



# Katherm QK

► Assembly, installation and operating instructions

Keep these instructions in a safe place for future use!



## Table of contents

<b>1 General</b> .....	<b>5</b>
1.1 About these instructions .....	5
1.2 Explanation of Symbols.....	5
<b>2 Safety</b> .....	<b>6</b>
2.1 Correct use.....	6
2.2 Limits of operation and use.....	6
2.3 Risk from electrocution!.....	8
2.4 Personnel requirements - Qualifications .....	9
2.5 Personal Protective Equipment .....	9
<b>3 Transport, storage and packaging</b> .....	<b>10</b>
3.1 General transport instructions .....	10
3.2 Scope of delivery.....	10
3.3 Storage .....	11
3.4 Packaging .....	11
<b>4 Technical data</b> .....	<b>12</b>
<b>5 Construction and function</b> .....	<b>13</b>
5.1 Overview.....	13
5.2 Brief description.....	13
<b>6 Installation and wiring</b> .....	<b>14</b>
6.1 Requirements governing the installation site.....	14
6.2 Installation .....	14
6.2.1 Installation steps .....	14
6.2.2 Screed work.....	18
6.3 Installation .....	19
6.3.1 Connection to the pipe network .....	20
6.4 Katherm QK supply air modules (optional) .....	22
<b>7 Electrical connection</b> .....	<b>24</b>
7.1 Maximum electrical rating values .....	24
7.2 Electromechanical connection, 24 V (*24).....	25
7.2.1 DE_Verlegepläne Katherm QK elektromechanisch 24 V.pdf .....	26
7.3 Electromechanical connection, 230 V (*00).....	28
7.3.1 DE_Verlegepläne Katherm QK elektromechanisch 230 V.pdf .....	29
7.4 KaControl (*C1) .....	31
7.4.1 KaController installation.....	31

7.4.2	Connection (*C1).....	32
<b>8</b>	<b>Pre-commissioning checks.....</b>	<b>36</b>
<b>9</b>	<b>Operation.....</b>	<b>37</b>
9.1	Operation of electromechanical control .....	37
9.2	Operation of the KaController.....	37
9.2.1	Function keys, display elements .....	37
9.2.2	KaController type 3210001, type 3210002, type 3210006 .....	40
<b>10</b>	<b>Maintenance .....</b>	<b>41</b>
10.1	Securing against reconnection .....	41
10.2	Maintenance Schedule:.....	41
10.3	Maintenance work.....	42
10.3.1	Clean the inside of the unit .....	42
<b>11</b>	<b>Faults .....</b>	<b>43</b>
11.1	Fault table.....	43
11.2	KaControl faults .....	44
11.3	Start-up after rectification of fault .....	44
<b>12</b>	<b>List of KaControl parameters.....</b>	<b>45</b>
12.1	KaController parameter list.....	45
<b>13</b>	<b>Certificates.....</b>	<b>46</b>
13.1	142_EU_Konformitätserklärung_Katherm_QK_HK_QK_nano.pdf.....	47

## 1 General

### 1.1 About these instructions

These instructions ensure the safe and efficient handling of this equipment. These instructions form an integral part of the equipment and have to be kept in the direct vicinity of the equipment and available to personnel at all times.

All personnel must have carefully read through these instructions prior to commencing all work on the equipment. A fundamental prerequisite for safe working is compliance with all the stated safety instructions and other instructions contained in this manual.

In addition all local occupational health and safety at work regulations apply, as do general safety provisions governing the use of the equipment.

Illustrations in this guide are intended to provide a basic understanding and may differ from the actual model.

Ongoing tests and further developments may result in small variations between the unit supplied and the instructions.

### 1.2 Explanation of Symbols



#### **DANGER!**

This combination of symbol and signal word indicates an immediately dangerous situation caused by electrical power, which will cause death or serious injury if not avoided.



#### **WARNING!**

This combination of symbol and signal word indicates a possible hazardous situation.



#### **IMPORTANT NOTE!**

It represents a potentially hazardous situation, which could lead to damage to property or for a measure to optimise workflows.



#### **IMPORTANT NOTE!**

This symbol highlights useful hints, recommendations and information for efficient and trouble-free operation.

# Katherm QK

Assembly, installation and operating instructions

## 2 Safety

This section provides an overview of all important safety aspects to ensure optimum protection of personnel as well as safe and trouble-free operation. In addition to the safety instructions in these operating instructions, the valid safety, accident prevention and environmental protection regulations must be observed for the area of use of the unit. It is the duty of the operator to ensure that instructions relating to maintenance (e.g. relating to hygiene) are complied with.

### 2.1 Correct use

The units are used to heat all areas of buildings that need to be heated in winter. Within the room to be heated, the unit needs to be connected to the building's heating/cooling/ventilation system and to the building's sewage system and power grid. The operating limits and limits of use described in Chapter 2.2 [▶ 6] must be observed.

Intended use of the unit also includes adherence to these instructions.

#### Information in accordance with EN60335-1

- ▶ This unit can be used by children aged 8 years or more and also by people with reduced physical, sensory or mental capabilities or a lack of experience and knowledge, if they are supervised or have been instructed in the safe use of the unit and the resulting dangers. Do not allow children to play with the unit. Do not allow children to clean and maintain the unit without supervision.
- ▶ This unit is not intended for permanent connection to the drinking water supply system.
- ▶ This unit is intended for being accessible to the general public.

Any use beyond or other than the stated intended use is considered as misuse.

Any change to the unit or use of non-original spare parts will cause the expiry of the warranty and the manufacturer's liability.

## 2.2 Limits of operation and use

Limits of operation		
Min./max. water temperature	°C	15-90
Min./max. air intake temperature	°C	15-40
Min./max. air humidity	%	15-75
Min. operating pressure	bar/kPa	-
Max. operating pressure	bar/kPa	10/1000
Min./max. glycol percentage	%	25-50

Tab. 1: Limits of operation

Operating voltage	230 V/ 50/60 Hz
Power/current consumption	On the typeplate

Tab. 2: Operating voltage

We would refer to VDI-2035 Sheets 1 & 2, DIN EN 14336 and DIN EN 14868 with regard to the properties of the medium used to protect the equipment. The following values provide further guidance.

The water used should be free of contamination, such as suspended substances and reactive substances.

Water quality		
pH value (at 20 °C)		8-9
Conductivity (at 20 °C)	µS/cm	< 700
Oxygen content (O <sub>2</sub> )	mg/l	< 0.1
Hardness	°dH	4-8.5
Sulphur ions		not measurable
Sodium ions (Na <sup>+</sup> )	mg/l	< 100
Iron ions (Fe <sup>2+</sup> )	mg/l	< 0.1
Manganese ions (Mn <sup>2+</sup> )	mg/l	<0.05
Ammonia ions (NH <sup>4+</sup> )	mg/l	< 0.1
Chlorine ions (Cl)	mg/l	< 100
CO <sub>2</sub>		< 50
Sulfate ions (SO <sub>4</sub> <sup>2-</sup> )	mg/l	< 50
Nitrite ions (NO <sub>2</sub> <sup>-</sup> )	mg/l	< 50
Nitrate ions (NO <sub>3</sub> <sup>-</sup> )	mg/l	< 50

Tab. 3: Water quality

# Katherm QK

Assembly, installation and operating instructions



## IMPORTANT NOTE!

### Danger of frost in cooling mode!

There is a risk of the heat exchanger freezing when used in unheated rooms.

- ▶ Make sure that the unit is equipped with a frost protection sensor and/or thermostat in this case.



## IMPORTANT NOTE!

### Warning of misuse!

In the event of misuse, as itemised below, there is a danger of limited or failing operation of the unit. Ensure that the airflow can circulate freely.

- ▶ Never operate the unit in humid areas, such as swimming pools, wet areas etc.
- ▶ Never operate the unit in rooms with an explosive atmosphere.
- ▶ Never operate the unit in aggressive or corrosive atmospheres (e.g. sea air).
- ▶ Never operate the unit above electrical equipment (such as switch cabinets, computers or other electrical units, or contacts that are not drip-proof).
- ▶ Never use the unit as a construction site heater.
- ▶ Never operate the unit in areas with a high dust content.

## 2.3 Risk from electrocution!



## DANGER!

### Risk of fatal injury from electrocution!

Contact with live parts will lead to fatal injury from electrocution. Damage to the insulation or individual components can lead to a fatal injury.

- ▶ Only permit qualified electricians to work on the electrical system.
- ▶ Immediately disconnect the system from the power supply and repair it in the event of damage to the insulation.
- ▶ Keep live parts away from moisture. This can cause a short circuit.
- ▶ Properly earth the unit.

## 2.4 Personnel requirements - Qualifications

### Expertise

The installation of this product requires specialist knowledge of heating, cooling, ventilation, installation and electrical engineering. This knowledge, generally learned in professional training in one of the fields mentioned above, is not described separately.

Damage caused by improper installation is the responsibility of the operator or installer. The installer of these units should have adequate knowledge of the following gained from specialist professional training

- ▶ Safety and accident prevention regulations
- ▶ Guidelines and recognised technical regulations, i.e. Association of German Electricians VDE regulations, DIN and EN standards.
- ▶ VDI 6022; maintenance personnel must be trained to Category B (possibly Category C) to comply with hygiene requirements (as required).

The installation, operation and maintenance of this unit must comply with the applicable laws, standards, provisions and regulations in the respective country and the current state of the art.

## 2.5 Personal Protective Equipment

Personal protective equipment is used to protect people from impaired safety and health when working with the unit. The applicable accident prevention regulations at the place of use apply in all cases.

Personnel have to wear personal protective equipment during maintenance and troubleshooting on and with the unit.

# Katherm QK

Assembly, installation and operating instructions

## 3 Transport, storage and packaging

### 3.1 General transport instructions

Check on delivery for completeness and transport damage.

Proceed as follows in the event of visible damage:

- ▶ Do not accept delivery or only accept with reservations.
- ▶ Record any transport damage on the transportation documents or on the transport company's delivery note.
- ▶ Submit a complaint to the freight forwarder.



#### IMPORTANT NOTE!

Warranty claims can only be made within the applicable period for complaints. (More information is available in the T&Cs on the Kampmann website)



#### IMPORTANT NOTE!

2 people are needed to transport the unit. Wear personal protective clothing when transporting the unit. Only lift the unit on both sides and not by the pipes / valves.



#### IMPORTANT NOTE!

##### Material damage caused by incorrect transport!

Units being transported can drop or topple over if transported wrongly. This can cause serious material damage.

- ▶ Proceed carefully when unloading the equipment on delivery and when transporting it on site and note the symbols and instructions on the packaging.
- ▶ Only use the holding points provided.
- ▶ Only remove packaging shortly before assembling the unit.

### 3.2 Scope of delivery



#### IMPORTANT NOTE!

##### Check the scope of delivery!

- ▶ Check the delivery for damage.
- ▶ Check that the articles and type numbers are correct.
- ▶ Is the delivery and number of items delivered correct?

## 3.3 Storage

Store packaging under the following conditions:

- ▶ Do not store outdoors.
- ▶ Store in a dry and dust-free place.
- ▶ Store in a frost-free place.
- ▶ Do not expose to aggressive media.
- ▶ Protect from direct sunlight.
- ▶ Avoid mechanical vibrations and shocks.



### **IMPORTANT NOTE!**

Under certain circumstances, packages can carry storage instructions that exceed the requirements listed here. Comply with these instructions accordingly.

## 3.4 Packaging

Handling packaging materials



### **IMPORTANT NOTE!**

Dispose of packaging materials in line with the applicable statutory requirements and local regulations.



### **IMPORTANT NOTE!**

The packaging is also use to protect the product from site dust and dirt. Only remove packaging shortly before assembling the unit.

# Katherm QK

Assembly, installation and operating instructions

## 4 Technical data

Unit	Katherm QK (performance values for roll-up grille)	
Size	QK 190	QK 215
Trench width [mm]	190	215
Trench height [mm]	112	112
Trench length [mm]	1000 - 3200	1000 - 3200
Air volume flow [m³/h]	43 - 548	43 - 548
Heat output, 2-pipe <sup>1</sup>	437 - 5781	522 - 6025
Sound pressure level [dB (A)] <sup>2, 3</sup>	<20 - 41	<20 - 41
Sound power level [dB(A)] <sup>3</sup>	<28 - 49	<28 - 49
Power consumption [W]	3.6 - 21.1	3.6 - 21.1
Current consumption [mA]	54 - 173	54 - 173
Water content [l]	0.31 - 1.95	0.42 - 2.65
Weight [kg]	11.2 - 33.6	12.1 - 37.2

<sup>1</sup> at LPHW 75 / 65 °C,  $t_{L1}$ = 20°C, with fan-assisted convection

<sup>2</sup> The sound pressure level was calculated with an assumed room insulation of 8 dB(A). This corresponds to a distance of 2 m, a room volume of 100 m³ and a reverberation time of 0.5 s (in accordance with VDI 2081).

