintenance**
  If this function has been enabled by the maintenance company, the Control Centre indicates the due maintenance through flashing of indicator after about 11 months of operating time. After about 14 months maintenance is overdue and a malfunction signal is generated additionally.
- **Accumulators:**
  - Check the accumulators **at least once** a year for proper functioning. They should be replaced following a typical service life of 3, but no more than 4 years in an ambient temperature of 20 °C. The service life falls by 1 year for every 10 °C rise in ambient temperature!
  - Checking the accumulators: Remove mains fuse **F1**. The accumulator voltage should be 25 - 27 V. Activate an alarm now (open the actuators). The voltage on the accumulator terminals should not fall below 23 V during the opening. Reinsert the mains fuse **F1**!
    After testing the accumulators, reset the alarm testing (press button *Reset* briefly) and close all actuators again.
    ℹ *A quick check of the accumulators with less load takes place automatically every 15 minutes.*
  - The end user, i.e. the final owner, must return used batteries / accumulators to a distributor or public waste management authority. This obligation to return applies regardless of whether it is a private or commercial end user.
  - If the system is put out of service / temporarily shut down, **the accumulators must be unplugged** and the line voltage switched off!
  - Charged accumulators that are not connected yet have a shelf-life of about 6 months. For longer storage, they must be recharged.

❗ ***When directly driving actuators**, e.g. with external accumulators during installation or maintenance work, **the actuators must be disconnected from the Control Centre**! Otherwise, this can lead to defects in the power output.*

5 Detection of fault / troubleshooting

5.1 General information

Occurrence of malfunction is indicated by flashing of the indicator ⚠ in main alarm points and in the Control Centre. With the help of the service display, the cause can be localized (see 5.2).

- The following are detected as **malfunctions**:
  - Accumulator or mains failure, accumulator polarity reversed
  - Failure of the fuses F1 or F2
  - Wire-break or short-circuit of signal lines
  - Wire-break or short-circuit of the actuator supply line (unbranched common line)
  - Connection lost to the call point in the enclosure door (option MT)
  - Maintenance is overdue
- Notify maintenance company in case of malfunction.
- **Spare material:** In the Control Centre, there is a bag of spare fuses and resistors.
- **Memory of the service display:** If there is no pending alarm or malfunction, the memory content may be displayed for 1 s by briefly pressing button *Reset* (alarm memory) or *SD* (malfunction memory).
- After troubleshooting, the cause of malfunction will not be shown at the service display any longer. Exception is the malfunction code [U] “accumulator test failed” (also see 4 (Accumulators) and 5.2). This code has to be reset after troubleshooting by pressing the button *SD*.

5.2 Indications of the service display

- With the help of the internal service display, operating conditions can be accurately displayed. In normal condition, there is no indication on the service display and the indicator OK of the Control Centre is lit.
- For alarm / malfunction, the display is switched on automatically, but switched off after 10 s during mains failure. In this case, it may be switched on again for 10 s by pressing the button *SD* for 4 s.

ℹ *If there is no alarm / malfunction, the indication of the accumulator charging method can be switched on for 120 s by pressing the button* SD *for 4 s:* [␣.] = *U-Charging,* [.] = *I-Charging,* [.] = *no charging.*

Operating conditions of the Control Centre:

Code	Description
0	Mains failure or fuse F1 blown
1	Wire-break accumulators or fuse F2 blown
2	Actuator output: wire-break / short circuit
3	Line ▭: alarm
4	Line ▭: wire-break
5	Line ▭: short circuit
6	Line ▭: undefined
7	Line ▣: alarm
8	Line ▣: wire-break
9	Line ▣: short circuit
A	Line ▣: undefined
b	Option MT: wire-break manual call point
c	Ventilation position reached / ventilation blocked
d	“Automatic OFF” with changeover contact

Code	Description
h	“Malfunction = Alarm” active
L	Adjustment ventilation position
o	Ventilation position reset
P	Changeover contact for ventilation detected
q	Alarm through internal thermal sensor
t	Accumulator test active
U	Accumulator test failed
y	Accumulator polarity reversed
-	Memory alarm / malfunction empty
r	Button *Reset*: short circuit
J	Button *SD*: short circuit
E	Maintenance is due
µ	Microcontroller fault

6 Technical data

6.1 Version

Type	**RWZ 2-4f**
Product code (with option MT)	8100 2604 0000 (8100 2604 0001)
Output current	4 A (24 V⎓ / 96 W)
Current input	0.1 A / 230 V~
Lead-acid accumulators, VdS approved	2 x 2 Ah / 12 V
I / U charging	0.15 A (28.8 V) / 27.4 V
Dimensions in mm (W x H x D)	205 x 300 x 100

The Control Centre complies with the requirements of the 2006/95/EC and 2004/108/EC Directives (emission: EN 61000-6-3 and EN 55022, immunity: EN 61000-6-2 and EN 50130-4).

