Smoke and Heat Ventilation
Pneumatics – Electronics
Control Systems

Installation and Operating Instructions

Version 5/21

SHE Control

IS 3 b

CE
0786

EN 12101-10:2005
Class A
0786-CPR-50643 (14)

ISO 21927-9:2012
Type D

VdS
G 513007

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Please read these instructions carefully.

Work at the Control may be performed only by qualified personnel.

Symbols used:

OK = Trouble-free operation	= Automatic fire detector	= Maintenance
= Alarm	= Manual call point	= Solenoid output activated
= Fault	= Fire Alarm Control Panel (FACP)	= Warning tone / buzzer

1 Concept of Control

- SHE Control with 24 V- impulse output for actuation of electromagnets/solenoid valves (**CA**/**CFR**) or pneumatic valves with electric add-on components (**EA**/**EZ**)
- Certified according to DIN EN 12101-10 (Internal power supply) and ISO 21927-9 (control unit)
- VdS approved according to the guidelines VdS 2581 and VdS 2593
- One SHE group, two signal lines:
  - Line : automatic fire detectors or Fire Alarm Control Panel (FACP)
  - Line : manual call point **RT 2** or **RT 4** (main alarm point RT 2/4-*-BS or secondary alarm point RT 2/4-*).
    Connectable versions see section 6 „Technical data“
- Reset the alarm/detector using the button in the main alarm point or in the Control
- Selectable functions:
  - “Continuous signal” (5 s duration of output pulse, e.g. for actuation of pneumatic valves with electric add-on components **EA**/**EZ**)
  - “Malfunction = Alarm” (alarm upon malfunction of a signal line)
  - “Thermal alarm” (alarm on exceeding an enclosure inside temperature of 70 °C)
- Internal service display for detailed status information during installation and maintenance
- Plug-in connection terminals (apart from solenoid output)
- Sheet steel enclosure, light grey (RAL 7035)

1.1 Option

- **PK:** Potential-free contacts (PFC) for alarm/malfunction forwarding

2 Putting into service / Putting out of service

Work 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.

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

2.1 Installation / Putting into service

Perform work only in de-energised condition!

- Fasten the enclosure securely to a wall using suitable mounting material. Guide the connection cables through the openings provided and wire them according to the connection diagrams.
- Make function settings (see 3.2)
- Switch on the mains voltage. The indicators and the service display light up briefly. Subsequently, the indicator ⚠ flickers for about 15 s (calibration process). If the indicator ⚠ is permanently lit, there is a fault in a signal line (see 5).
- Insert the accumulators in the enclosure as illustrated on the “Line voltage, Installation, Accumulators” plan, secure them with the fastening plates and connect them.
- The indicator OK lights up, the indicator ⚠ goes out, the system is ready for operation. If a fault is still displayed, follow the instructions in section 5 "Detection of fault / Troubleshooting". If necessary, decommission the Control again (see 2.2).
- While putting into service, check all functions and indicators of the Control and its components. The individual functions are described in section 3. Also simulate faults and check detection (see 5).

After about 24 hours of continuous operation without mains failure, the accumulators are sufficiently charged to achieve the full standby time in case of mains failure.

2.2 Putting out of service

- Disconnect the accumulators from the Control (remove accumulator connection line or fuse F2).
  ℹ *Charged accumulators have a shelf-life of about 6 months. They must be recharged if stored for a longer period.*
- Switch off line voltage.

3 Functions and operation

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

3.1 Indicators / control elements of the Control

- **Indicators on the board:**
  - OK (green): **Trouble-free operation**. Goes out when a fault is detected.
  - (red): **Alarm**, see 3.2 - 3.4.
  - ⚠ (yellow): **Fault**, see 5.
  - (blue): **Maintenance is due** (flashes) or **maintenance mode enabled** (lights up).
  - 8 (red): **Service display**, see 5.2.
  - (blue): Solenoid output activated.
- **Control elements on the board:**
  - **Button *Reset*** (red): Reset the alarm function.
  - **Button *Reset*** (yellow): Switch off the warning tone.
  - **Button *µC-Reset*:** Only for service purposes.

3.2 Selectable functions

- **"Single pulse"** DIP switch **S1-1**:
  In position ON, the output of the Control is activated once for 5 s in the event of an alarm. This function is used e.g. for actuation of pneumatic valves with electric add-on components **EA**/**EZ.**
  Factory setting: OFF (impulse output, no single pulse).
- **"Fault = Alarm"** DIP switch **S1-2**:
  In the ON position, the alarm function (see 3.4) is executed if a signal line is faulty. The alarm can also be reset by pressing the button *Reset* in a main alarm point or the Control Centre before eliminating the fault.
  Factory setting: OFF (no alarm in case of fault).
- **"Thermal Alarm"** DIP switch **S1-4**:
  In the ON position, the alarm function (see 3.4) is executed when the inside temperature of the enclosure exceeds 70 °C.
  Factory setting: OFF (no alarm when 70 °C is exceeded).
- DIP switches **S1-3**, **S1-5** and **S1-6**: Do not change the setting. Factory setting: OFF.