<sup>3</sup> Sound pressure level < 20 dB (A) and sound power level < 28 dB (A) outside the usual measuring and audible range.

## 5 Construction and function

### 5.1 Overview

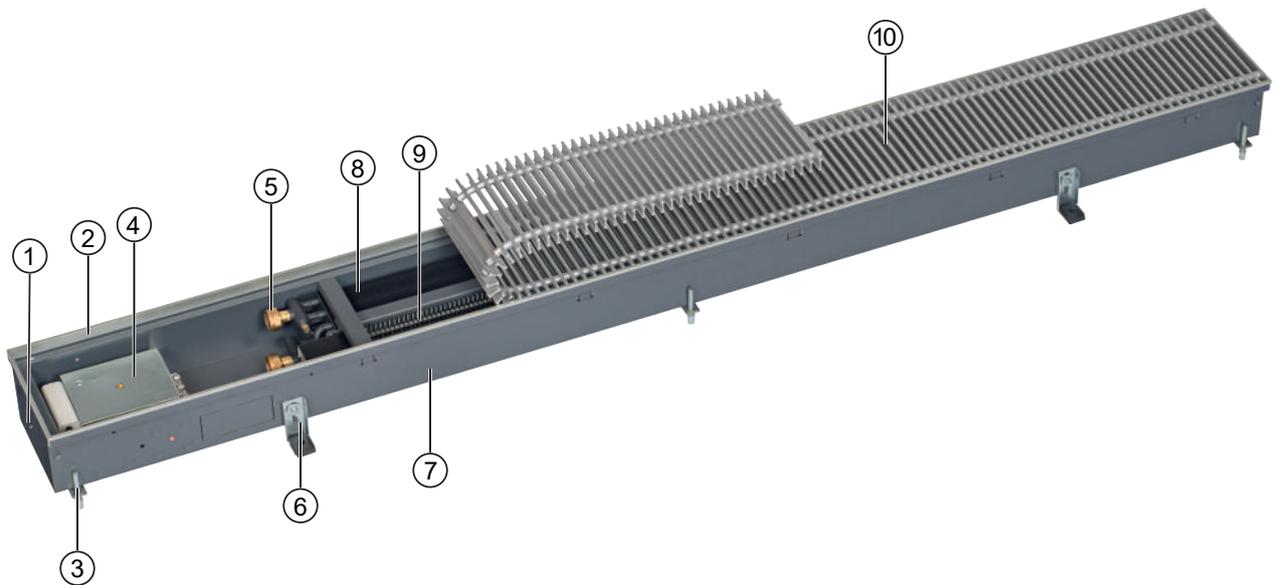


Fig. 1: Katherm QK at a glance

1	Easy to connect	2	Frame edge (matches grille colour)
3	Load-bearing height adjustment feet	4	Connection-ready control box
5	Eurokonus valve connection	6	Height adjustment feet with sound insulation
7	Floor trench	8	Coil
9	EC fan	10	Roll-up grille (example)

### 5.2 Brief description

Katherm QK are decentralised units for the heating of room air, for use in hotels, offices and business premises, among others. Secondary air is drawn in by the fan and passed through the copper/aluminium heat exchanger. The temperature-controlled air rises up the façade of the building to create a pleasant indoor climate.

# Katherm QK

Assembly, installation and operating instructions

## 6 Installation and wiring

### 6.1 Requirements governing the installation site

Only install and assemble the unit if the following conditions are met:

- ▶ Make sure that the unit is securely suspended/standing.
- ▶ Ensure that the airflow can circulate freely.
- ▶ Provide adequate space for appropriately sized flow and return water connections on site (Connection to the pipe network [▶ 20]).
- ▶ There is a power supply on site (Maximum electrical rating values [▶ 24]).
- ▶ If need be, provide a condensation connection with a sufficient gradient on site.

### 6.2 Installation

2 people are needed to install the unit.



#### **CAUTION!**

##### **Risk of injury from sharp metal housing!**

The inner metal of the casing can have sharp edges.

- ▶ Wear suitable protective gloves.



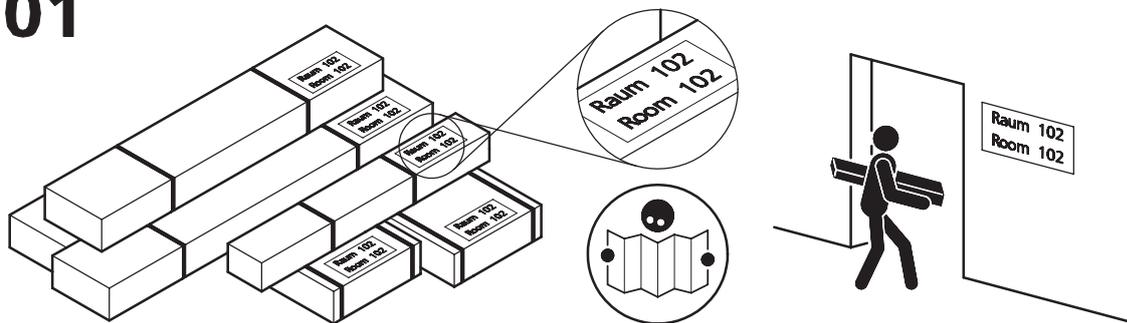
#### **IMPORTANT NOTE!**

##### **Horizontal installation of units!**

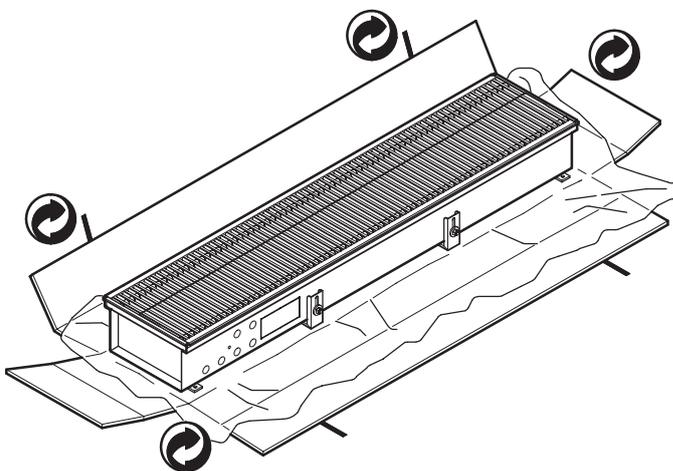
When installing the units, ensure that they are completely horizontal to ensure proper operation.

## 6.2.1 Installation steps

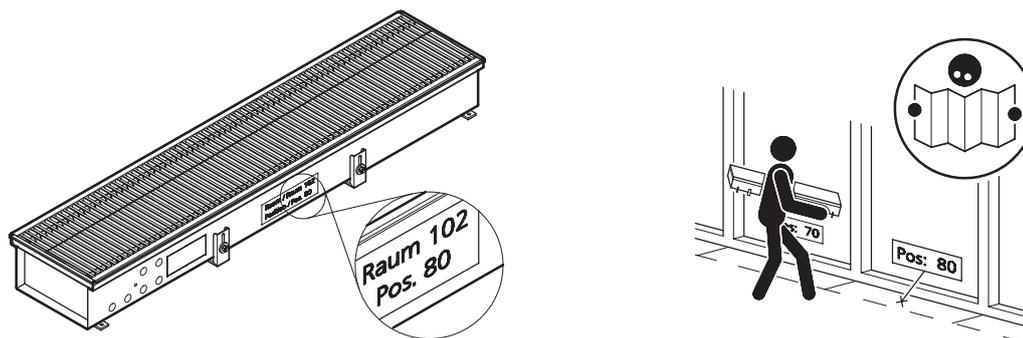
### 01



### 02



### 03



# Katherm QK

Assembly, installation and operating instructions

## 04

Baulänge Model lengths			
4 x	1000	2 x	
6 x	1200 - 1800	2 x	
8 x	2000 - 2600	2 x	
10 x	2800 - 3200	2 x	

M8

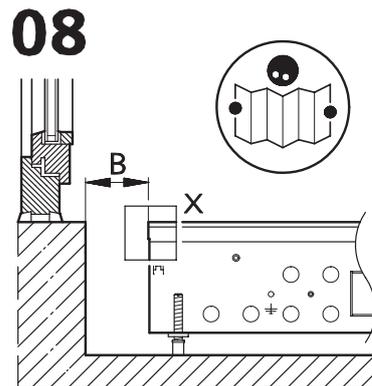
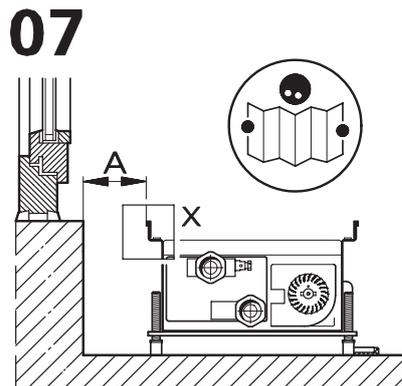
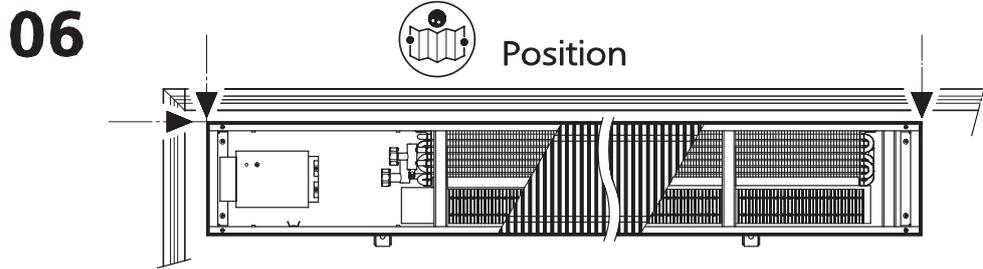
M6

## 05

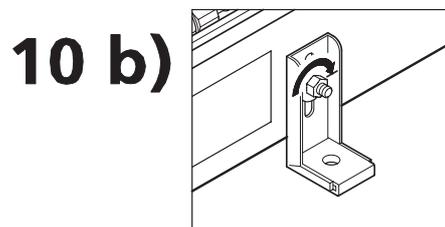
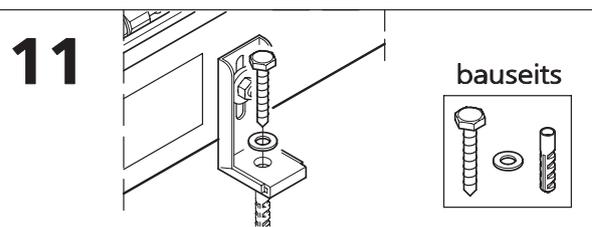
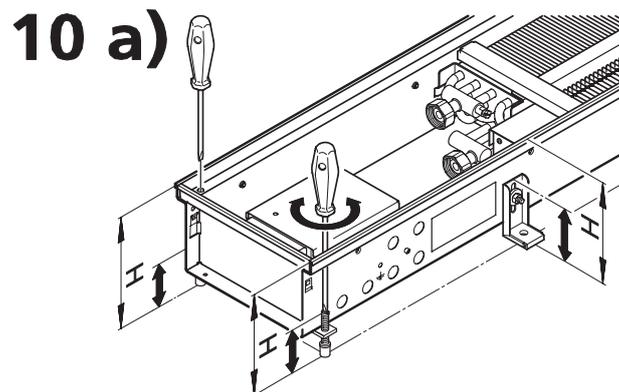
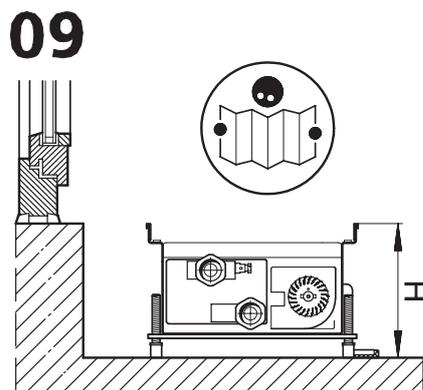
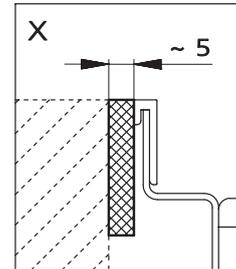
### Y a)