6.2 Performance data and characteristics

General	
Line voltage supply Internal voltage supply / standby time	230 V~ / 50 - 60 Hz 24V⎓ / 72 h (mains failure)
Cable feed	from above, below or behind
Environmental Class 1 / III (to EN 12101-10 / VdS 2581) Relative humidity Enclosure protection rating (to DIN EN 60529)	-5 °C … +40 °C 20 % … 80 %, non-condensing IP30
For mounting dimensions, see plan “Line voltage, mounting and accumulators”. Not suitable for use outdoors. Protect from direct sunlight, humidity and excessive formation of dust! Preferably, the installation should be carried out in dry, heated rooms.	

Signal lines	
Line monitoring	wire-break, short-circuit
Line ⎓: Automatic fire detectors: Smoke detector / heat detector (**RM 2** / **TM 2** or **RM 3 / TM 3**) or Fire Alarm Control Panel: − Terminating resistor − Alarm resistor	 20 pieces normally open contact 10 kΩ (± 10 %, ¼ W) 1 kΩ … 1.5 kΩ (± 10 %, ½ W)
Line ⊡, manual call points: Main alarm point (**RT 3-*-BS**)	 10 pieces

In- / Outputs	
Ventilation button (**LT**) Ventilation button with indication of position OPEN (**LT 2-A**)	unlimited 10 pieces
Wind and Rain Control (type **WRS**)	normally closed contact [1]

[1] *In the WRC, use a separate contact for each connected Control Centre*

Actuator output

Rated voltage	24 V⎓ (+6 V / -4 V)
Max. cross-section of supply line	4 x 6 mm² (rigid)
Allowed voltage drop between Control Centre and actuator	1 V at full load
Line monitoring (unbranched common line)	wire-break, short-circuit

Allowed cable length with simple and moderately branched arrangement of the actuators

Current / Cross section	0.8 A	1.0 A	1.3 A	1.6 A	2.0 A	2.6 A	3.2 A	4.0 A
2 x 1.5 mm²	54 m	44 m	33 m	27 m	22 m	17 m	14 m	11 m
2 x 2.5 mm²	91 m	73 m	56 m	45 m	36 m	28 m	23 m	18 m
2 x 4.0 mm²	145 m	116 m	89 m	73 m	58 m	45 m	36 m	29 m
2 x 6.0 mm²	218 m	174 m	134 m	109 m	87 m	67 m	54 m	44 m
4 x 1.5 mm²	109 m	87 m	67 m	54 m	44 m	33 m	27 m	22 m
4 x 2.5 mm²	181 m	145 m	112 m	91 m	73 m	56 m	45 m	36 m
4 x 4.0 mm²	290 m	232 m	178 m	145 m	116 m	89 m	73 m	58 m
4 x 6.0 mm²	435 m	348 m	268 m	218 m	174 m	134 m	109 m	87 m

When 4 cores are used, connect 2 cores each in parallel.

Fuses

Primary mains (miniature fuse 5 x 20 mm)	F1: T 125 mA
Accumulators / actuators (miniature flat fuse 11 mm)	F2: 7.5 A

Alarm and malfunction forwarding (option PK)

Contact load rating PFC-, PFC-⚠ (changeover contacts)	5 A / 30 V⎓ / 230 V~
Fuses PFC-, PFC-⚠ (miniature fuses 5 x 20 mm)	P:F1, P:F2: F 5 A