3.3 Indicators / functions of the manual call points

- For activation and reset, see 3.4.
- **Show:**
  - (red, **RT 2/4-***): **Alarm**, see 3.4.
  - OK (green, **RT 2/4-*-BS**): **Trouble-free operation**. Goes out when a fault is detected.
  - ⚠ (yellow, **RT 2/4-*-BS**): **Fault**, see 5.
- **Button *Reset*** (**RT 2/4-*-BS**): Reset the alarm function (accessible after opening the door with a key).
- Manual call point with buzzer for alarm and fault signal (**RT 2/4-*-BS-AA)**:
  The buzzer emits a continuous tone in the event of alarm, and an intermittent warning tone in the event of fault.
  The warning tone is switched off with the button *Reset* .

3.4 Alarm functions

- **Alarm function:** When an alarm is detected, the impulse output of the control is activated (an impulse of 2 s duration every 10 s over a period of 2 minutes). The indicators light up and manual call points with buzzer emit a continuous tone. Depending on the connected components:
  - Pneumatic valves **CA** with electric control are activated and CO_2 flows into the system.
  - Pneumatic valves with electric add-on components **EA**/**EZ** are controlled. In this case, activate the function "Single pulse" (see 3.2).
  - Window catches **CFR** are unlatched.
- **Resetting the alarm function:** Resetting is done by briefly pressing the button *Reset* in a main alarm point or the Control. Then the indicators will go out and the buzzers will be switched off.
- **Manual call points:** For manual alarm signalling, 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 alarm is triggered automatically (depending on the type of detector due to smoke and/or heat detection).
  If an automatic fire detector responds immediately after resetting, press the button *Reset* again (smoke particles may still be present in the detector).
- **Fire Alarm Control Panel (FACP):** When an alarm is signalled by the FACP, the alarm function will be executed.
  The alarm is reset at the FACP.

To make the entire system ready for operation again after an alarm, follow the operating instructions of the connected components. For this purpose, for example, replace used CO_2 bottles, retension valves, etc.

Further alarm functions ("Single pulse", "Fault = Alarm", "Thermal alarm") see 3.2.

3.5 Mains failure

- In case of mains failure, the accumulators cannot be charged, but they provide the operating power for the standby time.
  The mains failure must be rectified immediately to prevent the deep-discharge protection from responding, to recharge the accumulators, and to ensure safe functioning of the system.
- **Deep discharge protection:** If the accumulators are in critical condition, the device is **switched off** completely. However, a low quiescent current continues to flow (in addition to the natural self-discharge). Therefore, without recharging, there is a risk of permanent damage to the accumulators after only a few days.

4 Maintenance

- In the course of maintenance - unless other local regulations apply - check all the functions and displays of the device and the components at least once a year. This also includes checking the terminal points, connection cables, indicators and fuses, and cleaning of various components, if necessary.
  The individual functions are described in section 3. Likewise simulate faults of the signal lines and power supply and check the detection, see 5.
- **Indication of due maintenance**
  If the maintenance company has enabled this function, the indicator 🔧 flashes after about 11 months of service life. After about 14 months, the overdue maintenance leads to the indication of a fault ⚠.
- **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. For every 10 °C rise in ambient temperature, the service life decreases by about 1 year!
    ℹ *An automatic check of the accumulators with low load takes place every 60 minutes.*
    If the accumulator voltage drops too low during this, the accumulators are defective. A fault will be displayed until the accumulators have been replaced.
  - The end user, i.e., the final owner, has to return used batteries / accumulators to a distributor or public waste management company. This return obligation applies regardless of whether the end user is a private or commercial consumer.
  - If the system needs to be put out of service / temporarily shut down, **the accumulators have to be disconnected** and the mains voltage has to be switched off!
  - Accumulators that are charged but not yet connected have a shelf-life of about 6 months. They must be recharged if stored for a longer period.

5 Detection of fault / Troubleshooting

5.1 General notes

Occurrence of a fault is indicated by flashing of the indicator ⚠ in main alarm points and in the control. With the help of the service display, the cause can be limited (see 5.2).

- The following are detected as **faults**:
  - Accumulator or mains failure, accumulator polarity reversed
  - Failure of the fuses F1 to F3
  - Wire-break or short-circuit of the signal lines
  - Wire-break or short-circuit of the solenoid line (unbranched common line)
  - Maintenance overdue (if activated)
- Notify the maintenance company in case of faults.
- **Spare material:** In the control, there is a bag of spare fuses and resistors.
- **Automatic calibration in case of a fault in the signal line ⊟:** After rectifying a fault that was present for more than 10 minutes, the line is automatically calibrated. The indicator ⚠ flickers for about 15 s. If the indicator ⚠ then lights up continuously, there is another fault.

5.2 Service display

- Operating conditions can be accurately displayed with the help of the service display.
  The display is switched off in normal condition. It can be switched on for 120 s by pressing the button *Reset* for 4 s.
- If no alarm/fault message is present, the memory content of the display can be shown for 1 s by briefly pressing the button *Reset* (alarm memory) or the button *Reset* (fault memory).
- In case of alarm/fault, the display is switched on automatically, but switched off again after 10 s in the event of a power failure. In this case it can be switched on again for 10 s by pressing the button *Reset* for 4 s.