### b)

### c)



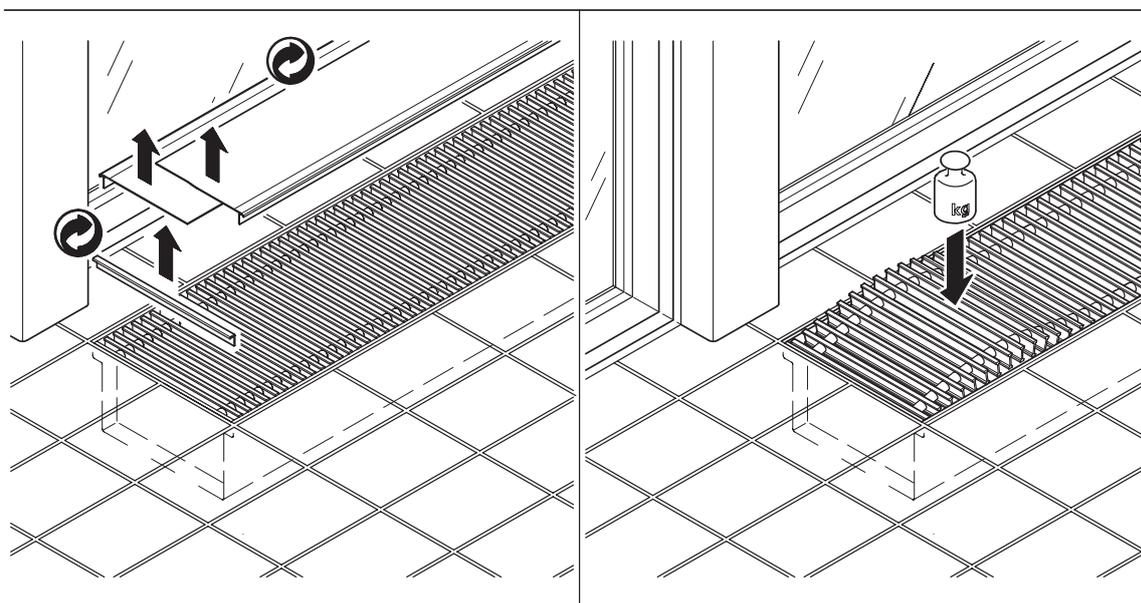
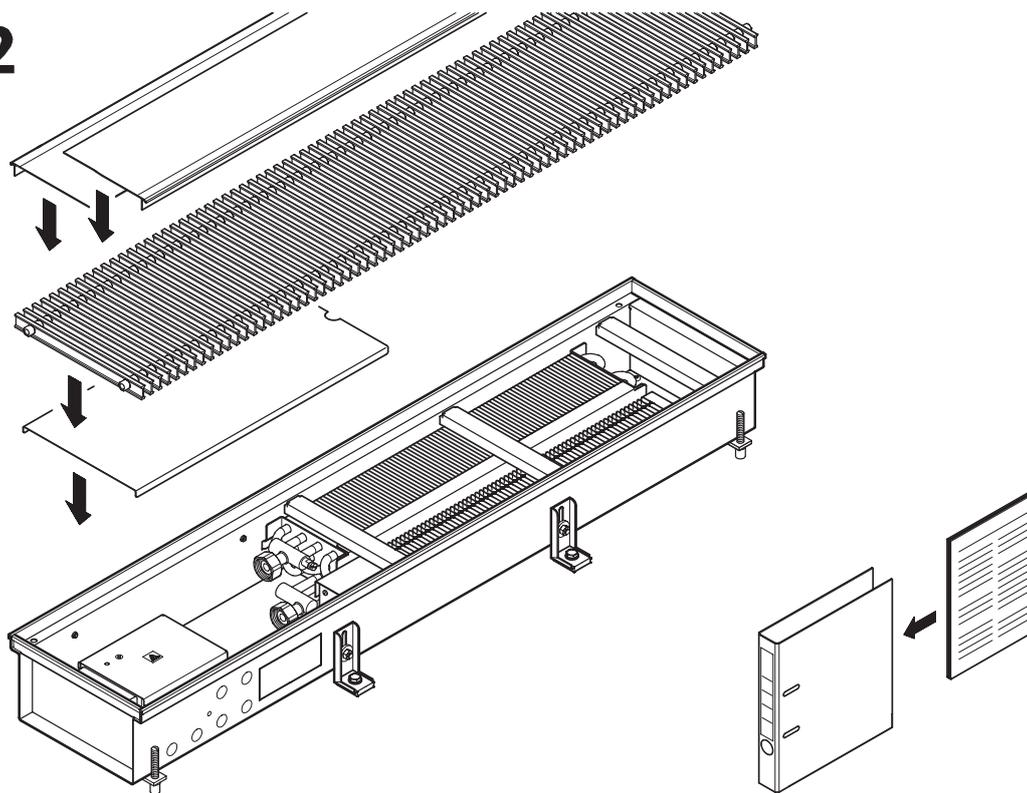
Dehnfuge bauseits



# Katherm QK

Assembly, installation and operating instructions

## 12



Separately packed roll-up grilles, for instance when using installation covers to protect the trenches from dirt, are rolled up in the factory. The grille can become slightly over-long due to the steel springs extending. Unrolling the grille and laying it flat for a few hours can return the grille to its original length. Laying the grille into the trench helps it to fit more easily into the frame.

## 6.2.2 Screed work

The following work needs to have been completed before screeding can begin:

- ▶ Water has been correctly connected.
- ▶ The electrical connections have been correctly wired.
- ▶ The unit is correctly positioned and levelled.
- ▶ There are no sound bridges to the concrete slab, especially in the area of the height adjustment feet.
- ▶ Expansion joints have been provided on site to prevent the unit from being compressed by the floor or screed.
- ▶ All the appropriate cable conduits have been laid.
- ▶ Appropriate material has been used to seal all the openings and punched openings in the unit. They also need to be additionally sealed when using floating screed or other low-viscosity floor coverings!
- ▶ Cover the grille and floor trench with the transparent installation cover to protect the trench from dirt or cement.

## 6.3 Installation

### Actuator with 'First Open' function

- ▶ When delivered, the actuator is normally open in a de-energised state, thanks to the First Open function. This enables heating mode to run even if the electric wiring is not yet completed.
- ▶ When subsequently commissioned and with the application of power (for longer than 6 minutes), the First Open function is automatically unlocked so that the actuator becomes fully operational.

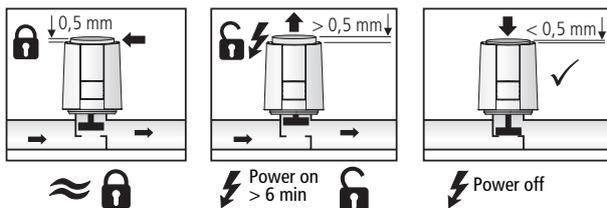


Fig. 2: "First Open" function

### Valve and return shut-off valve connection

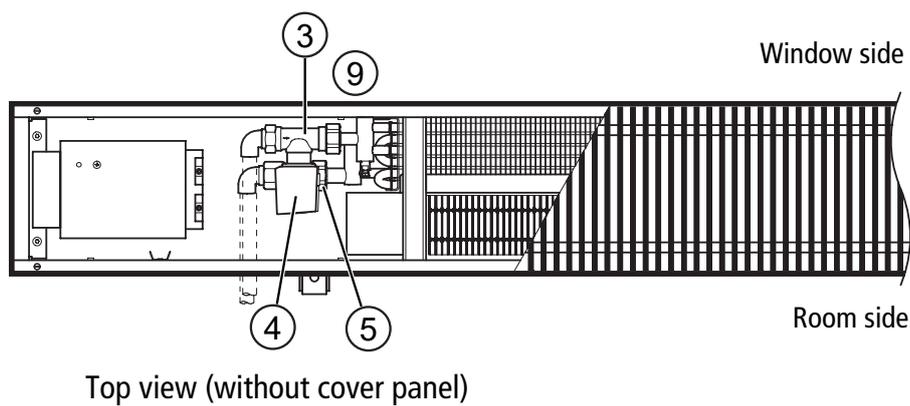
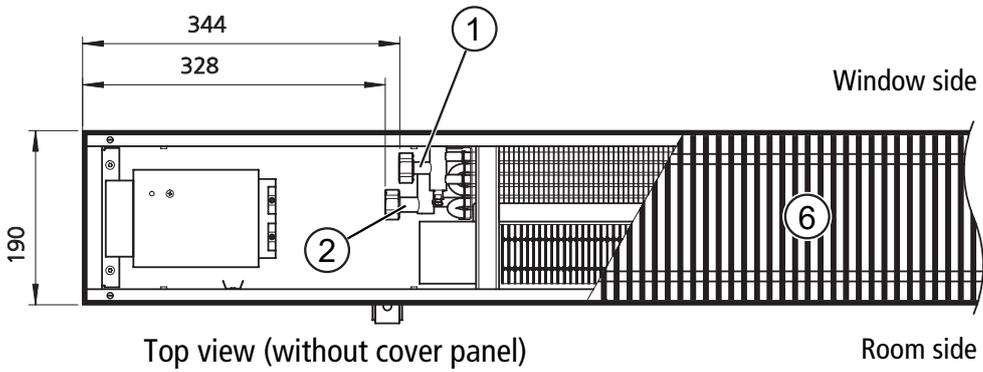
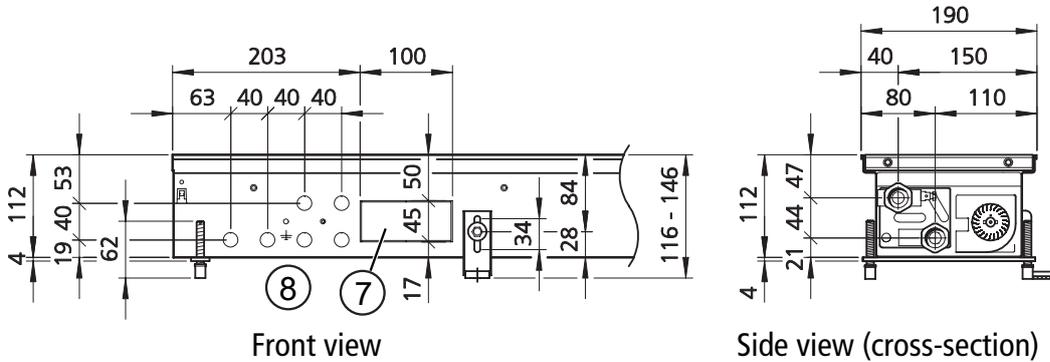
- ▶ Using a suitable sealant (e.g. NEO Fermit), screw the thermostatic valve and the return shut-off valve to the convector's Eurocone valve connections.
- ▶ Fit the flow and return pipes. Use the punched pipe openings on the room side for the water-side connection.
- ▶ Perform a pressure test.

# Katherm QK

Assembly, installation and operating instructions

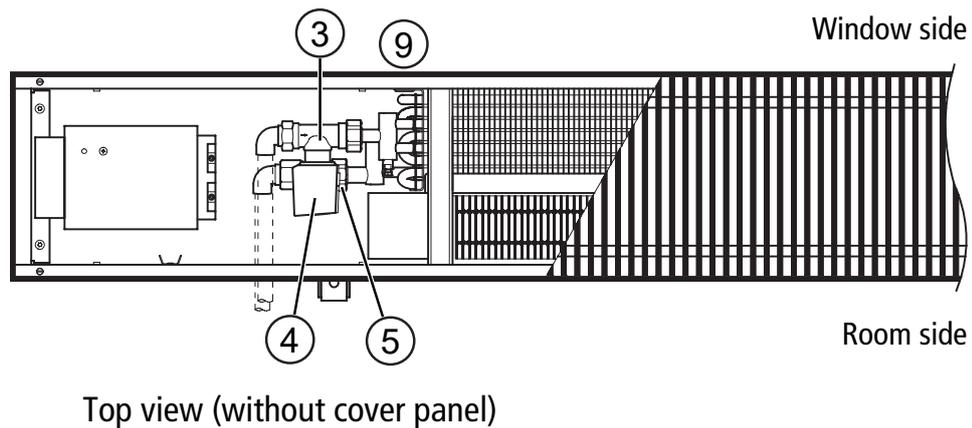
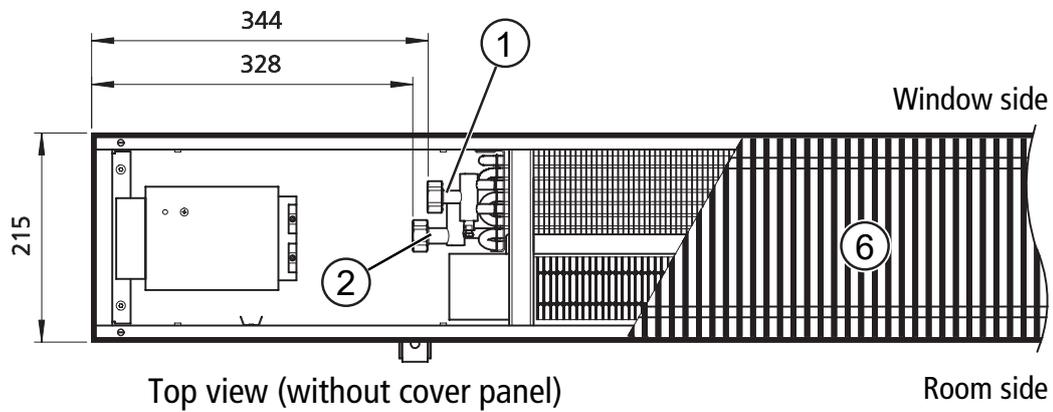
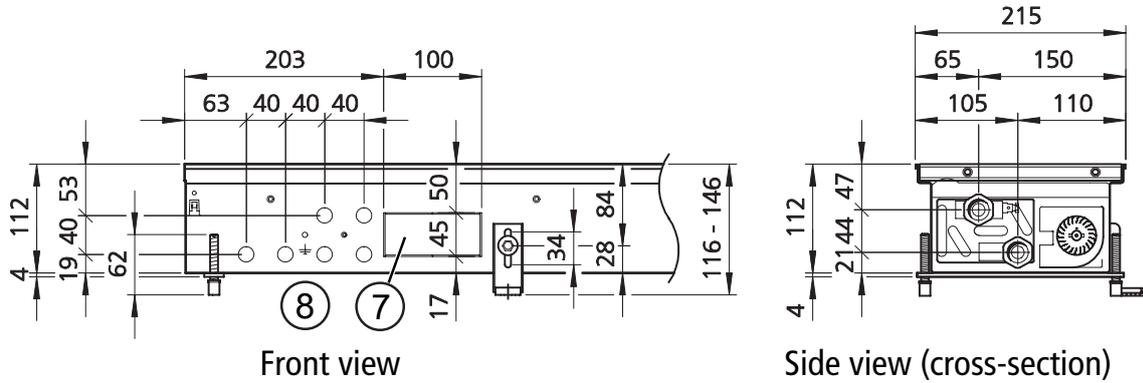
## 6.3.1 Connection to the pipe network

