



# Decentralised ventilation units

## Underfloor units

FSL-U-ZAS



Read the instructions prior to performing any task!

**TROX<sup>®</sup> TECHNİK**  
The art of handling air

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## General information

### About this manual

This operating and installation manual enables operating or service personnel to correctly install the ventilation unit and to use it safely and efficiently.

This operating and installation manual is intended for use by fitting and installation companies, in-house technicians, technical staff, instructed persons, and qualified electricians or air conditioning technicians.

It is essential that these individuals read and fully understand this manual before starting any work. The basic prerequisite for safe working is to comply with the safety notes and all instructions in this manual.

The local regulations for health and safety at work and the general safety regulations for the area of application of the ventilation unit also apply.

This manual must be given to the system owner when handing over the system. The system owner must include the manual with the system documentation. The manual must be kept in a place that is accessible at all times.

Illustrations in this manual are mainly for information and may differ from the actual design.

### Other applicable documentation

- FSL-CONTROL II installation and configuration manual (for units with FSL-CONTROL II control system)
- Project-specific documents (if any)

### TROX Technical Service

To ensure that your request is processed as quickly as possible, please keep the following information ready:

- Product name
- TROX order number
- Delivery date
- Brief description of the fault

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The information in this manual has been compiled with reference to the applicable standards and guidelines, the state of the art, and our expertise and experience of many years.

The manufacturer does not accept any liability for damages resulting from:

- Non-compliance with this manual
- Incorrect use
- Operation or handling by untrained individuals
- Unauthorised modifications
- Technical changes
- Use of non-approved replacement parts

The actual scope of delivery may differ from the information in this manual for bespoke constructions, additional order options or as a result of recent technical changes.

The obligations agreed in the order, the general terms and conditions, the manufacturer's terms of delivery, and the legal regulations in effect at the time the contract is signed shall apply.

We reserve the right to make technical changes.

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The Delivery and Payment Terms of TROX GmbH are available at [www.troxtechnik.com](http://www.troxtechnik.com).

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# 1 Ventilation unit overview

## 1.1 Variants

### 1.1.1 FSL-U-ZAS left side construction

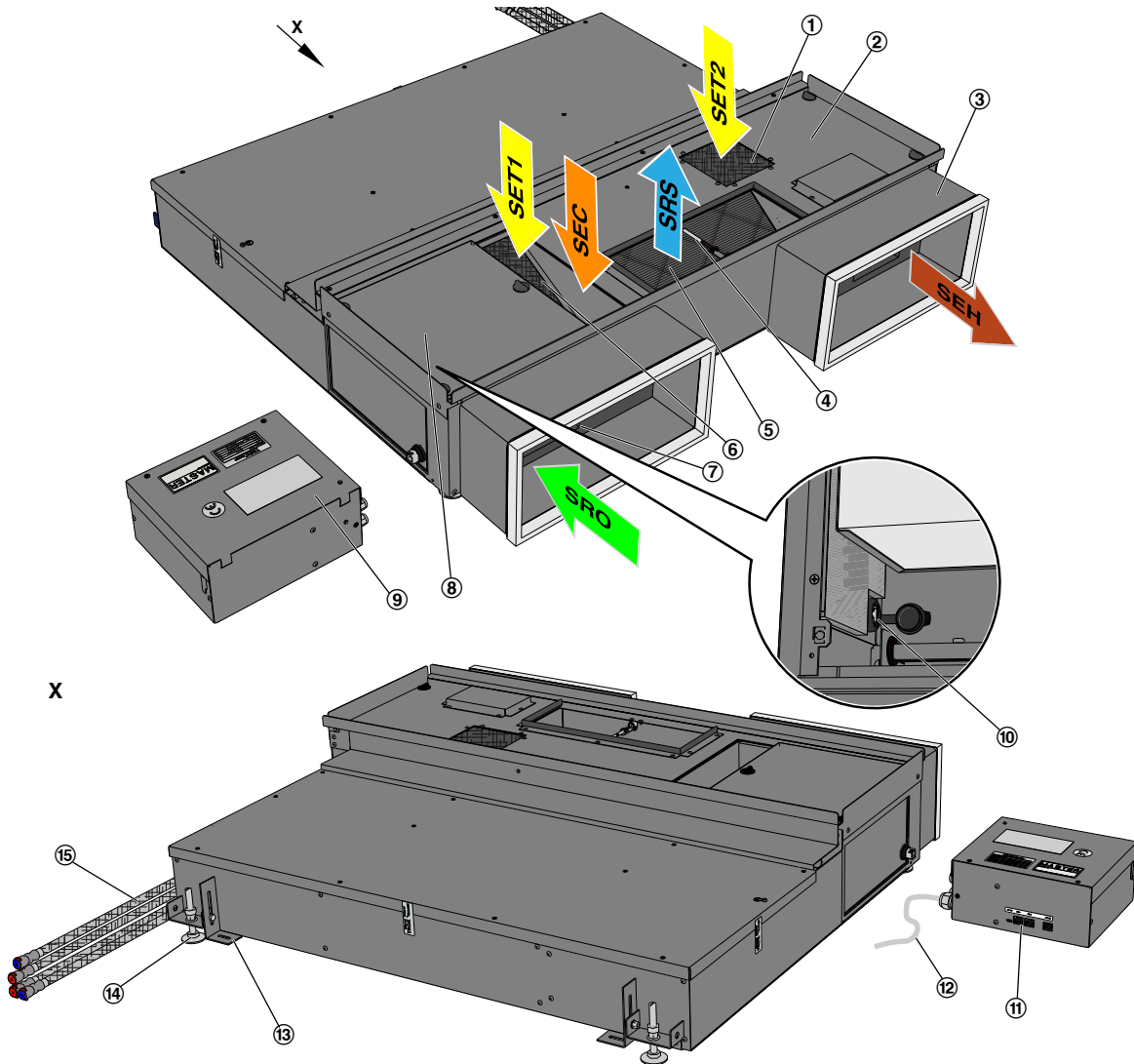


Fig. 1: FSL-U-ZAS, left side construction

- |    |   |      |   |
|----|---|------|---|
| 1  | Bypass filter (flat filter)<br>G3 coarse dust filter,<br>filter class to ISO 16890: ISO coarse 50%                      | 12   | Mains cable   |
| 2  | Inspection access panel   | 13   | Mounting bracket (sliding)                              |
| 3  | Spigot (optional) / seal on the wall side   | 14   | Feet  |
| 4  | Supply air temperature sensor   | 15   | Water connections, optional flexible hoses              |
| 5  | 4-pipe heat exchanger   | SEH  | Single room exhaust air                                 |
| 6  | Extract air / secondary air filter (flat filter)<br>G3 coarse dust filter,<br>filter class to ISO 16890: ISO coarse 50% | SET1 | Single room extract air                                 |
| 7  | Outdoor air temperature sensor  | SET2 | Single room extract air (summer bypass, night<br>purge) |
| 8  | Cover for outdoor air filter chamber,<br>F7 outdoor air filter (Mini Pleat fine dust filter)                            | SRO  | Single room outdoor air                                 |
| 9  | Control equipment box   | SRS  | Single room supply air                                  |
| 10 | Service socket  | SEC  | Secondary air   |
| 11 | Network connections   |      |   |

## 1.1.2 FSL-U-ZAS right side construction

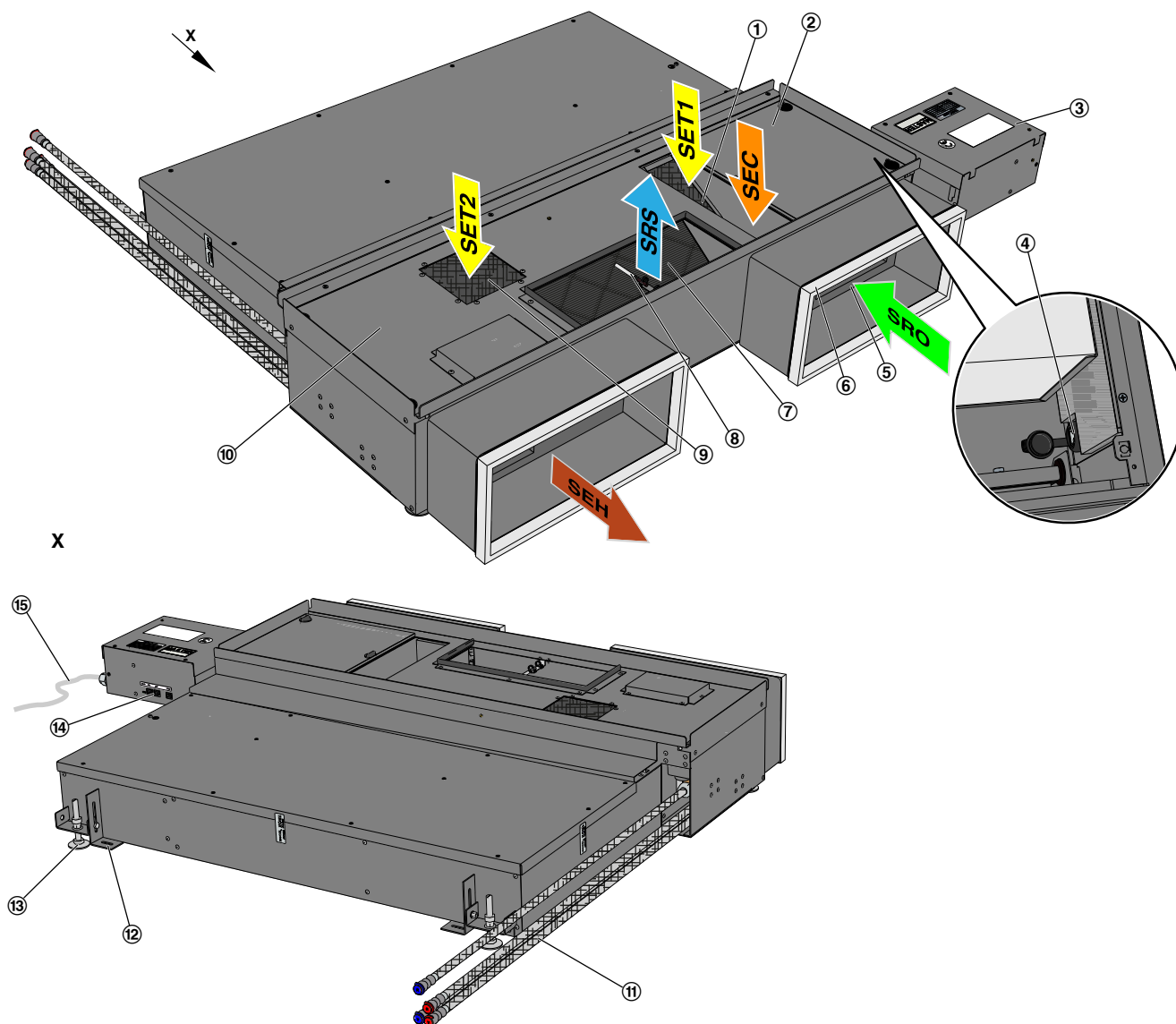


Fig. 2: FSL-U-ZAS, right side construction

1	Extract air / secondary air filter (flat filter) G3 coarse dust filter, filter class to ISO 16890: ISO coarse 50%	12	Mounting bracket (sliding)
2	Cover for outdoor air filter chamber F7 outdoor air filter (Mini Pleat fine dust filter)	13	Feet
3	Control equipment box	14	Network connections
4	Service socket	15	Mains cable
5	Spigot (optional) / seal on the wall side	SEH	Single room exhaust air
6	Outdoor air temperature sensor	SET1	Single room extract air
7	4-pipe heat exchanger	SET2	Single room extract air (summer bypass, night purge)
8	Supply air temperature sensor	SRO	Single room outdoor air
9	Bypass filter (flat filter) G3 coarse dust filter, filter class to ISO 16890: ISO coarse 50%	SRS	Single room supply air
10	Inspection access panel	SEC	Secondary air
11	Water connections, optional flexible hoses		

## 1.2 Schematic illustration of the airflows

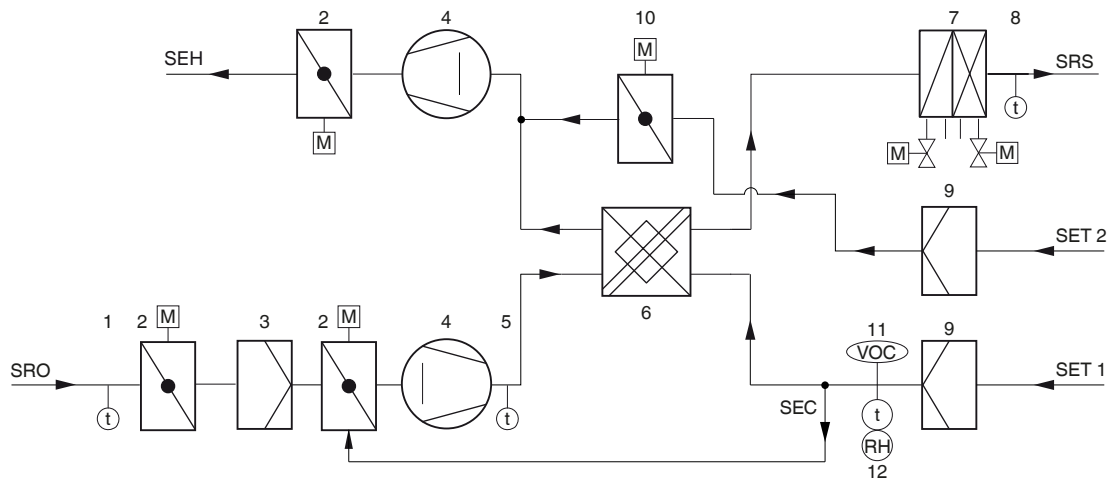


Fig. 3: Ventilation diagram for FSL-U-ZAS

1	Outdoor air temperature sensor (optional)	10	Bypass damper with actuator
2	Shut-off damper with actuator (exhaust air and outdoor air)	11	VOC sensor (optional)
3	Outdoor air filter	12	Extract air temperature sensor/Humidity sensor
4	Fan (supply air and extract air)	SEH	Single room exhaust air
5	Mixed air temperature sensor	SET 1	Single room extract air
6	Recuperative plate heat exchanger	SET 2	Single room extract air (summer bypass, night purge)
7	2-pipe or 4-pipe heat exchanger	SRO	Single room outdoor air
8	Supply air temperature sensor	SRS	Single room supply air
9	Extract air filter	SEC	Secondary air

### Functional description

Decentralised ventilation units of Type FSL-U-ZAS are underfloor units for installation in raised floors.

The casing is made of painted sheet steel; mineral wool faced with glass fibre fabric provides noise and thermal insulation. The supply air opening in the floor can be covered with a grille, e.g. a roll down grille or a linear grille.

An EC centrifugal fan draws in the outdoor air which then passes through the motorised shut-off damper and the F7 filter. The air then flows through the recuperative heat exchanger, where part of the thermal energy of the extract air is recovered and transferred to the supply air. If necessary, the air is heated or cooled by the heat exchanger before it is discharged to the room as a displacement flow.