Operating conditions:

Code	Description
0	Mains failure or fuse F1 blown
1	Wire-break of accumulators or F2 blown
2	Solenoid output: Fuse F3 blown
3	Solenoid output: Wire-break / short-circuit
4	Line : Alarm
5	Line : Wire-break
6	Line : Short-circuit
7	Line : Undefined
8	Line : Alarm
9	Line : Wire-break
A	Line : Short-circuit
b	Line : Undefined

Code	Description
h	"Fault = Alarm" active
q	Alarm through internal thermal sensor
t	Accumulator test active
U	Accumulator is defective
y	Accumulator polarity reversed
-	Memory alarm / fault empty
r	Button *Reset* : Short-circuit
J	Button *Reset* : Short-circuit
E	Maintenance due
P	Error, service required

Accu charging phases:
[.] = I-charging, [.] = U-charging, [.] = Trickle charging, [.] = Standby, [.] = No charging

6 Technical data

6.1 Version

Type	**IS 3-4b**
Part number	8140 3204 0000
Output current	4 A (24 V⎓/96 W)
Current input	0.7 A/230 V~
Dimensions in mm (W x H x D)	337 x 337 x 113
Lead accumulators (VRLA-AGM), VdS approved	2 x 2 Ah / 12 V
Only supplied or approved accumulators may be used. See compatibility list on: www.kg-tectronic.de (Electronics - System Accessories - Accumulators)	

The requirements of the Directives 2014/35/EU and 2014/30/EU are met. CE
Suitable for operation in residential, business and commercial areas.

6.2 Performance data and characteristics

General

Line voltage supply Internal supply voltage/standby time	230 V~/50 - 60 Hz 24 V⎓/72 h in case of mains failure
Cable entry	from above, below or behind
Environmental class 1/III (EN 12101-10/VdS 2581) Relative humidity Enclosure protection rating	-5 °C … +40 °C 20 % … 80 %, non-condensing IP30
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.	

Signalling 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:	 20 pieces, of which max. 10 heat detectors [1] normally open contact
Line ⊡, manual call points: – **RT 2/4-*** – **RT 2/4-*-BS** – **RT 2/4-*-BS-AA**	 total of 10 pieces, of which max. 3 pieces with buzzer

Solenoid output

Rated voltage/current for 5 s (designed for 12 solenoid valves **CA** or window unlocking devices **CFR**, 17 electric add-on parts **EA** or **EZ** for ventilation valves)	24 V⎓ (+6 V/-4 V)/4 A
Maximum cable cross-section of the supply line Line monitoring (unbranched common line)	2 x 10 mm² (rigid) wire-break, short-circuit

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

Strom / Querschnitt	0,3 A (1 CA/CFR)	0,6 A (2 CA/CFR)	0,9 A (3 CA/CFR)	1,2 A (4 CA/CFR)	1,5 A (5 CA/CFR)	1,8 A (6 CA/CFR)	2,1 A (7 CA/CFR)	2,4 A (8 CA/CFR)	3,0 A (10 CA/CFR)	3,6 A (12 CA/CFR)
2 x 1,5 mm²	145 m	73 m	48 m	36 m	29 m	24 m	21 m	18 m	15 m	12 m
2 x 2,5 mm²	242 m	121 m	81 m	60 m	48 m	40 m	35 m	30 m	24 m	20 m
2 x 4,0 mm²	387 m	193 m	129 m	97 m	77 m	64 m	55 m	48 m	39 m	32 m
2 x 6,0 mm²	580 m	290 m	193 m	145 m	116 m	97 m	83 m	73 m	58 m	48 m
2 x 10,0 mm²	967 m	483 m	322 m	242 m	193 m	161 m	138 m	121 m	97 m	81 m

Fuses

Primary mains (miniature fuse 5 x 20 mm)	F1: T 2 A
Accumulators (flat fuse 19 mm)	F2: 10 A
Solenoids (flat fuse 19 mm)	F3: 10 A

[1] *heat detector:* **TM 2-D** (65-55000-122), **TM 2-M** (65-55000-137), **TM 3-D** (FD-851RE), **TM 3-M** (FD-851HTE), **RM 3-OT** (SD-851-TE),
Optical detectors: **RM 2-O** (65-55000-317), **RM 3-O** (SD-851-E)

