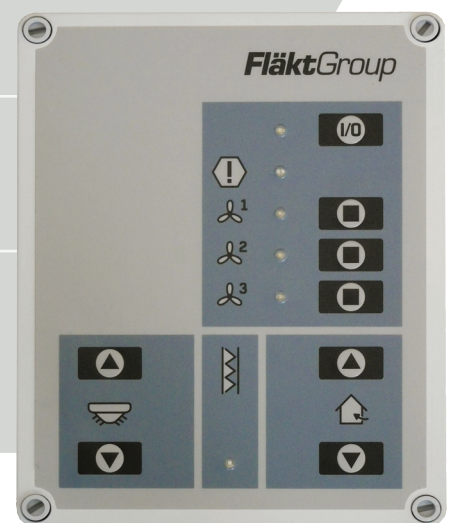


MC 4 - SWITCH UNITS

OPERATION MANUAL





FläktGroup product range – MC4 switch unit: layout example

Switch unit

MC 4 M 3 A C . Z K F

4 = Type series

Function
 U = Recirculating air
 M = Mixed air

Electric motor type
 1AC = AC motor, 1-speed, 1x230V, 50Hz
 2AC = AC motor, 2-speed, 3x400V, 50Hz
 3AC = AC motor, 3-speed, 3x400V, 50Hz
 1EC = EC motor, continuously variable, 1x230V, 50Hz
 1EC = EC motor, continuously variable, 1x230V, 50Hz
 3EC = EC motor, continuously variable, 3x400V, 50Hz

Additional control functions

Recirculating air
 000 = no additional function
 Z00 = Control of the secondary air louvre - actuator 230V, closed/open
 00F = Signaling filter contamination
 Z0F = Control of secondary air louvre - actuator 230V, closed/open and signaling of filter contamination

Mixed air
 0KF = Control of the mixing-air box (mixing-air damper) - damper 230V, closed/open or Actuator with spring return 230V and signaling of filter contamination
 ZKF = Control of the secondary-air louvre actuator 230V, closed/open, Control of the mixing-air box (mixing-air damper), actuator 230V, closed/open or Actuator with spring return 230V and signaling of filter contamination

| | | |
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Original operation manual - copyright note

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1 Safety and user information

This is an original operating manual confirmed by the manufacturer.

The MC4 switch unit is developed and manufactured according to the state-of-the-art technological standards, established technical safety codes and EC Directive on Machinery.

Use the MC4 switch unit only when it is in technically good working order and only for its intended use, conscious of safety and hazard issues, while observing the operating instructions! Failure to follow the instructions in this manual may result in danger to health and safety, damage to heating units and incorrect unit operation.

Have all faults repaired by an authorized specialist without delay!

All instructions in this chapter are important and relevant for your safety. However, not all of the information contained in the present manual is labeled with special danger pictograms.

1.1 Availability of the operation manual

This operation manual contains important instructions regarding safe and proper operation of the MC4 switch unit.

The current operation manual is intended to be used by operators, installation companies, technical personnel or instructed staff as well as electrical specialists.



This operation manual must be available at the location of the MC4 switch unit at all times.

Anyone who works with or on the unit must read and observe this operation manual.

1.2 Scope of the operation manual

This manual provides critical information about the following:

- Assembly/disassembly
- Installation
- Commissioning and testing
- Operation
- Maintenance and troubleshooting

1.3 Icons (symbols) used

The following icons are used to highlight specific text sections in this operation manual:

- Indicates text paragraphs
- Indicates work steps.
- ✓ Indicates process results.



Notice!

You can find supplementary information on using the MC4 switch unit here.

1.4 Identification of safety information



The following designations are used in this manual to specify safety-relevant information:

1.4.1 DANGER – Damage to health and accident hazards from electric current

 **DANGER**

Indicates an extremely hazardous situation which **will result in death or serious injury** if the safety instruction is not followed.

Example:


| | |
|---|---|
|  | <p> DANGER</p> |
| | <p>Electrocution will lead to death or serious injury!</p> <ul style="list-style-type: none"> • Disconnect the switch unit from the power supply and ensure the power cannot be switched back on. • Make sure the system is isolated from the supply; ground and short-circuit the live parts. |

1.4.2 WARNING – Damage to the MC4 switch unit or material damage and environmental damage

ATTENTION

Tasks which can lead to damage to the switch unit or to material or environmental damage.

Example:

| | |
|---|--|
|  | <p>ATTENTION</p> |
| | <p>Damage from static discharge!</p> <p>This symbol warns of tasks which could result in damage to the switch unit from static discharge.</p> |

1.5 Used safety symbols



Electrical hazard



Personal injury



Environmental damage




Damage to the unit




Damage from static discharge

1.6 Safety-conscious work procedures

When working on 1x230V/50Hz,3x400V /50Hz mains supply voltage:

| | |
|---|--|
|  | ⚠ DANGER |
| | <p>Electrocution through hazardous voltage will lead to death or serious injury!</p> <ul style="list-style-type: none"> • Disconnect the unit from the power supply and ensure the power cannot be switched back on. • Make sure the system is isolated from the supply; ground and short-circuit the live parts. |

| | |
|---|---|
|  | ATTENTION |
| | <p>Damage to the units from static discharge!</p> <p>When connecting and adjusting the MC 4 switch unit, make sure that they are statically discharged before you touch the control electronics board.</p> |

- Observe all assembly instructions for the MC4 switch unit.
- Fluctuations or imbalances in the mains supply voltage may not exceed the tolerance limits specified in the technical data. Otherwise, the functional failures and limit states cannot be excluded.

1.7 Proper use

The MC4 switch units are used solely for controlling and monitoring the FläktGroup heating units - depending on the equipment used, as part of building control.

The MC4 switch unit can be used depending on the equipment:

- for switching the heating unit on and off with signaling
- for selecting the fan operating modes – speed with signaling
- for adjusting the heating unit discharge louver
- for adjusting the mixing-air damper (closing flap)
- for signaling filter contamination
- for shutting off the heating valve
- **Setting or control:**
 - AC motor, up to 3-speed (depending on type)
 - EC motor, 3-stage
- **Handling:**
 - external door contact or contact off/on or 902113 room thermostat or 902135 contact thermostat or programmable 902110 thermostat
 - external connection of a 230V heating valve, open/close
 - external connection of a 230V discharge louver actuator, open/close
 - external connection of a 230V mixing-air box damper actuator, open/close
- **Communication for ISYteq control:**
 - Fan operating modes

The MC4 switch units meet protection class IP65, which defines how the control electronics are protected against external influences:

*Protection class IP65
Interior areas*

- With protection class IP65 (according to DIN EN 60529), the MC4 switch unit can only be used indoors.

The intended use of the MC4 switchgear also includes compliance with this installation manual and the conditions for inspection and maintenance established by FläktGroup.

Improper use Any use of the MC4 switch unit other than that described above is considered **improper**. The manufacturer/supplier is not liable for any damages arising from improper use. The user alone bears the risk.



Damage to the switch units!

The MC4 switch unit may not be operated:

- in areas subject to explosion risk
- in rooms with a high dust content
- in rooms with strong electromagnetic fields
- in rooms with an aggressive atmosphere that attacks plastics, for instance
- in rooms with a humid atmosphere

1.8 Modifications and changes

Do not attempt to modify, add components, or convert the MC4 switch unit in any way.

Changes or modifications to the switch unit will invalidate the CE conformity and render all warranty claims null and void.

1.9 Spare parts

Only original FläktGroup spare parts may be used since FläktGroup is not liable for damage caused by use of third-party spare parts.

1.10 Disposal

Equipment and operating supply materials must be disposed of according to the material type in a safe and environmentally friendly manner.

1.11 Selection and qualification of personnel



Ensure that every person working on the MC4 switch unit **has read and understood this entire operation manual** – especially the chapter on safety. It is too late to do this after work has already begun.

Please read this document fully before commencing any work, and not while performing a task.

Electrical connections may only be carried out by qualified licensed staff with proper professional training and experience in the following areas:

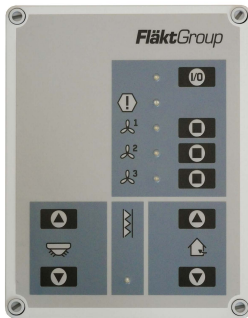
- Occupational health and safety regulations
- Accident prevention regulations
- Guidelines and recognized codes for technical practice and engineering

All skilled staff must be able to assess the entrusted work and must be able to recognize and avoid all associated dangers.

2 Technical data

2.1 Packaged content

- MC4:
- **Switch unit** for wall mounting (protection class IP65)
 - **Accompanying documentation** – wiring diagram and operating the switch unit.



- Optional:
- **Industrial room thermostat 902113, contact temperature thermostat 902135 programmable room thermostat 902110 and intermediate terminal strip**

2.2 Functions of the MC4 switch unit










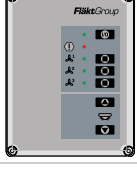
All functions of the MC4 switch cabinet for controlling the heating units with air side accessories. The MC4 switch unit is not only used to directly control the heating units, but also for user communication with other FläktGroup control systems.






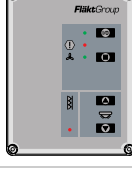

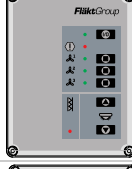
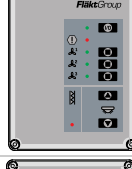
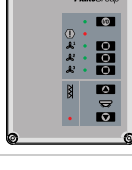
2.3 Technical data on the MC4 switch unit





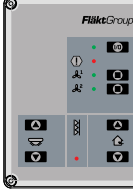
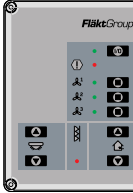


| Unit type | MC4 |
|---|---|
| Application area | Application area |
| Ambient | |
| Permissible ambient temperature | 5°C to 45°C |
| Permissible relative ambient humidity | <95% r.h. |
| Electromagnetic Compatibility | |
| Electromagnetic interference (EMI) | DIN EN 61000-6-3 2011-09 |
| Electromagnetic immunity (EMS) | DIN EN 61000-6-2 2011-06 |
| Technical data | |
| External dimensions (W/H/D) | 170 x 220 x 86 (106)* mm |
| Assembly | Wall |
| Weight | 1.5 (1.7)* kg |
| Color | RAL 7035 (light gray) |
| Protection class (DIN EN 60 529) | IP 65 |
| Operating position | vertical |
| Cable entry point | from top |
| Electrical data | |
| Operating voltage | 1x230 V AC 50 Hz, 3x400 V AC 50 Hz |
| Signal output TCOK/ TCERROR+OFF(NC/NO contact) | 230 VAC, 50 Hz, 5 A (resistive load) |
| Output heating valve actuator | 230 VAC, 50 Hz, max. 0.8 A (on/off) (for EC motor and reversible actuator) |
| Input Control ISYteq 1-2-3-OFF (NC/NO contact) | 24 V DC |
| Output fan electric motor | 1x230 V AC 50 Hz, 3x400 V AC 50 Hz |
| Input door contact or contact on/off or room thermostat | 230 VAC, 50 Hz, max. 2 A (on/off) ** |
| Output louver actuator | 230 VAC, 50 Hz, max. 2 A (on/off) ** |
| Output mixing-air box damper | 230 VAC, 50 Hz, max. 2 A (on/off) ** |
| Input differential pressure switch | 24 V DC, max. 0.2 A (on/off) |
| Input frost protection | 230 V AC, 50 Hz, max. 2 A (on/off) |
| Optional accessories | |
| Industrial room thermostat | Type 902 113 |
| Contact temperature thermostat | Type 902 135 |
| Programmable room thermostat | Type 902 110 |

* Values in brackets apply to the switch unit type MC4M###.###, ** Sum of all inputs and outputs max. 2 A.

2.3.1 MC4 - Overview switch units

| Type | Function | Electrical motor | Functional description | View | | |
|-------------|-------------------|--|--|--|--|---|
| MC4U1AC.000 | Recirculation air | AC motor, 1 speed stage, 1x230 V AC 50 Hz | <ul style="list-style-type: none"> ON/OFF with signaling Signaling a fan fault Output heating valve 230V AC, open/closed Output signaling TC OK / TC ERROR+OFF (NC/NO contact) 230V AC Input control ISYteq 1-2-3-OFF (NC/NO contact) |  | | |
| MC4U2AC.000 | | AC motor, 2 speed stage, 3x400 V AC 50 Hz | | <ul style="list-style-type: none"> ON/OFF Motorized fan with operation signaling Input door contact 230V AC or contact ON/OFF 230V AC or room thermostat 230V AC |  | |
| MC4U3AC.000 | | AC motor, 3 speed stage, 1x230 V AC 50 Hz | | |  | |
| MC4U1EC.000 | | EC motor, 3 Speed stage 1x230 V AC 50 Hz | | |  | |
| MC4U3EC.000 | | EC motor, 3 Speed stage 3x400 V AC 50 Hz | | |  | |
| MC4U1AC.Z00 | | AC motor, 1 speed stage, 1x230 V AC 50 Hz | | <ul style="list-style-type: none"> ON/OFF with signaling Signaling a fan fault Output heating valve 230V AC, open/closed Output signaling TC OK / TC ERROR+OFF (NC/NO contact) 230V AC Input control ISYteq 1-2-3-OFF (NC/NO contact) |  | |
| MC4U2AC.Z00 | | AC motor, 2 speed stages, 3x400 V AC 50 Hz | | | <ul style="list-style-type: none"> ON/OFF Motorized fan with operation signaling Input door contact 230V AC or contact ON/OFF 230V AC or room thermostat 230V AC Control of discharge louver actuator 230V AC, closed/ open |  |
| MC4U3AC.Z00 | | AC motor, 3 speed stages, 3x400 V AC 50 Hz | | | |  |
| MC4U1EC.Z00 | | EC motor, 3 Speed stages 1x230 V AC 50 Hz | | | |  |
| MC4U3EC.Z00 | | EC motor, 3 Speed stages 3x400 V AC 50 Hz | | | |  |