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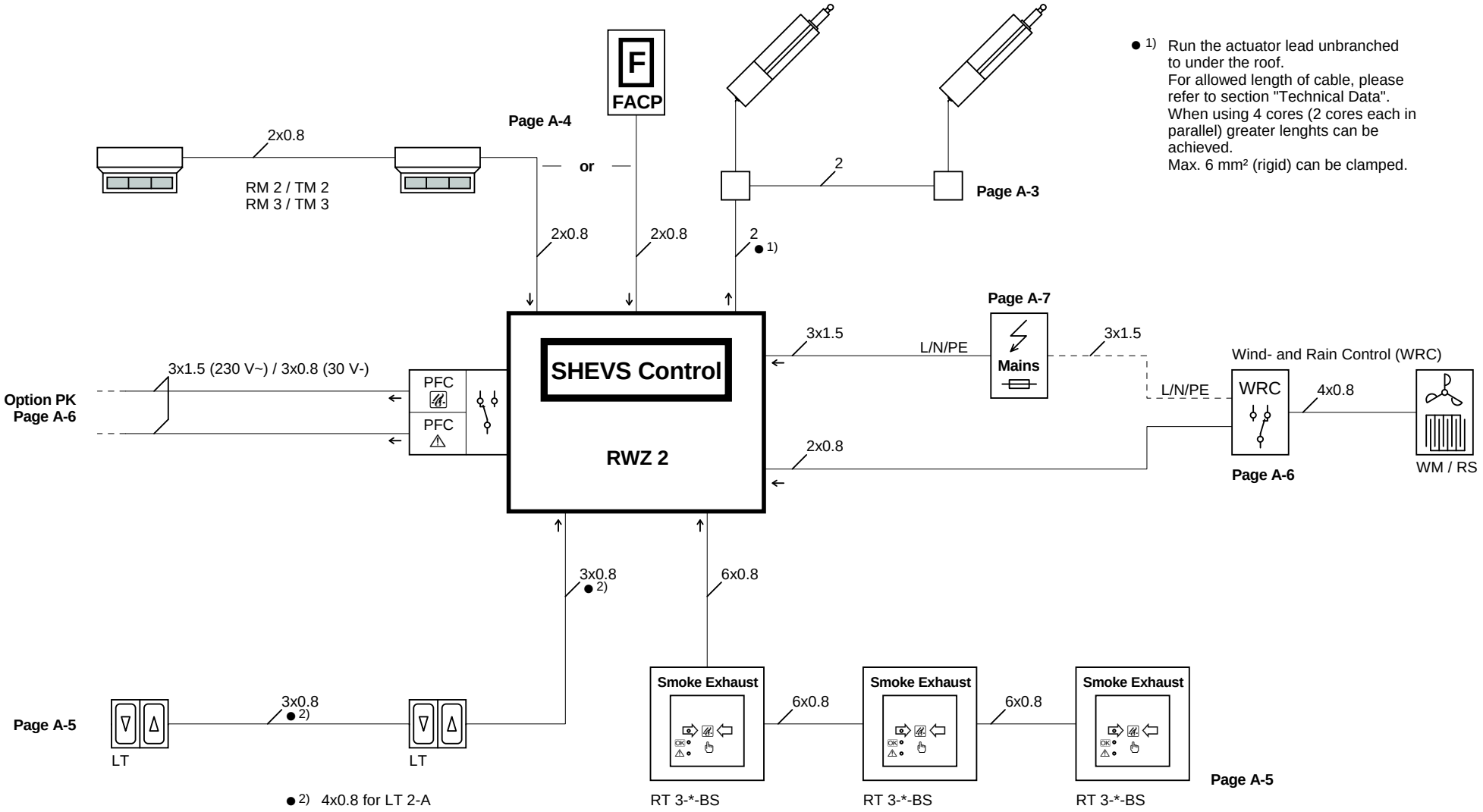
System diagram (please consider local conditions / components)

Example of connection on page A-2, detailed examples on following pages.



General: length of cable max. 400 m, if not specified otherwise.

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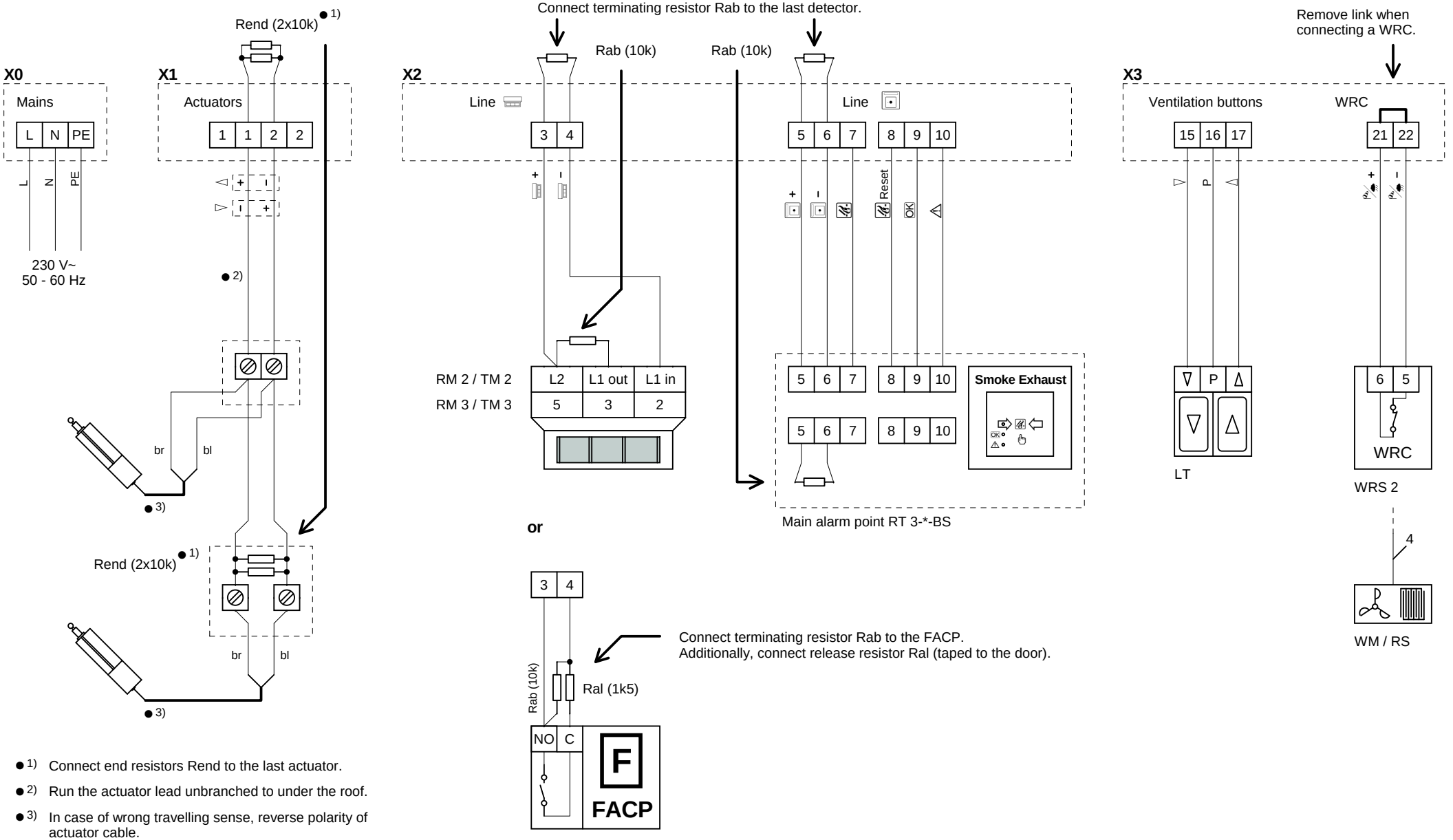
Example of connection