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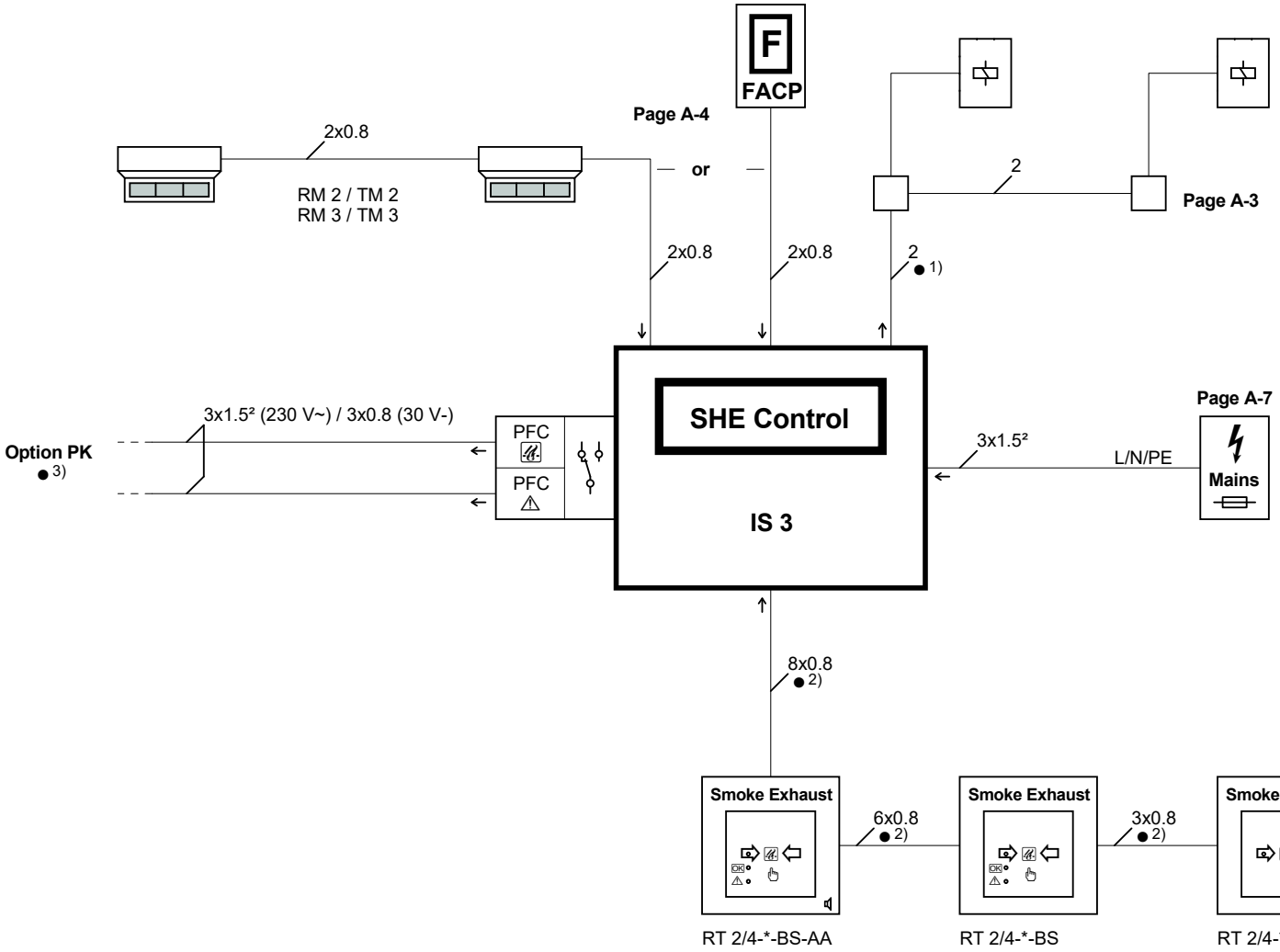
System diagram (please consider local conditions / components)

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



● 1) Run the supply line unbranched to under the roof.
For permissible cable length, see section "Technical Data".
Max. 10 mm² (rigid) can be clamped.

● 2) Number of wires depends on type and order of connection of the manual call points.

RT 2: Page A-5
RT 4: Page A-6

Cable types (examples):
Signal lines: J-Y(St)Y 2x2x0.8 - 4x2x0.8
Mains: NYM-J 3x1.5 mm²
PFC: NYM-J 4x1.5 mm² / NYM-O 3x1.5 mm²

● 3) Separate documentation

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

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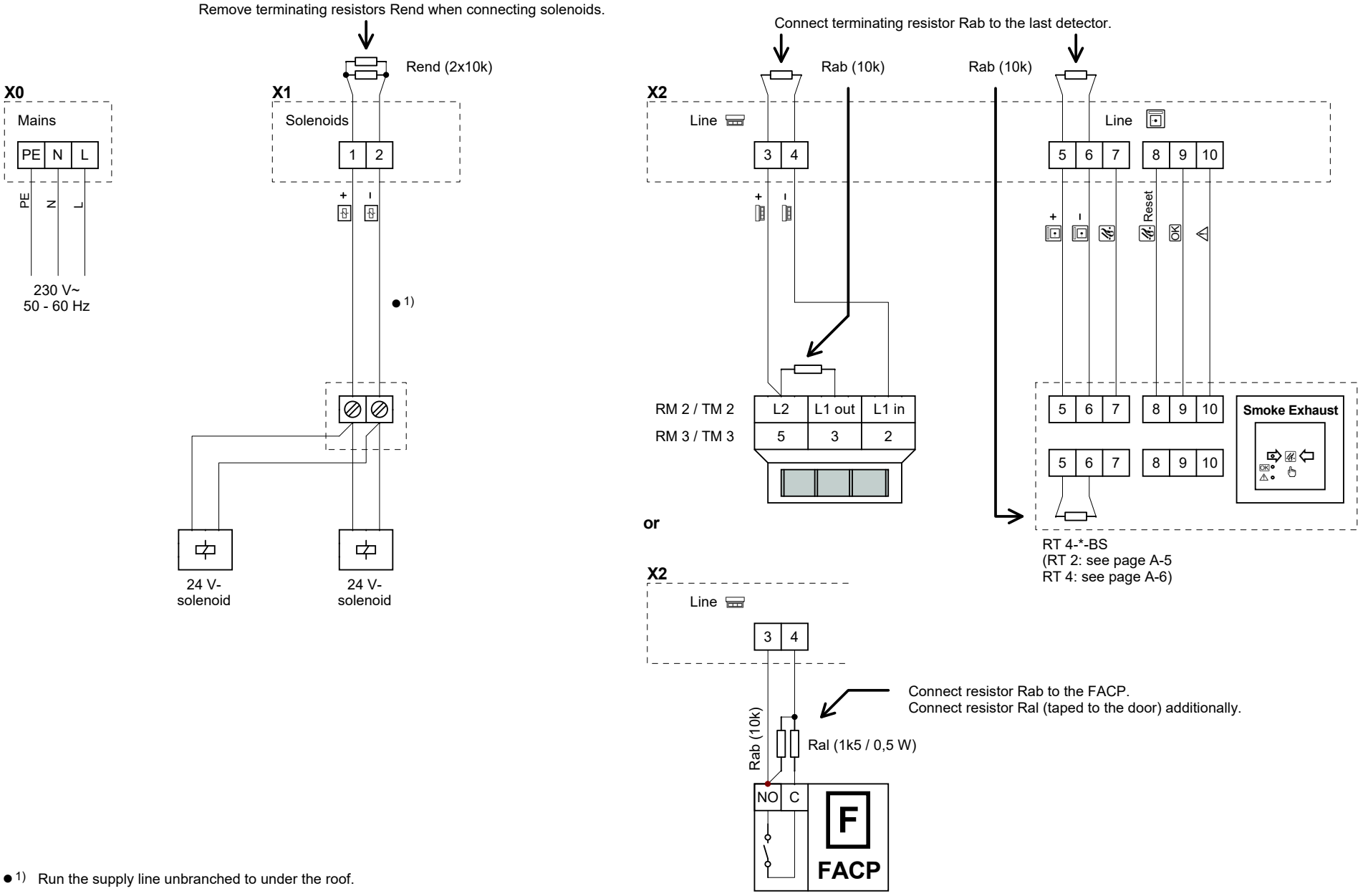
Example of connection