If the outdoor air temperature is very low or if it makes sense with regard to energy efficiency, the recuperative heat exchanger can be bypassed (bypass damper open).

An EC centrifugal fan draws in the extract air which then passes through a coarse dust filter that protects the recuperative heat exchanger and the fan from contamination. The extract air passes through the recuperative heat exchanger and the fan before it leaves the space and is led into the open.

It is possible to add extract air (secondary air) to the outdoor air in order to increase the thermal output and speed up the conditioning of the supply air, while the required outdoor air volume is reduced to a minimum.

If cooling is required, the heat exchanger can be used for dry cooling. Temperatures below the dew point, however, should be avoided in any case. The heat exchanger can be vented and drained.

The ventilation unit is controlled with the FSL-CONTROL II single room control system, which has its own control equipment box. For more information see the FSL-CONTROL II installation and configuration manual. All electrical components of the ventilation unit are factory wired to the control equipment box.

If the power fails, the outdoor air and exhaust air dampers are closed to ensure fire protection and frost protection and to avoid draughts. This is ensured by a capacitor in each actuator.

## 2 Safety

### 2.1 Symbols used in this manual

#### Safety notes

Symbols are used in this manual to alert readers to areas of potential hazard. Signal words express the degree of the hazard.

Comply with all safety instructions and proceed carefully to avoid accidents, injuries and damage to property.

#### **DANGER!**

Imminently hazardous situation which, if not avoided, will result in death or serious injury.

#### **WARNING!**

Potentially hazardous situation which, if not avoided, may result in death or serious injury.

#### **CAUTION!**

Potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

#### **NOTICE!**

Potentially hazardous situation which, if not avoided, may result in property damage.

#### **ENVIRONMENT!**

Environmental pollution hazard.

#### Safety notes as part of instructions

Safety notes may refer to individual instructions. In this case, safety notes will be included in the instructions and hence facilitate following the instructions. The above listed signal words will be used.

Example:

1. ▶ Untighten the screw.

2. ▶

#### **CAUTION!**

**Danger of finger entrapment when closing the lid.**

Be careful when closing the lid.

3. ▶ Tighten the screw.

#### Tips and recommendations



*Useful tips and recommendations as well as information for efficient and fault-free operation.*

#### Additional markers

In order to highlight instructions, results, lists, references and other elements, the following markers are used in this manual:

Marker	Explanation
1., 2., 3. ...	Step-by-step instructions
	Results of actions
	References to sections in this manual and to other applicable documents
	Lists without a defined sequence
[Switch]	Operating elements (e.g. push buttons, switches), display elements (e.g. LEDs)
'Display'	Screen elements (e.g. buttons or menus)

### 2.2 Correct use

Decentralised ventilation units are used to create a comfortable room temperature and to ventilate rooms such as offices, meeting rooms, or classrooms in schools.

Functions of the ventilation unit

- Ventilation
- Outdoor air filtering
- Heating and/or cooling (optional)

The ventilation unit is designed for frost-proof installation in buildings, on the inside of an external wall. The unit has to be properly installed next to an external wall (by others).

Correct use also involves complying with all the information provided in this manual.

Any use that goes beyond the correct use or any different use of the unit is regarded as incorrect use.



### Incorrect use

#### **WARNING!**

##### **Danger due to incorrect use!**

Incorrect use of the unit can lead to dangerous situations.

Incorrect use includes:

- Any use that is not described in this operating manual
- Operation that does not comply with the technical data
- Modifying of the unit by others, tampering with the unit
- Use, installation, operation, maintenance or repair other than described in this manual
- Having work carried out by unqualified individuals
- Use of non-genuine replacement parts or accessories, whose quality and function are not equivalent to those of the original parts
- Operation in rooms with explosive gases or gas mixtures
- Operation in rooms where the supply or extract air contains particles that are conductive, aggressive, corrosive, combustible or hazardous to health
- Operation in rooms where the humidity is permanently high (> 90 %)
- Operation outdoors
- Use for enforced ventilation
- Operation without air filters

## 2.3 Safety signs

The following symbols and signs are found on the unit. They apply to the very location where they are found.

### Electrical voltage



Hazardous electrical voltage that is present in the ventilation unit. Only skilled qualified electricians are allowed to work on parts of the ventilation unit marked with this symbol. Such work must be carried out only by skilled qualified electricians or the technical service.

### Controls access panel



Only skilled qualified electricians are allowed to open the controls access panel. Ensure that no voltage is present on any mains circuit before you open the cover to access the terminal connections.

## 2.4 Electric shock hazard

### Electric current

#### **DANGER!**

##### **Danger of death due to electric current!**

Danger of electric shock! Do not touch any live components! Damaged insulation or damaged parts are a life threatening hazard.

- Only a skilled qualified electrician must work on the electrical systems.
- If the insulation is damaged, disconnect the power supply immediately and have the insulation repaired.
- Switch off the power supply before you carry out maintenance or cleaning.
- Ensure that live parts do not come into contact with moisture. Moisture can cause a short circuit.

## 2.5 Risks from rotating parts

### Rotating parts

#### **WARNING!**

##### **Risk of injury from rotating parts!**

Rotating parts in the fan can cause severe injuries.

- Switch off the power supply before you carry out maintenance or cleaning.
- The fan does not stop immediately! Check that no parts are moving once you have opened the ventilation unit.
- Do not reach into the moving fan.
- Do not open the ventilation unit while the fan is in operation.

## 2.6 Health risk due to hygiene issues

### Hygiene issues

**⚠ CAUTION!**

**Health risk due to hygiene issues!**

If you do not stick to the maintenance schedule or if the unit is not used for several weeks, bacteria and germs may start growing in the air filter and in the recuperative heat exchanger.

- Change filters and clean the recuperative heat exchanger in the recommended intervals.
- Change the air filters and clean the recuperative heat exchanger after lengthy idle periods.

## 2.7 Risks caused by an unsuitable installation location

### Unsuitable installation location

**⚠ WARNING!**

**Risks caused by an unsuitable installation location!**

Installing the unit in an unsuitable location can lead to dangerous situations.

- The ventilation unit should preferably be installed in a thermally insulated, low-leakage building.
- Frost free and dry installation location.
- Install the optional outer casing or use other means (by others) to protect the unit from being tampered with by unauthorised individuals.
- The unit must remain accessible for maintenance and cleaning.

## 2.8 Qualified staff

### Qualification

The work described in this manual has to be carried out by individuals with the qualification, training, knowledge and experience described below:

#### Facility manager

Facility managers have been instructed so that they are able to avoid any potential hazards related to the work under consideration. Facility managers must not carry out any jobs beyond regular operation unless explicitly stated in this manual and unless the system owner has specifically agreed to them. Instruction is provided by the HVAC contractor when the system is handed over.

Facility managers are responsible for cleaning the unit, for carrying out functional tests and regular checks, for maintenance and for smaller adjustments.

#### HVAC technician

HVAC technicians are individuals who have sufficient professional or technical training in the field they are working in to enable them to carry out their assigned duties at the level of responsibility allocated to them and in compliance with the relevant guidelines, safety regulations and instructions. HVAC technicians are individuals who have in-depth knowledge and skills related to HVAC systems; they are also responsible for the professional completion of the work under consideration.

HVAC technicians are individuals who have sufficient professional or technical training, knowledge and actual experience to enable them to work on HVAC systems, understand any potential hazards related to the work under consideration, and recognise and avoid any risks involved.

#### Network administrator

Network administrators design, install, configure and maintain the IT infrastructure in companies or organisations.

#### Skilled qualified electrician

Skilled qualified electricians are individuals who have sufficient professional or technical training, knowledge and actual experience to enable them to work on electrical systems, understand any potential hazards related to the work under consideration, and recognise and avoid any risks involved.

Any work has to be carried out by individuals who can be expected to carry out their assigned duties reliably. Individuals whose reaction time is delayed due to alcohol, drugs or other medication must not carry out any work.

### 2.8.1 Personal protective equipment

Personal protective equipment is equipment that protects the user against health or safety risks at work.

Personal protective equipment must be worn for various types of work; the protective equipment required is listed in this manual together with the description of each type of work.

#### Description of personal protective equipment

##### Industrial safety helmet



Industrial safety helmets protect the head from falling objects, suspended loads, and the effects of striking the head against stationary objects.

**Protective gloves**

Protective gloves protect hands from friction, abrasions, punctures, deep cuts, and direct contact with hot surfaces.

**Safety shoes**

Safety shoes protect the feet from crushing, falling parts and prevent slipping on a slippery floor.

## 3 Transport and storage

### Checking delivered goods

Check delivered items immediately after arrival for transport damage and completeness.

If there is any visible damage, proceed as follows:

- Either do not accept the delivered items, or accept them with reservations.
- Note down the damage on the shipping documents or on the shipping company's delivery note.
- Immediately file a complaint with the shipping company and vendor.



*File a complaint as soon as you detect any damage. Claims for compensation can be filed only within the complaint period.*

### Transport

#### CAUTION!

**Danger of injury from sharp edges, sharp corners and thin sheet metal parts!**

Sharp edges, sharp corners and thin sheet metal parts may cause cuts or grazes.

- Be careful when carrying out any work.
- Wear protective gloves, safety shoes and a hard hat.

- If possible, take the unit in its transport packaging up to the installation location.
- Use only lifting and transport gear designed for the required load.
- Always secure the load against tipping and falling.
- Do not move bulky items just by yourself. Get help to prevent injuries and damage.

### Storage

Please note:

- Store the product only in its original packaging
- Protect the product from the effects of weather
- Protect the product from humidity, dust and contamination
- Storage temperature: -10 °C to 50 °C.
- Relative humidity: 95% max., no condensation

### Packaging

Properly dispose of packaging material.

## 4 Installation

### 4.1 General installation information

#### Before installation

Before you install the unit, take suitable precautions to protect air distribution components from contamination during installation ⇒ VDI 6022.

If this is not possible, at least cover the unit or take other precautions to protect it from contamination. In this case you have to ensure that the unit cannot be started.

Ensure that all components are clean before you install them. If necessary, clean them thoroughly. If you have to interrupt the installation procedure, protect all openings from the ingress of dust or moisture.

#### Installation information

- Install the ventilation unit preferably in a thermally insulated, low-leakage building.
- Frost free and dry installation location.
- Installation and connections to be performed by others; fixing, connection and sealing material to be provided by others
- Install the unit only on structural elements that can carry the load of the unit.
- Use only certified fixing systems.
- The room facing side of the unit must remain completely accessible for maintenance and cleaning.

#### Air connection

Two openings in the façade are required, one for outdoor air and one for exhaust air. The ventilation unit is to be sealed to the external wall with a factory fitted closed cell perimeter seal. The surfaces onto which the outdoor air and exhaust air openings are sealed must be even. Ensure that the unit is correctly sealed to the wall.

The outdoor air and exhaust air openings have to be protected against the effects of weather (by others).

### 4.2 Installing the ventilation unit

Dimensions, the position of air openings and the position of fixing points may differ for each variant; drawings with project-specific information will be provided together with the order documents.

#### Personnel:

- HVAC technician

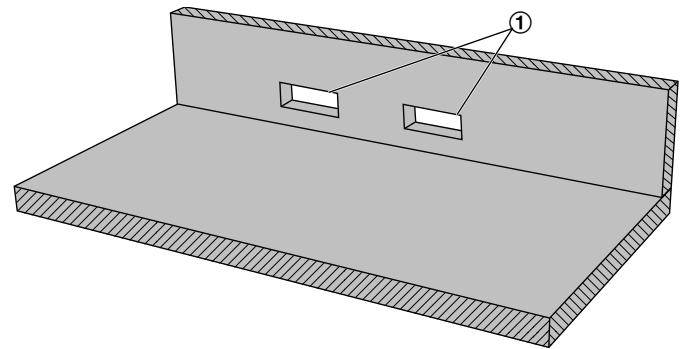


Fig. 4: Preparing the façade (example)

Place the ventilation unit on the floor slab, on the inside of an external wall. Façade openings (Fig. 4/1) for outdoor air and exhaust air are required. Screws and wall-plugs for fixing the ventilation unit to the floor are not included in the supply package, but have to be selected by others and suitable for the floor.

Install the unit in such a way that it rests completely on its feet. Use the fixing points only as an additional means of securing the unit in the intended position.

Make sure that the unit can be connected to the pipe-work and to the mains supply.

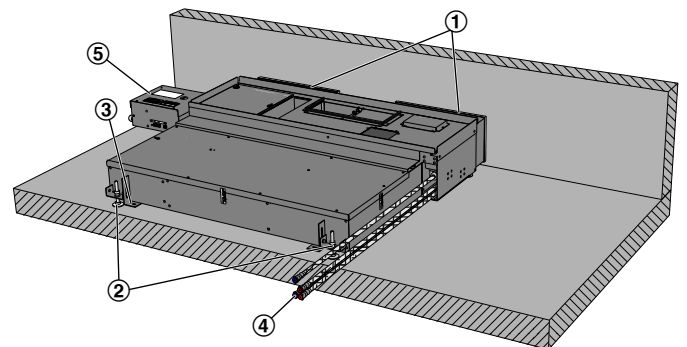


Fig. 5: Installing the unit, FSL-U-ZAS, right side construction (example)

1. ▶ Place the unit with the air openings (Fig. 5/1) in front of the wall.

Align the air openings of the unit with the openings in the wall; if necessary, adjust the feet accordingly (Fig. 5/2). Secure the feet by tightening the nuts. Push the unit slightly towards the wall such that the seals become slightly compressed and the unit is tightly attached to the wall openings.

2. ▶ Then use suitable screws (Ø 6 mm) to fix the unit through the fixing brackets (Fig. 5/3) to the floor.

## Installing the ventilation unit

3. ▶ Connect the water pipes (Fig. 5/4) (flexible hoses are available as an option), ↻ 15; apply pressure to check for leakages.
4. ▶ Connect the electrical cables to the control equipment box (Fig. 5/5), ↻ 16, then carry out a functional test.

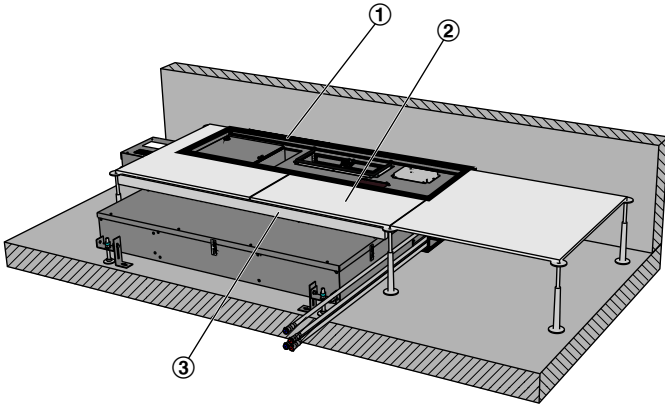


Fig. 6: Building the raised floor

5. ▶ The height of the raised floor (Fig. 6/2) has to be such that the ventilation grille is flush with the finished floor including flooring (grille max. 0.5 mm lower than the floor surface); leave an opening the size of the ventilation unit (Fig. 6/1). Do not place any props or studs near the ventilation unit. Support the ventilation unit across the entire width with a support structure (Fig. 6/3).