● 1) Connect end resistors Rend to the last actuator.

● 2) Run the actuator lead unbranched to under the roof.

● 3) In case of wrong travelling sense, reverse polarity of actuator cable.

Colour code for resistors: 10k = brown/black/black/red 1k5 = brown/green/black/brown

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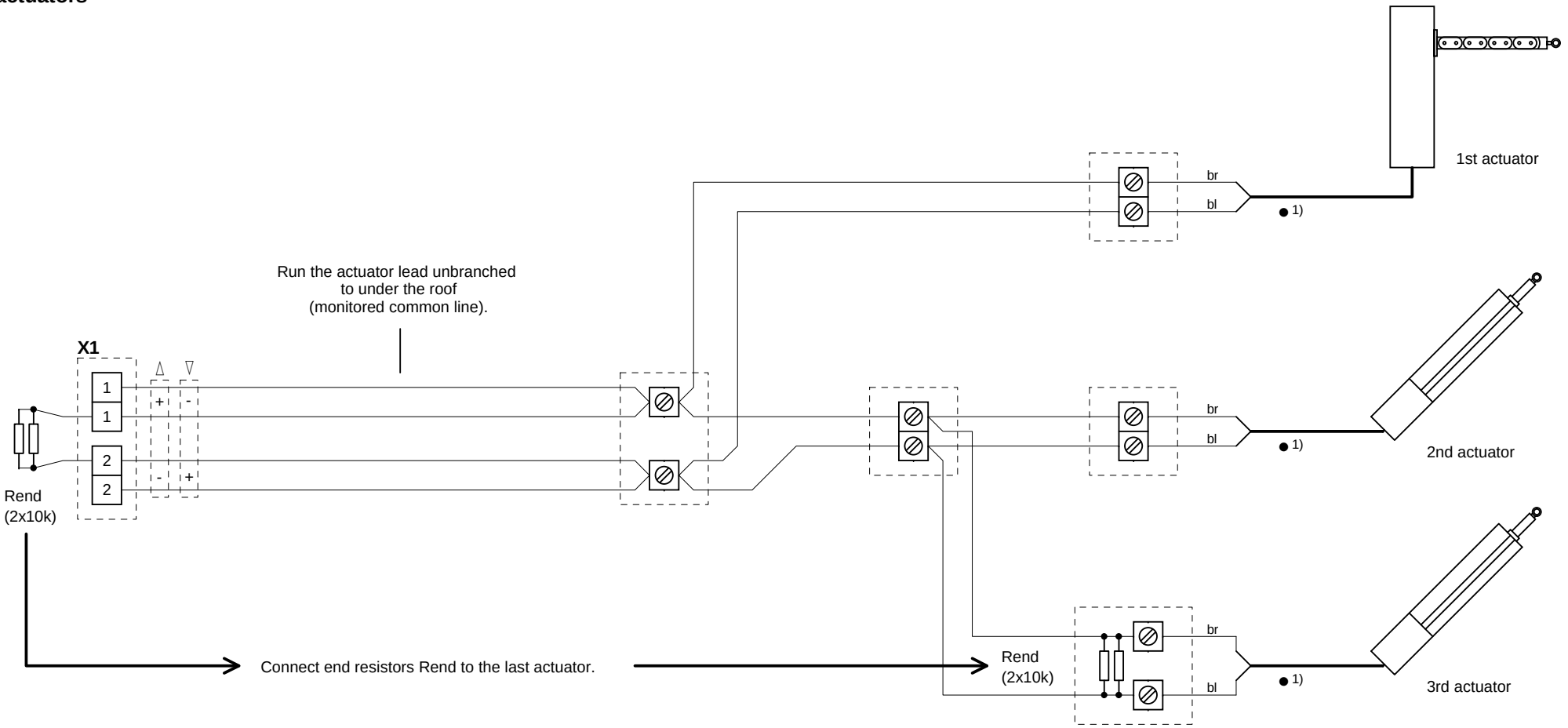
24V- actuators