| Type | Function | Electrical motor | Functional description | View |
|--------------------|--------------------------|--|--|---|
| MC4U1AC.00F | Recirculation-air | AC motor, 1 speed stage, 1x230 V AC 50 Hz | <ul style="list-style-type: none"> – ON/OFF with signaling – Signaling a fan fault – Output heating valve 230V AC, open/closed – Output signaling TC OK / TC ERROR+OFF (NC/NO contact) 230V AC – Input control ISYteq 1-2-3-OFF (NC/NO contact) |  |
| MC4U2AC.00F | | AC motor, 2 speed stages, 3x400 V AC 50 Hz | <ul style="list-style-type: none"> – ON/OFF Motorized fan with operation signaling – Input door contact 230V AC or contact ON/OFF 230V AC or room thermostat 230V AC – Signaling filter contamination |  |
| MC4U3AC.00F | | AC motor, 3 speed stages, 3x400 V AC 50 Hz | |  |
| MC4U1EC.00F | | EC motor, 3 Speed stages 1x230 V AC 50 Hz | |  |
| MC4U3EC.00F | | EC motor, 3 Speed stages 3x400 V AC 50 Hz | |  |
| MC4U1AC.Z0F | | AC motor, 1 speed stage, 1x230 V AC 50 Hz | <ul style="list-style-type: none"> – ON/OFF with signaling – Signaling a fan fault – Output heating valve 230V AC, open/closed – Output signaling TC OK / TC ERROR+OFF (NC/NO contact) 230V AC – Input control ISYteq 1-2-3-OFF (NC/NO contact) |  |
| MC4U2AC.Z0F | | AC motor, 2 speed stages, 3x400 V AC 50 Hz | <ul style="list-style-type: none"> – ON/OFF Motorized fan with operation signaling – Input door contact 230V AC or contact ON/OFF 230V AC or room thermostat 230V AC – Control of discharge louver actuator 230V AC, closed/ open – Signaling filter contamination |  |
| MC4U3AC.Z0F | | AC motor, 3 speed stages, 3x400 V AC 50 Hz | |  |
| MC4U1EC.Z0F | | EC motor, 3 Speed stages 1x230 V AC 50 Hz | |  |
| MC4U3EC.Z0F | | EC motor, 3 Speed stages 3x400 V AC 50 Hz | |  |

| Type | Function | Electrical motor | Functional description | View |
|--------------------|------------------|--|--|---|
| MC4M2AC.0KF | Mixed air | AC motor, 2 speed stages, 3x400 V AC 50 Hz | <ul style="list-style-type: none"> – ON/OFF with signaling – Signaling a fan fault – Output heating valve 230V AC, open/closed – Output signaling TC OK / TC ERROR+OFF (NC/NO contact) 230V AC – Input control ISYteq 1-2-3-OFF (NC/NO contact) |  |
| MC4M3AC.0KF | | AC motor, 3 speed stages, 3x400 V AC 50 Hz | <ul style="list-style-type: none"> – ON/OFF Motorized fan with operation signaling – Input door contact 230V AC or contact ON/OFF 230V AC or room thermostat 230V AC – Signaling filter contamination – Control of mixing-air box - actuator 230VAC, closed/open |  |
| MC4M1EC.0KF | | EC motor, 3 Speed stages 1x230 V AC 50 Hz | <ul style="list-style-type: none"> – or control of the mixing-air box actuator 230 V with spring return 230V |  |
| MC4M3EC.0KF | | EC motor, 3 Speed stages 3x400 V AC 50 Hz | |  |
| MC4M2AC.ZKF | | AC motor, 2 speed stages, 3x400 V AC 50 Hz | <ul style="list-style-type: none"> – ON/OFF with signaling – Signaling a fan fault – Output heating valve 230V AC, open/closed – Output signaling TC OK / TC ERROR+OFF (NC/NO contact) 230V AC – Input control ISYteq 1-2-3-OFF (NC/NO contact) |  |
| MC4M3AC.ZKF | | AC motor, 3 speed stages, 3x400 V AC 50 Hz | <ul style="list-style-type: none"> – ON/OFF Motorized fan with operation signaling – Input door contact 230V AC or contact ON/OFF 230V AC or room thermostat 230V AC – Control of discharge louver actuator 230V AC, closed/ open – Signaling filter contamination – Control of mixing-air box actuator 230V AC, closed/ open |  |
| MC4M1EC.ZKF | | EC motor, 3 Speed stages 1x230 V AC 50 Hz | <ul style="list-style-type: none"> – or control of the mixing-air box - actuator with spring return 230V |  |
| MC4M3EC.ZKF | | EC motor, 3 Speed stages 3x400 V AC 50 Hz | |  |

2.3.2 Dimensions of the MC4 switch unit

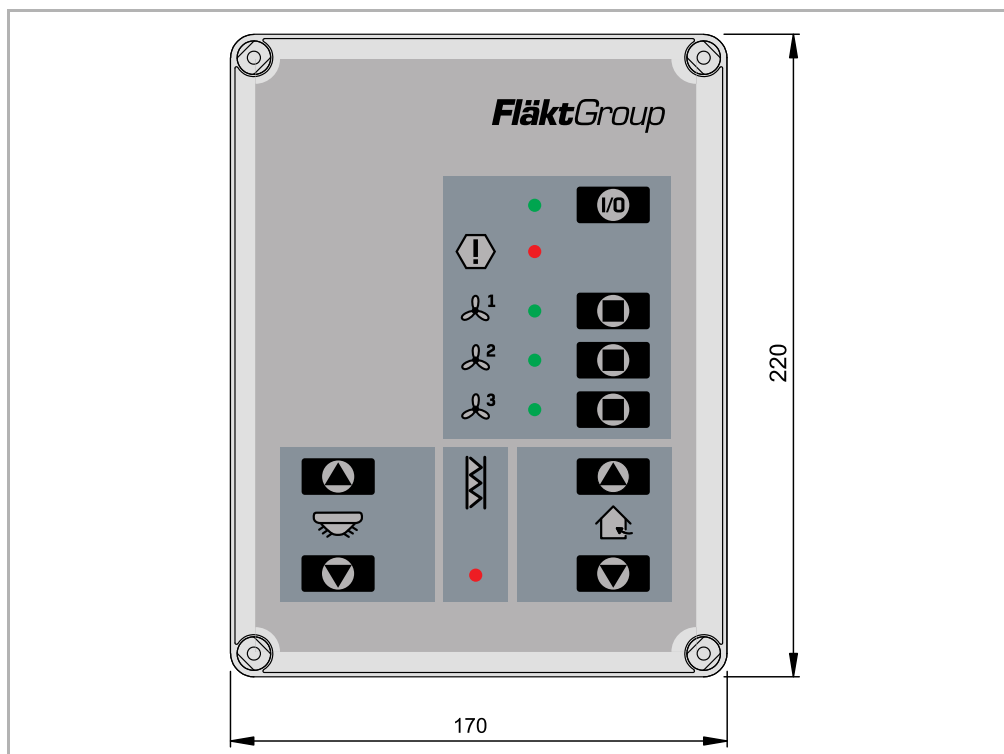


Fig. 2-1: Dimensions of the MC4 switch unit

2.4 Technical data on the accessories

2.4.1 Industrial room thermostat



| Industrial room thermostat | Type 902113 |
|--|-----------------------|
| Application area | Interior areas |
| Technical data | |
| External dimensions (W/H/D) | 96 x 135 x 87 mm |
| Temperature setting range | 0 °C to 60 °C |
| Permissible ambient temperature | -5 °C to 70 °C |
| Switching difference | 1.5 +/-1 K |
| Assembly | Wall/surface mounting |
| Weight | 1.6 kg |
| Protection class (according to the DIN EN 60529) | IP54 |
| Cable entry point | from below |
| Electrical Data | |
| Voltage | 1x230 V AC 50 Hz |

2.4.2 Contact temperature thermostat



| Contact temperature thermostat | Type 902135 |
|--|------------------|
| Application area | Interior areas |
| Technical data | |
| External dimensions (W/H/D) | 38 x 105 x 56 mm |
| Temperature setting range | 0 °C to 90 °C |
| Switching difference | 5 K |
| Assembly | on the pipework |
| Weight | 1.6 kg |
| Protection class (according to the DIN EN 60529) | IP40 |
| Cable entry point | from below |
| Electrical Data | |
| Voltage | 1x230 V AC 50 Hz |

2.4.3 Programmable room thermostat



| Programmable room thermostat | Type 902110 |
|---------------------------------|-----------------------|
| Application area | Interior areas |
| Technical data | |
| External dimensions (W/H/D) | 133x 186 x 26 mm |
| Temperature setting range | 5 °C to 35 °C |
| Permissible ambient temperature | 0 °C to 40 °C |
| Switching difference | 0.5 +/-0.5 K |
| Assembly | Wall/surface mounting |
| Weight | 1.2 kg |
| Cable entry point | from behind |
| Electrical Data | |
| Voltage | 1x230 V AC 50 Hz |

2.4.4 Intermediate terminal box

– is used to connect **max. 4 heating units**



| Intermediate terminal box (refer to table below) | |
|--|------------------------------------|
| Application area | Interior areas |
| Technical data | |
| External dimensions (W/H/D) | 270 x 220 x 105 mm |
| Permissible ambient temperature | -5 °C to 70 °C |
| Assembly | Wall/surface mounting |
| Weight | 1.8 kg |
| Casing color | RAL 9016 (white) |
| Protection class (according to the DIN EN 60529) | IP54 |
| Cable entry point | from top |
| Electrical data | |
| Voltage | 1x230 V AC 50 Hz, 3x400 V AC 50 Hz |

Assignment of the intermediate terminal boxes for the MC4 switch unit

| Function | Intermediate terminal box type | Electric motor, operating voltage | Switch unit type |
|--------------------------|--------------------------------|--|---|
| Recirculation air | 981 840 | AC motor, 1 speed stage, 1x230 V AC 50 Hz | MC4U1AC.000, MC4U1AC.Z00, MC4U1AC.00F, MC4U1AC.Z0F |
| | 981 860 | AC motor, 2 speed stages, 3x400 V AC 50 Hz | MC4U2AC.000, MC4U2AC.Z00, MC4U2AC.00F, MC4U2AC.Z0F |
| | 981 870 | AC motor, 3 speed stages, 3x400 V AC 50 Hz | MC4U3AC.000, MC4U3AC.Z00, MC4U3AC.00F, MC4U3AC.Z0F |
| | 981 880 | EC motor, 3 Speed stages 3x400 V AC 50 Hz | MC4U3EC.000, MC4U3EC.Z00, MC4U3EC.00F, MC4U3EC.Z0F |
| | 981 890 | EC motor, 3 Speed stages 1x230 V AC 50 Hz | MC4U1EC.000, MC4U1EC.Z00, MC4U1EC.00F, MC4U1EC.Z0F |
| Mixed air | 981 865 | AC motor, 2 speed stages, 3x400 V AC 50 Hz | MC4M2AC.0KF, MC4M2AC.ZKF |
| | 981 875 | AC motor, 3 speed stages, 3x400 V AC 50 Hz | MC4M3AC.0KF, MC4M3AC.ZKF |
| | 981 885 | EC motor, 3 Speed stages 3x400 V AC 50 Hz | MC4M3EC.0KF, MC4M3EC.ZKF |
| | 981 895 | EC motor, 3 Speed stages 1x230 V AC 50 Hz | MC4M1EC.0KF, MC4M1EC.ZKF |

3 Transport and storage

3.1 Transport safety



Unit damage!

Improper shipping can cause damage to the MC4 switch unit.

- If damage has been caused by impacts to the unit or by dropping it, carefully check the proper operation and current consumption of the switch unit.

3.2 Packaged content

Remove packaging and inspect shipment immediately upon receipt to determine if any damage has occurred to the switch unit during shipment (if any damage is found, immediately file claim for damage with the transportation company), also check for missing items and verify that the shipment is complete. For this purpose, compare the details of the unit name plate with the information on the dispatch note.

The same applies to possible further partial deliveries as well. Missing parts or claims of shipping damage can only be reported to the transport insurance if the damage has been confirmed as soon as possible by the delivering carrier in writing.

3.3 Packaging

The MC4 switch unit is shipped in a sturdy cardboard box.

3.4 Storage

Consider the following points when storing:

- Store the switch unit in its original packing.
- Storage is warehouses of type IE12 according to DIN EN 60721-3-1 in weather-protected premises, storage location must be dry and dust-free, air humidity must stay from 0 to 85% r.h.
- Storage temperature must stay within -10 to +50°C.

3.5 Recycling




Recycling!

Ensure that operating supplies, packaging and replacement parts are disposed of in a safe and environmentally-friendly manner. Use the local recycling facilities and observe all pertinent local regulations and codes.

To do this it is necessary to separate the switch unit parts as best as possible and sort them by material type.

4 Assembly

⚠ DANGER



Electrocution through hazardous voltage will lead to death or serious injury. Electrical installation and (dis)assembly of the MC4 switch unit may only be carried out by qualified electricians in compliance with this operation manual and current VDE regulations.

- Before drilling, check that there are no obstacles such as electrical lines, gas or water pipes at the drilling location.
- Only install the MC4 switch unit indoors.

4.1 Assembling the MC4 switch unit



Notice!

- When assembling the MC4 switch unit, consider the distances for openings shown below (see Fig. 4-3).
- Please make sure that the bottom switch box part is not deformed when assembling.

The in-house MC4 switch unit (IP65) is suitable for wall mounting.



Fig. 4-1: Assembling the MC4 switch unit

- Using a screwdriver, turn 4 safety bolts of the upper switch box part (see Fig. 4-1) and lift the upper part upwards from the mounting plate (from the bottom switch box part).
- Fix the mounting plate (the bottom part) of the MC4 switch unit to the wall using the mounting openings (see Fig. 4-3).
- Pull the cable lines through the cable sleeves and connect the conductors to the terminals of the MC4 switch unit according to the enclosed wiring diagram (see chapter 5). By moving back the cable guide, ensure that the cable glands are tight (see Fig. 4-2, Pos. 2) to achieve the required protection (IP65) of the MC4 switch unit.
- Connect the conductor strip of the control panel to terminals X1 and X2, cover the upper part of the switch box and screw in the 4 safety bolts.