The outer casing must prevent unauthorised individuals from reaching into the unit and from being injured (e.g. by electric shock).

6. ▶ Insert the ventilation grille only after the flooring has been completed. Cover the unit with the supplied wooden board to protect it while you build the floor.

The interior of the ventilation unit must remain accessible for maintenance.

### ! NOTICE!

#### Contamination

If there is a lengthy gap between installation and commissioning of the unit, we recommend the following measures in order to avoid cumbersome cleaning procedures at the time of commissioning.

- Remove the filters and store them in a dry place, protected from dust; cover the filter openings.
- Cover all openings of the unit, e.g. with plastic, to prevent the ingress of dust.
- Switch off the power supply to the unit.

### 4.3 Connecting the water pipes

**Personnel:**

- HVAC technician

**Protective equipment:**

- Industrial safety helmet
- Safety shoes
- Protective gloves

**General information**

- Using flexible hoses (accessories) instead of rigid water pipes to connect the heat exchanger will make it easier to clean the heat exchanger.
- Fittings such as valves and lockshields are factory fitted but you will have to tighten them at the time of installation.
- Control valves are fitted in the return pipe, lockshields in the flow pipe; this improves the control behaviour.
- Units with a condensate drip tray (optional) require a drainage pipe and a drain trap (by others).
- Control valves, gate valves and safety valves are required; if they are not part of the supply package, they have to be provided by others.
- Drain valves and vent valves are required; if they are not part of the supply package, they have to be provided by others.
- As a last step, check all connections to make sure they do not leak.
- We recommend insulating the pipes in order to prevent energy losses.

**! NOTICE!**

**Temperatures below the dew point**

Temperatures below the dew point should be avoided as they lead to condensation which may cause damage to the building structure.

Interfaces	Dimensions	Connection options:
Chilled water/hot water connection	G 1/2" union nut and flat seal, SW24	Screw connection (rigid) Flexible hoses (accessory)
Condensate drain (optional)	Spigot Ø12 mm	Hose (by others)

#### Marking of 2-pipe heat exchangers

Symbol	Connection	Type of fitting <sup>1</sup>	Operating mode
V (blue)	Chilled water or hot water flow	Lockshield	Cooling or heating <sup>2</sup>
R (blue)	Chilled water or hot water return	Control valve	

1) Only units with FSL-CONTROL II.

2) A three-way valve allows for both heating and cooling.

#### Marking of 4-pipe heat exchangers

Symbol	Connection	Type of fitting <sup>2</sup>	Operating mode
V (blue)	Chilled water flow	Lockshield	Cooling
R (blue)	Chilled water return		
V (red)	Hot water flow	Lockshield	Heating
R (red)	Chilled water return	Control valve	

1) Only units with FSL-CONTROL II.

Ensure that the surfaces are clean

1. ▶ Insert seal and tighten screw connection by hand.

**! NOTICE!**

Heat exchanger and pipes may easily become damaged.

Always use a suitable tool to counter the tightening force in order to prevent any damage.

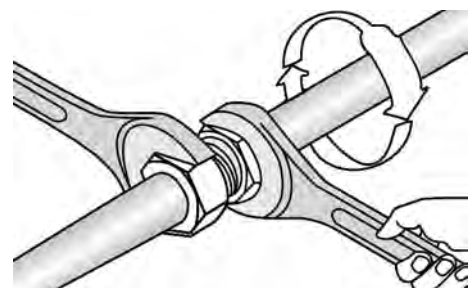


Fig. 7: Tightening the connection

2. ▶ Tighten threaded connections, including valves and lockshields, with a spanner.

**! NOTICE!****Subzero temperatures will damage the heat exchanger!**

Only fill the heat exchanger if there is no danger of freezing.

3. ▶ Fill the heat exchanger and vent it. To fill the system, use clean tap water (pH value 6.5 to 9) or a water glycol mixture (max. 30 % glycol). Heat exchangers are fitted with bleed screws for venting.
4. ▶ Check the system for leaks immediately after installation and then at regular intervals.

**Flexible hoses**

🔗 Appendix 'Flexible hoses' on page 45

- Feed cables through the cable glands on the ventilation unit.
- Ensure that the unit can be de-energised (all phases) for maintenance such that no voltage is present. This requires separators (e.g. fuses or RCBOs); the distance between contacts should be at least 3 mm.
- For units without integral controls from TROX follow the instructions of the controls provider.

**Notes on control panels**

Select an installation location where the control panel is not affected by disturbances. Avoid solar gain and draughts.

Seal the end of the conduit in the junction box as otherwise a draught could occur in the conduit and affect the measurement results.

## 4.4 Making electrical connections

**⚠ DANGER!****Electric shock hazard! Electrical equipment carries a dangerous electrical voltage!**

- Only skilled qualified electricians are allowed to work on the electrical system and to connect the unit to the mains.
- Disconnect the cable from the mains (all phases) and secure the unit against being switched on accidentally.
- Ensure that no voltage is present.
- Carry out assembly or connection jobs only as long as no voltage is present.

**Notes on the electrical installation**

Use only cables that are designed for the supply voltage for which they will be used. The length and cross section as well as any contact resistance may increase voltage losses. The power rating of each unit must also be considered. A skilled qualified electrician has to select the correct cable types and sizes. This job must only be carried out by specialist electrical companies.

- For the electrical connection comply with any applicable regulations and follow the code of good practice. Be sure to comply with the applicable guidelines for working on electrical and electronic equipment as well as with any applicable local regulations.
- The connection data can be found on the rating plate or in the wiring diagrams.
- Protect any connections from physical damage.



### 4.4.1 Wiring

#### Personnel:

- Skilled qualified electrician

#### DANGER!

Danger of electric shock! Do not touch any live components! Electrical equipment carries a dangerous electrical voltage.

- Only skilled qualified electricians are allowed to work on the electrical system.
- Switch off the power supply before working on any electrical equipment.

We recommend you to make the electrical connections before you build the raised floor. If this is not possible, you can access the control equipment box after removing the side with the service socket ( ↻ 5). The control equipment box must remain accessible even after the ventilation unit has been installed (provide sufficient extra cable length).

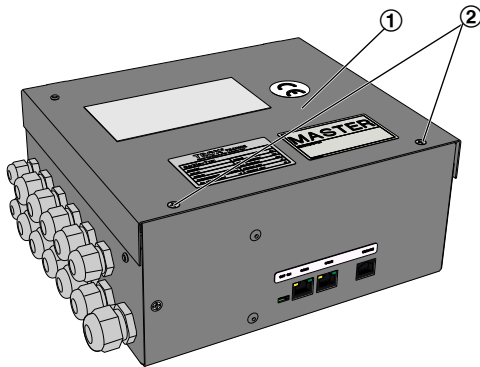


Fig. 8: Control equipment box

1. ▶ Remove the cover of the control equipment box (Fig. 8/1). To do so, loosen the Phillips screws (Fig. 8/2), then take off the cover.
2. ▶ Connect the ventilation unit according to the wiring diagram.
  - Stand-alone operation ↻ 18
  - Integration with the central BMS ↻ 21

## 4.4.1.1 Stand-alone operation

### Wiring diagram, unit with digital control panel

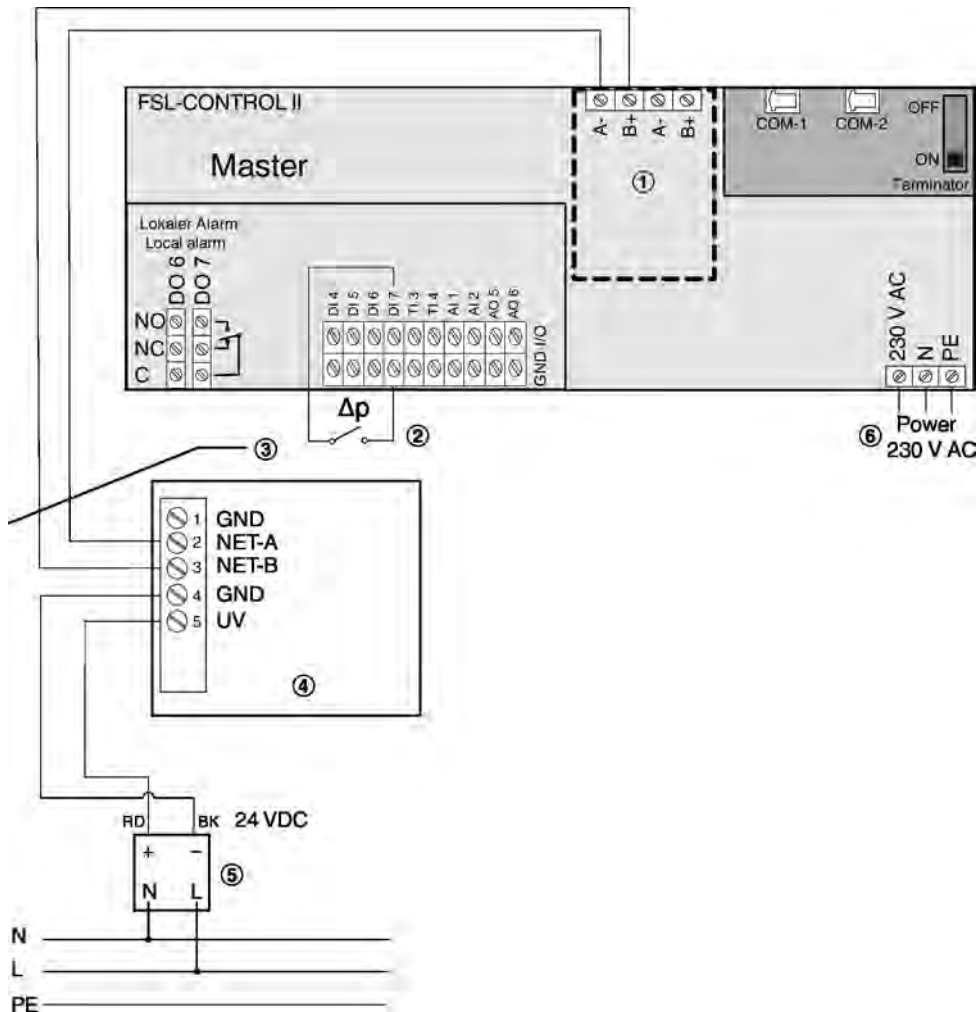


Fig. 9: Wiring diagram, stand-alone operation (without central BMS)

- |   |   |
|---|---|
| ① LonWorks (FTT10) interface, 24  | ④ Digital control panel   |
| ② Outdoor air filter differential pressure monitoring, unit variants *-HE, *-HV | ⑤ Power supply unit, 24 V DC (optional or to be provided by others) |
| ③ JY(St)Y 2 × 2 × 0.8, 10 m max. (use only twisted pair for LON-A and LON-B)    | Connecting cable 3 × 0.75 mm <sup>2</sup> (L, N, PE)                |

### Important note:

The digital control panel is a dedicated device to be used with the ventilation unit (master). Both carry the same serial number, which is found on the rating plate (ventilation unit) or on the packaging (control panel).

Use any control panel only for a ventilation unit with the same serial number.

**Digital control panel**

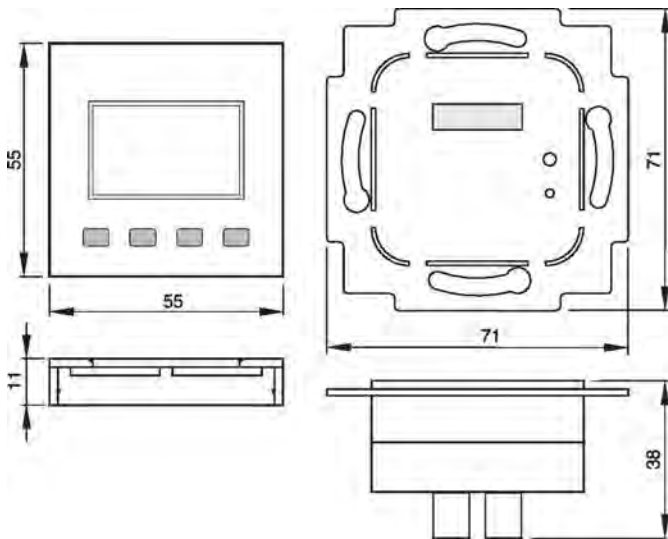


Fig. 10: Dimensions

Note: The overall dimensions depend on the frame that has been selected for the switch.

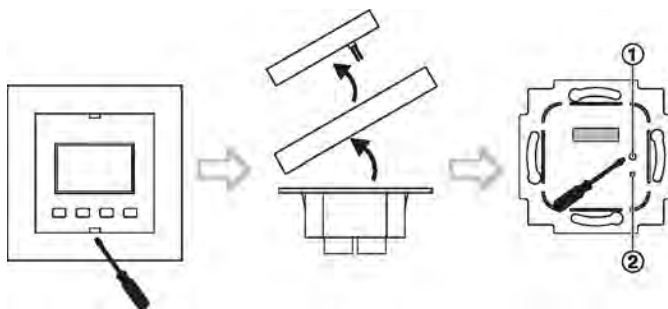


Fig. 11

- 1 Service push button
- 2 Service LED

**Notes on installation**

The control panel is suitable for installation on a junction box. You can connect the bus cable to the control panel with a screw terminal. For pre-wiring you can remove the screw terminal from the panel.

We recommend using deep junction boxes as they provide more space for cables.

Attach the LON interface card to the screws (by others) in the junction box; max. torque for the screws is 0.8 Nm. Place the mounting ring of the LON interface card flat on the face of the wall; do not cover it with paint or wallpaper.