Katherm QK 190, trench height 112 mm



1	Flow	2	Return
3	Valve body, 1/2" straight, type 346909, pre-settable	4	Thermoelectric actuator 24 V, type 146906
5	1/2" return shut-off valve, straight, type 145952	6	Unit shown with roll-up grille
7	Pipe openings for water connection, punched	8	Cable entry, stamped
9	Alternatively: Valve kit type 142110, consisting of valve body 1/2" pre-settable, actuator 24 V and return shut-off valve 1/2"		

## Katherm QK 215, trench height 112 mm



1	Flow	2	Return
3	Valve body, 1/2" straight, type 346909, pre-settable	4	Thermoelectric actuator 24 V, type 146906
5	1/2" return shut-off valve, straight, type 145952	6	Unit shown with roll-up grille
7	Pipe openings for water connection, punched	8	Cable entry, stamped
9	Alternatively: Valve kit type 142110, consisting of valve body 1/2" pre-settable, actuator 24 V and return shut-off valve 1/2"		

# Katherm QK

Assembly, installation and operating instructions

## 6.4 Katherm QK supply air modules (optional)

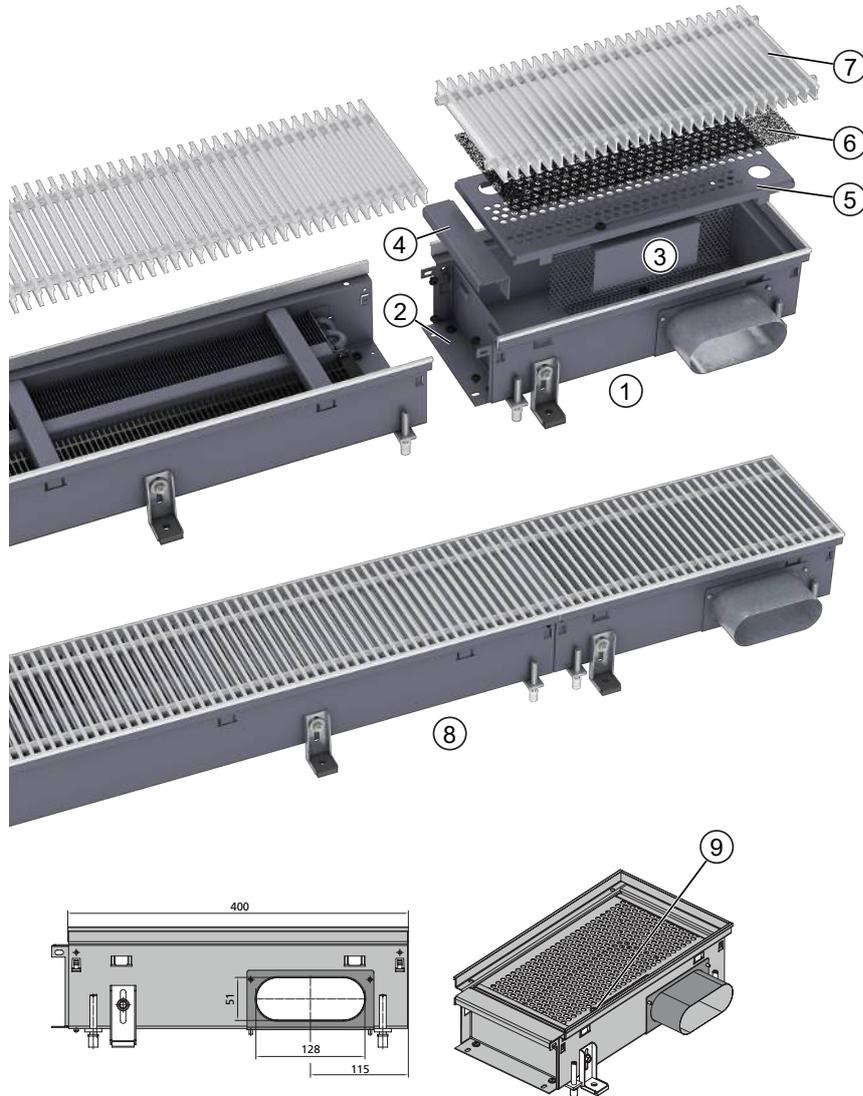
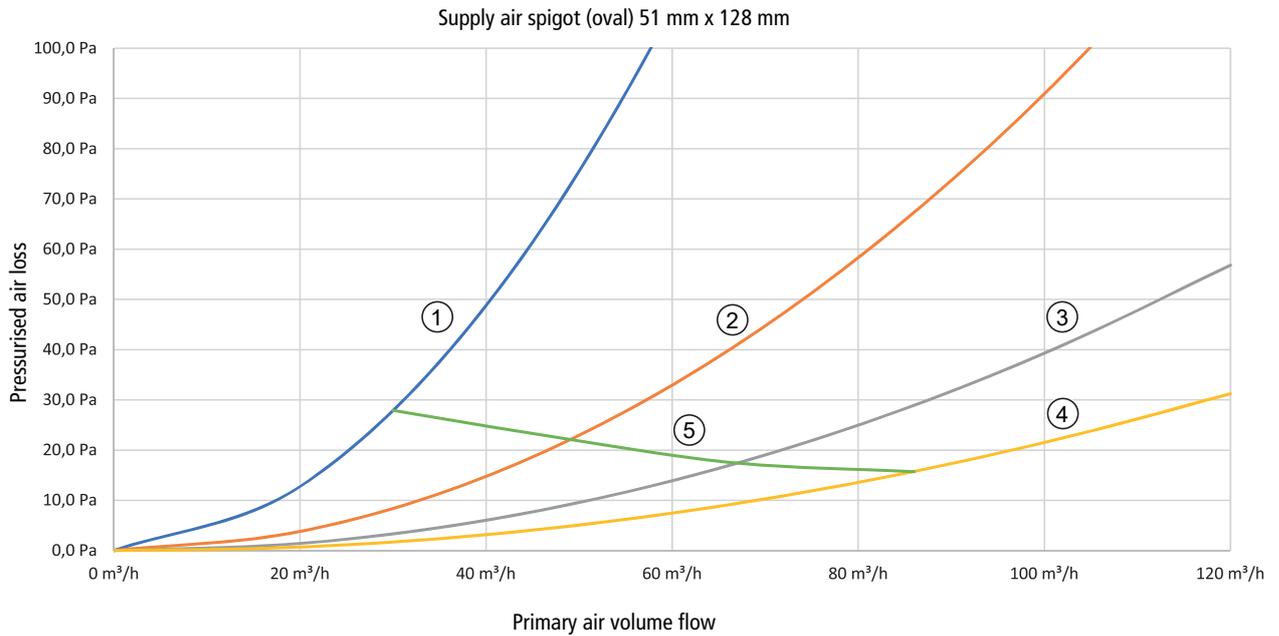


Fig. 3: QK supply air modules

1	Supply air module with supply air spigot	2	Connecting brackets
3	Supply air slider	4	Reinforcing struts
5	Perforated plate	6	Filter
7	Example of Optiline roll-up grille	8	Kampmann QK shown with Optiline roll-up grille
9	Slider		

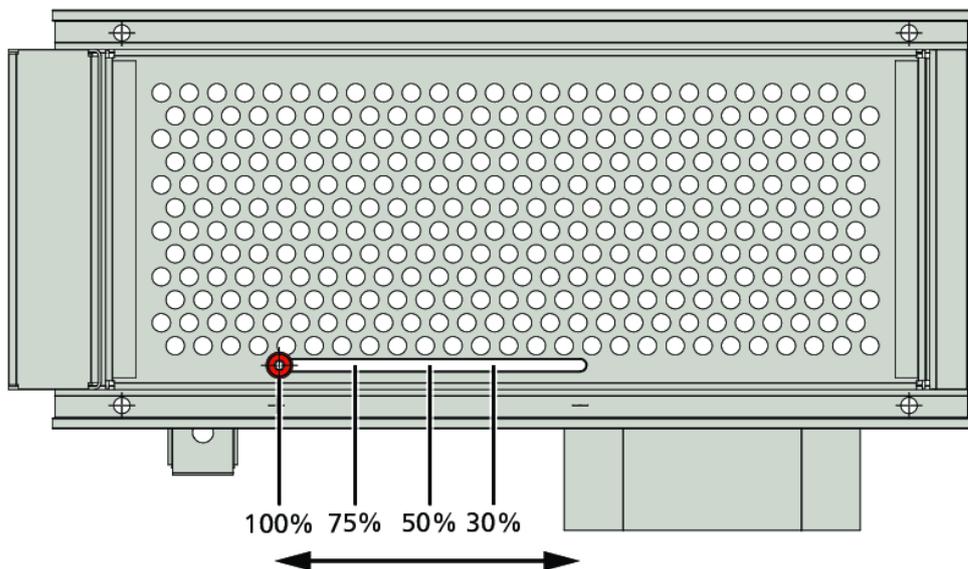
Trench width [mm]	Trench length [mm]	Trench height [mm]	Supply air spigot [mm]	Design air volume flow [m <sup>3</sup> /h]
190	400	112	51 x 128 (oval)	70
215	400	112	51 x 128 (oval)	70

Tab. 4: Technical data – Katherm QK supply air module



1	Slider position 30% open	2	Slider position 50% open
3	Slider position 75% open	4	Slider position 100% open
5	Sound power level 30dB(A)		

## Adjusting the slider position



The height of the supply air module is adjusted using the threaded rods and connected by the installation brackets to the substrate. The slider can be moved into different positions to adjust the required volumetric flow at the supply air module. The figure shows four different slider positions (100%, 75%, 50% and 30% opened). They are also shown in the design diagrams in which the required pressure losses, sound levels and air volume flows can be seen. Intermediate values can be interpolated.