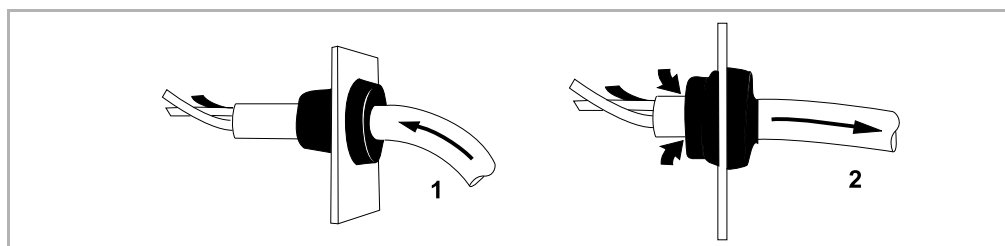


Fig. 4-2: Wire mounting - Cable glands

4.2 Drill template for MC4 switch unit

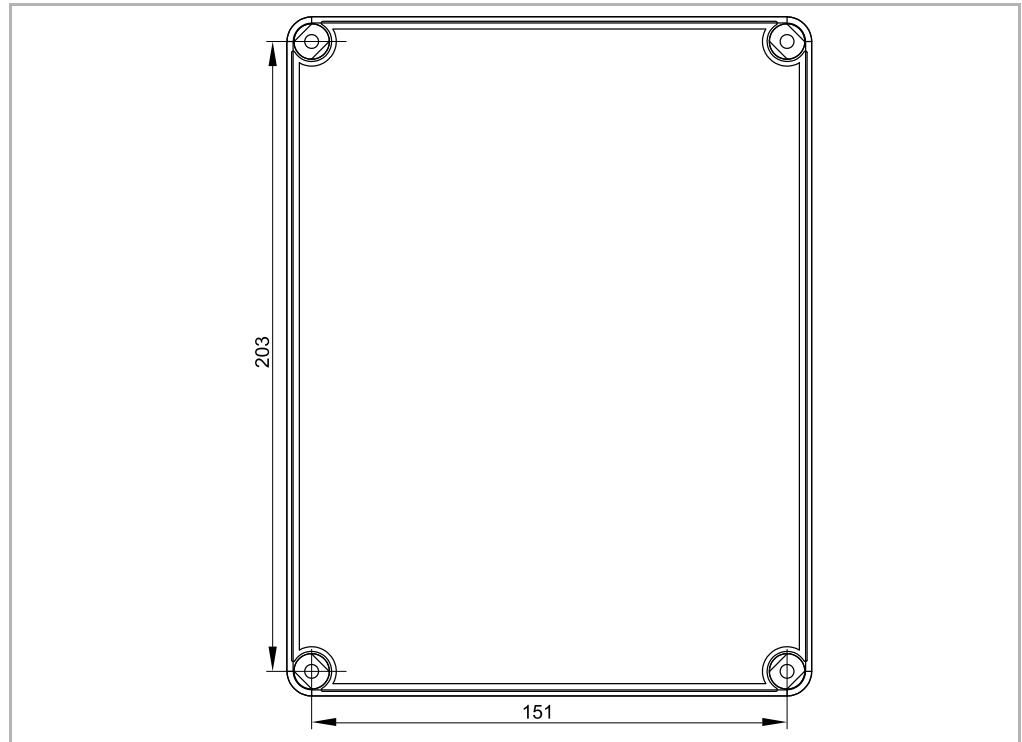


Fig. 4-3: Drill template for MC4 switch unit

4.3 Installation site of room thermostat



Notice!

The installation site of the room thermostat is critical for the precise room temperature control. Therefore, do not install a room thermostat in the following locations:

- next to doors, windows, etc. as intense movement of air can cause incorrect measurements,
- on hot or cold walls (e.g. external wall, chimney) as the wall temperature can cause incorrect measurements,
- immediately near unit discharge grilles as the discharge temperature can cause incorrect measurements,
- below cold surfaces like windows as the lack of cold air flows can cause incorrect measurements.


4.4 Disassembling the MC4 switch unit

| | |
|---|-----------------|
| | ⚠ DANGER |
| <p>Electrocution will lead to death or serious injury!</p> <p>The MC4 switch unit is supplied via the power sections of the air heaters. Therefore, the switch unit itself cannot be powered down!</p> <ul style="list-style-type: none"> • Disconnect the air heaters from the power supply and ensure the power cannot be switched back on. • Verify that all circuits are de-energized, ground and join the connecting terminals with a jumper. | |

- Disconnect the unit and the MC4 switch unit from the power supply.
- When dismantling the MC4 switch unit (see Fig. 4-1) using a screwdriver, turn the 4 safety screws of the front panel of the switch unit and lift the front panel upwards from the mounting plate (bottom section of the switch unit).
- Using a screwdriver, open the respective conductor terminals, loosen the cable sleeves and pull out the individual wires.
- Loosen the mounting plate (the bottom part) of the switch unit from the wall.

5 Electrical connection

⚠ DANGER



Electrocution will lead to death or serious injury!

Electrical installation of the MC4 switch unit must only be carried out by qualified licensed electricians trained in the field of electrical engineering in compliance with this operation manual and the following applicable regulations:



Notice!

- VDE regulations, including safety regulations
- Accident prevention regulations
- Installation instructions

5.1 Wiring diagrams

The electrical connection of the heating units to the MC4 switch unit may only be carried out according to the applicable wiring diagrams. The wiring diagrams are enclosed separately.



Risk of accident due to electric current!

The wiring diagrams do not mention any protective measures. The applicable standards and regulations must always be observed when connecting.

| | Fusing |
|-----------------|--------|
| MC4 switch unit | 16 A |

Tab. 5-1: Fuse

Connection of the MC4 switch unit

For the connection of the MC4 switch unit we recommend using the following cable types or comparable conductor cross-sections.

| Cable connection type | Cable type | Conductor cross-section |
|-----------------------------|----------------------------------|-------------------------|
| Supply voltage AC fan | CYKY 5c x 2.5 (max. CYKY 5c x 4) | max.4 mm ² |
| Control voltages EC fan | ÖLFLEX CLASSIC 110 | 0.75 mm ² |
| Analog inputs and outputs* | ÖLFLEX CLASSIC 110 | 0.75 mm ² |
| Digital inputs and outputs* | ÖLFLEX CLASSIC 110 | 0.5 mm ² |

Tab. 5-2: Cable types and conductor cross-sections

* The total length of the cables, including the submain, must not exceed 500 m.

The following steps are required to connect the MC4 switch unit:

- Connection of the supply voltage
- Connection of the unit heater fan
- Or connection of the inputs and outputs
- Or connection of the mains for controlling ISYteq – X3 terminals
- Connection of the control panel – terminals X1 and X2

5.1.1 MC4 switch unit printed circuit board: terminal designation

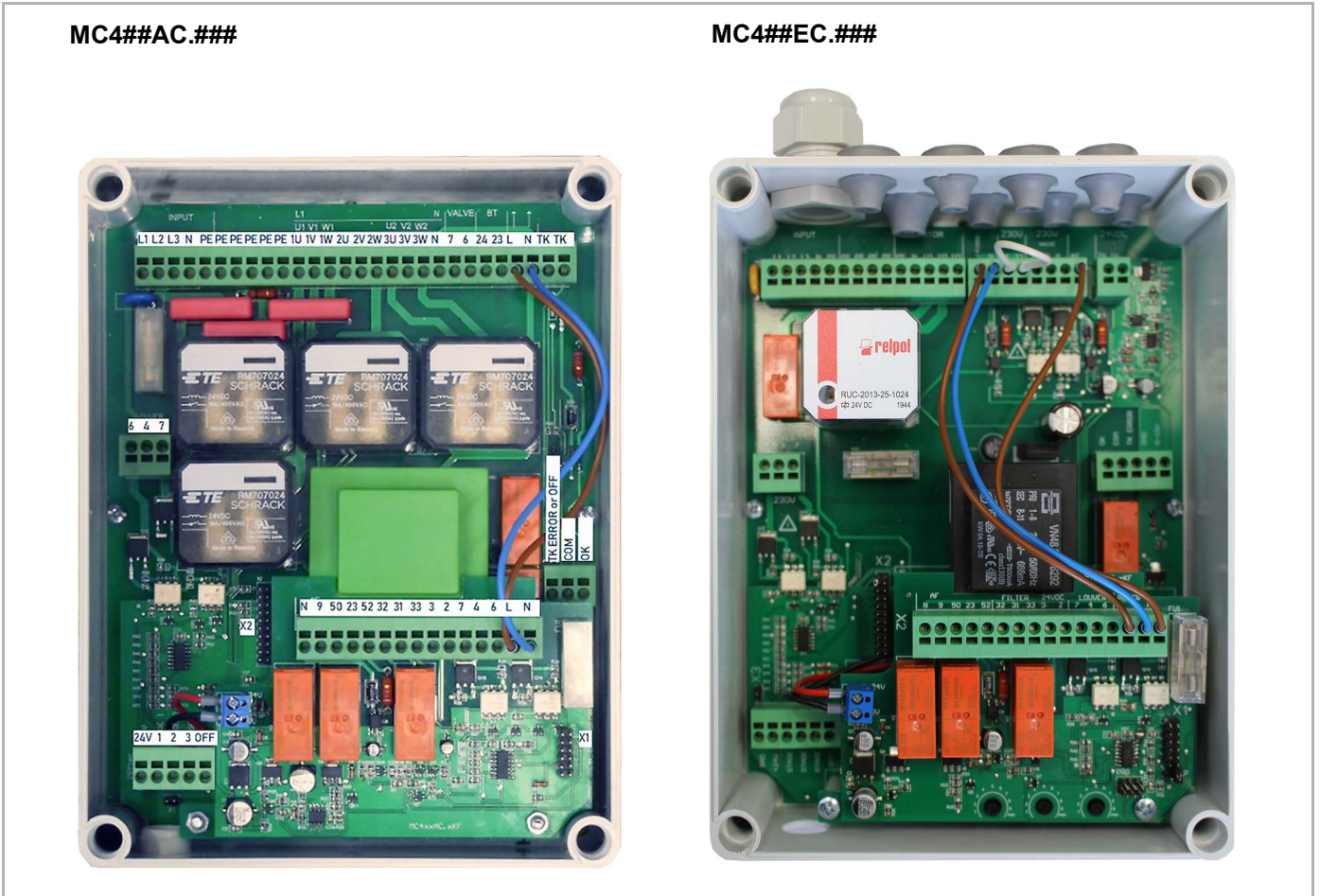


Fig. 5-4: MC4##AC.### a MC4##EC.### - Board - Designation of the terminals

5.1.2 Connection of the controller PCB of the MC4 switch unit – terminal block X1 and X2

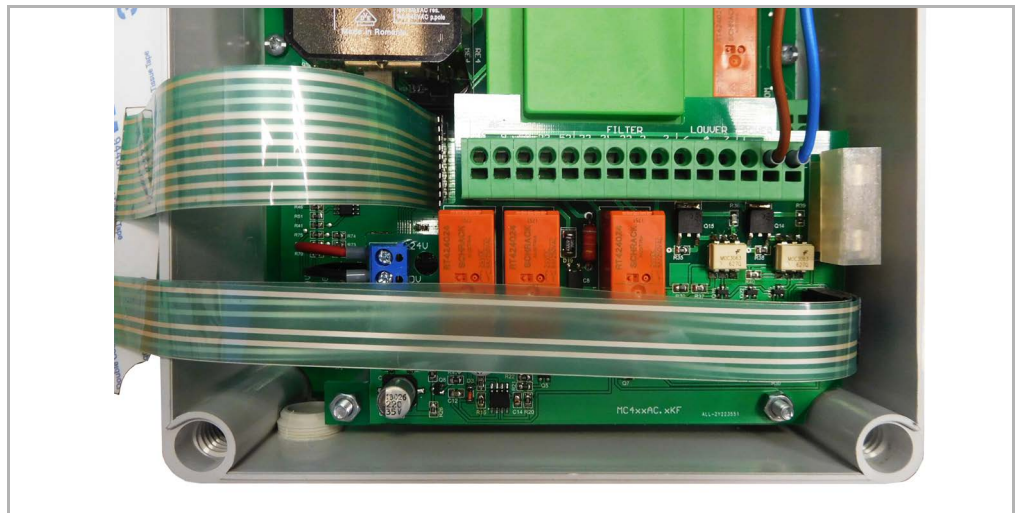


Fig. 5-5: Connection of the controller PCB of the MC4 switch unit – terminal block X1 and X2