● 1) Run the supply line unbranched to under the roof.

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

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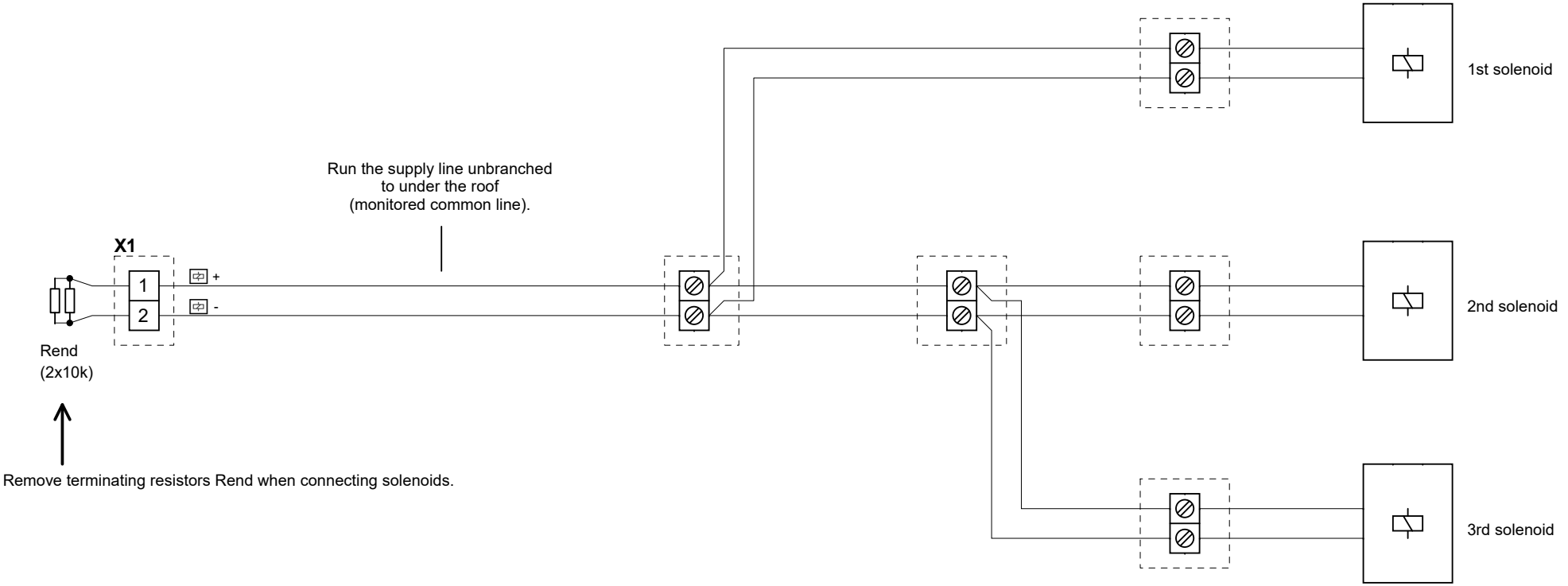
24V- solenoids