# Katherm QK

Assembly, installation and operating instructions

## 7 Electrical connection

### 7.1 Maximum electrical rating values

#### Katherm QK, 230 V electromechanical version (\*00)

Trench length [mm]	Nominal voltage [V DC]	Mains frequency [Hz]	Nominal power [W]	Nominal current [A]	Leakage current [mA]	Ri analogue input [kΩ]	IP class	Protection class
1000	230	50	7	0.08	-	200	IP00	I
1200	230	50	8.4	0.09	-	200	IP00	I
1400	230	50	9.9	0.10	-	200	IP00	I
1600	230	50	11.3	0.11	-	200	IP00	I
1800	230	50	12.7	0.12	-	200	IP00	I
2000	230	50	12.7	0.12	-	200	IP00	I
2200	230	50	14.1	0.13	-	200	IP00	I
2400	230	50	15.5	0.14	-	200	IP00	I
2600	230	50	17	0.15	-	200	IP00	I
2800	230	50	18.4	0.15	-	200	IP00	I
3000	230	50	19.8	0.16	-	200	IP00	I
3200	230	50	21.2	0.17	-	200	IP00	I

Tab. 5: Maximum electrical rating values Katherm QK

#### Katherm QK, 24 V electromechanical version (\*24)

Trench length [mm]	Nominal voltage [V DC]	Mains frequency [Hz]	Nominal power [W]	Nominal current [A]	Leakage current [mA]	Ri analogue input [kΩ]	IP class	Protection class
1000	24	-	4	0.17	-	47	IP00	III
1200	24	-	5	0.21	-	54	IP00	III
1400	24	-	6.5	0.27	-	60	IP00	III
1600	24	-	7.5	0.32	-	67	IP00	III
1800	24	-	9	0.38	-	70	IP00	III
2000	24	-	9	0.38	-	70	IP00	III
2200	24	-	11.5	0.48	-	71	IP00	III
2400	24	-	13	0.55	-	72	IP00	III
2600	24	-	14	0.59	-	76	IP00	III
2800	24	-	15.5	0.65	-	85	IP00	III
3000	24	-	16.5	0.69	-	88	IP00	III
3200	24	-	18	0.75	-	92	IP00	III

Tab. 6: Maximum electrical rating values Katherm QK

## Katherm QK, KaControl version (\*C1)

Trench length [mm]	Nominal voltage [V DC]	Mains frequency [Hz]	Nominal power [W]	Nominal current [A]	Leakage current [mA]	Ri analogue input [kΩ]	IP class	Protection class
1000	230	50	7	0.08	-	20	IP00	I
1200	230	50	8.4	0.09	-	20	IP00	I
1400	230	50	9.9	0.10	-	20	IP00	I
1600	230	50	11.3	0.11	-	20	IP00	I
1800	230	50	12.7	0.12	-	20	IP00	I
2000	230	50	12.7	0.12	-	20	IP00	I
2200	230	50	14.1	0.13	-	20	IP00	I
2400	230	50	15.5	0.14	-	20	IP00	I
2600	230	50	17	0.15	-	20	IP00	I
2800	230	50	18.4	0.15	-	20	IP00	I
3000	230	50	19.8	0.16	-	20	IP00	I
3200	230	50	21.2	0.17	-	20	IP00	I

Tab. 7: Maximum electrical rating values Katherm QK

## 7.2 Electromechanical connection, 24 V (\*24)

**Note these points in the following wiring diagrams with electromechanical control:**

- ▶ Comply with the details on cable types and cabling with due consideration for VDE 0100.
- ▶ Without \*: NYM-J. The requisite number of wires, including protective earth, is stated on the cable. Cross-sections are not stated, as the cable length is involved in the calculation of the cross-section.
- ▶ With \*: J-Y(ST)Y 0.8mm. Lay separately from power lines.
- ▶ If other types of cables are used, they must be at least equivalent.
- ▶ The terminals on the unit are suitable for a maximum wire cross-section of 2.5 mm<sup>2</sup>.
- ▶ The Electrical data for PowerKon nano, 230 V need to be respected when rating the in situ mains power supply and fusing.

# Electrical cabling - BMS control



5\*  
W1



W1: On-site fuse (0.63A)

Automation station including central power supply (24V DC)

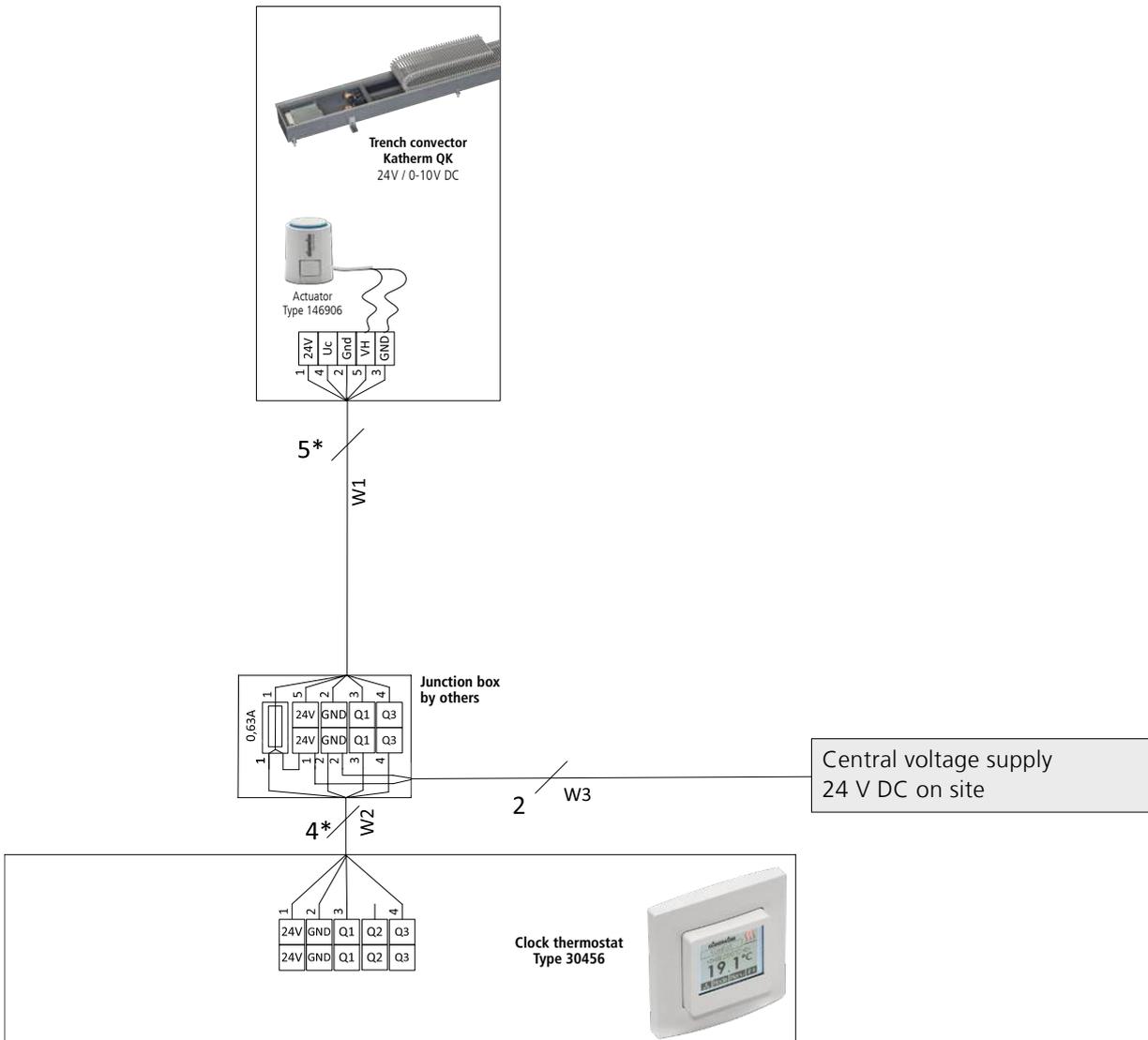


\* Lay shielded cables (e.g. IY(ST)Y, 0.8 mm), separately from high-voltage cables.

W1: Voltage supply and control signal for (on-site fuse 0.63 A) and actuator.

Subject to technical modifications: Refer to the control accessory documentation in the event of deviation from the circuit diagrams!

## Electrical cabling – Control via clock thermostat, type 30456



- \* Lay shielded cables (e.g. IY(ST)Y, 0.8 mm) separately from power cables.
- W1: Voltage supply and control signal for fan (on-site fuse 0.63 A) and actuator.
- W2: Voltage supply and control signal for fan and actuator.
- W3: Voltage supply (fuse by others).

# Katherm QK

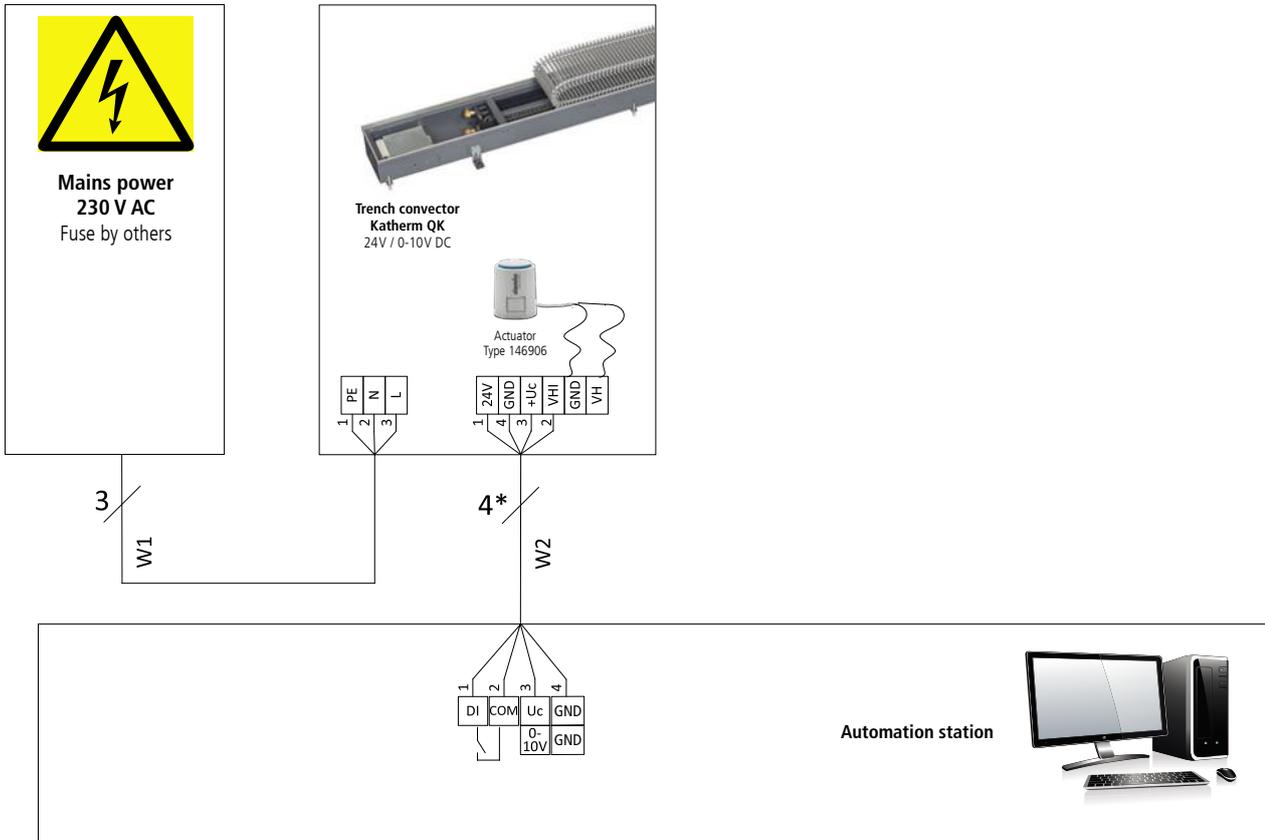
Assembly, installation and operating instructions

## 7.3 Electromechanical connection, 230 V (\*00)

**Note these points in the following layout plans for Katherm QK with electromechanical control 230 V(\*00):**

- ▶ Comply with the details on cable types and cabling with due consideration of VDE 0100.
- ▶ Without \*: NYM-J. The requisite number of wires, including PE conductor, is stated on the cable. Cross-sections are not stated, as the cable length is involved in the calculation of the cross-section.
- ▶ With \*: J-Y(ST)Y 0.8mm. Lay separately from high voltage lines.
- ▶ If other types of cables are used, they must be at least equivalent.
- ▶ The terminals on the unit are suitable for a maximum wire cross-section of 2.5 mm<sup>2</sup>.
- ▶ We recommend type F when using RCCBs. Refer to the provisions of DIN VDE 0100 Parts 400 and 500 when configuring the rated fault current.
- ▶ Note the electrical data when rating the in-situ mains power supply and fuse.