When directly driving actuators, e.g. with external accumulators during installation or maintenance work, the actuators must be disconnected from the Control Centre!

● 1) In case of wrong travelling sense, reverse polarity of actuator cable.

Colour code for resistors: 10k = brown/black/black/red

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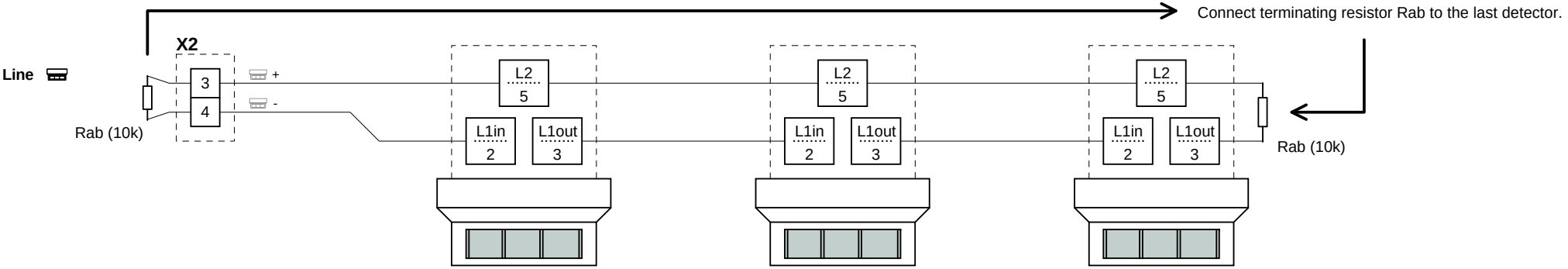
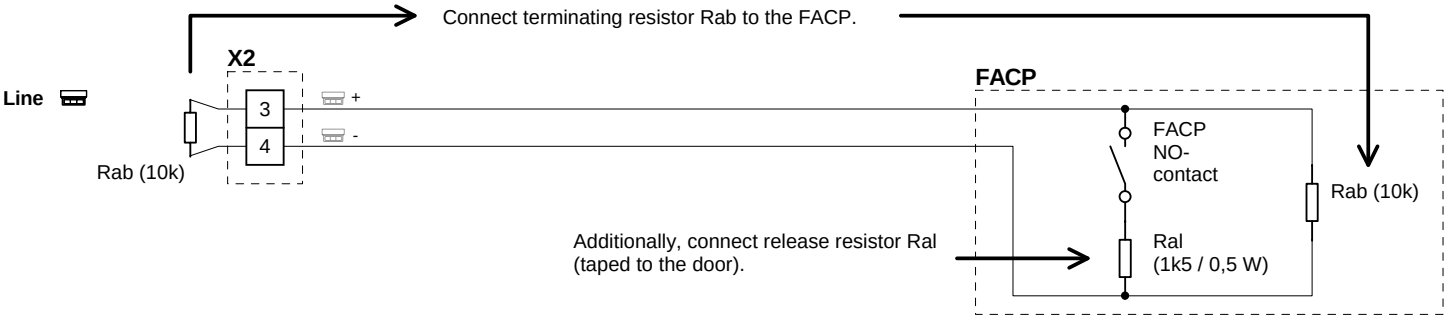
Automatic fire detectors or Fire Alarm Control Panel (FACP)

Automatic fire detectors RM 2 / TM 2 (terminals L1 in, L1 out and L2) **or RM 3 / TM 3** (terminals 2, 3 and 5)



or

Fire Alarm Control Panel (FACP)