**Technical data**

Supply voltage	15...24 V= (±10%) or 24 V~ (±10%)
Power consumption	1.3 W / 1.5 VA
Interface	FTT, free topology
Measuring range	0...+50 °C
Accuracy (21 °C)	±0.5 K
Response time	Time constant $t_{63}$ 15 minutes
Screw terminals	1.5 mm <sup>2</sup> max.
Protection level	IP 30 to EN 60529
Ambient temperature	0...50 °C
Transport	-10...50 °C / max. 85% rh, no condensation

## Wiring diagram, unit with analogue control panel

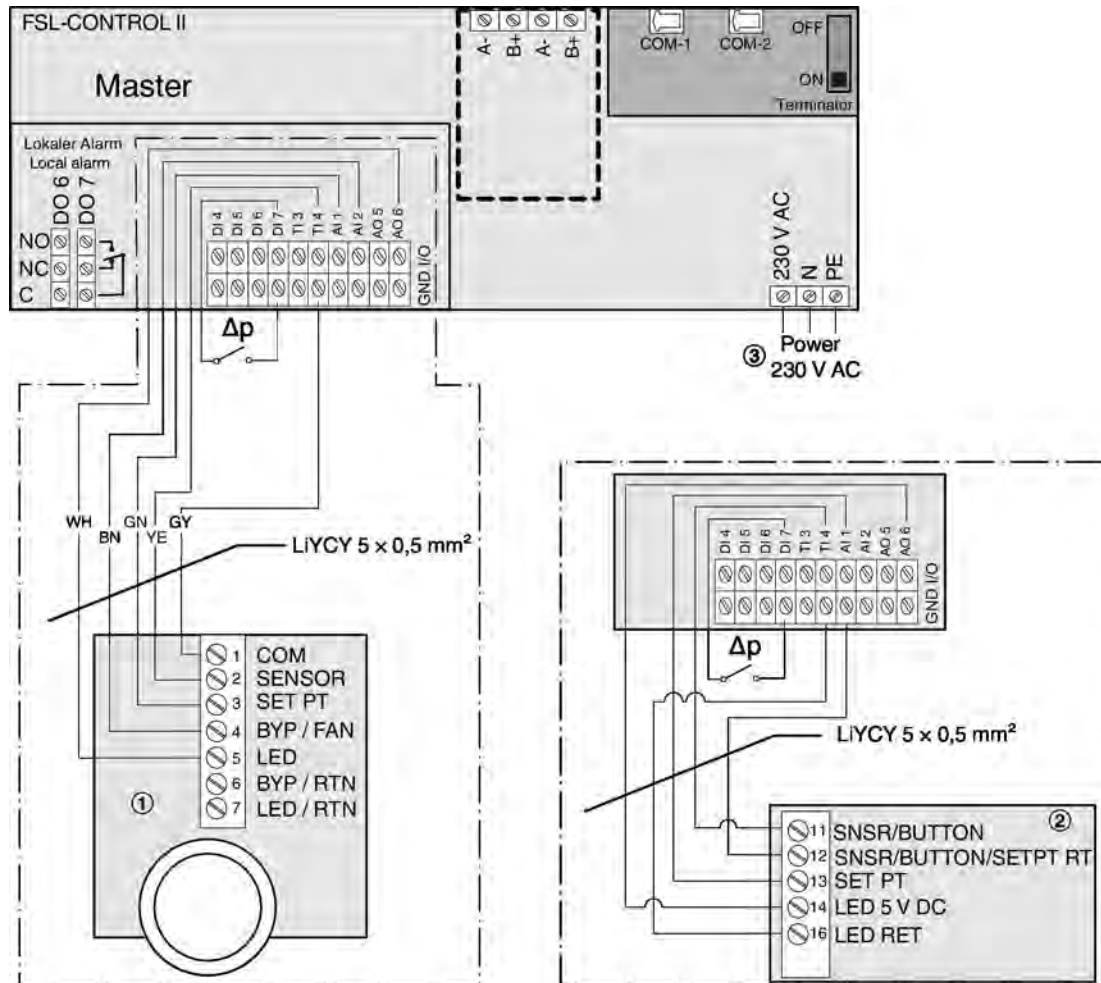


Fig. 12: Wiring diagram for analogue control panels

- ① Control panel with 0-1-2-3-AUTO selector switch
- ② Control panel without selector switch
- ③ Connecting cable 3 × 0.75 mm<sup>2</sup> (L, N, PE)

4.4.1.2 Integration with a central BMS

Wiring example for three interconnected FSL-CONTROL II controllers in a control zone

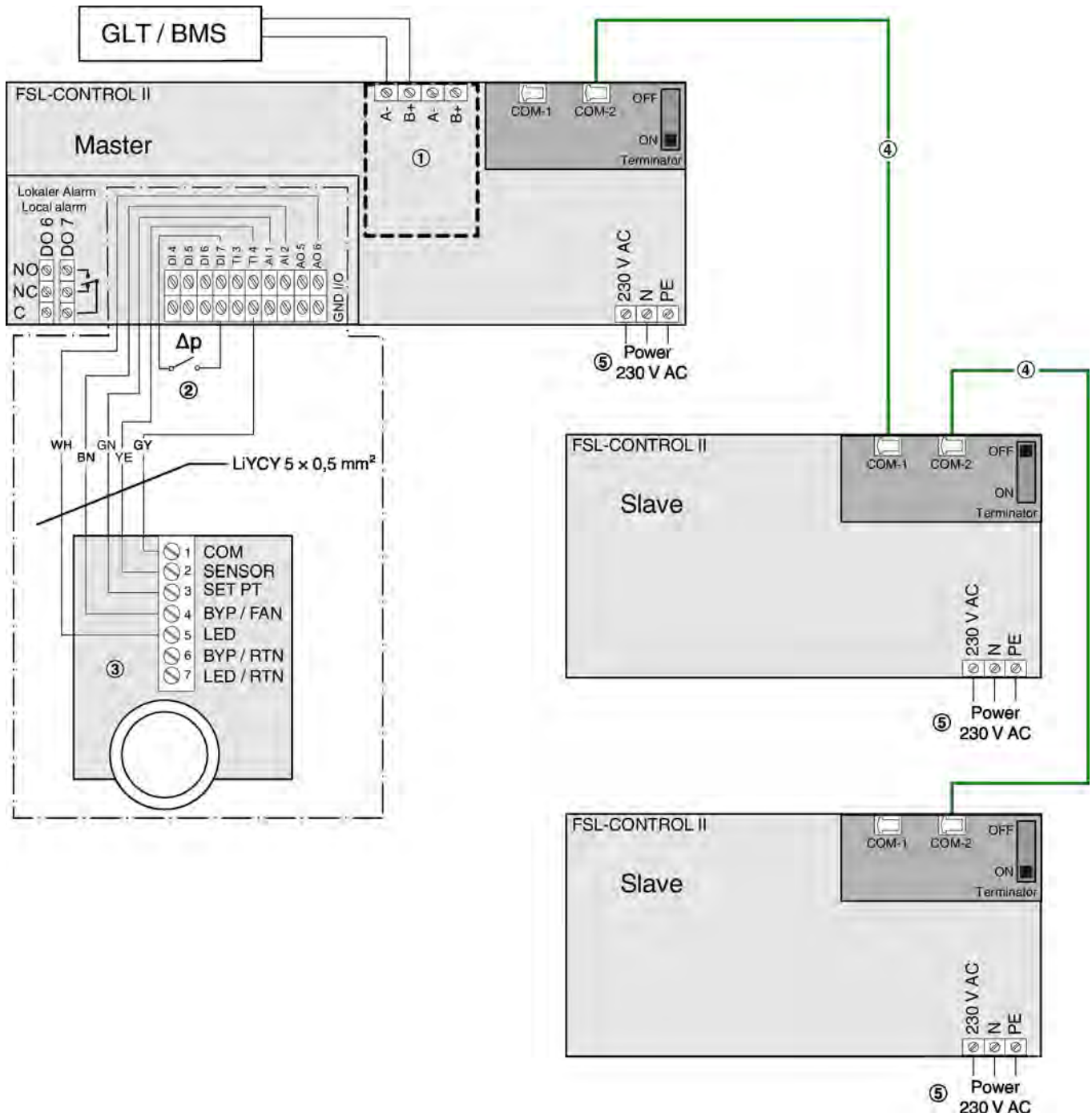


Fig. 13: Wiring diagram: Interconnected FSL-CONTROL II controllers

- ① LonWorks (FTT10) interface or BACnet MS/TP or Modbus RTU interface (optional) ⚡ 23
- ② Outdoor air filter differential pressure monitoring, unit variants \*-HE, \*-HV
- ③ Analogue control panel with or without selector switch (a digital control panel can be used only for stand-alone operation of the ventilation unit)
- ④ Patch cable (by others, at least cat. 5)
- ⑤ Connecting cable 3 × 0.75 mm<sup>2</sup> (L, N, PE)

## 4.4.2 FSL-CONTROL II communication

### 4.4.2.1 Several controllers in a control zone

Connect FSL-CONTROL II controllers (master-slave) within a control zone with a standard network cable (RJ45, to be provided by others).

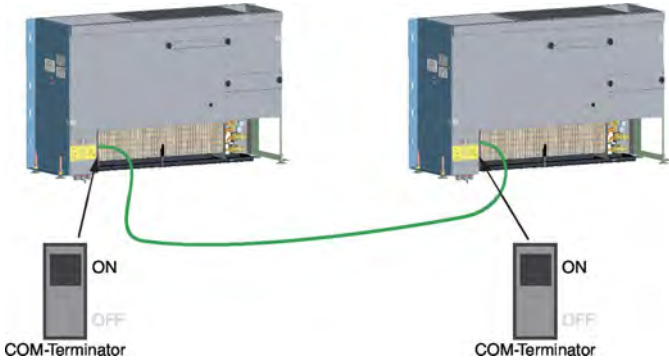


Fig. 14: FSL-CONTROL II communication of 2 units



Fig. 15: FSL-CONTROL II communication of 3 units

- Up to 15 FSL-CONTROL II controllers for a control zone (1 × master, 14 × slave)
- Up to 300 m network cable for each control zone
- Network cable type SF-UTP (braided and with foil), to ISO IEC 11801 (2002), as a patch cable with RJ45 plugs on both ends, or from a roll, at least cat. 5
- Activate terminal resistors on the first and last controllers on the communication cable

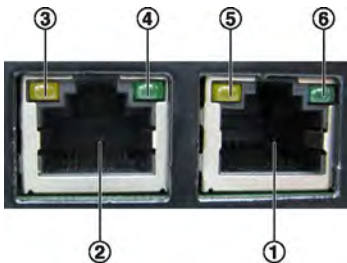


Fig. 16: Sockets and LEDs

- ① Port COM-1
- ② Port COM-2
- ③ LED for communication cable termination
- ④ Not used
- ⑤ LED - Data reception
- ⑥ LED - Heartbeat

### LEDs

Termination (yellow)

ON - Cable termination is enabled

OFF - Cable termination is disabled

Data reception (yellow)

ON (blinking) - Data reception in progress

OFF - No data reception

Heartbeat (green)

ON (blinking) - Normal controller operation

OFF - Device not ready

### Terminal resistor / termination

Fault-free data exchange between the controllers requires that both ends of the communication cable are terminated.

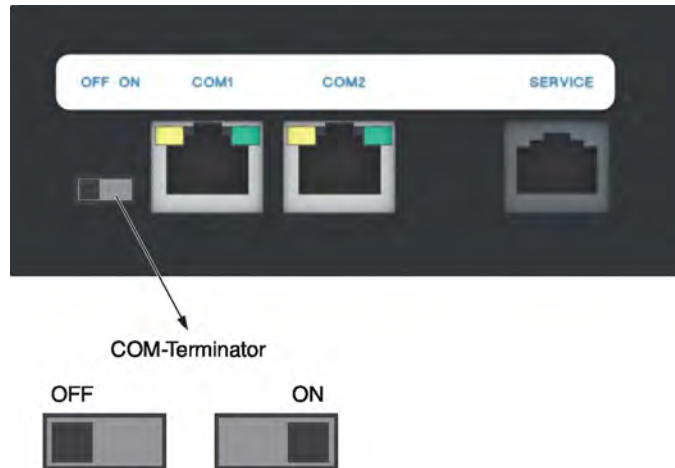


Fig. 17: COM terminal resistor

COM terminal resistor

OFF - Cable termination is disabled

ON - Cable termination is enabled

#### 4.4.2.2 Network with several control zones

##### Building a network

You may interconnect control zones by making use of a standard network protocol such as LON FTT10, BACnet MS/TP or Modbus RTU. This requires a bus interface card to be connected to the FSL-CONTROL II master controller.

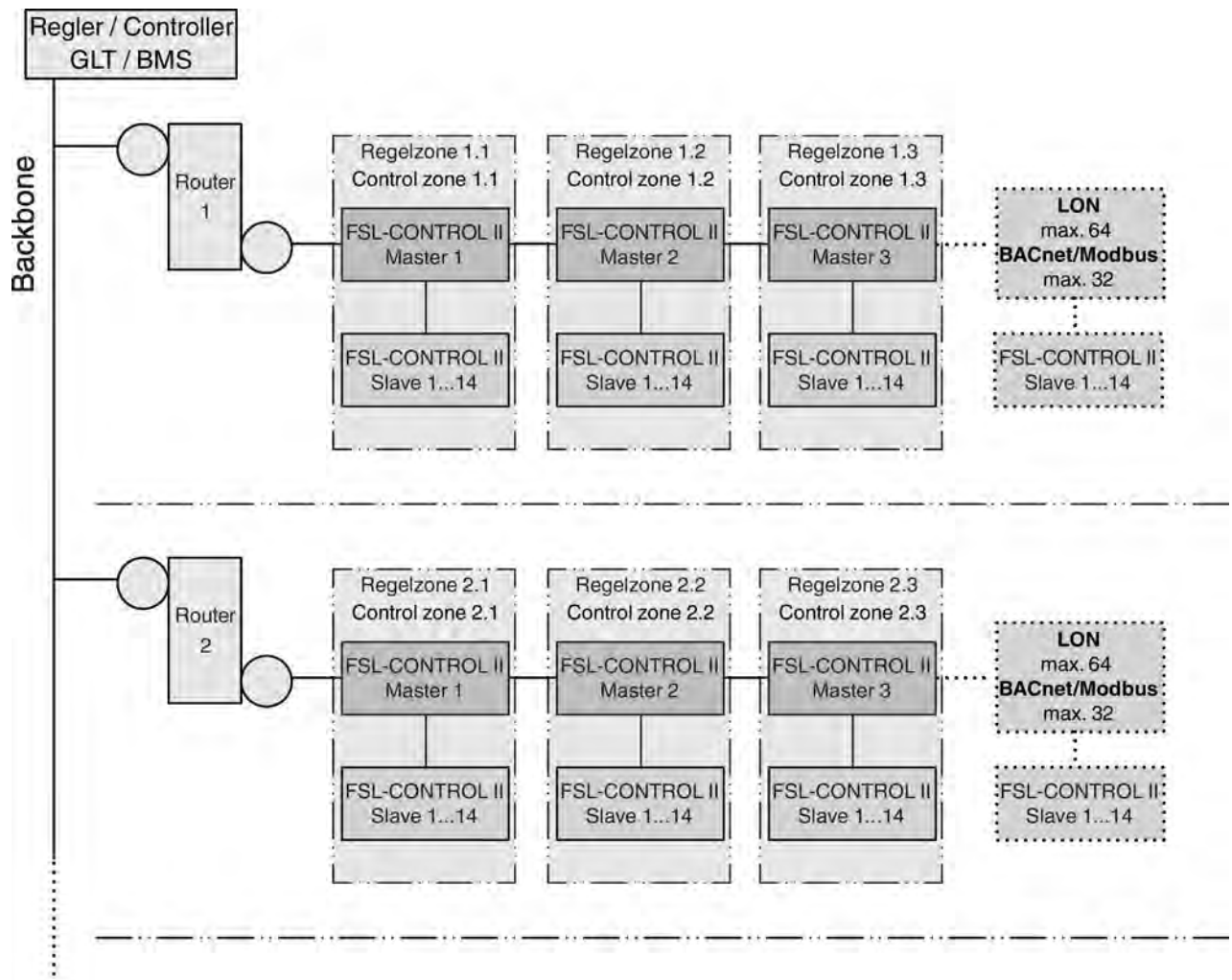


Fig. 18: FSL-CONTROL II, building a network



If the master controller is integrated with a central BMS (by others), it acts as a slave within the bus network, but as a master within the FSL-CONTROL II system.