5.1.3 Electrical connection of the MC4U1AC.### switch unit (for recirculating-air unit)

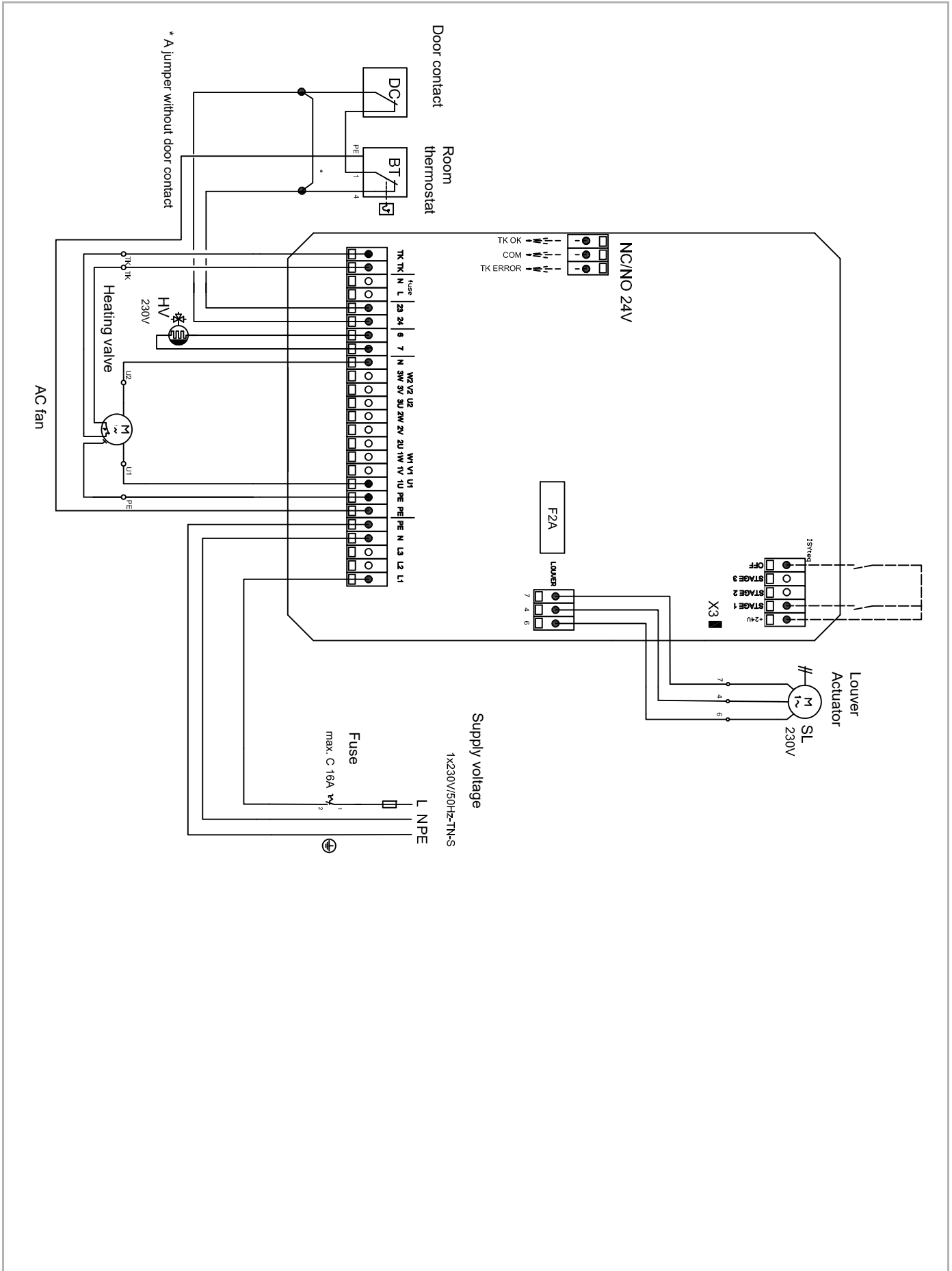
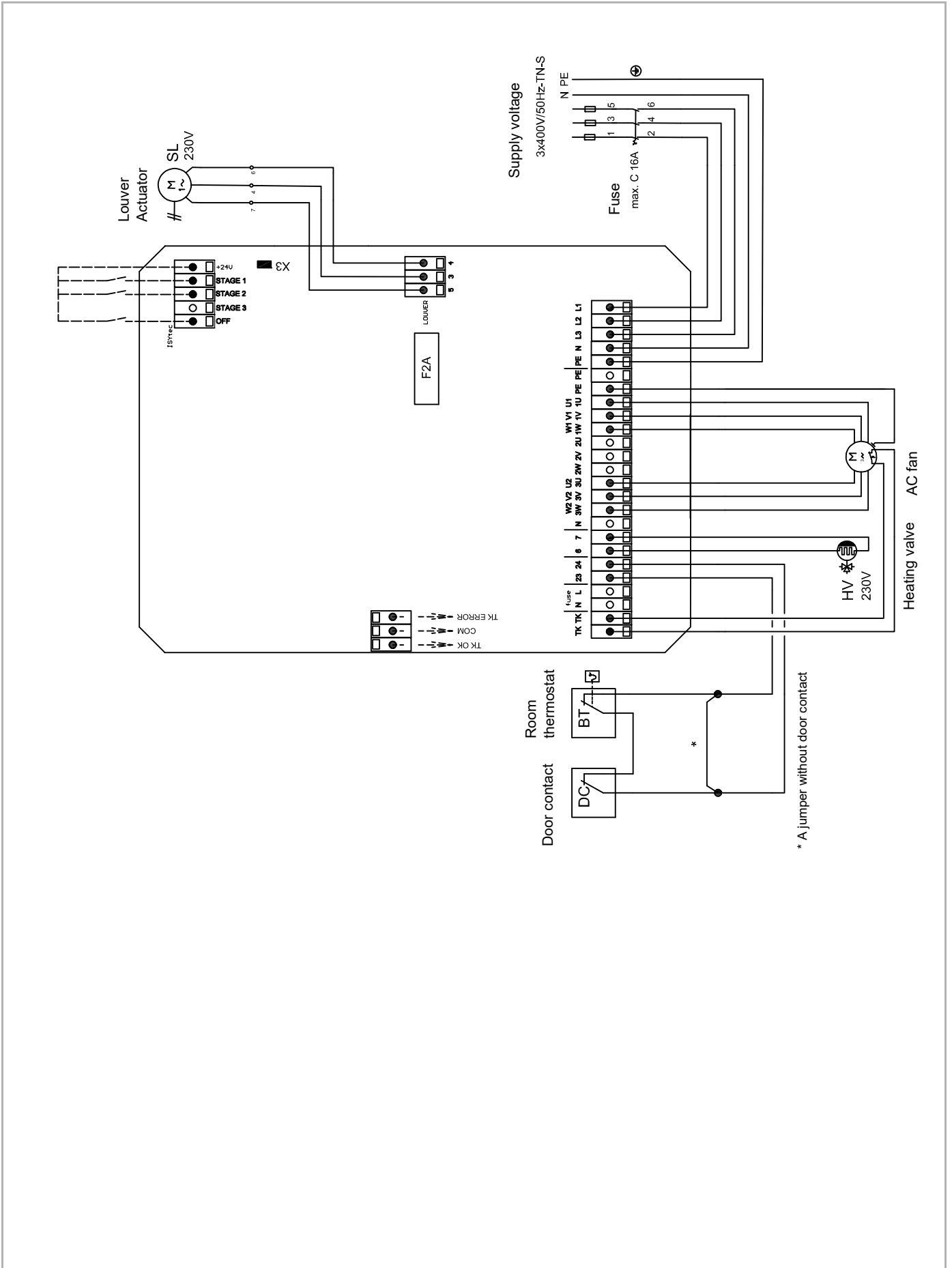