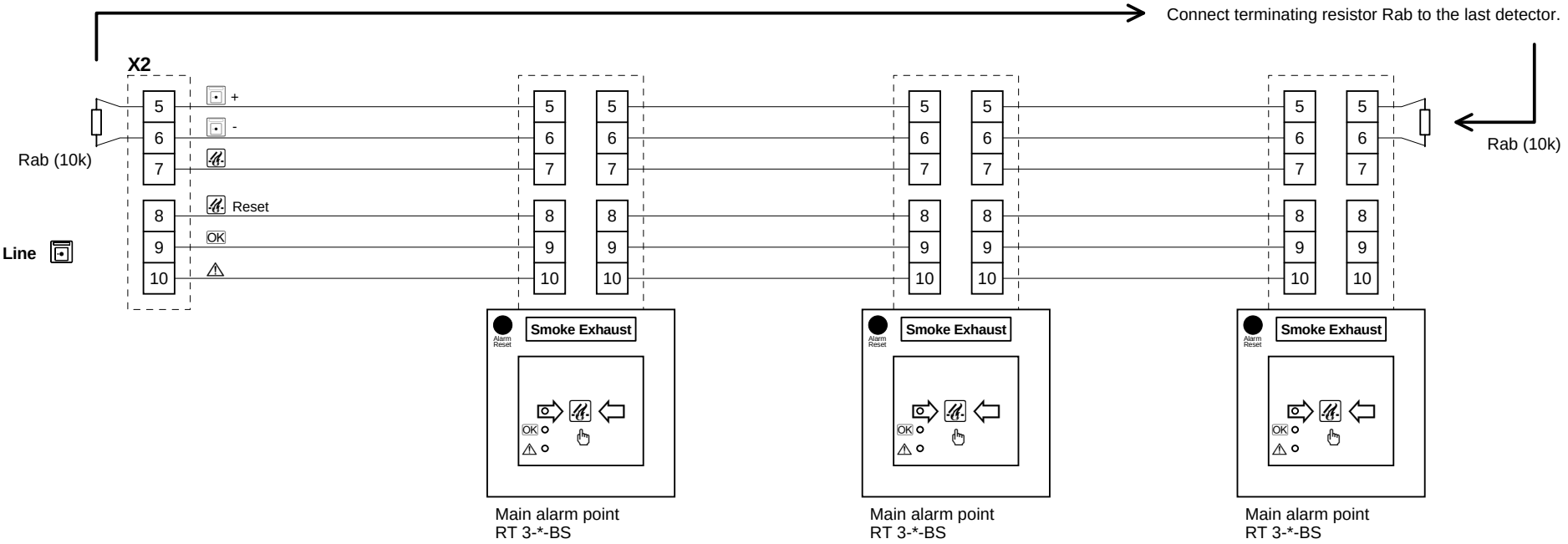


Colour code for resistors: 10k = brown/black/black/red 1k5 = brown/green/black/brown

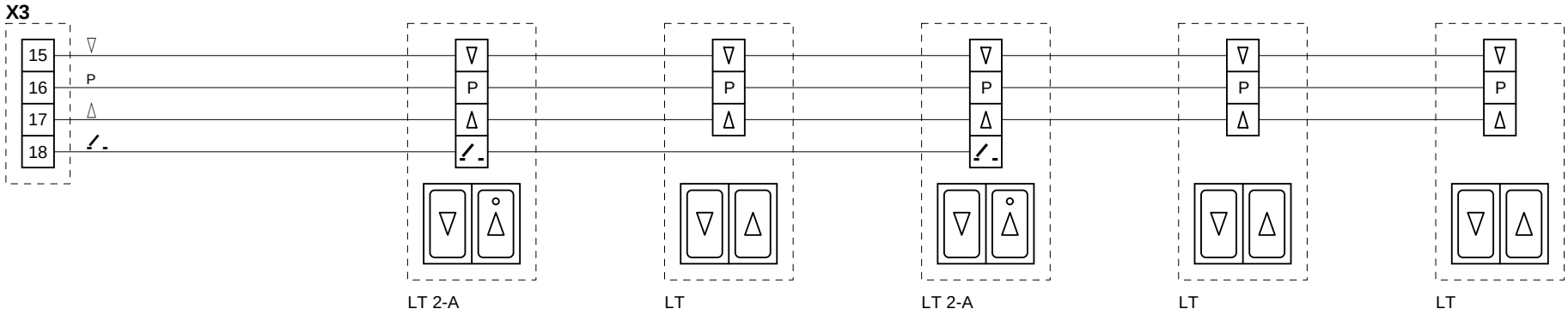
SHEVS Control Centre RWZ 2f

Manual call points, ventilation buttons

Manual call points



Ventilation buttons

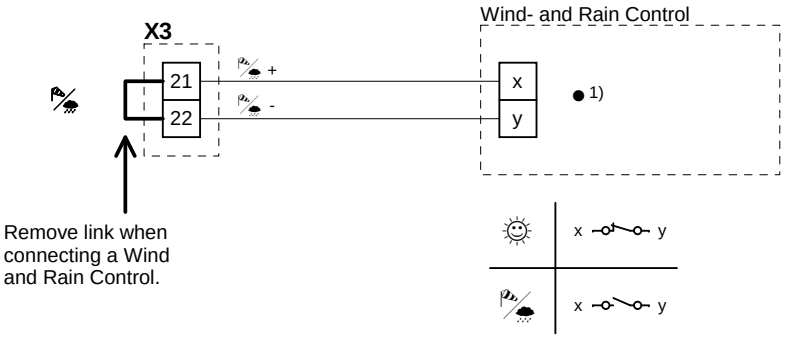


Colour code for resistors: 10k = brown/black/black/red

SHEVS Control Centre RWZ 2f

External Wind and Rain Control, potential-free contacts (option PK)