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

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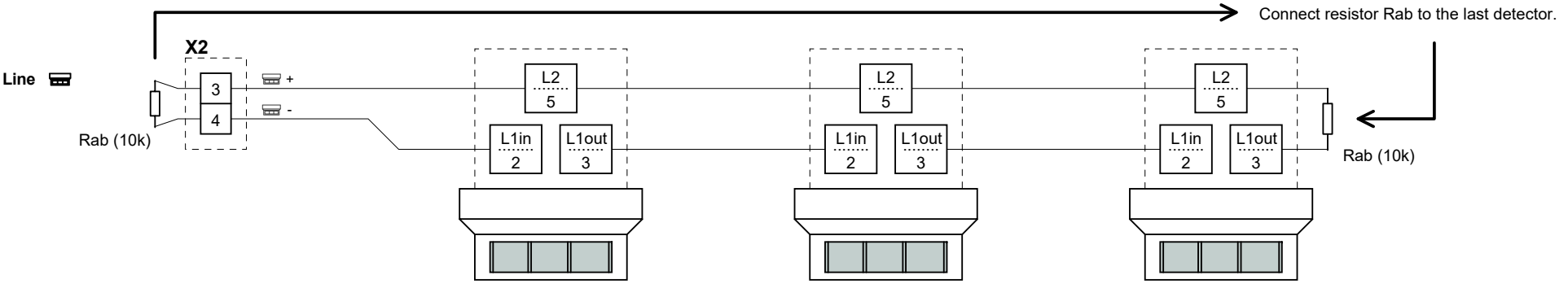
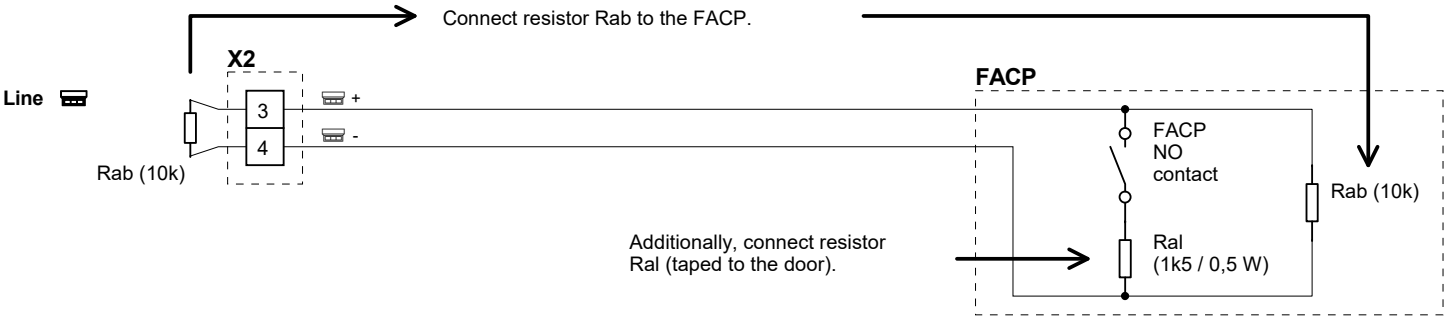
Automatic fire detectors or Fire Alarm Control Panel (FACP)

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)



For more convenient connection of an NO contact to terminals X2, the module MA (accessory) can be used.
The required resistors are already present on the module and do not need to be wire separately.

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

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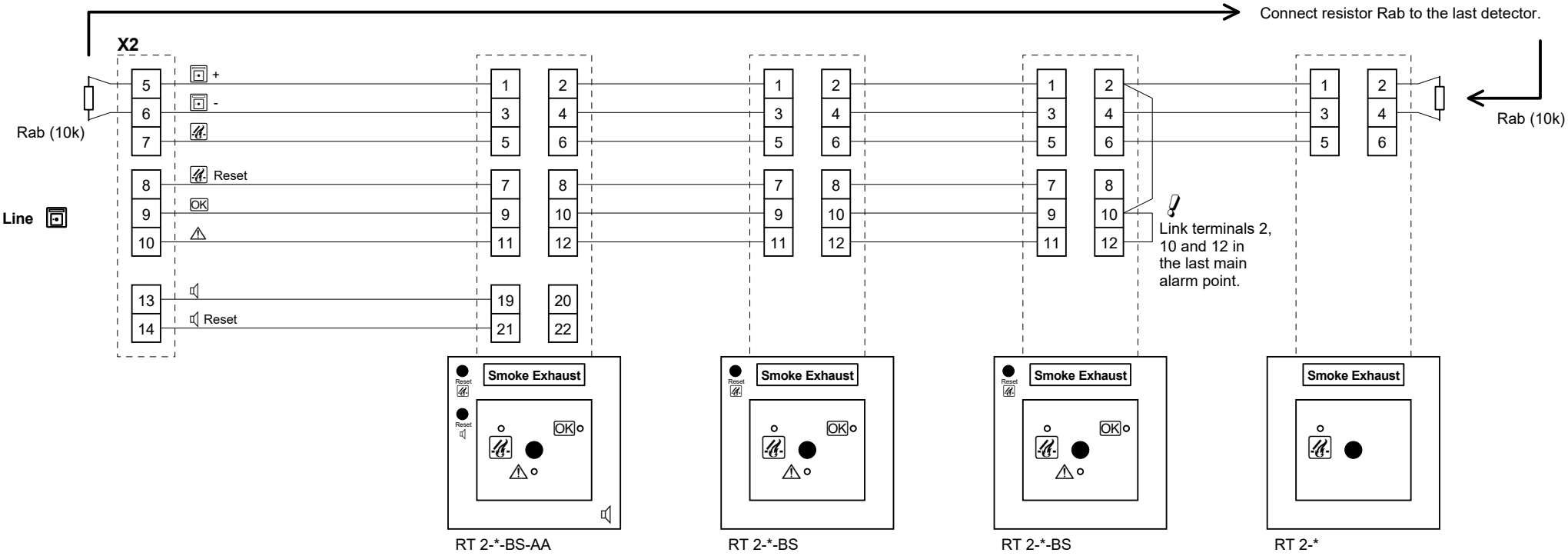
Manual call points RT 2