## 4.4.2.2.1 Integration with a bus communication system provided by others

### LonWorks LON-FTT10 interface module

#### Connecting data cables

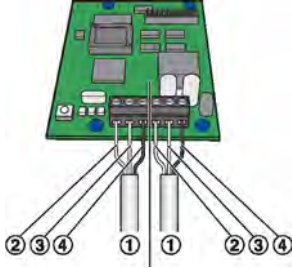


Fig. 19: Wiring the LonWorks interface card

- ① Bus cable
- ② LON A
- ③ LON B
- ④ SH (shield)

The LonWorks interface card has terminals for two bus cables of a LonWorks network. Depending on the network topology, controllers at the end of a chain may be connected to one bus, controllers at other positions in the chain may be connected to two buses.

1. ▶ Strip the insulation from the bus cable (at least two wires), insert the bare wires into the terminals and tighten the screws by hand.
2. ▶ Fix the bus cables to the casing using the wire clamping bracket.
3. ▶ Connect the shield to the SH terminals.

**Note:** Within a chain (channel) connect the shield only at one point to the earth. Earthing the shield at every controller will lead to voltage disturbances.

4. ▶ To avoid reflections at the end of a chain (channel), use a terminal resistor.

#### Recommended bus cables

Bus cables to TIA 568A, category 5

- Belden 8471 or 85102
- Cables to DOCSIS specification level IV
- JY(St)Y 2×2×0.8 (use only twisted pair for LON-A and LON-B)

### Commissioning

#### Personnel:

- Network administrator

#### Materials:

- Software, e.g. Echelon or LonMaker
- Application software, download from [www.troxtechnik.com](http://www.troxtechnik.com)

1. ▶ **Commissioning:** Press the service pin push button and download the application software for the LonWorks node.
2. ▶ **Binding:** Create the logical bindings for the network variables to be transferred by the LonWorks interface card (expansion module). As an alternative, use polling.
3. ▶ **Configuration:** If necessary, adjust the configuration.
4. ▶ Configure data points

### BACnet MS/TP or Modbus RTU interface card

#### Connecting data cables

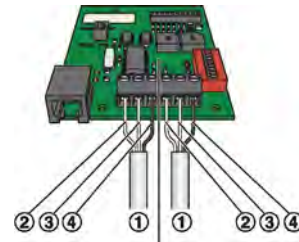


Fig. 20: Wiring the BACnet MS/TP or Modbus RTU interface card

- ① Bus cable
- ② B+ (EIA-485)
- ③ A- (EIA-485)
- ④ SH (shield)

The interface card has terminals for two cables of an EIA-485 network. A maximum of 32 units can be operated on one network segment.



- ▶ Strip the insulation from the bus cable (at least two wires), insert the bare wires into the terminals and tighten the screws by hand.

Make sure that the polarity of the conductor pairs is correct. Incorrect polarity will result in inverted data signals and hence communication errors.

- ▶ Fix the bus cables to the casing using the wire clamping bracket.
- ▶ Connect the shield to the SH terminals.

**Note:** Within a chain (channel) connect the shield only at one point to the earth. Earthing the shield at every controller will lead to voltage disturbances.

- ▶ To avoid cable reflections, network segments must be terminated at both ends with 120 Ω bus terminal resistors. Alternatively, the terminal resistors can be enabled or disabled on the PCB.

### Recommended bus cables

Twisted Pair, e.g. JY(St)Y 2 × 2 × 0.8 (use only twisted pair for B+ and A-)

### Hardware configuration

Before you use a BACnet MS/TP or Modbus RTU interface card, you have to configure it to the actual application. To do so, use the switches on the interface card.

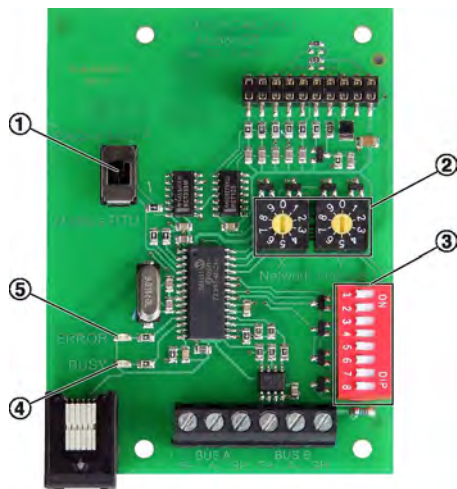


Fig. 21: BACnet MS/TP or Modbus RTU interface card

- ① Slide switch for setting the protocol type
- ② Rotary switch for setting the network address
- ③ DIP switch for setting the communication parameters
- ④ BUSY-LED (green): On = supply voltage OK, blinking = communication in progress
- ⑤ ERROR-LED (red): On = communication error

### Setting the protocol type

Use the slide switch (Fig. 21/1) to set the BACnet MS/TP or Modbus RTU protocol.

### Setting the network address

Use the two address code switches X and Y (Fig. 21/2) to set a network address (01 to 99). Address 00 is reserved for broadcast mode. A maximum of 32 controllers (network addresses) can be operated on one network segment. Each device requires a different network address.

### Transmission speed (EIA-485)

BACnet	Modbus	S2	S3
9600 Bd	9600 Bd	Off	Off
19200 Bd	19200 Bd	On	Off
38400 Bd	38400 Bd	Off	On
76800 Bd	57600 Bd	On	On

### Parity

Parity	S5	S6
None	Off	Off
None	On	Off
Odd	Off	On
Even	On	On

### Terminal resistor for EIA-485 network

Terminal resistor	S8
Disabled	Off
Enabled	On

### Commissioning

#### Personnel:

- Network administrator
  - ▶ Configuration of data points depending on protocol type
    - BACnet -
    - Modbus RTU -

## 5 Initial commissioning

### Personnel:

- Skilled qualified electrician

Before initial commissioning:

- Remove protective film, if any.
- Ensure that the unit is clean. If necessary, clean the casing and the inlet and outlet openings from dust.
- Professional connection of water pipes:
  - Ensure that all heat exchangers are clean and free from residues and foreign matter.
  - Ensure that the water system including the heat exchanger has been filled and vented.
  - Check operating pressure and temperature; ensure that there are no leaks.
  - If the unit has a condensate drain, check and ensure that the drain does not leak.
- Professional electrical connections:
  - Check and ensure that the actual supply voltage is the same as the one given on the rating plate.
  - Ensure that the ventilation unit has been correctly earthed.
- Check filters for correct fit and contamination
  - ↳ 8.1.1 'Checking and replacing the filters' on page 32. Should the filters have been contaminated even before installation, replace them.

For commissioning see also VDI 6022, part 1 – 'Hygiene requirements for ventilation and air-conditioning systems and units'.

1. ▶ Switch on the power supply.
  - ⇒ The ventilation unit is on.
2. ▶ Configure the control of the ventilation unit, if necessary.

### Control of ventilation units

For units with integral FSL-CONTROL II control system

↳ Installation and configuration manual, FSL-CONTROL II single room control.

For units without integral controls from TROX follow the instructions of the controls provider.

## 6 Control panel settings

### 6.1 Analogue control panel

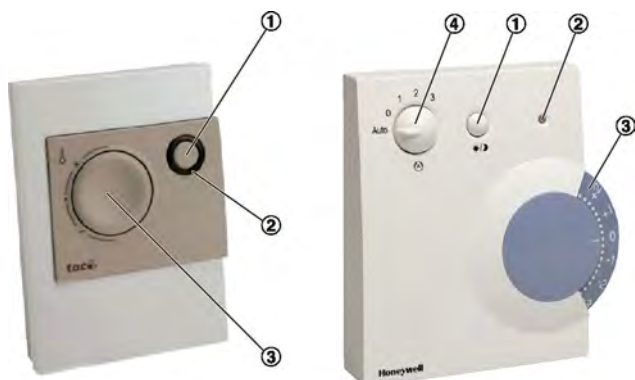


Fig. 22: Control panels

- ① Occupancy push button
- ② LED
- ③ Setpoint value adjuster
- ④ Fan stage selector

Function	Description	LED
Occupied/ Unoccupied <sup>1</sup>	If you want to change the operating mode from 'Occupied' to 'Standby' or vice versa, press the Occupancy push button briefly.  This allows you, for example, to manually switch to 'Standby' mode when the room is not occupied.  Start-up delay: 1 to 2 minutes in summer, 6 to 7 minutes in winter.	Standby: LED off Occupied: LED on
Boost	If you want to activate or deactivate rapid ventilation of the room, keep the Occupancy push button pressed for some time.	LED blinks slowly
Overtime <sup>1</sup>	If you want to manually switch on the Overtime function while the system is in 'Standby' or 'Unoccupied' mode, press the Occupancy push button briefly.  This allows you to set the ventilation unit to 'Occupied' mode for a previously set period of time if, for example, overtime is required after regular office hours.  The overtime period can be configured. After the set period the unit resumes the previous operating mode (RTC/central BMS).	Standby: LED off Overtime: LED on
Filter change	Double blinking of the LED indicates that a filter change is required (the number of operating hours can be configured; factory setting: after 2500 h).  Units with differential pressure sensor: Activated if the preset maximum differential pressure or the preset number of operating hours is reached.  To reset the number of operating hours, either keep the occupancy push button pressed for at least 10 s or use the FSL-CONNECT software.	LED double blinking  This function overrides all other LED signals.
Alarm	Frost alarm and hardware alarm.	LED blinks rapidly

1) The room control panel is factory set to either the 'Occupied/Unoccupied' function or the 'Overtime' function. If you need to change this setting, contact the TROX Technical Service.

## 6.2 Digital control panel

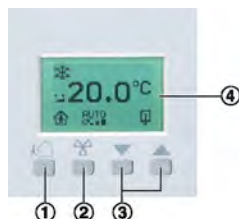




Fig. 23: Digital control panel

Push button Function	Settings	Display ④	Description
① Operating mode	Occupied		The 'Occupied' mode is used for occupied rooms.
	Unoccupied		The 'Unoccupied' mode is used for unoccupied rooms.
	Boost		'Boost' is used to increase ventilation, e.g. during breaks.
② Ventilation	Automatic		Automatic ventilation control.
	Off		Ventilation off.
	Stage 1		Manual ventilation control at the lowest level.
	Stage 2		Manual ventilation control at a medium level.
	Stage 3		Manual ventilation control at the highest level.
③ Temperature	▲		Used to increase the setpoint temperature.
	▼		Used to reduce the setpoint temperature.
Room temperature	–	20.0 °C	Displays the actual room temperature.
Frost protection	–		Indicates that the frost protection function is active, i.e. that the ventilation unit is protected from frost damage at low temperatures.

Push button Function	Settings	Display ④	Description
Filter	–		<p>Indicates that a filter change is due; the number of operating hours after which a filter should be changed can be configured (the factory setting is 2500 h).</p> <p>Units with differential pressure sensor: Activated if the preset maximum differential pressure or the preset number of operating hours is reached.</p> <p>Use the FSL-CONNECT software to reset the counter after a filter change.</p>
Window	–		<p>Indicates that a window is open. The corresponding window contact signal has been received. The ventilation unit is automatically switched off as a consequence.</p>

## 7 Control of the ventilation unit

### Control of ventilation units

For units with integral FSL-CONTROL II control system

↳ Installation and configuration manual, FSL-CONTROL II single room control.

For units without integral controls from TROX follow the instructions of the controls provider.

## 8 Maintenance and cleaning

### DANGER!

Danger of electric shock! Do not touch any live components! Electrical equipment carries a dangerous electrical voltage.

Switch off the supply voltage and secure it against being inadvertently switched on again before working on the unit.

### WARNING!

Risk of burning or scalding! The heat exchanger is hot! Before you work on a heat exchanger, switch it off and leave it to cool.

- Carefully clean the heat exchanger with an industrial vacuum cleaner. Be careful to not damage the fins. We recommend using a soft brush with the suction inlet.
- Rinse the recuperative heat exchanger with hot water (40 °C max.), e.g. by using a commercially available shower head.
  - Do not use any organic solvents (such as acetone or methanol) to clean the recuperative heat exchanger.
  - Do not put the recuperative heat exchanger into a dishwasher.

### Maintenance

The level of contamination of a ventilation unit depends to a large part on the location of the building and on the length of daily use of the unit.

The system owner should therefore set maintenance intervals based on the hygiene requirements. The legal hygiene requirements have to be met.

An increased dust exposure due to construction work is to be expected during the first three months after initial commissioning; this is why filters should be replaced after three months, and the unit should be cleaned.

We also recommend you to randomly check the contamination level of filters every three months during the first year and use the result as a basis for setting further maintenance intervals.

Operational reliability requires that the necessary maintenance measures are taken in the suggested maintenance intervals, ↪ *'Maintenance measures'* on page 56

### Hygiene inspection

A hygiene inspection to VDI 6022 is due every three years. Hygiene inspections have to be carried out by sufficiently qualified individuals and on a random selection of typical ventilation units. If any hygiene issues are detected, all decentralised ventilation units have to be cleaned.

### Cleaning

- Cleaning intervals to VDI 6022.
- Clean all surfaces with a damp (not wet) cloth.
- Use only common household cleaners, do not use any caustic, scouring or otherwise aggressive cleaning agents.

## 8.1 Maintenance

### 8.1.1 Checking and replacing the filters

#### Personnel:

- Facility manager

#### Special tool:

- Commercially available vacuum cleaner

#### **CAUTION!**

##### Risk of allergic reaction to filter dust!

- Wear a dust mask when you change a filter.

Filters have to be changed after a year or if they no longer meet the technical or hygienic requirements.

Use only original filters. Replacement filters can be ordered from the manufacturer; state the filter material number in your order (see page 2). The material number is given on the filter and in the replacement parts list ↗ 9 'Replacement parts list' on page 37.

#### 1. ▶

#### **DANGER!**

Danger of electric shock! Do not touch any live components! Electrical equipment carries a dangerous electrical voltage.

- Switch off the power supply before you carry out maintenance or cleaning.
- Only skilled qualified electricians are allowed to work on the electrical system.

Switch off the supply voltage and secure it against being switched on accidentally before cleaning the unit.

- #### 2. ▶
- Remove the ventilation grille and put it aside where it cannot be damaged.

#### Removing filters

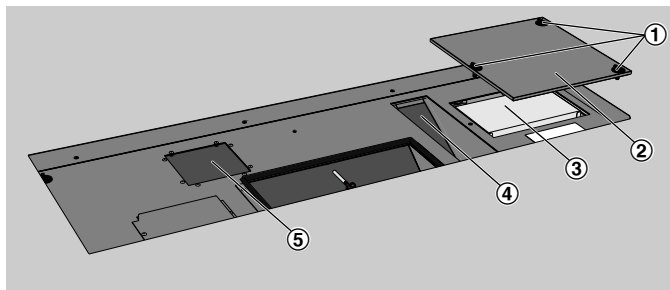


Fig. 24: Changing filters in a right side construction (example)

- #### 3. ▶ Outdoor air filter:
- Remove the cover (Fig. 24/2) of the outdoor air filter chamber. To do so, loosen the fasteners (Fig. 24/1), then remove the cover. Pull the Mini Pleat filter (Fig. 24/3) out of the filter chamber.