Fig. 5-6: Circuit diagram for recirculating-air units - MC4U1AC.###

5.1.4 Electrical connection of the MC4U2AC.### switch unit (for recirculating-air unit)



Abbr. 5-7 Circuit diagram for recirculating-air units - MC4U2AC.###

5.1.5 Electrical connection of the MC4U3AC.### switch unit (for recirculating-air unit)

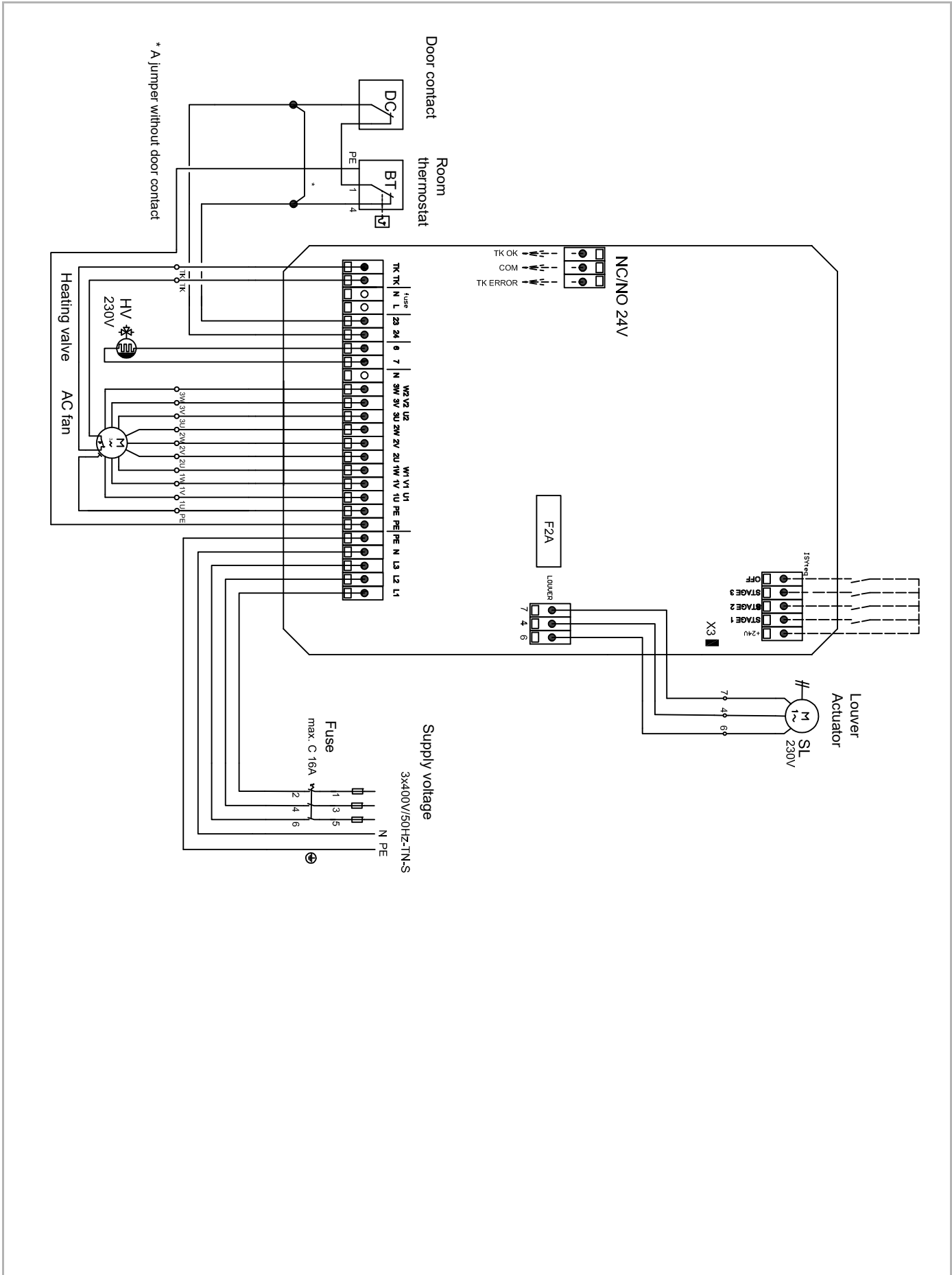


Fig. 5-8: Circuit diagram for recirculating-air units - MC4U3AC.###

5.1.6 Electrical connection of the switching unit MC4M2AC.### (for mixed-air units)

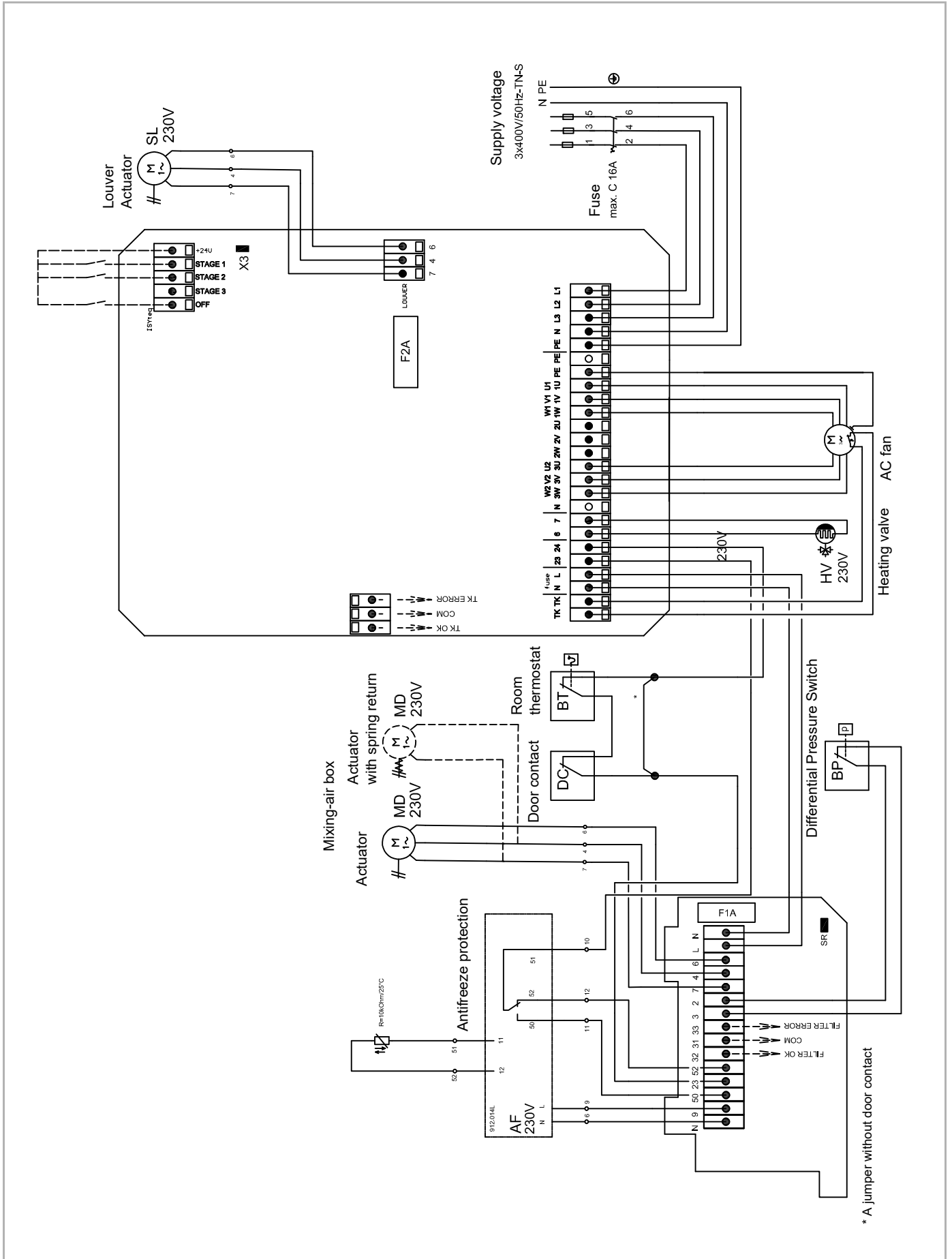


Fig. 5-9: Switch unit circuit diagram for mixed-air units - MC4M2AC.###

5.1.7 Electrical connection of the MC4M3AC.### switch unit (for mixed-air units)

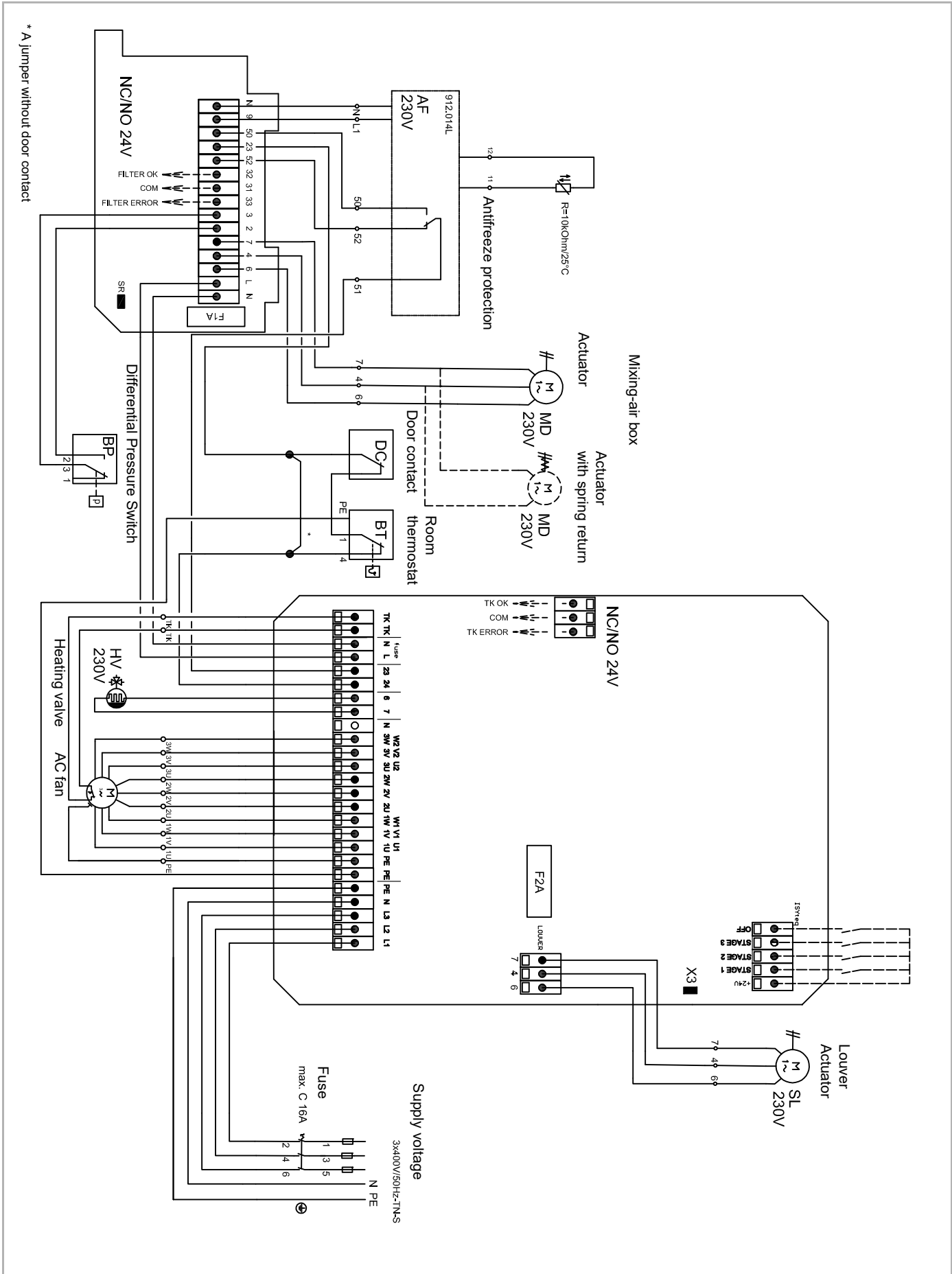


Fig. 5-10: Switch unit circuit diagram for mixed-air units - MC4M3AC.###

5.1.8 Electrical connection of the MC4U1EC.### switch unit (for recirculating-air unit)

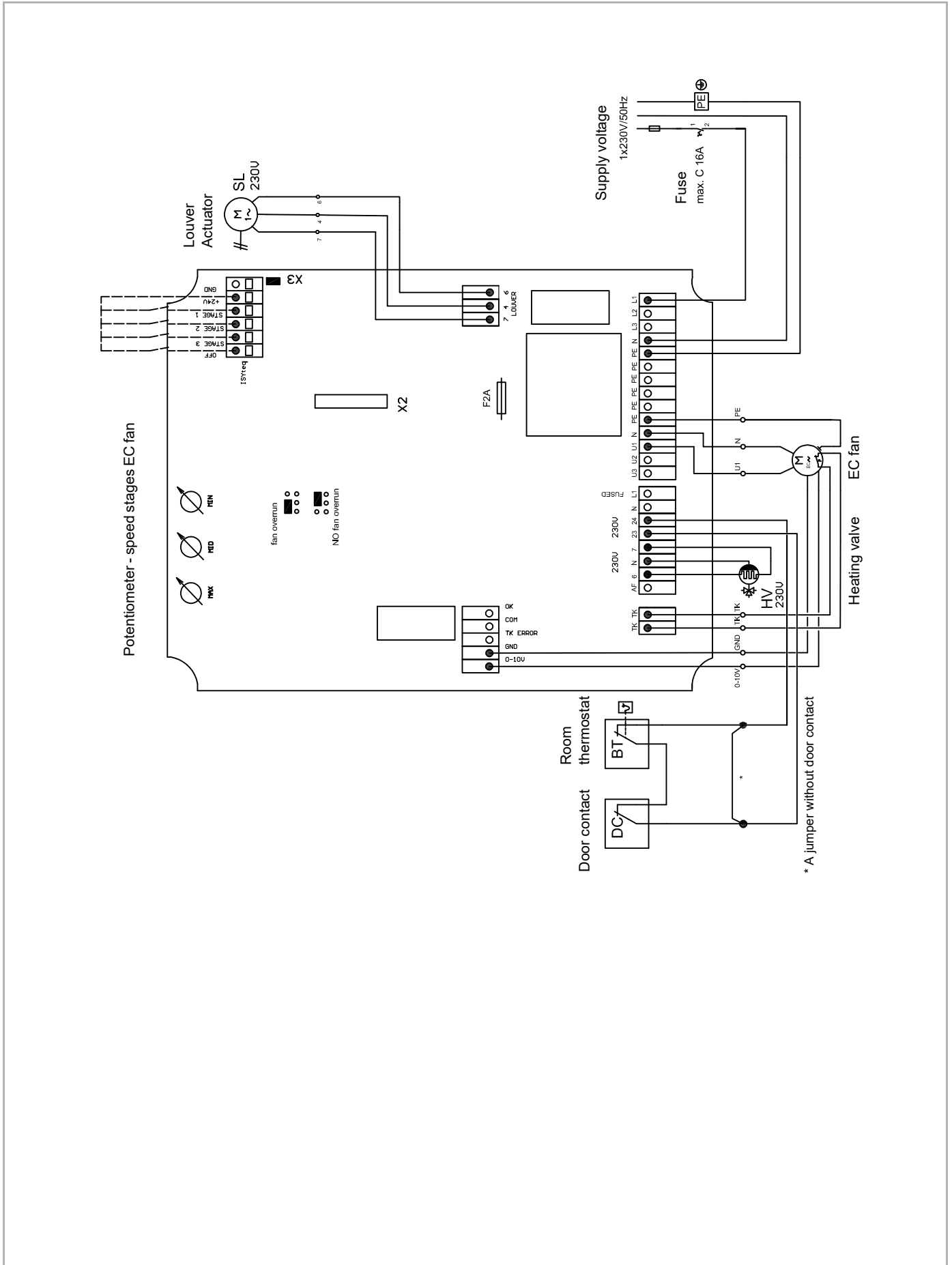


Fig. 5-11: Circuit diagram for recirculating-air units - MC4U1EC.###

5.1.9 Electrical connection of the MC4U1EC.### switch unit (for recirculating-air units), contact thermostat

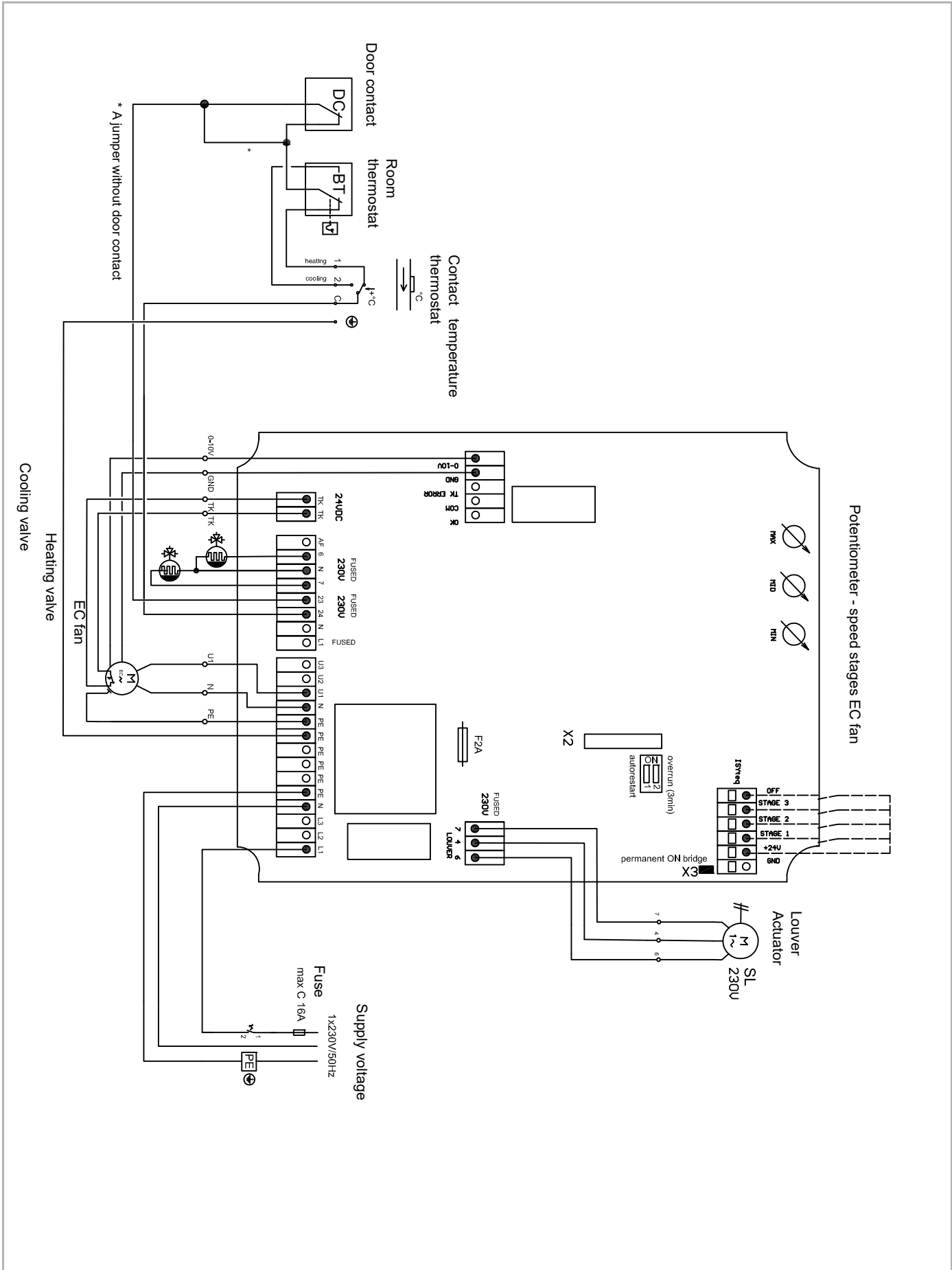


Fig. 5-12: Circuit diagram for recirculating-air units - MC4U1EC.###, contact thermostat