## Electrical cabling - BMS control



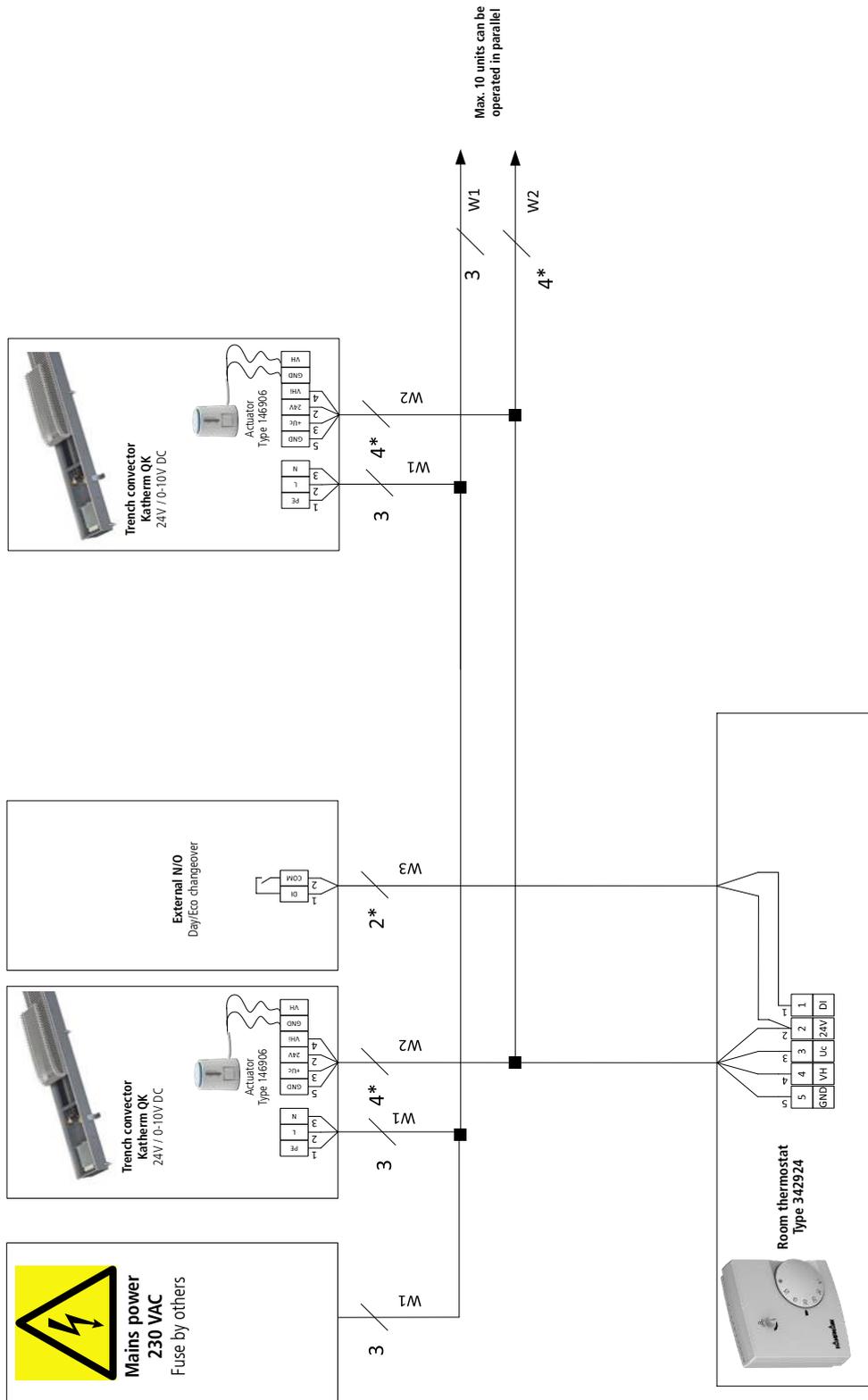
\* Lay shielded cables (e.g. IY(ST)Y, 0.8 mm) separately from power cables.

W1: power supply

W2: Control signal for fan and actuator

Subject to technical modifications: Refer to the control accessory documentation in the event of deviation from the circuit diagrams!

# Electrical cabling – Control via room thermostat, type 342924



\* Lay shielded cables (e.g. IY(ST)Y, 0.8 mm) separately from power cables.

W1: power supply

W2: Control signal for fan and actuator

W3: Operating mode changeover (optional)

Subject to technical modifications: Refer to the control accessory documentation in the event of deviation from the circuit diagrams!

## 7.4 KaControl (\*C1)

### 7.4.1 KaController installation

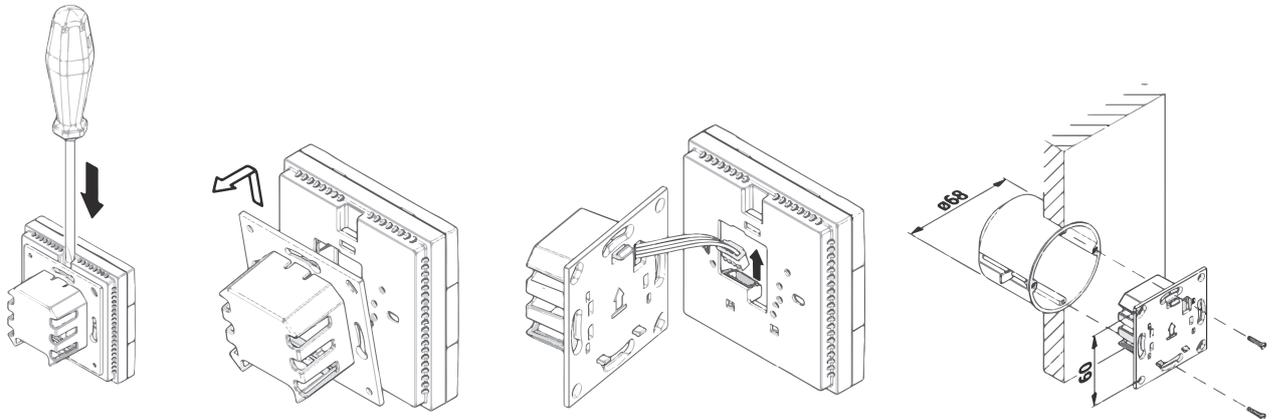


Fig. 4: Installation of flush-mounted back box

	<p><b>Electrical connection</b></p> <ul style="list-style-type: none"> <li>▶ Connect the KaController to the nearest KaControl unit in line with the wiring diagram. The maximum bus length between the KaController and the KaControl master unit is 30 m.</li> <li>▶ The respective KaControl automatically becomes the master unit in the control circuit when a KaController is connected to it.</li> </ul>
	<p><b>DIP switch setting</b></p> <p>The DIP switches on the rear of the KaController should be set according to the illustration:</p> <ul style="list-style-type: none"> <li>▶ DIP switch 1: ON</li> <li>▶ DIP switch 2: OFF</li> </ul>

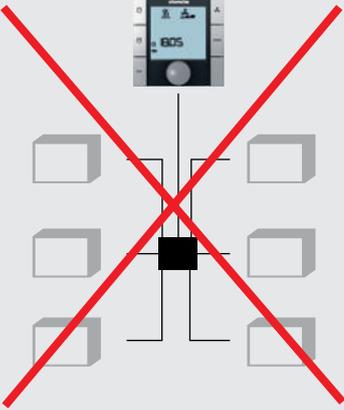
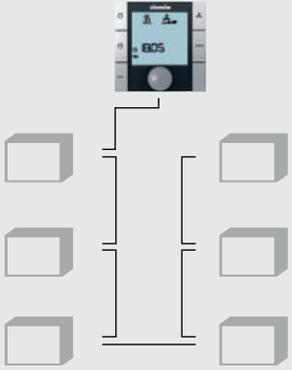
Fig. 5: KaController terminals

Fig. 6: DIP switch setting on KaController

# Katherm QK

Assembly, installation and operating instructions

## 7.4.2 Connection (\*C1)

 <p><b>Wrong!</b> Star-shaped wiring of the bus lines.</p>	<p><b>General information</b></p> <ul style="list-style-type: none"><li>▶ Route all low voltage cables along the shortest route.</li><li>▶ Ensure that low-voltage and power cables are separated, using metal partitions on cable harnesses.</li><li>▶ Use only shielded cables as low-voltage and bus cables.</li><li>▶ Lay all BUS cables in a linear pattern. Star-shaped wiring is not permitted.</li><li>▶ The KaController is connected via a bus connection to the respective control PCB on the unit.</li></ul>
 <p><b>Right!</b> Linear wiring of the bus lines.</p>	

Tab. 8: Wiring of bus lines



### IMPORTANT NOTE!

Use shielded, paired cables as bus cables, UNITRONIC® BUS LD 2x2x0.22, but at least of the same value or higher.



### IMPORTANT NOTE!

When laying bus cables, avoid the formation of star points, for instance in junction boxes. Loop the cables through to the units!

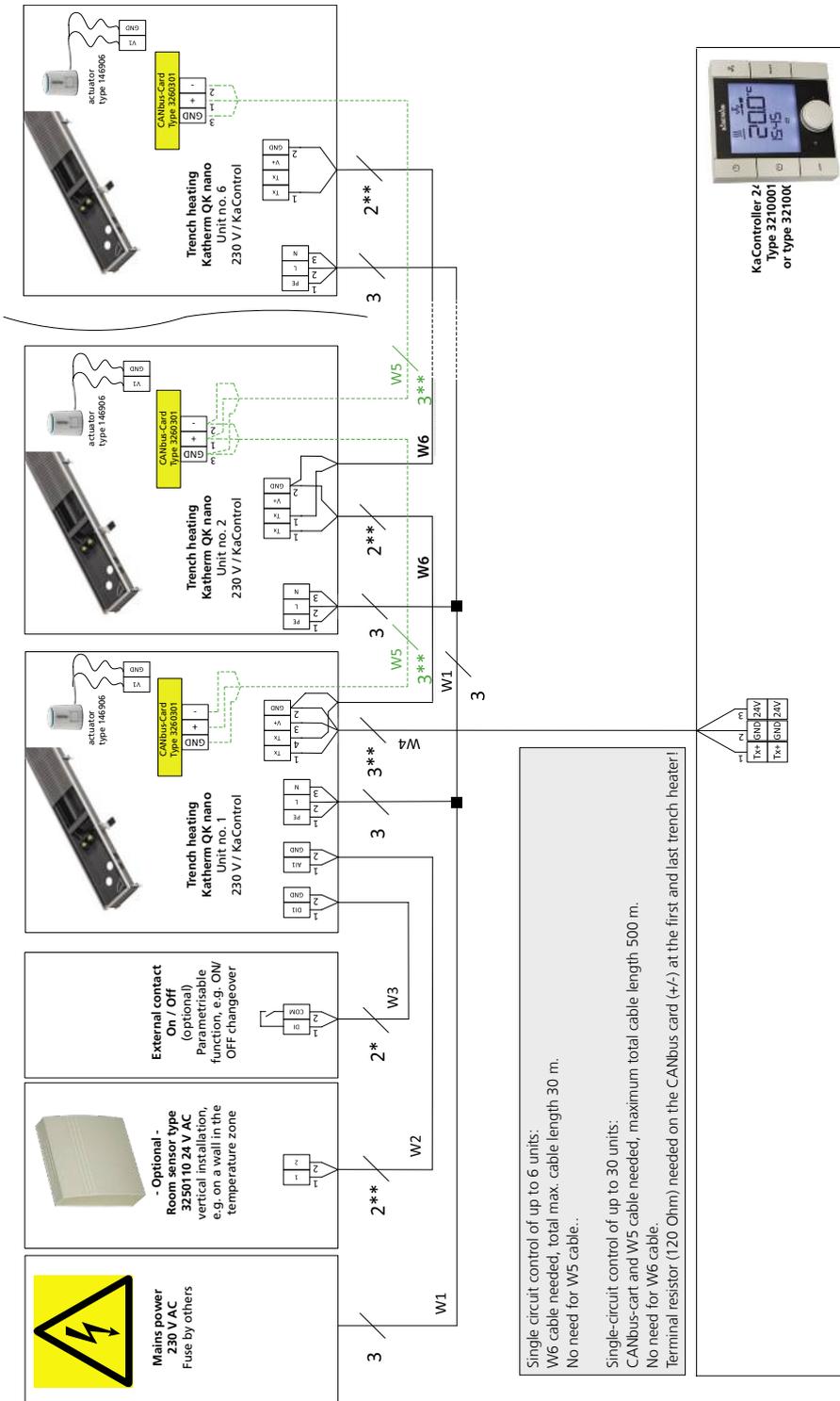
**Observe these points in the following installation diagrams for Katherm QK with KaControl:**

- ▶ Comply with the details on cable types and cabling with due consideration of VDE 0100.
- ▶ Without \*: NYM-J. The requisite number of wires, including PE conductor, is stated on the cable. Cross-sections are not stated, as the cable length is involved in the calculation of the cross-section.
- ▶ With \*: J-Y(ST)Y 0.8mm. Lay separately from high voltage lines.
- ▶ With \*\*: Lay UNITRONIC BUS LD 0.22 mm<sup>2</sup> or similar separately from high voltage lines.
- ▶ If other types of cables are used, they must be at least equivalent.
- ▶ Length of the BUS line from the KaController to unit 1: max. 30 m.
- ▶ Maximum number of parallel units: 6 units. CANbus cards type 3260301 needed for each unit (see accessories) maximum 30 no.
- ▶ Length of bus line from unit 1 to the last unit max. 30 m. The cable length can be increased to 300 m using CANbus cards type 3260301 (see accessories).
- ▶ The terminals on the unit for the mains power supply are suitable for a maximum wire cross-section of 2.5 mm<sup>2</sup>.
- ▶ We recommend type F when using RCCBs. Refer to the provisions of DIN VDE 0100 Parts 400 and 500 when configuring the rated fault current.
- ▶ Note the electrical data when rating the in-situ mains power supply and fuse (C16A, max.10 units, with the exception of Katherm HK 320 E).

# Katherm QK with KaController

## Single-circuit control, or maximum 30 Katherm QK units by CAN bus.

### Electrical cabling - 24 V Open / Close valve, external KaController



\* Lay shielded cables (e.g. IY(ST)Y 0,8 mm) separately from high-voltage cables.

\*\* Lay shielded, paired cables, e.g. UNITRONIC@ BUS LD 2x2x0,22 or equivalent, separately from high-voltage cables.