**Extract air / secondary air filter:** Remove the flat filter (Fig. 24/4) complete with its frame from the unit.

**Bypass filter:** Remove the flat filter (Fig. 24/5).

- #### 4. ▶
- Remove contamination in the ventilation unit with a commercially available vacuum cleaner.

#### Checking filters

- #### 5. ▶
- If a filter is intact, free of contamination and deposits, and if it has been used for less than 1 year, put it back.

If a filter has already been used for a year or if it does no longer meet the technical or hygiene requirements, replace it.

#### Inserting filters

- #### 6. ▶
- Put the flat filters (Fig. 24/4 and 5) and the Mini Pleat filter (Fig. 24/3) back into the filter chambers.



When you insert the outdoor air filter, make sure that the labelling at the front of the filter remains visible.

Once inserted, each filter must be flush with the surface as otherwise air will bypass the filter.

Replace the filter chamber cover (Fig. 24/2) with the fasteners (Fig. 24/1).

- #### 7. ▶
- Switch on the power supply.
- #### 8. ▶
- If the filter operating hours counter in FSL-CONTROL II has been used, reset it after a filter change ↗ Installation and configuration manual FSL CONTROL II.

⇒ Filter checking or filter change is complete.



Dispose of used filters with residual waste.



### 8.1.2 Cleaning the heat exchanger

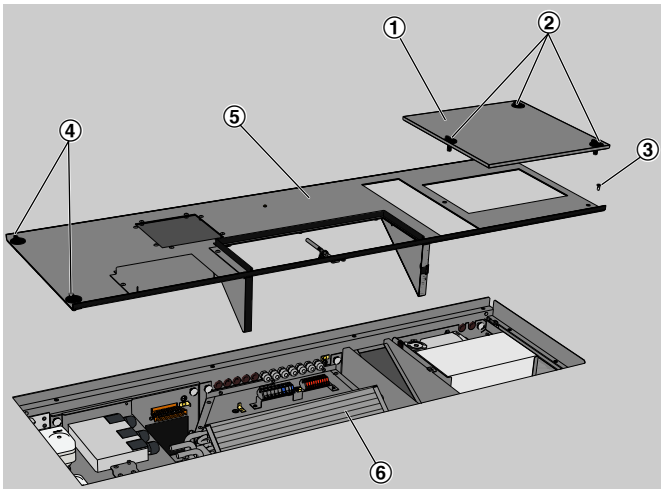


Fig. 25: Heat exchanger in an FSL-U-ZAS, right side construction (example)

**Personnel:**

- Facility manager

**Special tool:**

- Commercially available vacuum cleaner or air compressor

Check the heat exchanger for contamination at least every 12 months. Clean the heat exchanger, if necessary.



Keep the heat exchanger clean as otherwise contamination will impair the efficiency of the ventilation unit.

**1. ▶**



**DANGER!**

Danger of electric shock! Do not touch any live components! Electrical equipment carries a dangerous electrical voltage.

- Switch off the power supply before you carry out maintenance or cleaning.
- Only skilled qualified electricians are allowed to work on the electrical system.

Switch off the supply voltage and secure it against being switched on accidentally before working on the unit.

- 2. ▶** Remove the ventilation grille and put it aside where it cannot be damaged.

**Removing the heat exchanger**

- 3. ▶** Remove the cover of the filter chamber (Fig. 25/1). To do so, loosen the fasteners (Fig. 25/2).

- 4. ▶** Remove the inspection access panel (Fig. 25/5). To do so, loosen the Phillips screw (Fig. 25/3) and the two fasteners (Fig. 25/4). Put the inspection access panel aside.

- 5. ▶** If you use flexible hoses, you can clean the heat exchanger without removing the water-side connections.

Remove the protective earth conductor from the heat exchanger.

Remove the heat exchanger (Fig. 25/6) by lifting it out of the unit.

- 6. ▶** Use a commercially available vacuum cleaner or compressed air to remove contamination from the heat exchanger.

**! NOTICE!**

Be careful to not damage the fins of the heat exchanger.

- 7. ▶** Re-install the heat exchanger, inspection access panel and filter chamber cover by following the steps in reverse order.

- 8. ▶** Switch on the power supply.

⇒ The heat exchanger is clean.

## 8.1.3 Cleaning the recuperative heat exchanger

### Personnel:

- Skilled qualified electrician

### Special tool:

- Commercially available vacuum cleaner
- Compressor

1. ▶

### DANGER!

Danger of electric shock! Do not touch any live components! Electrical equipment carries a dangerous electrical voltage.

- Switch off the power supply before you carry out maintenance or cleaning.
- Only skilled qualified electricians are allowed to work on the electrical system.

Switch off the supply voltage and secure it against being switched on accidentally before working on the unit.

2. ▶ Remove the ventilation grille and put it aside where it cannot be damaged.

### Removing the heat exchanger

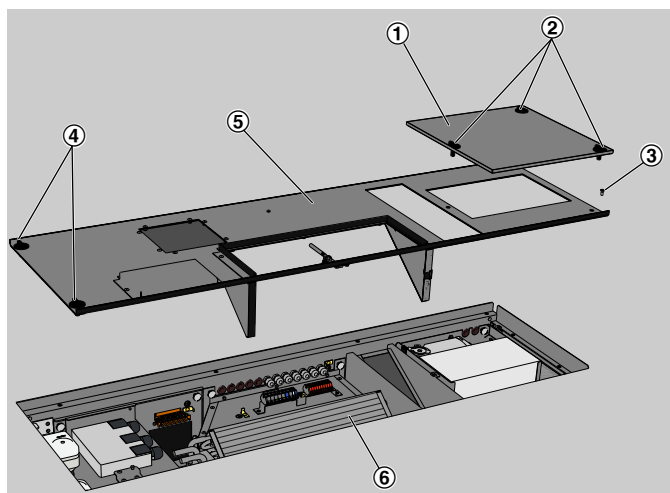


Fig. 26

3. ▶ Remove the cover of the filter chamber (Fig. 26/1). To do so, loosen the fasteners (Fig. 26/2).
4. ▶ Remove the inspection access panel (Fig. 26/5). To do so, loosen the Phillips screw (Fig. 26/3) and the two fasteners (Fig. 26/4). Put the inspection access panel aside.

5. ▶ Lift the heat exchanger (Fig. 26/6) out of the unit and put it aside.

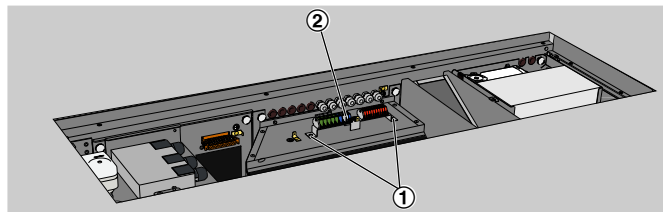


Fig. 27

6. ▶ Loosen the Phillips screws (Fig. 27/1) of the electric terminal holder and put the holder aside.

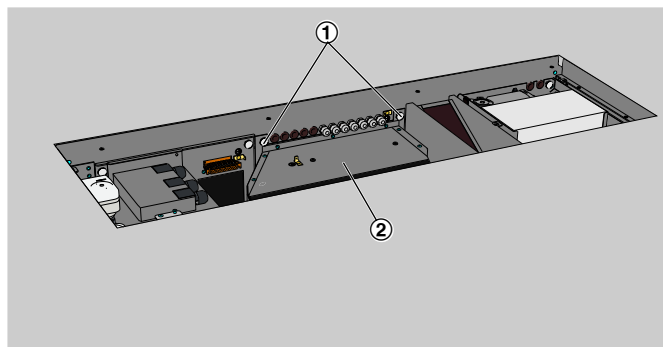


Fig. 28

7. ▶ Remove the knurled screws (Fig. 28/1) and the air deflection plate (Fig. 28/2).

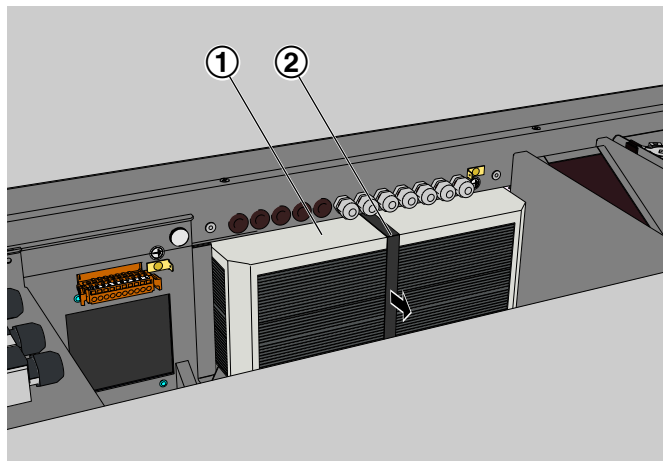


Fig. 29

8. ▶ Grasp the recuperative heat exchanger (Fig. 29/1) by the lug (Fig. 29/2), pull it out and lift it up.

**! NOTICE!****Risk of damage to the recuperative heat exchanger**

Incorrect cleaning may damage the recuperative heat exchanger beyond repair.

- Do not use any organic solvents (such as acetone or methanol) to clean the recuperative heat exchanger.
- Do not put the recuperative heat exchanger into a dishwasher.

Rinse the recuperative heat exchanger (Fig. 29/1) with hot water (40 °C max.), e.g. by using a commercially available shower head.

Put the recuperative heat exchanger into an upright position and let it dry out over night.

9. ▶ Remove contamination in the ventilation unit with a commercially available vacuum cleaner.
10. ▶ Push the recuperative heat exchanger back into the opening.
11. ▶ Re-install the air deflection plate, electric terminal holder, inspection access panel and filter chamber cover.

**! NOTICE!**

Be sure to insert the protective earth conductor into the inspection access panel when you fix the cover plate.

12. ▶ Put the ventilation grille back onto the ventilation unit.
13. ▶ Switch on the power supply.
  - ⇒ The recuperative heat exchanger is clean.



## **9 Replacement parts list**

FSL-U-ZAS

## 9.1 FSL-U-ZAS

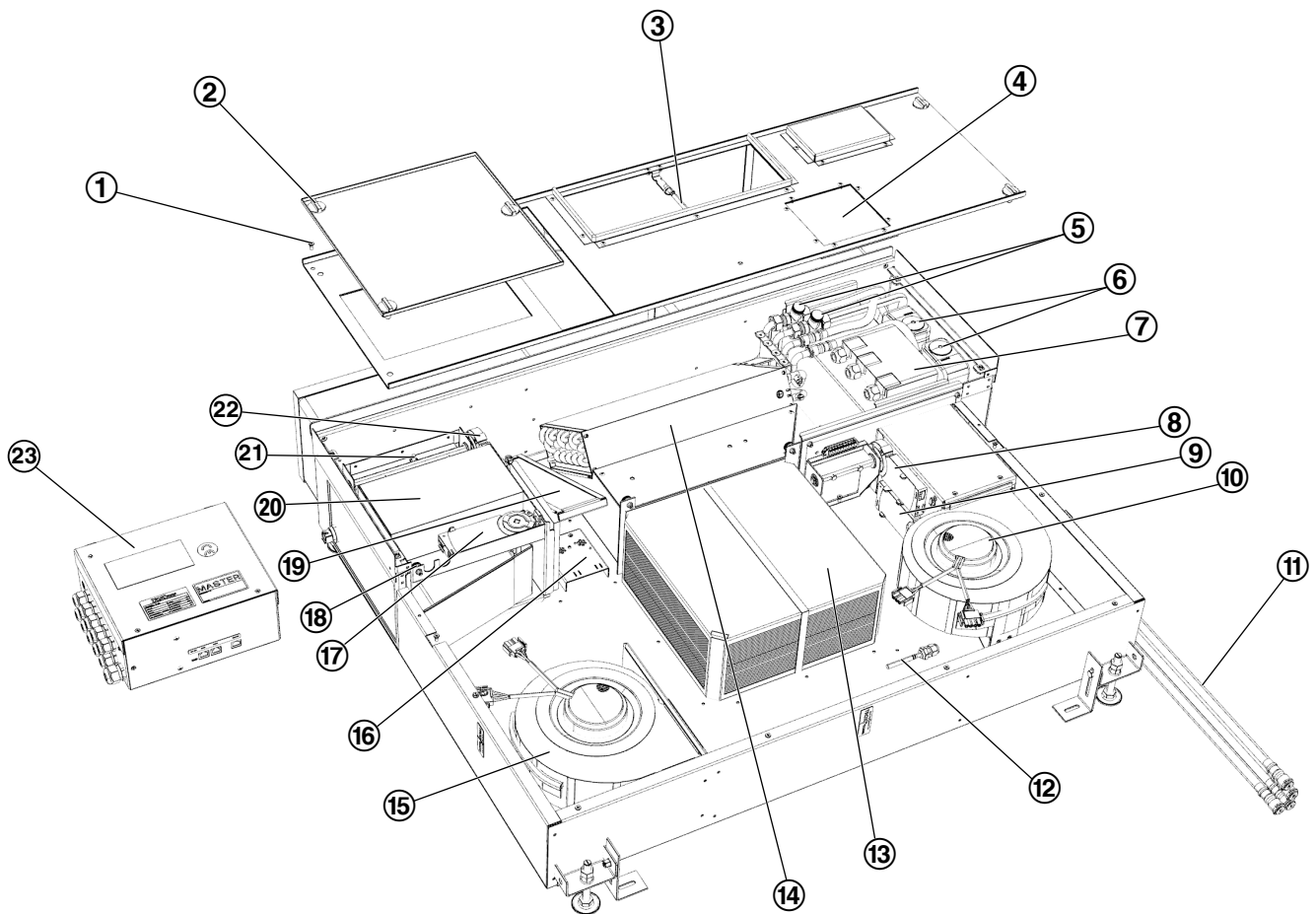


Fig. 30: Replacement parts for FSL-U-ZAS

**Ordering replacement parts**

You can identify order-specific components of the ventilation unit either by a code on the component itself or by the commission number on the rating plate ↗ 'Rating plate' on page 42. TROX Service: ↗ 'TROX Technical Service' on page 3