5.1.10 Electrical connection of the MC4U3EC.### switch unit (for recirculating-air unit)

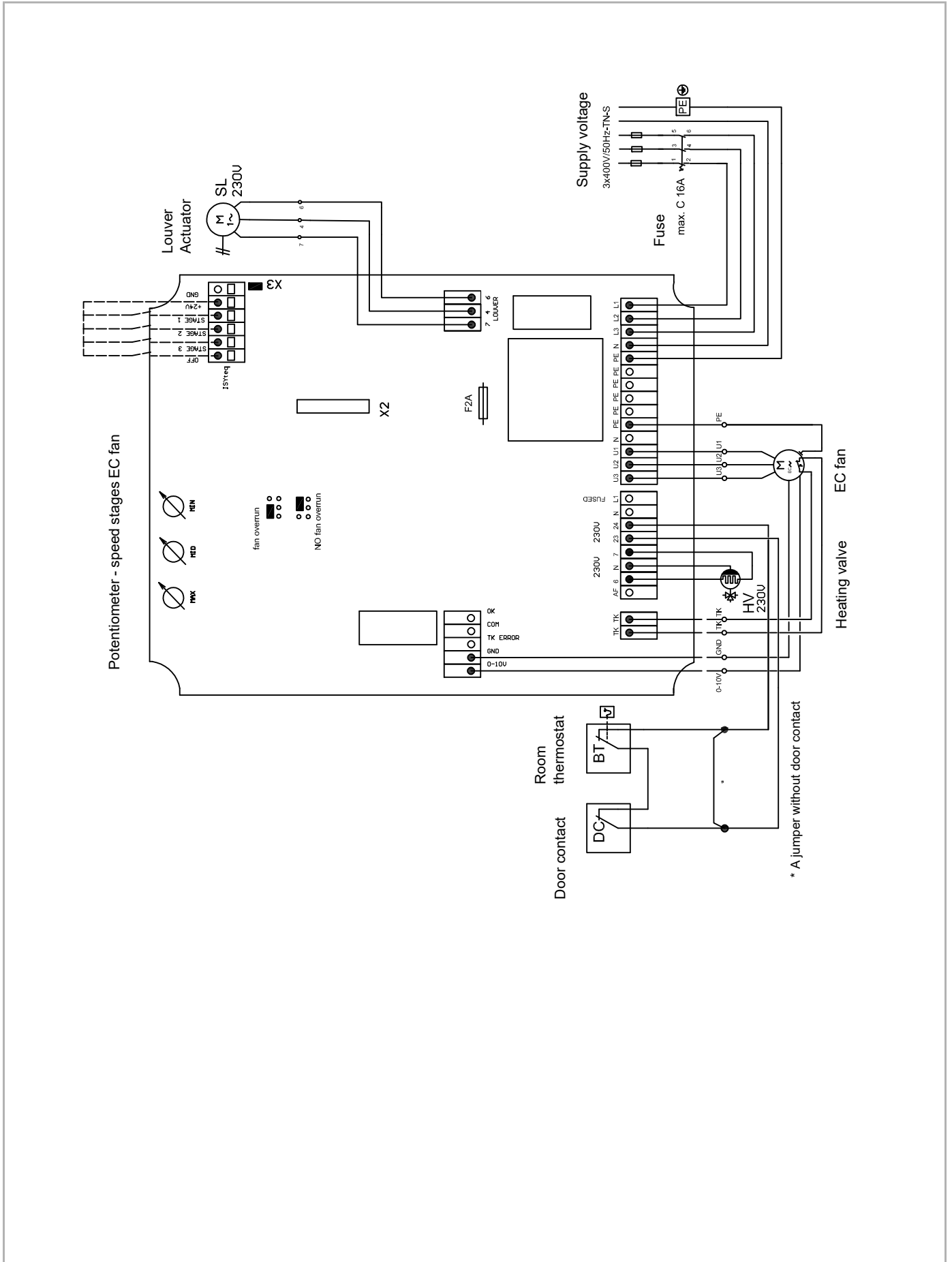


Fig. 5-13: Circuit diagram for recirculating-air units - MC4U3EC.###

5.1.11 Electrical connection of the MC4U3EC.### switch unit (for recirculating-air units), contact thermostat

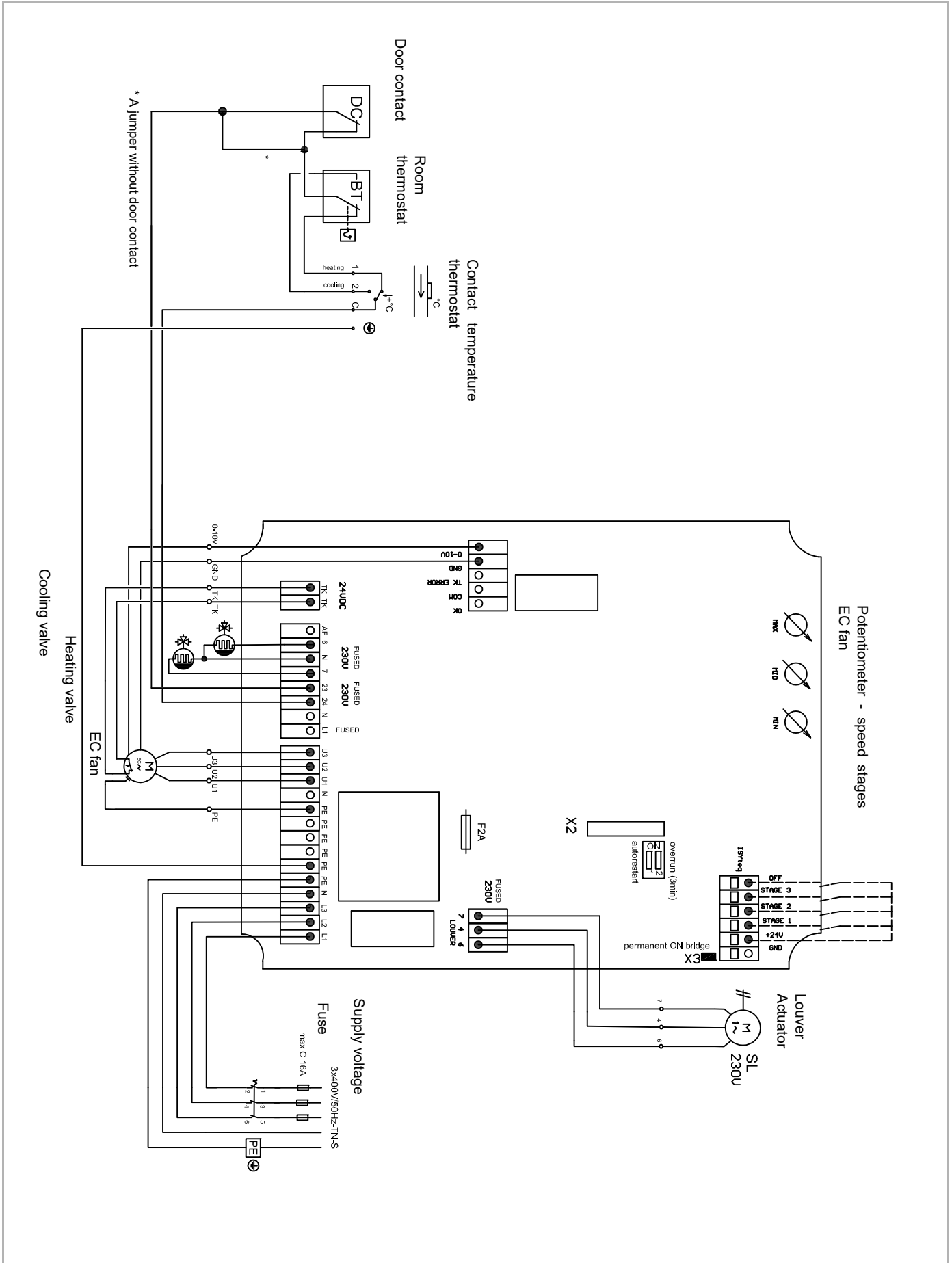


Fig. 5-14: Circuit diagram for recirculating-air units - MC4U3EC.###, contact thermostat

5.1.12 Electrical connection of the MC4M1EC.### switch unit (for mixed-air units)

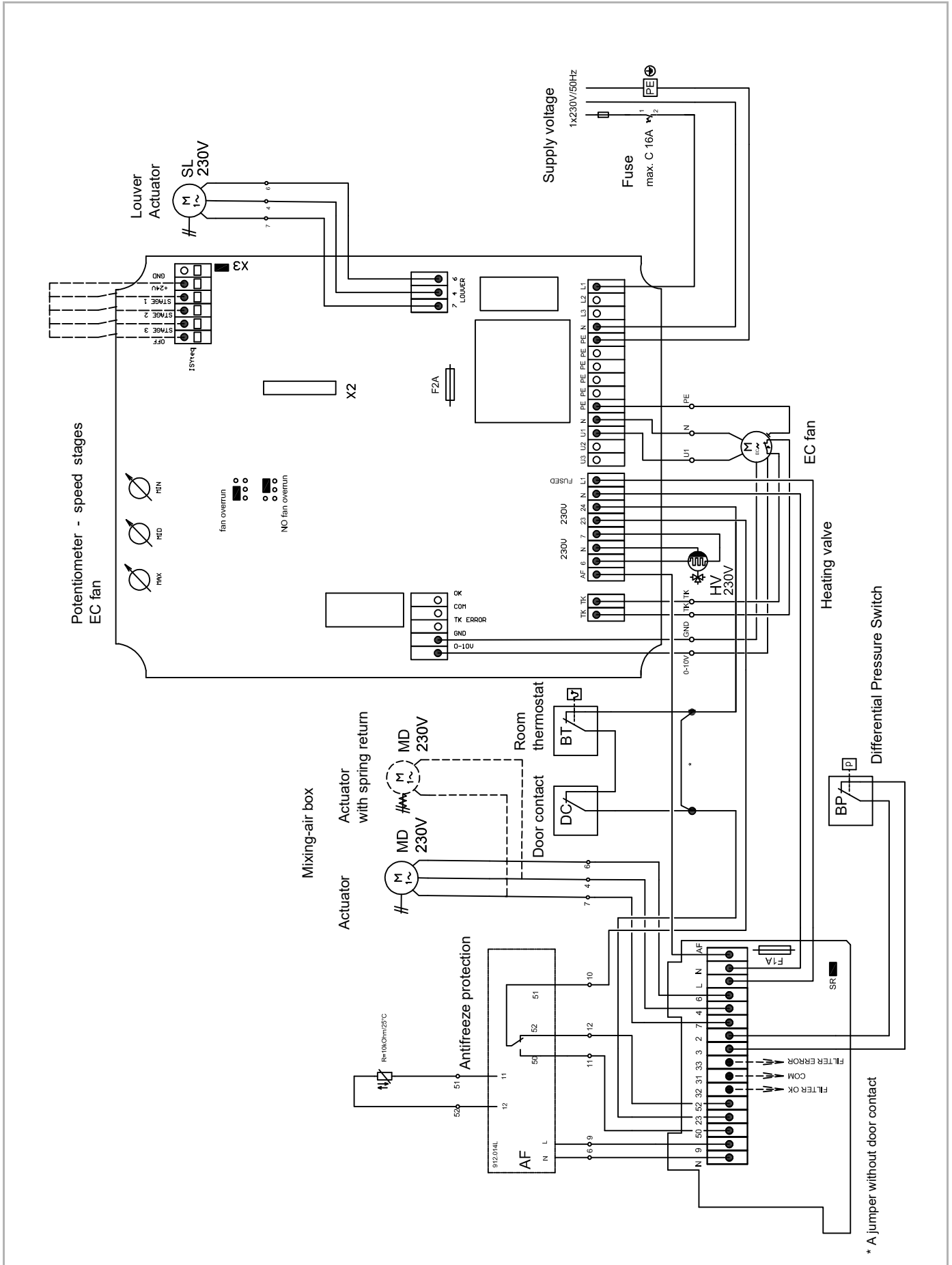


Fig. 5-15: Switch unit circuit diagram for mixed-air units - MC4M1EC.###

5.1.13 Electrical connection of the switch unit MC4M1EC.### (for mixed-air units), contact thermostat

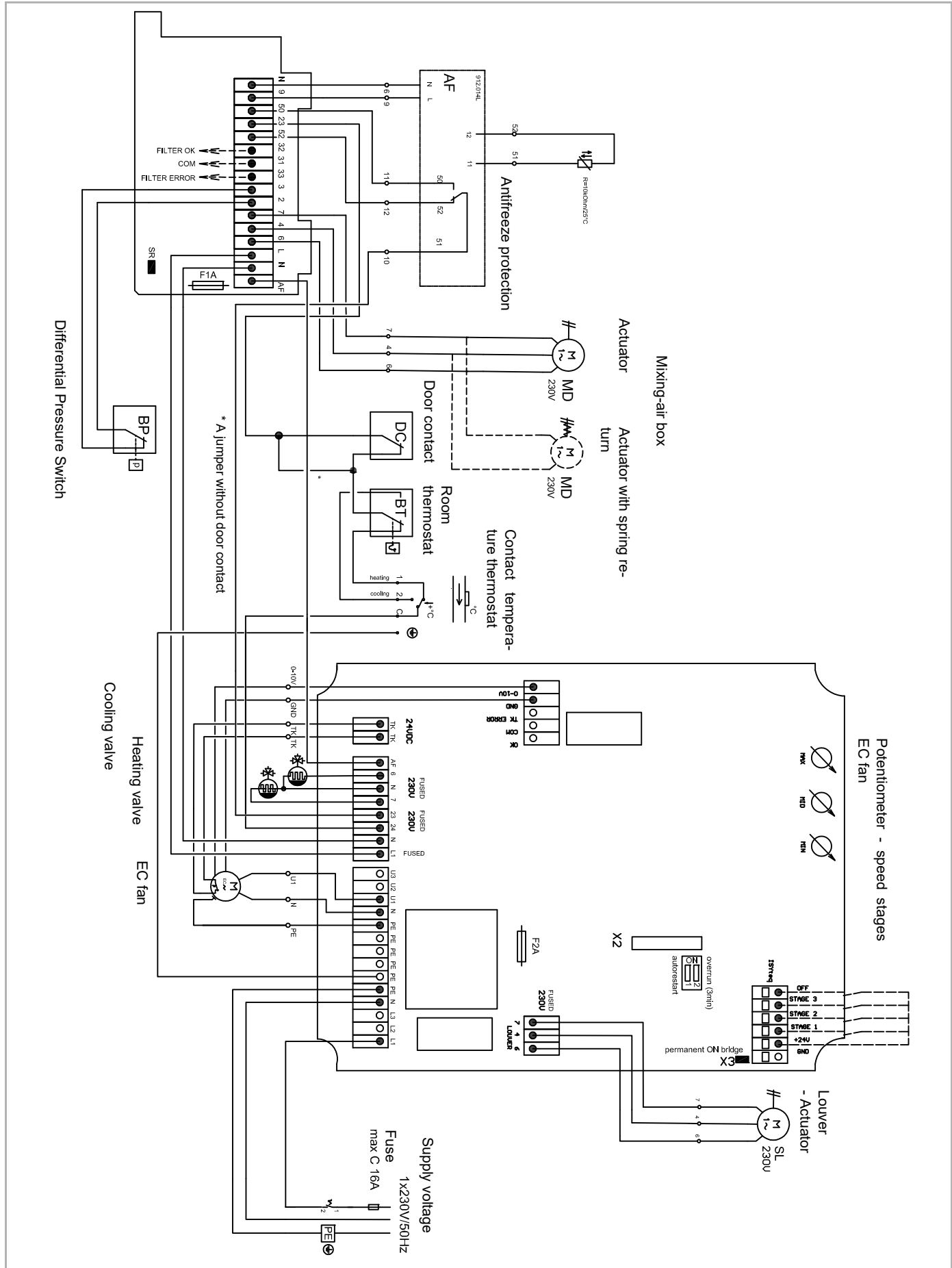


Fig. 5-16: Switch unit circuit diagram for mixed-air units - MC4M1EC.###, contact thermostat