(Manual call points RT 4 see page A-6)



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

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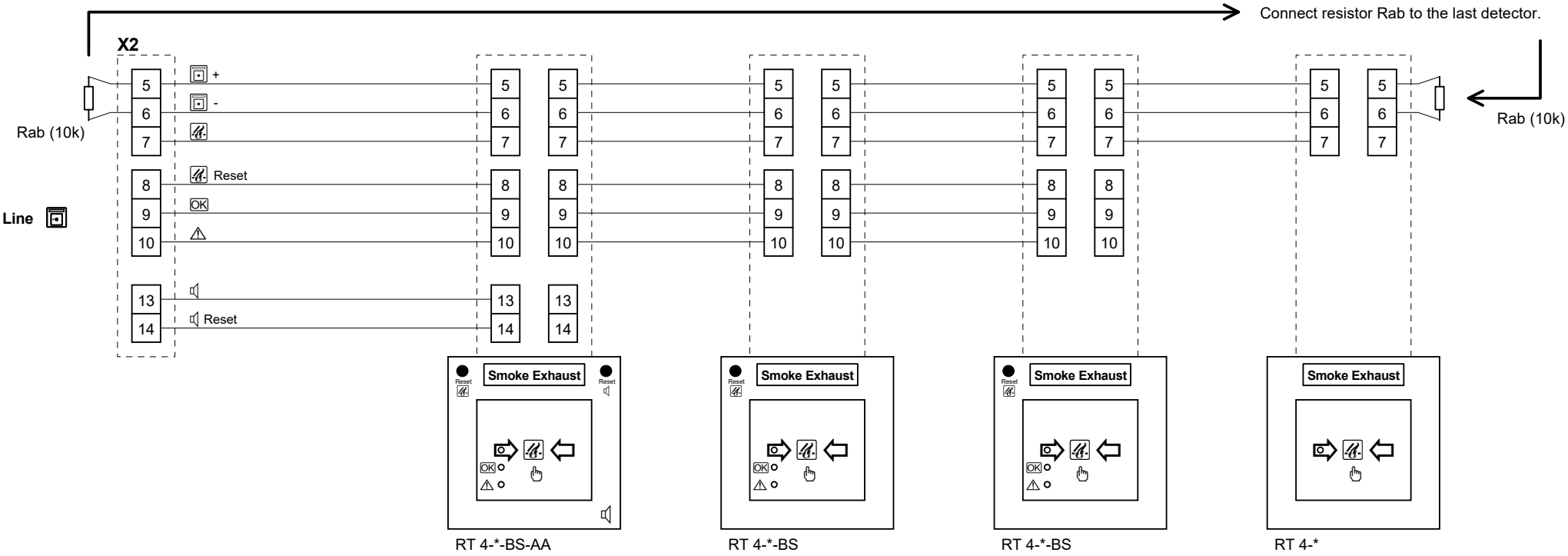
Manual call points RT 4

(Manual call points RT 2 see page A-5)



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

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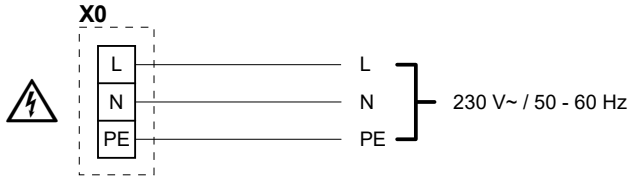
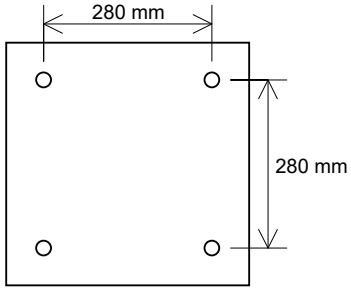
Line voltage, mounting, accumulators

Line voltage:

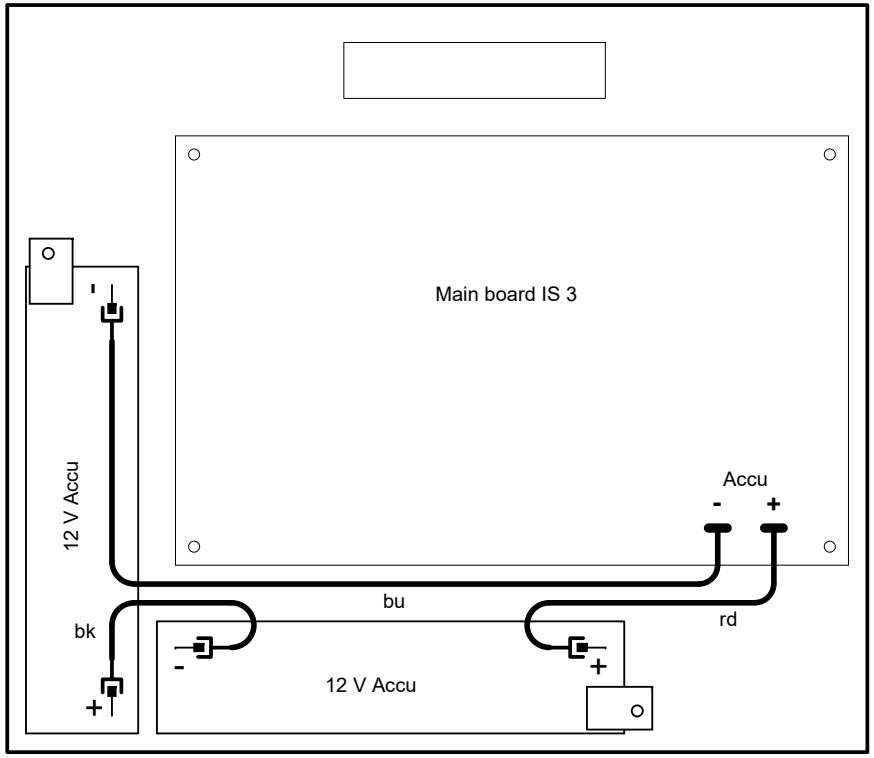


Mounting:

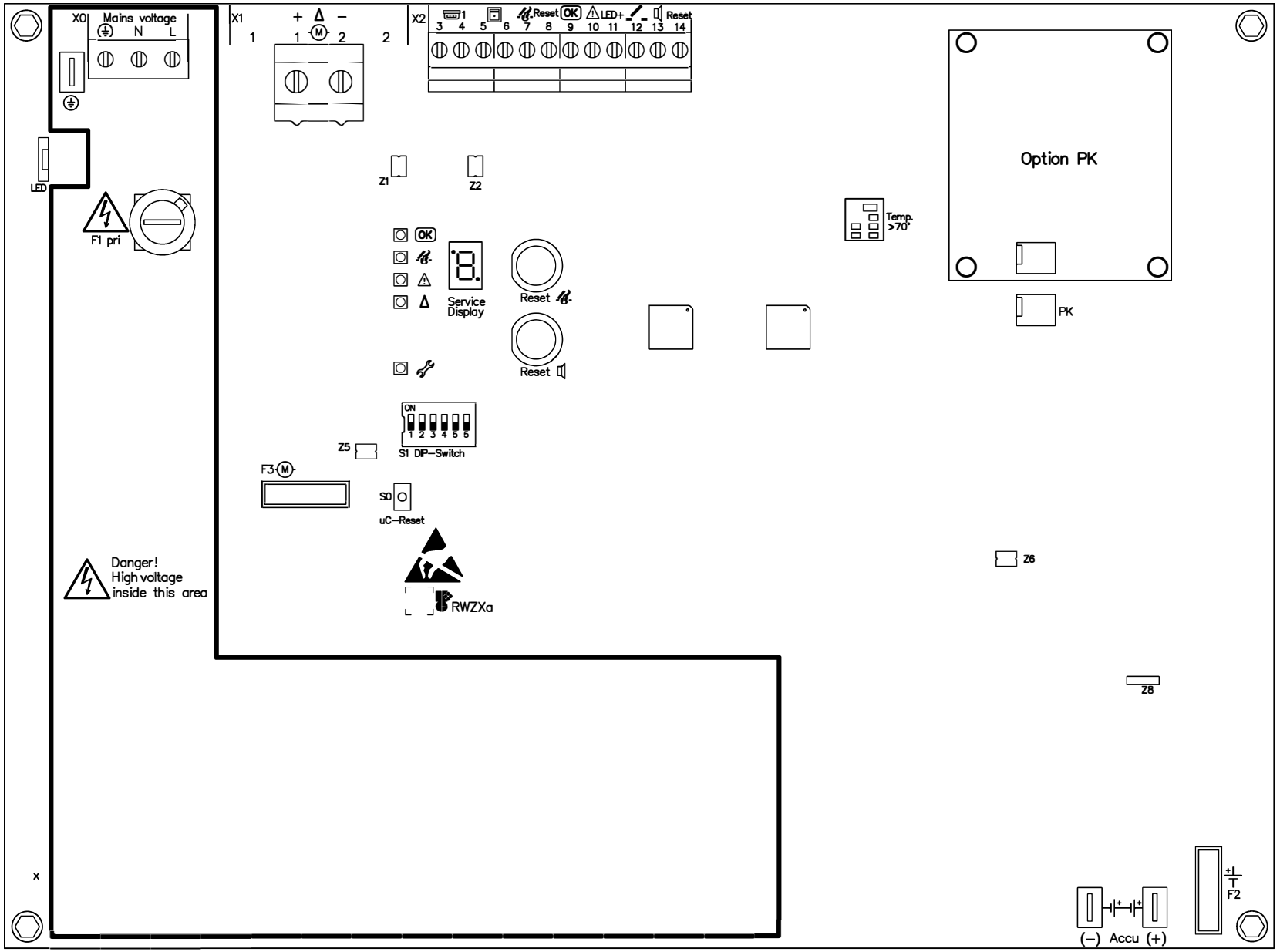


Accumulators:

Insert the accumulators in the enclosure, secure them with the fastening plates 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.



Füses

F1:	T 2 A	Primary mains
F2:	10 A	Accumulators
F3:	10 A	Solenoids

DIP–switch

S1: 1: Single pulse
2: Fault=Alarm
3: Do not change the setting!
4: Thermal alarm
5: Do not change the setting!
6: Do not change the setting!

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Layout diagram			
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