W1: Power supply

W2: Analogue input A11 (optional connection), max. cable length 10 m, from 1 mm<sup>2</sup> 30 m.

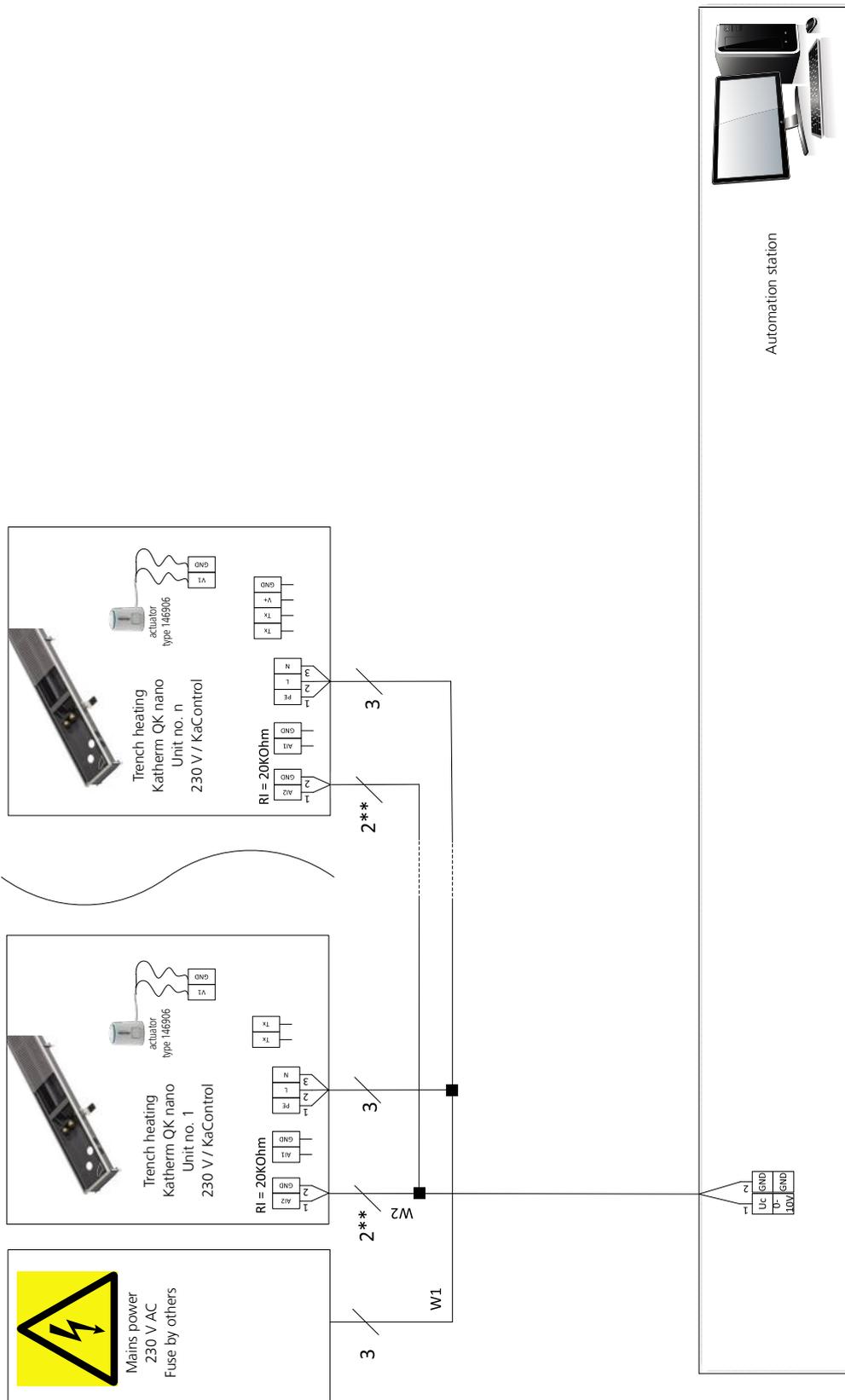
W3: Digital input DI1 (optional connection), max. cable length 30 m, from 1 mm<sup>2</sup> 100 m.

W4/W6: Bus signal (tLan), each max. total cable length 30 m.

W5: Bus signal (CANbus) only needed in a single-circuit control of up to 30 units.

Subject to technical modifications: Refer to the control accessory documentation in the event of deviation from the circuit diagrams!

# KaControl electrical cabling - BMS control



\*\* Lay shielded, paired cables, e.g. CAT5 (AWG23) of at least the same value, separately from high-voltage cables.

W1: Power supply

W2: Control signal for fan and actuator.

Subject to technical modifications: Refer to the control accessory documentation in the event of deviation from the circuit diagrams!

## 8 Pre-commissioning checks

Before initial commissioning, check whether all the necessary conditions have been met so that the unit can function safely and properly.

### Structural tests

- ▶ Check that the unit is securely standing and fixed.
- ▶ Check the horizontal installation/suspension of the unit.
- ▶ Check the completeness and correct seating of all filters (dirt side).
- ▶ Check whether all components are properly fitted.
- ▶ Check whether all dirt, such as packaging or site dirt, has been removed.

### Electrical tests

- ▶ Check whether all lines have been properly laid.
- ▶ Check whether all lines have the necessary cross-section.
- ▶ Are all wires connected in accordance with the electric wiring diagrams?
- ▶ Is the earth wire connected and wired throughout?
- ▶ Check all external electrical connections and terminal connections are fixed in place and tighten if necessary.
- ▶ Check whether DIP switches have been correctly set in accordance with the wiring diagram.

### Water-side checks

- ▶ Check whether all supply and drainage lines have been properly connected.
- ▶ Fill pipes and unit with water and bleed.
- ▶ Check whether all bleed screws are closed.
- ▶ Check leak tightness (pressure test and visual inspection).
- ▶ Check whether the parts carrying water have been flushed through.
- ▶ Check whether any shut-off valves fitted on site are open.
- ▶ Check whether any electrically actuated shut-off valves have been properly connected.
- ▶ Check whether all valves and actuators are working properly (note permitted mounting position).

### Air-side checks

- ▶ Check whether there is unimpeded flow at the air inlet and outlet.
- ▶ Check whether the air inlet filter is fitted and dirt-free.

Once all checks have been completed, initial commissioning can be carried out in line with Chapter 9 "Operation" [▶ 37].

## 9 Operation

### 9.1 Operation of electromechanical control

 <p>A white, rectangular room thermostat with a circular temperature dial on the right side. The dial has markings for 15, 20, 25, and 30 degrees Celsius. The brand name 'KAMPMAN' is visible at the bottom left of the device.</p>	<p><b>Room thermostat type 194000342924</b></p> <ul style="list-style-type: none"> <li>▶ Electronic room thermostat with continuously variable speed control, supplied as a surface-mounted wall-mounted unit on a flush-mounted box in visually discreet design</li> <li>▶ With thermal feedback, room temperature setting and speed pre-setting using dials</li> <li>▶ Internal temperature sensor NTC</li> <li>▶ Digital input for Day/Eco changeover</li> <li>▶ Parallel operation of 10 units is possible</li> </ul>
 <p>A square, light-colored clock thermostat with a digital LCD display. The display shows 'KAMPMAN komfort', a target temperature of '28.0°C', and the current room temperature of '19.1°C'. There are also icons for heating and a 'Modes Menu' button at the bottom.</p>	<p><b>Clock thermostat 24 V, type 30456</b></p> <ul style="list-style-type: none"> <li>▶ Electronic clock thermostat for 2- and 4-pipe applications, surface-mounted wall installation on a flush-mounted box in visually unobtrusive design</li> <li>▶ operation using 4 sensor keys</li> <li>▶ timer with automatic summer/winter switch-over</li> <li>▶ option for external room sensor connection</li> <li>▶ control input for heating/cooling changeover with 2-pipe applications</li> <li>▶ digital input can be set to Comfort/ECO or ON/OFF switchover</li> </ul>

Fig. 7: Room thermostat type 194000342924

Fig. 8: Clock thermostat, type 30456

### 9.2 Operation of the KaController

The following information is limited to the key content on the operation of the KaController and KaControl system. More information is included separately in the KaControl SmartBoard user manual.

#### 9.2.1 Function keys, display elements

All menus can be selected and set using the navigator dial.

The LED background lighting is automatically switched off 5 seconds after the KaController is last used. The LED background lighting can be permanently disabled using a parameter setting.

# Katherm QK

Assembly, installation and operating instructions

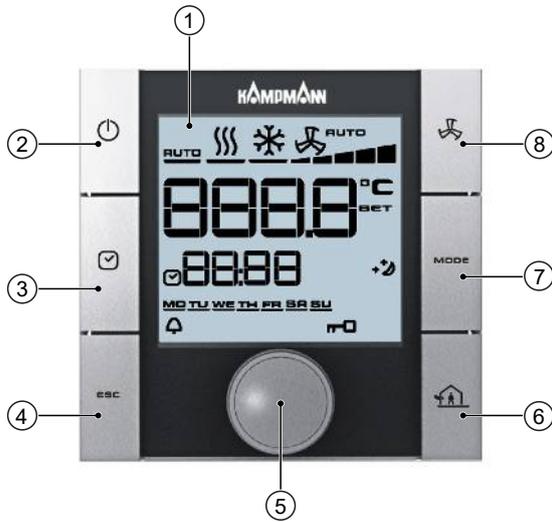


Fig. 9: KaController with function keys, type 3210002

1	Display with LED background lighting	2	ON/OFF key (depending on setting) ▶ ON/OFF ▶ Eco mode/Day mode (factory setting)
3	TIMER button ▶ Set time ▶ Set timer programs	4	ESC button ▶ back to standard view
5	Navigator dial ▶ Change settings ▶ Call up menus	6	House symbol ▶ External ventilation
7	MODE button ▶ Set operating modes (disabled with 2-pipe applications)	8	FAN button ▶ Set fan control

<p>Fig. 10: KaController type 3210001</p>	<p>KaController without operating keys (one-button operation) type 3210001</p> <ol style="list-style-type: none"> <li>1. Display with LED background lighting</li> <li>2. Navigator dial <ul style="list-style-type: none"> <li>▶ Change settings</li> <li>▶ Call up menus</li> </ul> </li> </ol>
<p>Fig. 11: KaController black, type 3210006</p>	<p>KaController, black without function keys (one-button operation) type 3210006</p> <ol style="list-style-type: none"> <li>1. Display with LED background lighting</li> <li>2. Navigator dial <ul style="list-style-type: none"> <li>▶ Change settings</li> <li>▶ Call up menus</li> </ul> </li> </ol>

The symbols shown on the display depend on the application (2-pipe, 4-pipe etc.) and the parameters set.

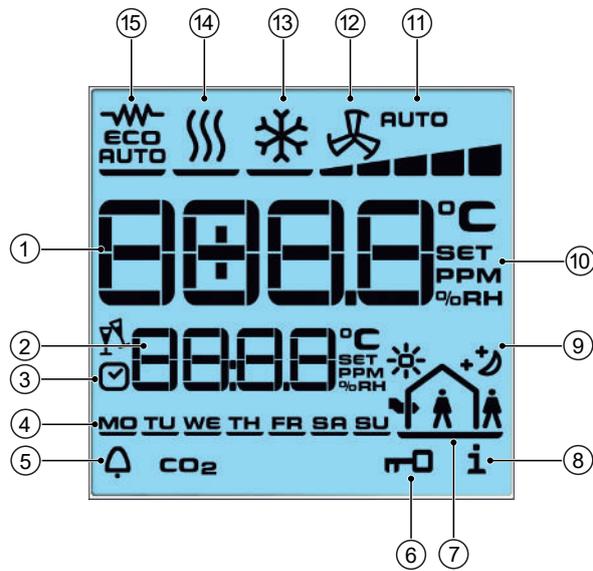


Fig. 12: Display

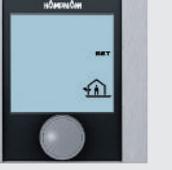
1	Display of setpoint room temperature	2	Current time
3	Timer program enabled	4	Weekday
5	Alarm	6	Selected function is locked
7	"External ventilation" mode is locked	8	Filter alert
9	Eco mode	10	Setpoint setting enabled
11	Fan control setting Auto-0-1-2-3-4-5	12	Ventilation mode
13	Cooling mode	14	Heating mode
15	Automatic Heating/Cooling changeover mode		

# Katherm QK

Assembly, installation and operating instructions

## 9.2.2 KaController type 3210001, type 3210002, type 3210006

Press and hold down the navigator dial for 3 seconds to move from one menu to the next.