Item	Description	Replacement part no.
1	Screw	M873BJ5
2	Quarter turn fastener	M388BB0
	Support washer for quarter turn fastener	M338BC6
	Clamp for quarter turn fastener	M382KC3
3	Supply air temperature sensor	A00000054037
4	G3 bypass filter ↗ 32	FMP-G3-C13/PADx133x133
5	Lockshield	M431AQ4
6	Straight-way valve	Order-specific
	Electronic valve actuator FSL-CONTROL II	A00000064176
7	SKM module for controlling the outdoor air dampers	M536ED0
8	Actuator for bypass damper	A00000018566
9	Actuator for exhaust air damper	M466EQ6
10	Extract air centrifugal fan	M546FD6
11	Flexible hoses	Order-specific
12	Mixed air temperature sensor	A00000054037
13	Recuperative heat exchanger ↗ 34	A00000054385
14	2-pipe or 4-pipe heat exchanger ↗ 33	Order-specific, see no. on the heat exchanger
15	Supply air centrifugal fan	M546FD6
16	VOC sensor	M546GA7
	Expansion module with humidity sensor	A00000028452
17	Actuator for secondary air damper	A00000028181
18	Knurled screw M4x10	M872AD2
19	G3 extract air / secondary air filter ↗ 32	FMP-G3-C13/PADx79x324
20	F7 outdoor air filter ↗ 32	A00000054424
21	Outdoor air temperature sensor	A00000054037
22	Actuator for outdoor air damper	M466EQ6
23	FSL-CONTROL II control module	M536ED8
	FSL-CONTROL II master module	M536ED9
	RTC (real-time clock) expansion module	M536EE0 (optional)
	BACnet MS/TP or Modbus RTU expansion module	A00000020207 (optional)
	LON expansion module	M536HD2 (optional)





## 10 Technical data

### 10.1 Technical data



#### Technical data sheets

*An illustration and the technical data have already been provided for information and acceptance by the customer. We recommend that you keep those documents with this manual.*

Data	Value	Unit
Max. operating pressure, water side	6	bar
Max. operating temperature	75	°C
Max. operating temperature with flexible hoses	55	°C
Supply voltage	230 ±10%	V AC
Supply voltage frequency	50/60	Hz
Power consumption (nominal volume flow rate)	32	W
Rating	272	VA
Protection level	IP 21	
Weight	90	kg

Item	Unit	Supply air		
		60 m³/h	90 m³/h	120 m³/h
Total cooling capacity	W	205	295	370
Internal cooling capacity	W	162	225	261
Air temperature inside the unit	°C	28.3	28.6	28.8
Rel. humidity	%	50	49	48
Water content of the dry air	g/kg	11.9	11.9	11.9
Supply air temperature	°C	17.9	18.5	19.5
Condensation	g/h	0	0	0
Chilled water flow rate	l/h	50	75	85
Water temperature, inlet	°C	16	16	16
Water temperature, outlet	°C	19.5	19.5	19.5
Water side pressure drop	kPa	3	6.5	8
Total heating capacity	W	653	959	1220

General conditions – summer:

- Outdoor air: 32 °C / 40% (corresponds to a water content of 11.9 g/kg of dry air)
- Room air: 26 °C / 50% (corresponds to a water content of 10.5 g/kg of dry air)

General conditions – winter:

- Outdoor air: -12 °C
- Room air: 21 °C

Heat recovery has been accounted for.

Item	Unit	Supply air	Supply air	Supply air
		60 m³/h	90 m³/h	120 m³/h
Internal heating capacity	W	417	556	778
Air temperature inside the unit	°C	10.5	9	8
Supply air temperature	°C	41.8	39.5	40.4
Hot water flow rate	l/h	50	85	110
Water temperature, inlet	°C	50	50	50
Water temperature, outlet	°C	38.7	40.2	40.4
Water side pressure drop	kPa	2	5	7.6
Sound power level L <sub>w,a</sub>	dB(A)	28	36	43
Sound pressure level with 8 dB room attenuation	dB(A)	20	28	35

General conditions – summer:

- Outdoor air: 32 °C / 40% (corresponds to a water content of 11.9 g/kg of dry air)
- Room air: 26 °C / 50% (corresponds to a water content of 10.5 g/kg of dry air)

General conditions – winter:

- Outdoor air: -12 °C
- Room air: 21 °C

Heat recovery has been accounted for.

## Rating plate



Fig. 31: The rating plate is affixed to the cover plate.

- ① Type of unit
- ② Year of manufacture
- ③ Commissioning no.
- ④ Serial number
- ⑤ Supply voltage
- ⑥ Max. power consumption
- ⑦ Protection level
- ⑧ Max. water temperature
- ⑨ Max. operating pressure
- ⑩ Supply air filter class
- ⑪ Extract air filter class

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## Appendix

## Flexible hoses



- • **Installation Instructions**

- **Connecting hoses  
Type FS**



**TROX<sup>®</sup> TECHNIK**  
The art of handling air

Part No. A0000036075 (03/2013)

## Contents

## 1 General information

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These instructions describe the installation of the type FS connecting hoses. Connecting hoses that are oxygen diffusion tight (to DIN 4726) enable a simple, quick water-side connection between the TROX components and the on-site pipe system.

## Symbols used in this manual

**Important**

Designates danger that can cause minor personal injury or damage to property.

**Protective gloves**

Wear protective gloves to avoid injuries.

# TROX<sup>®</sup> TECHNIK

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www.troxtechnik.com

Part No. A00000036075

Subject to change. /

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## 2 Correct use

### Correct use

- The connecting hoses are suitable for all TROX air conditioning components, such as chilled ceilings, passive chilled beams, induction units and decentralised ventilation units.
- The connecting hose serves as a flexible, water-side connection between the heat exchanger and the on-site pipe system consisting of copper pipes according to EN 1057 used for heating and/or cooling.
- Connecting hoses let you remove or swivel out the heat exchangers for cleaning and maintenance without having to empty the system.

### Incorrect use

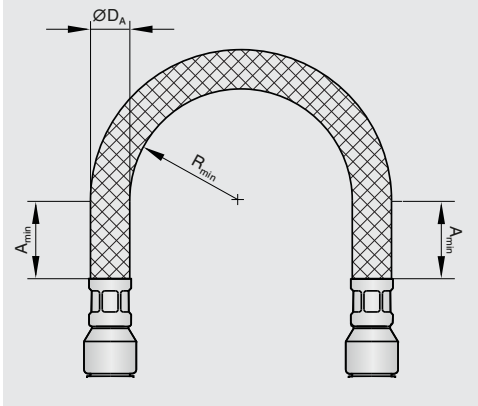
- Tensioning the hose
- Kinking the hose or using a bend radius that is too small
- Laying the hose along sharp edges
- For unacceptable operating pressures or operating temperatures, and for acceptable pressures and temperatures, see Technical data.

### Acceptable media

To fill the system, use clean tap water (pH value 6.5 to 9.5) or a water-glycol mixture (max. 30% glycol).

## 3 Technical data

### Minimum bend radius



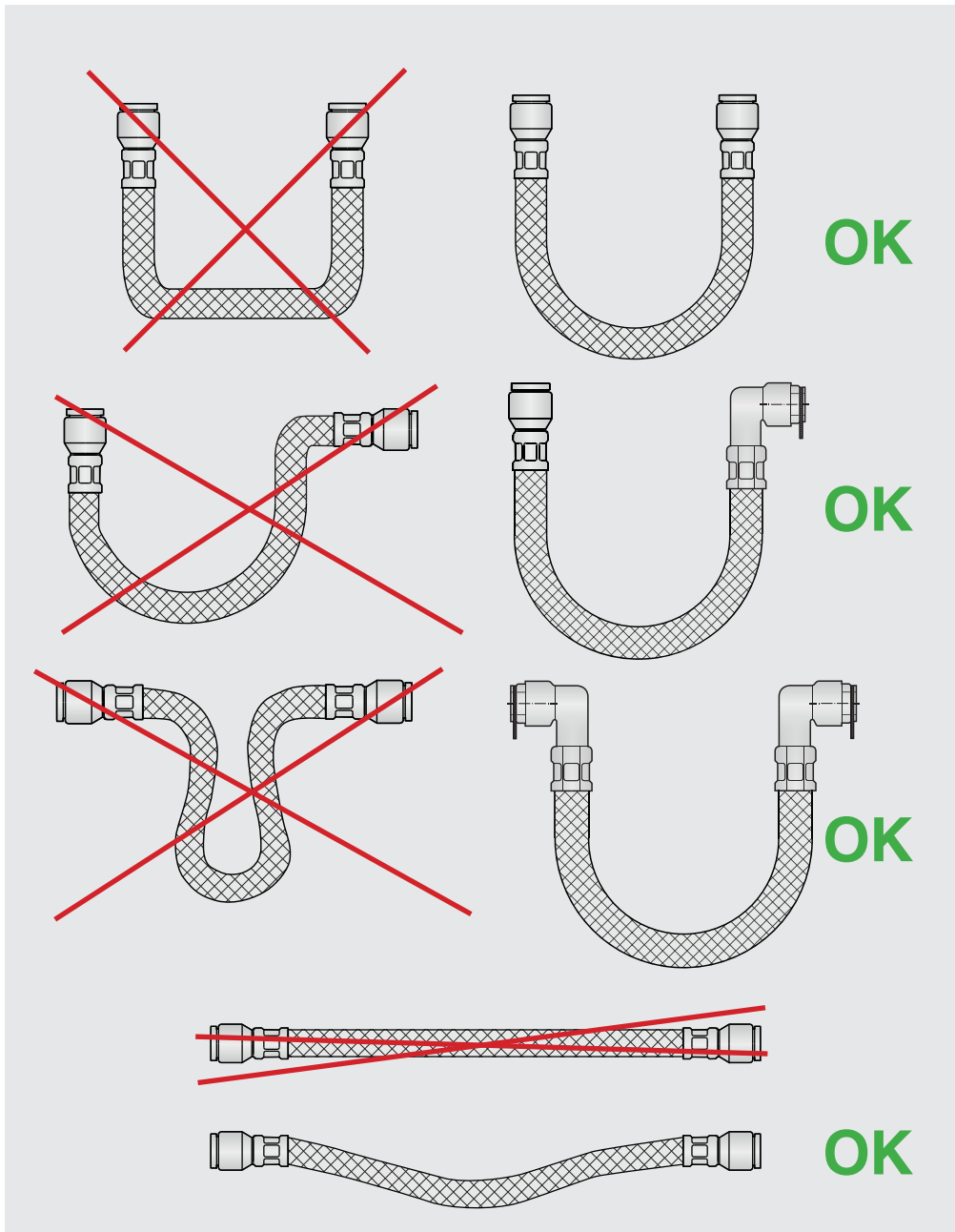
### Dimensions [mm]

Nominal width	ØD <sub>A</sub>	A <sub>min</sub>	R <sub>min</sub>
10	12.5	12.5	62.5
13	17	17	85

### Technical data

Operating pressure	6 bars max.
Media temperature	-20 °C to +55 °C

**4 Installation**  
Hose laying





## 4 Installation

### General information



#### Important

When working on hot water systems, there is a danger of burns. Before starting to work, shut down the heating circuit and leave it to cool down.



#### Important

Before starting the installation, block off and drain the water and/or water-glycol circuit.

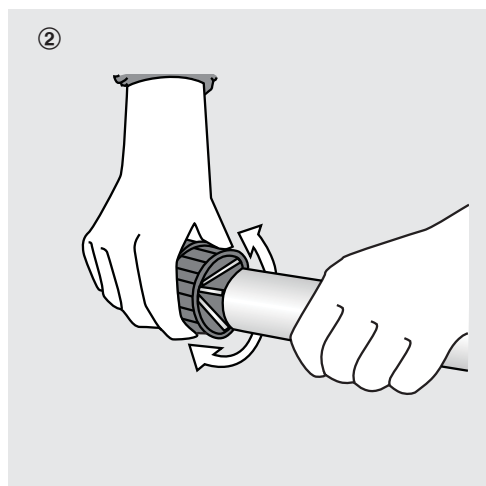
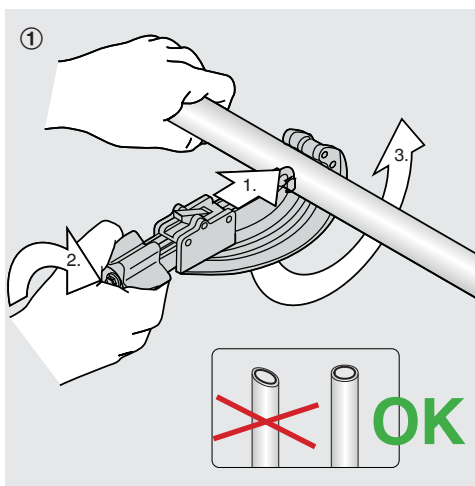


#### Protective gloves

Wear protective gloves for all work.

#### Preparations

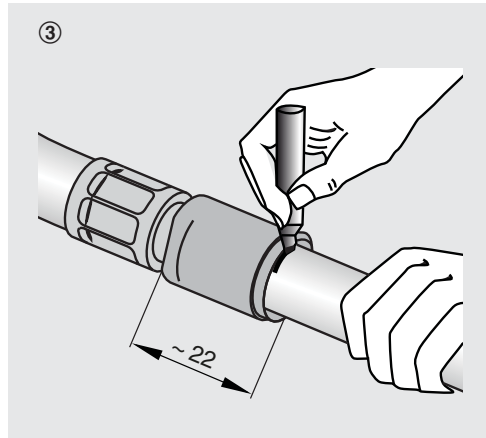
- Cut pipes at a right angle to the centre line. ①
- When using a pipe cutter, make sure that the disc blades are sharp; advance the cutter only slowly.
- Deburr the pipe ends afterwards on the inside and outside. ②
- Before installing the hose, remove any protective caps.
- If the hose is used to make a connection to swivel-out or removable components, be sure to use a sufficiently long hose to avoid kinking.



## 4 Installation Fittings

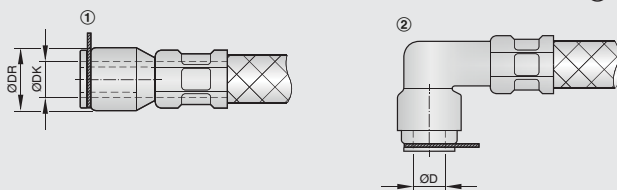
### Fittings

- Deformed pipe ends or those which are not perfectly circular must be calibrated with a calibration ring and mandrel before the fittings are used.
- Mark the plug-in depth (~ 22 mm) on the pipe. ③
- Insert the circlip (red) during installation, if possible, or before commissioning at the latest.
- Avoid tilting the fittings when placing them on the pipe.
- Push the fittings on up to the travel stop.
- To check the secure seat of the fitting, i.e. the locking of the claw, pull the mounted fitting into the removal direction.