5.1.14 Electrical connection of the MC4M3EC.### switch unit (for mixed-air units)

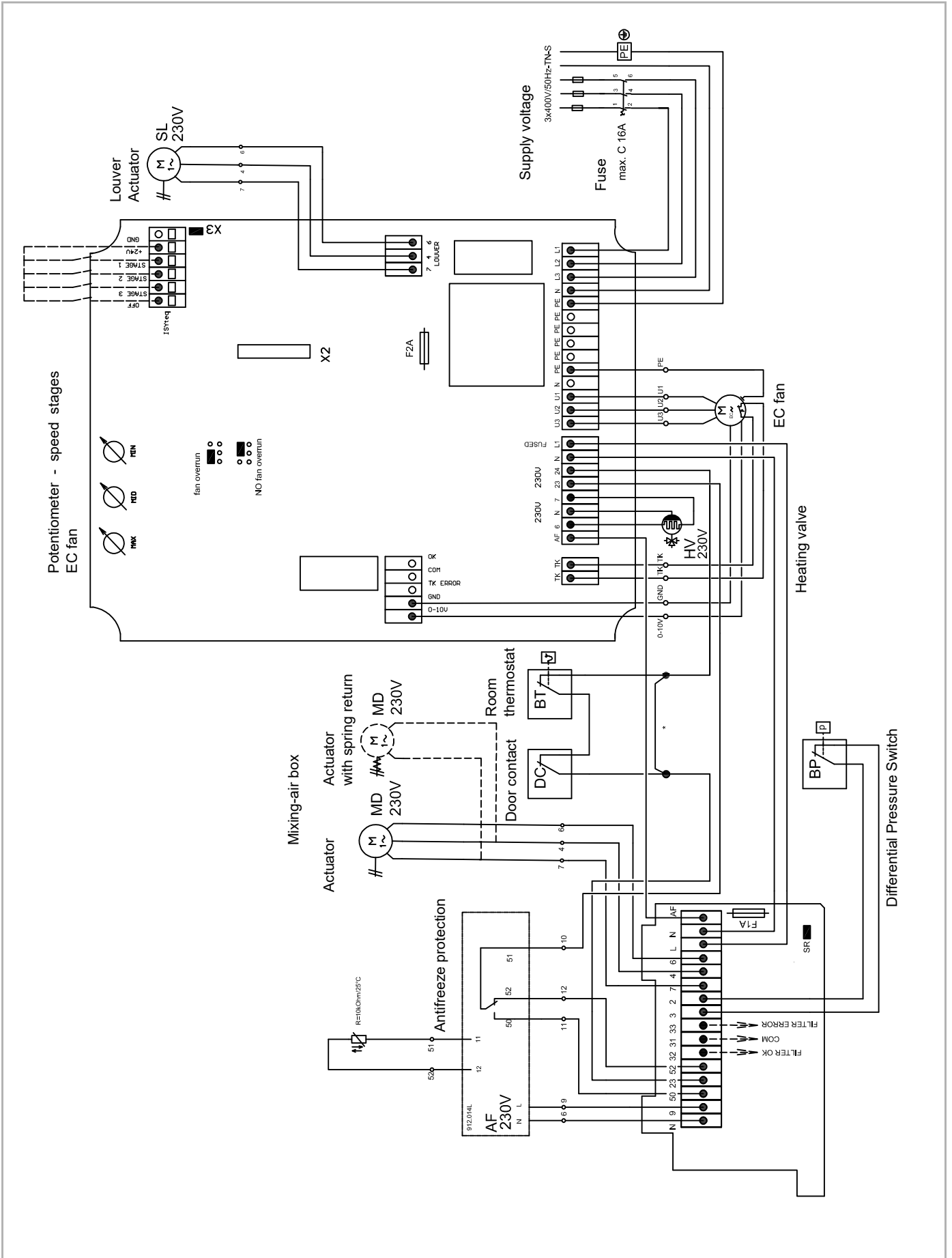


Fig. 5-17: Switch unit circuit diagram for mixed-air units - MC4M3EC.###

5.1.15 Electrical connection of the switch unit MC4M3EC.### (for mixed-air units), contact thermostat

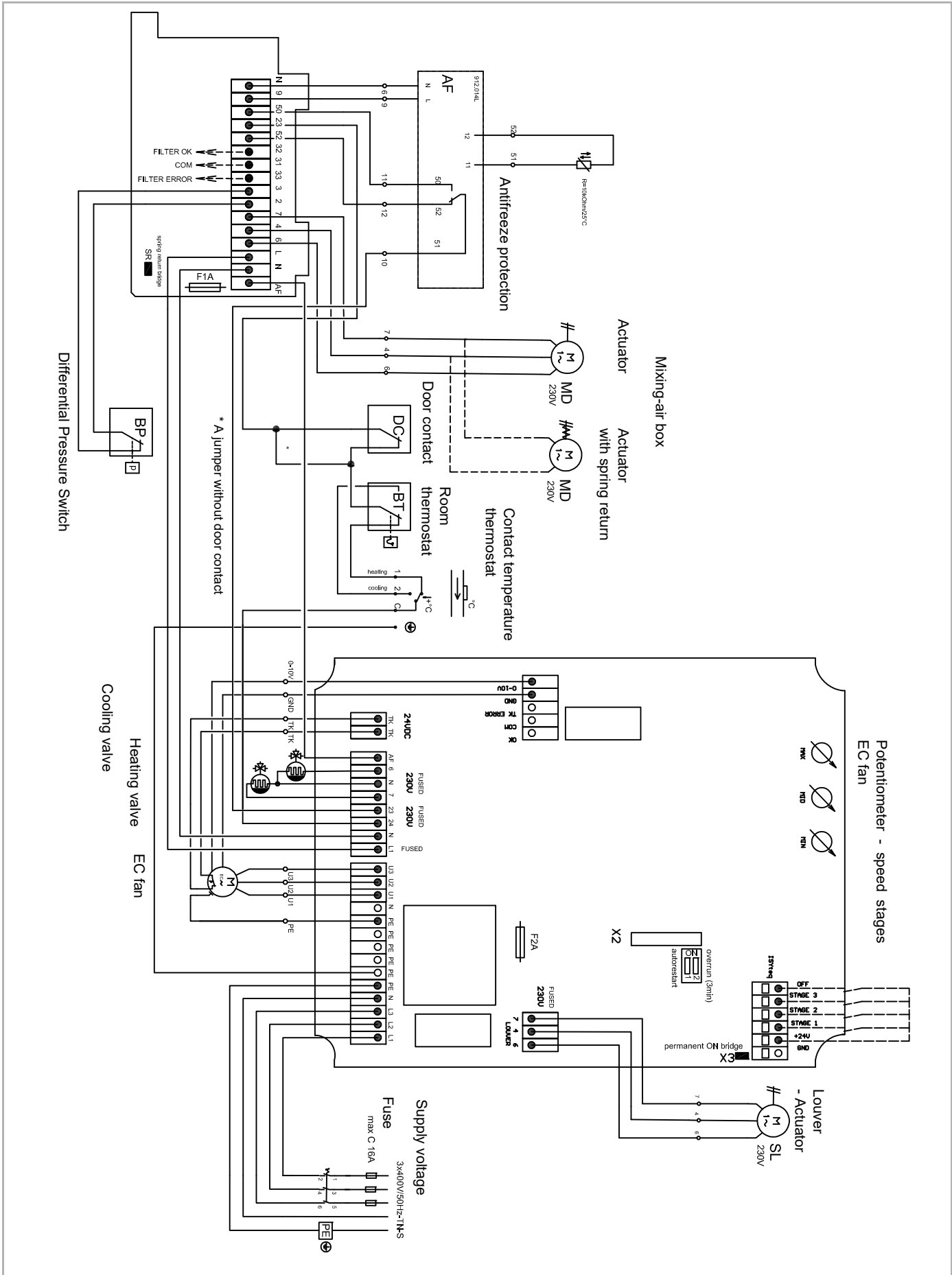


Fig. 5-18: Switch unit circuit diagram for mixed-air units MC4M3EC.###, contact thermostat

Legend for Fig. 5-4 (Fig. 5-6, Fig. 5-18) - Switch unit terminal designation MC4:

| | |
|-----------------------------------|---|
| | Terminal block top view |
| L1,L2,L3,N,PE | Supply voltage 3x400V TN-S |
| PE | Ground terminal |
| 1U,1V,1W,2U,2V,2W, 3U,3V,3W, N | Motor fan terminal clamps |
| 7 | Heating valve N |
| 6 | Heating valve L |
| 24 | Thermostat/door contact terminal |
| 23 | Thermostat/door contact terminal or common contact for frost protection |
| L | Phase for supplying the mixing-air box electronics (protected by a fuse) |
| N | Zero conductor for supplying the mixing-air box electronics |
| TC | Fan electrical motor thermal contact |
| | Terminal block left |
| 6 | Connection for 230V louver actuator |
| 4 | Connection for N louver actuator |
| 7 | Connection for 230V louver actuator |
| | Terminal block bottom left – for controlling ISYteq |
| 24V | Control voltage for remotely selecting the fan speed stages |
| 1 | Fan speed stage 1 |
| 2 | Fan speed stage 2 |
| 3 | Fan speed stage 3 |
| OFF | Switches all fan speed stages off |
| | Terminal block right – output signaling |
| TC ERROR or OFF | TC or switch-off status signaling (NO contact) |
| COM | Common contact – TC status signaling |
| OK | Status signaling – switched on (operation) |
| | Terminal block in the middle |
| N | Zero conductor – supplying the mixing-air box system |
| 9 | Phase for supplying the mixing-air box control system (protected by a fuse) |
| 50 | Frost protection contact – temperature OK |
| 23 | Thermal contact/door contact terminal |
| 52 | Frost protection – ERROR (OFF) |
| 32 | Filter status signaling (filter monitoring) – FILTER OK |
| 31 | Common contact – filter status signaling |
| 33 | Filter status signaling – FILTER ERROR |
| 7 | Connection for actuator of the 230V mixing-air box (open) |
| 4 | Connection for actuator of the mixing-air box N conductor |
| 6 | Connection for actuator of the 230V mixing-air box/louver (closed) |
| L | Phase for supplying the mixing-air box control system (wired by the manufacturer) |
| N | Zero conductor for supplying the mixing-air box electronics (wired by the manufacturer) |
| X1, X2 | Connectors for connecting the keypad to the switch box cover |
| X3 | Jumper for continuous control of the ISYteq control system |

5.2 Settings of EC motor potentiometer



Notice!

For control voltage values of a specific type of fan unit with EC motor and operating load refer to DesignAIR software. Consider the recommended values, see Table 5-3.

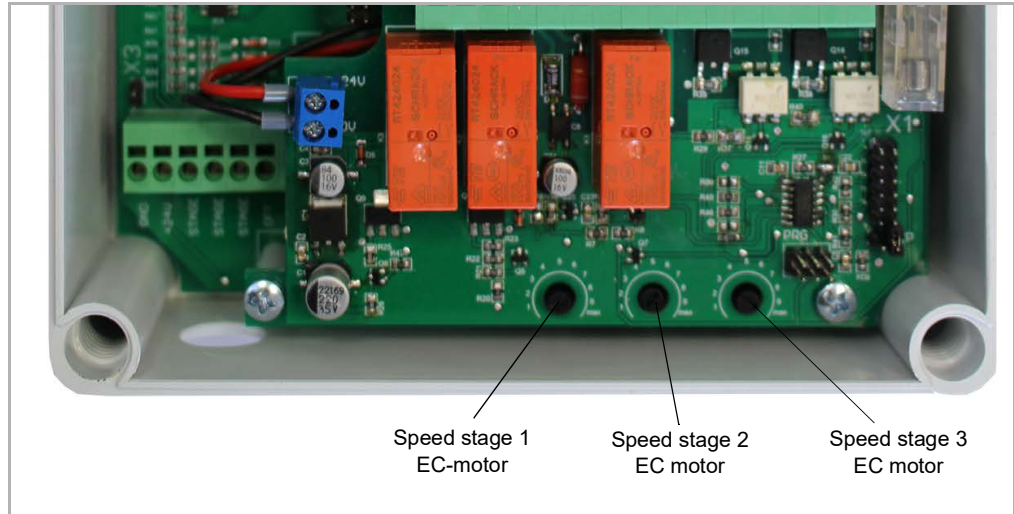


Fig. 5-19: Potentiometer for setting the speed stages of the EC motor - MC4##EC.###