 <p>Standard view</p>	 <p>Standard view</p>	<p><b>Switching on the unit</b></p> <p>Option 1: Turn the navigator dial. Option 2: Press the ON/OFF button.</p> <p><b>Switching off the unit</b></p> <p>Option 1: Press the navigator dial for 3 seconds. Option 2: Press the ON/OFF button. Option 3: Turn the navigator dial anti-clockwise until OFF appears.</p> <p><b>Setting the temperature setpoint</b></p> <p>Option 1: Turn the navigator dial.</p>
 <p>Fan setting</p>	 <p>Fan setting</p>	<p><b>Fan setting</b></p> <p>Option 1: Turn the navigator dial. Option 2: Press the FAN button several times.</p> <p><b>Fan stages</b></p> <p>Setting values: 0, 1, 2, 3, 4, 5, AUTO</p>
 <p>Time setting</p>	 <p>Time setting</p>	<p><b>Time setting</b></p> <p>Adjust the current time by turning and pressing the navigator dial.</p>
 <p>Timer programs</p>	 <p>Timer programs</p>	<p><b>Timer programs</b></p> <p>Adjust the switching times by turning and pressing the navigator dial.</p> <p><b>Sequence for entering a timer program:</b></p> <pre> graph LR     A[Timer start screen] --&gt; B[Day of the week entry]     B --&gt; C[Timer program no. entry]     C --&gt; D[Switching-on time entry]     C --&gt; E[Switching-off time entry]     D --&gt; F[Switching-on time entry]     E --&gt; G[Switching-off time entry]     F --&gt; H[Switching-off time entry]     G --&gt; I[Switching-on time entry]     H --&gt; J[Switching-off time entry]     </pre>
 <p>Operating modes</p>	 <p>Operating modes</p>	<p><b>Setting the operating modes</b></p> <p>Option 1: Turn the navigator dial. Option 2: Press the MODE button several times.</p> <p>The "Operating mode" menu item is locked in 2-pipe applications and cannot be accessed!</p>
 <p>External ventilation</p>	 <p>External ventilation</p>	<p><b>External ventilation</b></p> <p>Enable and disable external ventilation by turning and pressing the navigator dial. A house symbol with an arrow appears on the display when external ventilation is activated.</p>

Tab. 9: KaController user interfaces

## 10 Maintenance

### 10.1 Securing against reconnection



**DANGER!**

**Risk of death by unauthorised or uncontrolled restart!**

Unauthorised or uncontrolled restarting of the equipment can result in serious injury or death.

- ▶ Before restarting, ensure that all safety devices are fitted and working properly and that there is no hazard to humans.

Always follow the procedure described below to prevent accidental restart:

1. de-energise.
2. Prevent accidental re-connection.
3. Check that the equipment is de-energised.
4. Cover and cordon off adjacent live parts.



**WARNING!**

**Risk of injury from rotating parts!**

The fan impeller can cause severe injuries.

- ▶ Switch off the unit and prevent it from reconnection before commencing any work on moving components of the fan. Wait until all parts have come to a standstill.

### 10.2 Maintenance Schedule:

The sections below describe maintenance work needed for the proper and trouble-free operation of the equipment.

If there are signs of increased wear during regular checks, shorten the required maintenance intervals to the actual wear and tear. Contact the manufacturer with any questions about maintenance work and intervals.

Interval	Maintenance task	Personnel
As required	Regular visual checks and acoustic checks for damage, dirt and function.	User
quarterly	Check filter for dirt, clean and change filter when needed.	User
every six months	Clean unit components (heat exchanger, condensate tray, condensate pump, float switch).	User
every six months	Check water-side connections, valves and fittings for dirt, leak-tightness and function.	User
every six months	Check the electrical wiring.	Qualified personnel
every six months	Clean components/surfaces that come into contact with air.	Qualified personnel
quarterly	Check the heat exchanger for dirt, damage, corrosion and leak-tightness. Carefully vacuum the heat exchanger if dirty.	User

# Katherm QK

Assembly, installation and operating instructions

## 10.3 Maintenance work

### 10.3.1 Clean the inside of the unit

Check all elements that come into contact with air (internal surfaces of the unit, outlet elements etc.) for dirt or deposits during maintenance and use a commercially available product to remove.

## 11 Faults

The following chapter describes possible causes of faults and the work needed to rectify them. Should faults occur frequently, shorten the maintenance intervals in line with the actual loading on the unit.

Contact the manufacturer with any faults that cannot be rectified using the following information.

### Behaviour in the event of faults

The following applies:

1. Immediately switch off the unit with faults that pose an immediate danger to persons or property!
2. Determine the cause of the fault!
3. Switch off the unit and prevent it from being reconnected if rectifying the fault requires work in the hazard area. Immediately advise a supervisor on site about the fault.
4. Either rectify the fault yourself or have it repaired by authorised personnel, depending on the nature of the fault.

The Fault table [▶ 43] provides information on who is authorised to rectify and remedy faults.

### 11.1 Fault table

Fault	Possible cause	Remedy
No function.	No power supply.	Check voltage, switch on repair switch.
		Replace fuse.
Water outlet	Fault on the heat exchanger.	Replace the heat exchanger if you need to.
	Hydraulic connection not properly done.	Check flow and return and tighten, if necessary.
Unit not heating or cooling sufficiently (LPHW/CHW)	Fan is not switched on.	Switch on fan at controller.
	Air volume is too low.	Set a higher speed.
	Filter is dirty.	Replace filter.
	No heating or cooling medium.	Switch on heating and/or cooling system, switch on circulation pump, vent unit/system.
	Valves not operating.	Replace faulty valves.
	Water volume too low.	Check pump output, check hydraulics.
	Setpoint temperature on the controller set too low/high.	Adjust temperature setting on the controller.
	Operating unit with integral sensor and/or external sensor is exposed to direct sunlight or positioned over a heat source.	Place operating unit with integral sensor and/or external sensor in a suitable position.
	Air cannot blow out or in freely.	Remove obstacles at the air outlet/air inlet.
	Heat exchanger dirty.	Clean heat exchanger.
	Air in the heat exchanger.	Vent heat exchanger.
Unit too loud	Speed too high.	Set a lower speed, if possible.
	Air inlet/outlet opening is obstructed.	Free air ducts.
	Filter dirty.	Replace filter.
	Rotating parts unbalanced	Clean and/or replace impeller. Please make sure that no balancing clips are removed during cleaning.
	Fan dirty.	Clean dirt from fan.
	Heat exchanger dirty.	Clean dirt from Heat exchanger.

# Katherm QK

Assembly, installation and operating instructions

## 11.2 KaControl faults

Code	Alarms	Priority
A11	Faulty control sensor.	1
A12	Motor fault.	2
A13	Room frost protection.	3
A14	Condensation alarm.	4
A15	General alarm.	5
A16	Sensor AI1, AI2 or AI3 faulty.	6
A17	Unit frost protection.	7
A18	EEPROM error.	8
A19	Offline slave in the CAN bus network.	9

Tab. 10: KaControl unit alarms

Code	Alarms
tAL1	Temperature sensor in the KaController faulty.
tAL3	Real-time clock in the KaController faulty.
tAL4	EEPROM in the KaController faulty.
Cn	Communication fault with the external control.

Tab. 11: KaController alarms



### IMPORTANT NOTE!

#### Important note!

More information on control settings can be found in the separate KaControl SmartBoard user manual.

## 11.3 Start-up after rectification of fault

After correction of the fault, carry out the following steps for recommissioning:

1. Make sure that all maintenance covers and access openings are sealed.
2. Switch off the unit.
3. Acknowledge the fault on the controller, if necessary.

## 12 List of KaControl parameters

### 12.1 KaController parameter list

Parameter	Function	Standard	Min.	Max.	Unit	Comment
t001	Serial address	1	0	207	-	Address in Modbus network
t002	Baud rate 0 = Baud rate 4800 1 = Baud rate 9600 2 = Baud rate 19200	2	0	2	-	
t003	Background lighting function 0 = Slow fade in, fast fade out 1 = Slow fade in, slow fade out 2 = Fast fade in, fast fade out	0	0	2	-	
t004	Strong background lighting	4	0	5	-	
t005	Sensor calibration of KaController sensor	0	60	60	°C	
t006	LCD display contrast	15	0	15	-	
t007	BEEP setting 0 = BEEP ON 1 = BEEP OFF	0	0	1	-	
t008	Password for KaController Parameter menu	11	0	999	-	
t009	Minimum settable setpoint temperature	8	0	20	°C	
t010	Maximum settable setpoint temperature	35	10	40	°C	
t011	Interval of setpoint setting 0 = Automatic setting depending on PCB (parameterisable, freely programmable) 1 = Increment of 1 °C (parameterisable PCBs) 2 = Increment of 0.5 °C (freely programmable PCBs)	0	0	2	-	
t012	Date/Time setting: Year	9	0	99	-	
t013	Date/Time setting: Month	1	1	12	-	
t014	Date/Time setting: Day	1	1	31	-	
t015	Date/Time setting: Weekday	1	1	7	-	
t016	Date/Time setting: Hour	0	0	23	-	
t017	Date/Time setting: Minute	0	0	59	-	

# Katherm QK

Assembly, installation and operating instructions

## 13 Certificates

# EU-Konformitätserklärung

EU Declaration of Conformity

Déclaration de Conformité CE

Deklaracja zgodności CE

EU prohlášení o konformite

## Wir (Name des Anbieters, Anschrift):

We (Supplier's Name, Address):

Nous (Nom du Fournisseur, Adresse):

My (Nazwa Dostawcy, adres):

My (Jméno dodavatele, adresa):

**KAMPMANN** GMBH & Co. KG  
Friedrich-Ebert-Str. 128-130  
49811 Lingen (Ems)

## erklären in alleiniger Verantwortung, dass das Produkt:

declare under sole responsibility, that the product:

déclarons sous notre seule responsabilité, que le produit:

deklarujemy z pełną odpowiedzialnością, że produkt:

deklarujeme, vědomi si své odpovědnosti, že produkt:

## Type, Modell, Artikel-Nr.:

Type, Model, Articles No.:

Type, Modèle, N° d'article:

Typ, Model, Nr artykułu:

Typ, Model, Číslo výrobku:

**Katherm QK 142\*\*\***

**Katherm HK 143\*\*\***

**Katherm QK nano 442\*\*\***

## auf das sich diese Erklärung bezieht, mit der / den folgenden Norm(en) oder normativen Dokumenten übereinstimmt:

to which this declaration relates is in conformity with the following standard(s) or other normative document(s):

auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou autre(s) document(s) normatif(s):

do którego odnosi się niniejsza deklaracja, jest zgodny z następującymi normami lub innymi dokumentami normatywnymi:

na který se tato deklarace vztahuje, souhlasí s následující(mi) normou/normami nebo s normativními dokumenty:

**DIN EN 16430-1; -2; -3**

**DIN EN 442-1 ; -2**

**DIN EN 55014-1 ; -2**

**DIN EN 61000-3-2 ; -3-3**

**DIN EN 61000-6-1 ; -6-2 ; -6-3**

**DIN EN 60335-1 ; -2-40**

**Gebläseunterstützte Heizkörper, Konvektoren und Unterflurkonvektoren**

**Radiatoren und Konvektoren**

**Elektromagnetische Verträglichkeit**

**Elektromagnetische Verträglichkeit**

**Elektromagnetische Verträglichkeit**

**Sicherheit elektr. Geräte für den Hausgebrauch und ähnliche Zwecke**

**Gemäß den Bestimmungen der Richtlinien:**

Following the provisions of Directive:  
Conformément aux dispositions de Directive:  
Zgodnie z postanowieniami Dyrektywy:  
Odpovídající ustanovení směrnic:

**2014/30/EU  
2014/35/EU**

**EMV-Richtlinie  
Niederspannungsrichtlinie**

**Hendrik Kampmann**



**Lingen (Ems), den 01.09.2020**

---

**Ort und Datum der Ausstellung**

Place and Date of Issue  
Lieu et date d'établissement  
Miejsce i data wystawienia  
Místo a datum vystavení

**Name und Unterschrift des Befugten**

Name and Signature of authorized person  
Nom et signature de la personne autorisée  
Nazwisko i podpis osoby upoważnionej  
Jméno a podpis oprávněné osoby

## Table

Tab. 1	Limits of operation .....	7
Tab. 2	Operating voltage .....	7
Tab. 3	Water quality.....	7
Tab. 4	Technical data – Katherm QK supply air module.....	22
Tab. 5	Maximum electrical rating values .....	24
Tab. 6	Maximum electrical rating values .....	24
Tab. 7	Maximum electrical rating values .....	25
Tab. 8	Wiring of bus lines .....	32
Tab. 9	KaController user interfaces .....	40
Tab. 10	KaControl unit alarms .....	44
Tab. 11	KaController alarms .....	44





<https://www.kampmann.co.uk/hvac/products/trench-technology/katherm-qk>

Country	Contact
Great Britain	Kampmann UK Ltd.
	Dial House, Govett Avenue
	Shepperton, Middlesex, TW17 8AG
	T +44 1932/ 228592
	F +44 1932/ 228949
	E info@kampmann.co.uk
	W Kampmann.co.uk