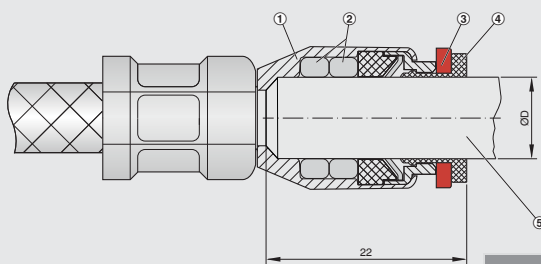


### Construction variants

- ① SG 10 / SG 12, fitting, straight
- ② SW 10 / SW 12, fitting 90°



### Installation of the push-on fittings



- ① Fitting
- ② Ring seal
- ③ Circlip
- ④ Opening ring
- ⑤ Pipe

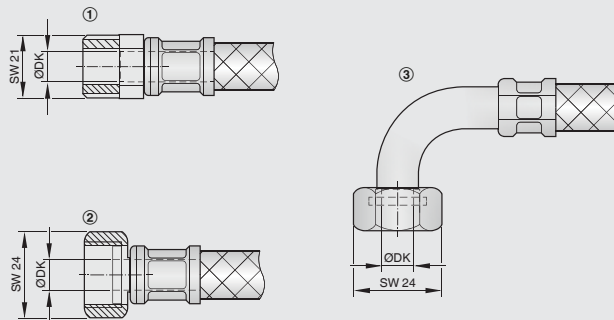
#### Dimensions [mm]

Hose	Connection		
	Ø D	Ø DK	Ø DR
10	10	6.6	17.5
13	12	10	19.7

## 4 Installation

### External threads and union nuts

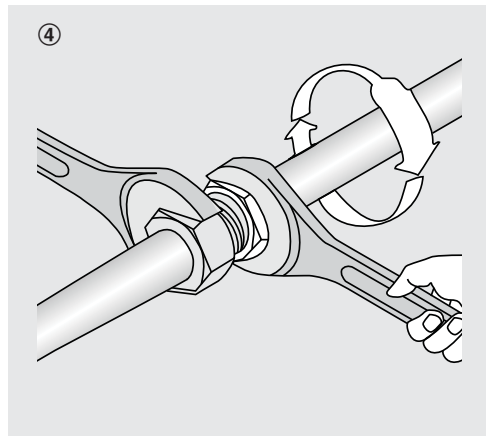
#### Construction variants



- ① G1/2" external thread, flat end seal
- ② G1/2" internal thread, union nut, flat end seal
- ③ G1/2" internal thread, union nut 90°, flat end seal

#### External threads and union nuts

- Sealing surfaces must be free of contamination.
- Check the seal for secure fit.
- Tighten the external thread and the nuts only hand-tight at first.
- Use suitable spanners to tighten the hand-tight screw joints.
- G1/2" external thread, 21 mm
- G1/2" union nut, 24 mm
- When tightening the screw joint, use a second spanner to lock it ④ and to prevent damage to the heat exchanger or pipe.



## 5 Removal

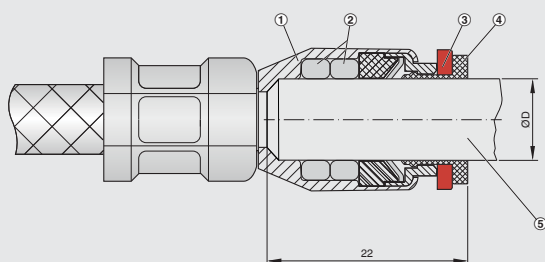
### Fittings

- Remove the circlip (red).
- Press the opening ring against the fitting to loosen the claw; then remove the fitting.

### Screw joints

Screw joints can be loosened using a suitable tool. When loosening the screw joint on the heat exchanger and pipe, use a second spanner to lock it and prevent damage.

### Removing the fittings



- ① Fitting
- ② Ring seal
- ③ Circlip
- ④ Opening ring
- ⑤ Pipe

## EU declaration of conformity

## EG-/EU-Konformitätserklärung

**Hersteller**

TROX GmbH  
Heinrich-Trox-Platz  
D - 47504 Neukirchen-Vluyn

**In der Gemeinschaft ansässige Person, die  
bevollmächtigt ist, die technischen Unterlagen  
zusammenzustellen**

Jan Heymann, TROX GmbH

**Beschreibung und Identifizierung der Maschine**

<b>Produkt / Erzeugnis</b>	Dezentrales Lüftungsgerät
<b>Typ</b>	FSL-U-ZAS
<b>Auftrag</b>	15 - 043 (Amprion)
<b>Funktion</b>	Unterflurgeräte mit FSL-Control II Dezentrale Lüftungsgeräte dienen der komfortablen Raumtemperierung, sowie der Be- und Entlüftung von Räumen wie z.B. Büroräumen, Besprechungsräumen oder Unterrichtsräumen.

**Hiermit erklären wir, dass das oben genannte Produkt allen einschlägigen Bestimmungen der folgenden EG-/EU-Richtlinien entspricht:**

2006/42/EG	Richtlinie 2006/42/EG des Europäischen Parlaments und des Rates vom 17. Mai 2006 über Maschinen und zur Änderung der Richtlinie 95/16/EG (Neufassung) (1)
2014/30/EU	Richtlinie 2014/30/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit (Neufassung)
2014/35/EU	Richtlinie 2014/35/EU des Europäischen Parlaments und des Rates vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung elektrischer Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen auf dem Markt

**Angewandte harmonisierte Normen:**

EN 349:1993+A1	Sicherheit von Maschinen - Mindestabstände zur Vermeidung des Quetschens von Körperteilen
EN 1037:1995+A1	Sicherheit von Maschinen - Vermeidung von unerwartetem Anlauf
EN 60204-1:2006/A1	Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen (IEC 60204-1:2005)
EN 547-2:1996+A1	Sicherheit von Maschinen - Körpermaße des Menschen - Teil 2: Grundlagen für die Bemessung von Zugangsöffnungen
EN 547-3:1996+A1	Sicherheit von Maschinen - Körpermaße des Menschen - Teil 3: Körpermaßdaten
EN 1005-3:2002+A1	Sicherheit von Maschinen - Menschliche körperliche Leistung - Teil 3: Empfohlene Kraftgrenzen bei Maschinenbetätigung
EN ISO 13857:2008	Sicherheit von Maschinen - Sicherheitsabstände gegen das Erreichen von Gefährdungsbereichen mit den oberen und unteren Gliedmaßen (ISO 13857:2008)
EN 1005-2:2003+A1	Sicherheit von Maschinen - Menschliche körperliche Leistung - Teil 2: Manuelle Handhabung von Gegenständen in Verbindung mit Maschinen und Maschinenteilen
EN 1005-1:2001+A1	Sicherheit von Maschinen - Menschliche körperliche Leistung - Teil 1: Begriffe
EN ISO 13732-1:2008	Ergonomie der thermischen Umgebung — Bewertungsverfahren für menschliche Reaktionen bei Kontakt mit Oberflächen — Teil 1: Heiße Oberflächen (ISO 13732-1:2008)
EN ISO 12100:2010-11	Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze - Risikobewertung und Risikominderung (ISO 12100:2010)

Neukirchen-Vluyn, 18.10.2017

Jan Heymann  
CE-Beauftragter, TROX GmbH

Seite 1/1

## Product information according to ErP directive

## FSL-U-ZAS

## Produktinformation



**TROX<sup>®</sup> TECHNIK**  
The art of handling air

## a) Name des Herstellers

TROX GmbH

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Telefax +49 (0)2845 202265

Heinrich-Trox-Platz  
47504 Neukirchen-Vluyn  
Germany

E-Mail trox@trox.de

Internet www.trox.de

## b) Modellkennung

U-ZAS-2-AR/L  
U-ZAS-4-AR/L

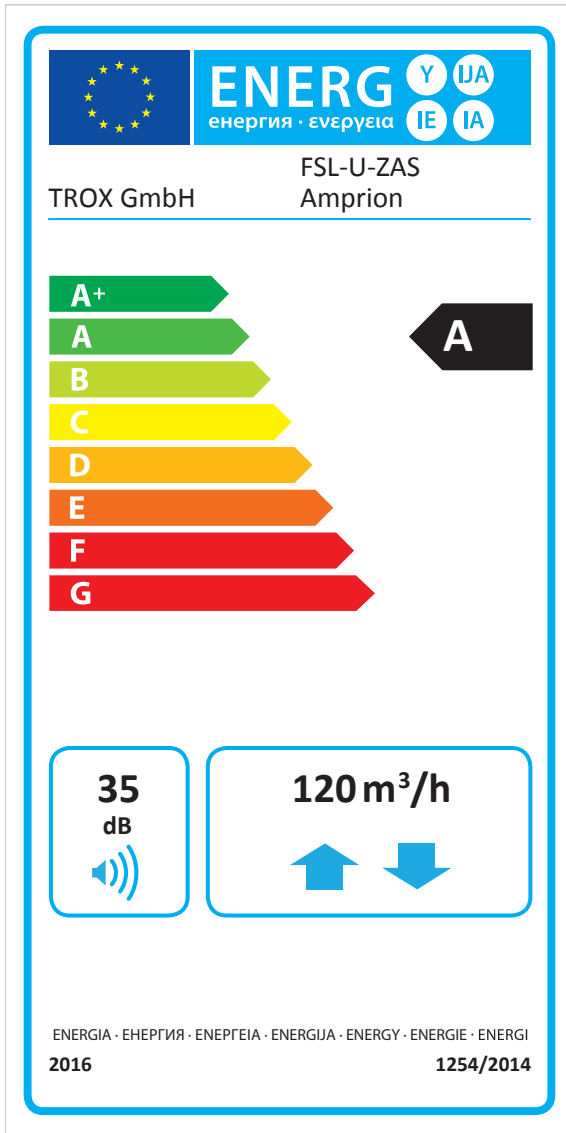
## Produktinformationen für Wohnraumlüftungsanlagen nach Verordnung (EU) Nr. 1254/2014 Artikel 3 Absatz 1

	Informationsanforderung	Daten Gerätekonfiguration
c)	Spezifischer Energieverbrauch (SEC)	
	Cold	-67,68 kWh/(m <sup>2</sup> × a)
	<b>Average</b>	<b>-36,18 kWh/(m<sup>2</sup> × a) ⇔ Energieeffizienzklasse <b>A</b></b>
	Warm	-15,51 kWh/(m <sup>2</sup> × a)
d)	Typ	Zwei-Richtungs-Lüftungsanlage
e)	Antriebsart	Mehrstufenantrieb
f)	Wärmerückgewinnung (WRG)	Rekuperativ
g)	Temperaturänderungsgrad der WRG	54 %
h)	Höchster-Luftvolumenstrom ( $\dot{V}_{max}$ )	150 m <sup>3</sup> /h
i)	Elektrische Eingangsleistung bei $\dot{V}_{max}$	32 Watt
j)	Schallleistungspegel $L_{WA}$ bei $\dot{V}_{BzG}$	39 dB(A)
k)	Bezugsvolumenstrom ( $\dot{V}_{BzG}$ )	105 m <sup>3</sup> /h
l)	Bezugsdruckdifferenz	0 Pa
m)	Spezifische Eingangsleistung (SPL) bei $\dot{V}_{max}$	0,132 W/(m <sup>3</sup> /h)
n)	Steuerungsfaktor	Steuerung nach örtlichem Bedarf
	Steuerungstypologie	Lüftungsgerät ohne Kanalanschlussstutzen
o)	Innere Leckluftquote bei $\dot{V}_{BzG}$ und 100 Pa	7 %
	Äußere Leckluftquote bei $\dot{V}_{BzG}$ und 100 Pa	3 %
p)	Mischquote	< 3 %
q)	Filterwarnanzeige (1)	Am Raumbediengerät - (Doppelblinker der Status-LED)
s)	Zerlegungshinweise	www.trox.de
t)	Druckschwankungsempfindlichkeit bei $\dot{V}_{max}$ und +20 Pa	+3 %
	Druckschwankungsempfindlichkeit bei $\dot{V}_{max}$ und -20 Pa	-3 %
u)	Luftdichtheit von innen nach außen	0 m <sup>3</sup> /h
v)	Jährlicher Stromverbrauch (AEC)	1,22 kWh/(m <sup>2</sup> × a)
w)	Jährliche Heizenergie Einsparung (AHS)	
	Cold	75,43 kWh/(m <sup>2</sup> × a)
	Average	38,56 kWh/(m <sup>2</sup> × a)
	Warm	17,43 kWh/(m <sup>2</sup> × a)



① Die Filter sind regelmäßig zu wechseln! Sie steigern damit die Energieeffizienz des Geräts, senken den Stromverbrauch der Ventilatoren und schützen damit nachhaltig unsere Umwelt.

**FSL-U-ZAS energy label**



## Commissioning report/Maintenance report

<b>Building:</b>	<b>Floor:</b>	<b>Unit:</b>
Commissioning: <input type="checkbox"/>	Maintenance: <input type="checkbox"/>	Date: __ . __ . 20__

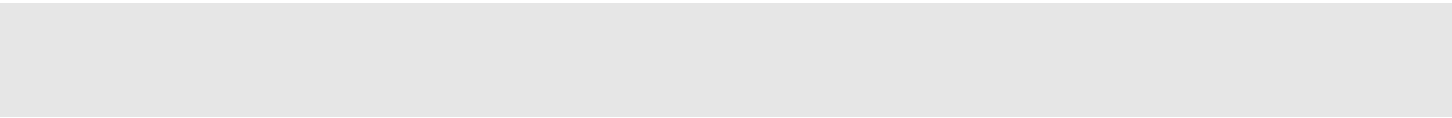
## Maintenance measures

Item to be checked	Measures	Intervall [months]			Done	
		6	12	24	Yes	No
Cleaning the ventilation unit	Remove dust and contamination from the casing and from the air passages inside the unit.		X		<input type="checkbox"/>	<input type="checkbox"/>
Checking air terminal units in the external wall for damage and corrosion (random check)	Clean; if necessary, repair.		X		<input type="checkbox"/>	<input type="checkbox"/>
Checking the heat exchanger, condensate drip tray and condensate drain (random check)	Check for corrosion and hygiene; clean	X <sup>1</sup>	X		<input type="checkbox"/>	<input type="checkbox"/>
Checking outdoor air and exhaust air openings for leakages (random check)	In case of visible leakages: adjust the damper opening angle, replace the actuator, clean		X		<input type="checkbox"/>	<input type="checkbox"/>
	Check if the damper blade closes in case of a power failure			X	<input type="checkbox"/>	<input type="checkbox"/>
Checking filters after any pressure drop, based on hygiene conditions, based on operating time (random checks)	Replace the filter medium, clean the filter chamber, check seals	X <sup>1</sup>	X		<input type="checkbox"/>	<input type="checkbox"/>
Checking the recuperative heat exchanger (random check)	Check seals, adjust or replace if necessary; clean the recuperative heat exchanger; check and clean water drain	X <sup>1</sup>	X		<input type="checkbox"/>	<input type="checkbox"/>
Checking fan functions (random check)	Different speeds			X	<input type="checkbox"/>	<input type="checkbox"/>
Checking release of the frost protection function for heat exchangers	Let the supply air temperature sensor cool down to a value below the release temperature and see if the ventilation unit is switched off as a consequence		X		<input type="checkbox"/>	<input type="checkbox"/>
Checking valves for function and leakages (random check)	Check whether the heating and cooling valves open and close correctly and whether the effect of the actuator action is correct			X	<input type="checkbox"/>	<input type="checkbox"/>
Checking the control panel (random check)	Check switching function, setpoint shift			X	<input type="checkbox"/>	<input type="checkbox"/>
Checking control units (random check)	Check circuits, control signals; adjust them if necessary			X	<input type="checkbox"/>	<input type="checkbox"/>

1) if condensation forms



<b>Comment:</b>	
<b>Next mainenance scheduled for:</b>	
<b>Signature:</b> (Technician)	
<b>Company:</b> (Stamp)	





**TROX<sup>®</sup> TECHNIK**

The art of handling air

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