Wind and Rain Control

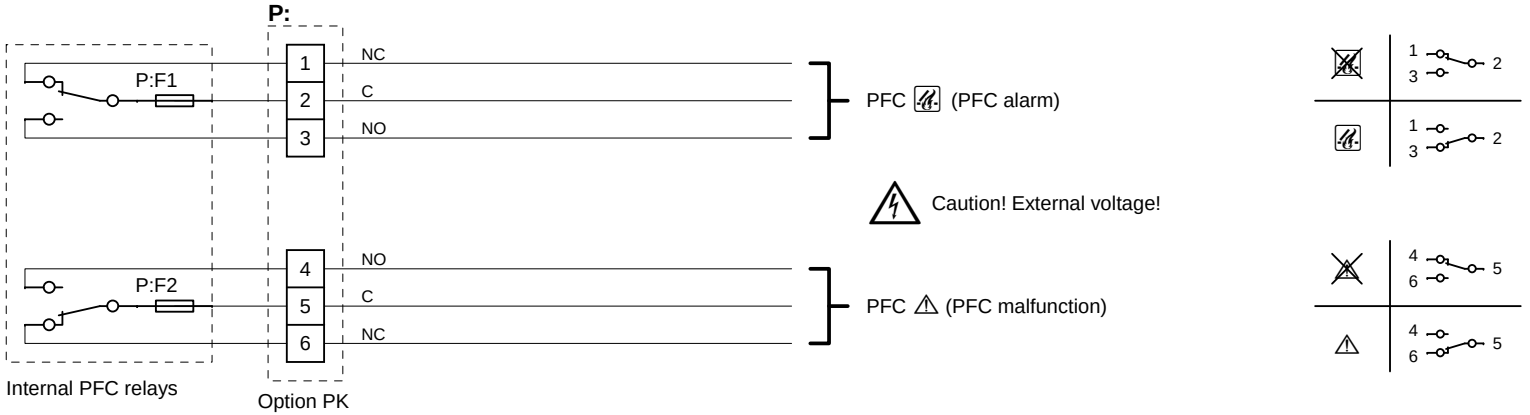


● 1)

WRS 2	x	y
Output contact 1	5	6
Output contact 2	8	9
Output contact 3	11	12
Output contact 4	14	15

Use a separate contact for each connected Control Centre / Control!

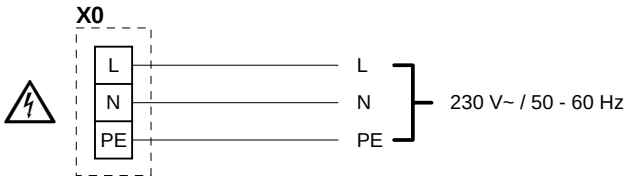
Potential-free contacts (option PK)



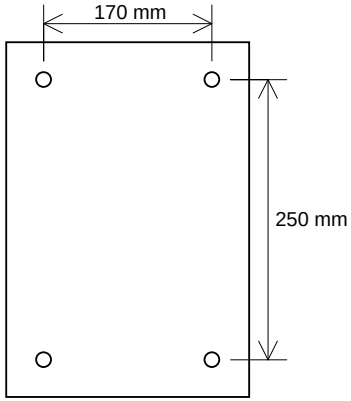
SHEVS Control Centre RWZ 2f

Line voltage, mounting, accumulators

Line voltage:

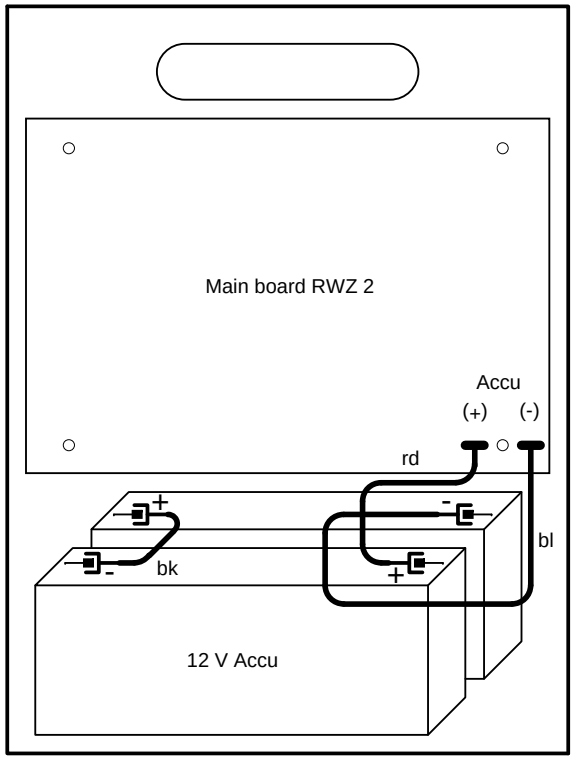


Mounting:

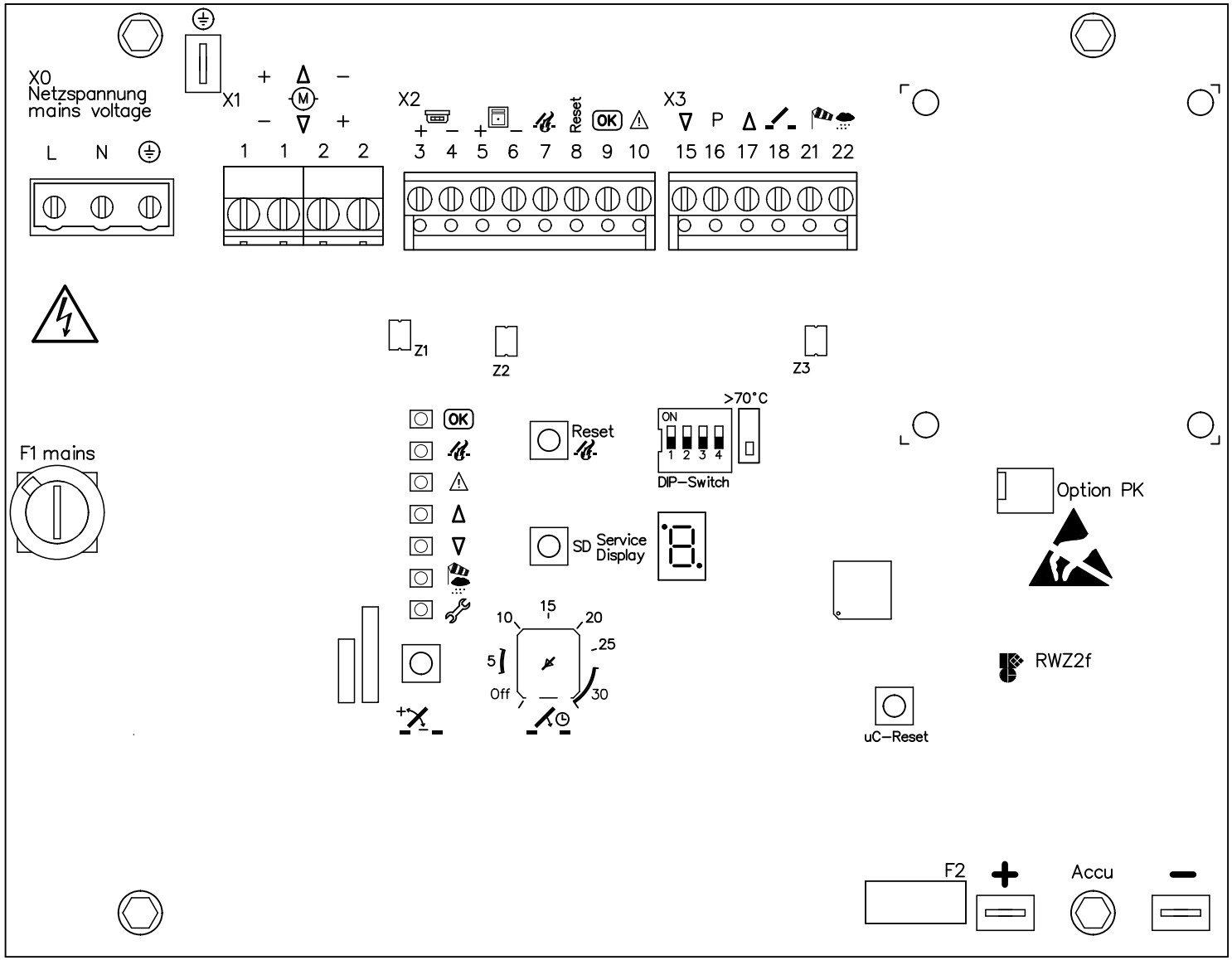


Accumulators:

Insert the accumulators in the enclosure and connect them as illustrated.



When putting into / out of service, observe the operating instructions!
Be sure to disconnect the accumulators if mains voltage supply is cut out for a longer time.



Fuses

F1:	T 125 mA	Primary mains
F2:	7,5 A	Accumulators / actuators

DIP–Switch

1: Auto close
2: Malfunction=Alarm
3: Automatic OFF
4: Thermal alarm

SHEVS Control Centre RWZ 2f		
Layout diagram		
RWZ2fA11.pcb	Ver. 1/15 Mo	6 May 2015