| Function | Unit Type | Electric motor, Operating voltage | Model size | Heating operation (ventilation) | | Cooling mode | | |
|-------------------------|--|-----------------------------------|------------|---------------------------------|------------------|------------------|------------------|-----|
| | | | | Min. Voltage (V) | Max. Voltage (V) | Min. Voltage (V) | Max. Voltage (V) | |
| Recirculating air | MultiMAXX HN | 1x230V EC, stepless (Y) | 1 | 3 | 9.9 | 3 | 6.7 | |
| | | | 2 | 3 | 9.9 | 3 | 5.8 | |
| | | | 3 | 3 | 9.9 | 3 | 7.2 | |
| | | | 4 | 3 | 9.9 | 3 | 6.8 | |
| | | | 5 | 3 | 9.9 | 3 | 7.5 | |
| | | 3x400V EC, stepless (Z) | 3 | 3 | 9.9 | 3 | 4.8 | |
| | | | | 4 | 3 | 9.9 | 3 | 5.9 |
| | | | | 5 | 3 | 9.9 | 3 | 7.1 |
| | MAXX Vent VN | 1x230V EC, stepless (Y) | 1 | 4.5 | 9.9 | - | - | |
| | | | 2 | 4.5 | 9.9 | - | - | |
| | | | 3 | 4.5 | 9.9 | - | - | |
| | | | 4 | 4.5 | 9.9 | - | - | |
| | | | 5 | 4.5 | 9.9 | - | - | |
| | | 3x400V EC, stepless (Z) | 3 | 4.5 | 9.9 | - | - | |
| | | | | 4 | 4.5 | 9.9 | - | - |
| | | | | 5 | 4.5 | 9.9 | - | - |
| | MultiMAXX HD | 3x400V EC, stepless (Z) | 1 | 3 | 9.9 | - | - | |
| | | | 2 | 3 | 9.9 | - | - | |
| 3x400V EC, stepless (H) | | 3 | 3 | 9.9 | - | - | | |
| | | 4 | 3 | 9.9 | - | - | | |
| Multi Flair | 1x230V EC, stepless (G, Y), (without filter) | 1 | 3 | 9.9 | 3 | 7.2 | | |
| | | 2 | 3 | 9.9 | 3 | 8.3 | | |
| | | 3 | 3 | 9.9 | 3 | 5.3 | | |
| | 1x230V EC, stepless (G, Y), (with filter) | 1 | 3 | 9.9 | 3 | 8.7 | | |
| | | 2 | 3 | 9.9 | 3 | 9.9 | | |
| | | 3 | 3 | 9.9 | 3 | 6.1 | | |
| Mixed air | MultiMAXX HN | 1x230V EC, stepless (Y) | 1 | 5.5 | 9.9 | 4.5 | 7.7 | |
| | | | 2 | 4.5 | 9.9 | 4.5 | 6.8 | |
| | | | 3 | 5.5 | 9.9 | 4.5 | 8.2 | |
| | | | 4 | 5.5 | 9.9 | 4.5 | 7.8 | |
| | | | 5 | 5.5 | 9.9 | 4.5 | 8.5 | |
| | | 3x400V EC, stepless (Z) | 3 | 4.5 | 9.9 | 4.5 | 5.8 | |
| | | | | 4 | 4.5 | 9.9 | 4.5 | 6.9 |
| | | | | 5 | 5.5 | 9.9 | 4.5 | 8.1 |
| | MAXX Vent VN | 1x230V EC, stepless (Y) | 1 | 4.5 | 9.9 | - | - | |
| | | | 2 | 4.5 | 9.9 | - | - | |
| | | | 3 | 4.5 | 9.9 | - | - | |
| | | | 4 | 4.5 | 9.9 | - | - | |
| 5 | | | 4.5 | 9.9 | - | - | | |
| 3x400V EC, stepless (Z) | | 3 | 4.5 | 9.9 | - | - | | |
| | | | 4 | 4.5 | 9.9 | - | - | |
| | | | 5 | 4.5 | 9.9 | - | - | |

Tab. 5-3: Recommended values min. and max. control voltage for EC motors - MC4##EC.###

6 Commissioning



Risk of accident due to electric current!

Disconnect the unit heater or the MC4 switch unit from the power supply before beginning all work. Ensure that the unit or the MC4 switch unit is isolated and secured against being energized at an appropriate installation site.

6.1 Operational test



⚠ DANGER

Electrocution will lead to death or serious injury!

- The MC4 switch unit's power feed is connected to the unit heater.
- Therefore switch on the supply voltage or supply circuit only after all work on the switch unit and the heater itself is completed!

6.1.1 Prerequisites for commissioning

- The entire plant, consisting of the MC4 switch unit, air heater and optional accessories, was installed both mechanically and electrically.
- The plant (air heaters and the MC4 switch unit) was disconnected from the power supply.
- The control voltage of the EC motor is set according to chapter 5.2.



Notice!

The following points must be observed for commissioning the MC4 switch unit and the air heater:

- The air heaters were installed in accordance with the operation manual.
- The accessories for the air heaters were connected to the electrical supply lines. (optional)
- Connect supply voltage to the air heater.

6.1.2 MC4 switch unit - Test



- Press the I/O(STANDBY)
 - key on the MC4 switch unit
 - Status signaling switched on (LED lamp lights up green).
- Press the "Fan/speed" key to set the desired speed on the MC4 switch unit
 - Status signaling switched on (LED lamp lights up green).
- ✓ If the functions are correctly selected/set, the fan of air heater will start.

Fig. 6-20: MC4 switch unit



Notice!

You can find supplementary information on operating the MC4 switch unit in chapter "Operation" on page 36.

7 Operation

7.1 Overview of the MC4 switch unit - operating elements

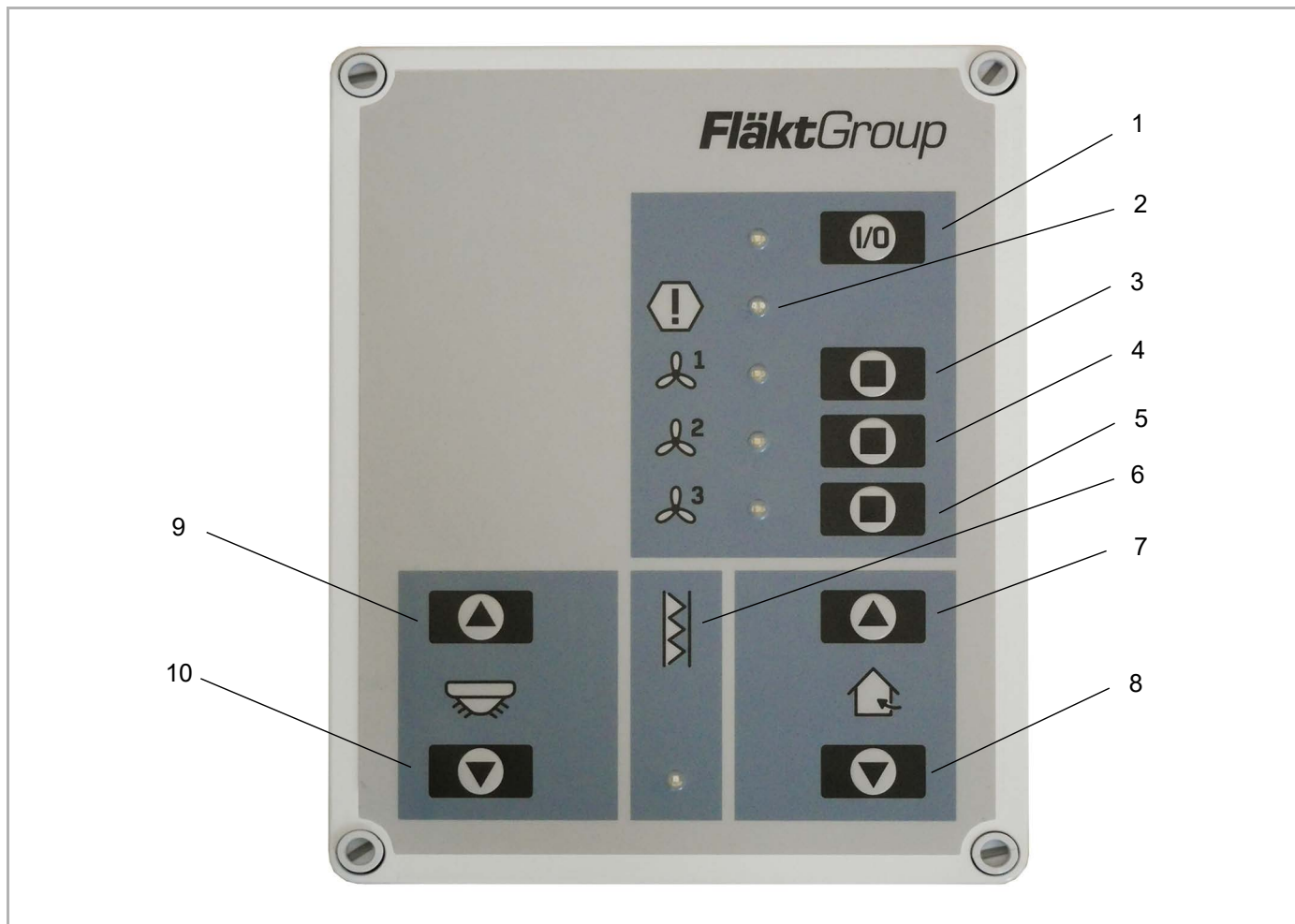


Fig. 7-21: Control elements of the MC4 switch unit (MC4M3AC.ZKF switch unit as an example, other versions differ based on their equipment)

The MC4 switch unit is operated via the control elements:

Pos. 1: I/O switch +signaling ON/OFF

Pos. 2: Signaling FAULT (ERROR)

Pos. 3: Fan 1 speed step switch + signaling ON/OFF

Pos. 4: Fan 2 speed step switch + signaling ON/OFF

Pos. 5: Fan 3 speed stepping switch + signaling ON/OFF

Pos. 6: Signaling filter contamination

Pos. 7: Mixing-air box switch OPEN+RESET Frost protection fault






Pos. 8: Mixing-air box switch CLOSED

Pos. 9: Louver switch TO TOP

Pos. 10: Louver switch TO BOTTOM

7.2 Description of the operating elements of the MC4 switch unit

7.2.1 Setting the fan speeds and signaling a fault

| Switch (signaling) | Description |
|--|---|
|  | Switch (button) I/O is used to switch on/off the fan speed stages with signaling. Filter contamination signaling, the mixing-air box damper switches and the discharge louver are still active and can be controlled when the I/O switch is deactivated. Standby mode |
|  | Signaling ERROR (see chapter 7.2.2) - TC fault - AF fault |
|  | The fan operates at the set speed stage 1 with an operation indicator. The speed stage can be changed by pressing the button for 2 seconds. |
|  | The fan operates at the set speed stage 2 with an operation indicator. The speed stage can be changed by pressing the button for 2 seconds. |
|  | The fan operates at the set speed stage 3 with an operation indicator. The speed stage can be changed by pressing the button for 2 seconds. |

7.2.2 Signaling FAULT (ERROR)

Error TC (motor thermal protection)



- Signaling lights up continuously / Signaling on the I/O switch does not light up
- Blocks operation of the unit until the protective reasons are resolved and it does not switch on again.

Error AF (frost protection activation)




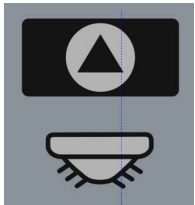
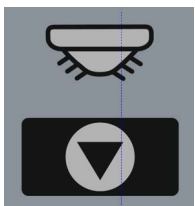
- This fault only appears in mixed-air heaters.
- Signaling is continuously lit / Signaling on the I/O switch is not lit.
- Antifreeze activation (active after detection of the power supply failure, i.e. also after switching on), the fan stops for 180 s. and during this time the mixing-air air box is closed. Thus, only the circulating air is provided until the protective reasons are resolved (the temperature rises above the critical value) and the mixing-air box is not opened by pressing the button for opening the mixing-air damper (for a period of at least 1 s)



Notice!

If the outside temperature drops below 4°C, the frost protection function is activated (the heating valve is opened, the fan motor and the mixing-air damper are closed) and the fault is activated. After the outdoor temperature has been measured above 4 °C or after 180 s., the fan motor is started, the heating valve is opened and the fault is continuously active. The mixing-air damper remains closed.

7.2.3 Setting control elements of accessories

| Switch (signaling) | Description |
|---|---|
|  | <p>Switch - opening of mixing-air damper, without signaling</p> |
|  | <p>Switch - Closing the mixing-air damper, without signaling</p> |
|  | <p>Signaling the filter contamination</p> |
|  | <p>Switch - Setting the discharge louver in the UP direction without signaling (press the button until the desired angle of the discharge louver – the direction of the discharge air flow – is adjusted).</p> |
|  | <p>Switch setting of the discharge louver in the DOWN direction without signaling (press the button until the desired angle of the discharge louver – the direction of the discharge air flow – is adjusted).</p> |

8 Maintenance and troubleshooting



Notice!

Maintenance may only be performed by qualified licensed staff in compliance with the notes mentioned in this operation manual and current regulations.



Risk of accident due to electric current!

Disconnect the MC4 switch unit from the power supply before beginning all work requiring removal of the casing. Ensure that the unit is isolated and secured against being energized at an appropriate installation site of the on-site electrical power supply.

8.1 Maintenance

The MC4 switch unit is almost maintenance-free.

The following cleaning procedures must be done at regular intervals:

- Clean the MC4 control panel only with a soft cloth.
- Check the casing as well as the control elements for damage.



Notice!

The manufacturer’s warranty is void from damage caused by neglected maintenance.



Notice!

- Avoid aggressive cleaning agents when cleaning the MC4 switch unit!
- Make sure that no water or humidity enter the MC4 switch unit!

8.2 Breakdowns

Any deviation from the normal operating mode of the MC4 switch unit indicates a possible breakdown which must be examined by the maintenance personnel.

The following table acts as a guideline for the maintenance personnel when it comes to determining possible causes of malfunctions and their remedy:

| Fault | Possible cause | Troubleshooting |
|--|--|--|
| TK error - if the control lamp ERROR is active, the I/O control lamp is not lit | Fan overheating or damage | Allow the fan and switch unit to cool down. |
| | | If MC4 does not switch on the heating unit, then replace the heating unit’s motor. |
| AF error - if the indicator lamp ERROR lights up, the I/O indicator lamp also lights up | The outdoor-air temperature has dropped below 4°C (the mixing-air box was switched to the "Recirculating air" position, no outdoor air is drawn in). | To open the mixing-air damper press switch for at least 1 min. |
| Filter contamination control lamp lights up | Dirty filter | Replace filter - see the operating instructions for the respective heater. |

Tab. 8-1: Causes of faults and their troubleshooting



Notice!

If the fault cannot be fixed by the maintenance personnel, please consult our authorized service department.

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