



TOP [TOP C]

► Assembly, installation and operating instructions

Keep these instructions in a safe place for future use!

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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.

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

These units are used for the decentralised heating and ventilation of high-ceiling buildings, industrial and commercial workplaces and buildings with a connection to a district heating system or broad temperature spreads. Within the room, the unit needs to be connected to the building's heating/cooling/ventilation system and to the building's waste water and power network. The operating limits and limits of use described in Chapter 2.2 [► 7] 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.
- ▶ The unit is not intended for operation above 2,000 m.a. s.l.
- ▶ This unit is not intended for permanent connection to the drinking water network.
- ▶ This unit is designed to be accessible to the general public.

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

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

2.2 Limits of operation and use

Limits of operation		
Min./max. water temperature	°C	5 - see type plate
Min./max. air intake temperature	°C	-20 - (+40)
Min./max. air humidity	%	15-75
Min. operating pressure	bar/kPa	-
Max. operating pressure	bar/kPa	see type plate
Min./max. glycol percentage	%	25-50

Tab. 1: Limits of operation

Maximum flow temperatures

Use	Ceiling model	Wall-mounted model
Without shut-off valve	100°C	120°C
With shut-off valve	160°C	160°C

Tab. 2: Maximum flow temperatures

Operating voltage	
Power/current consumption	On the typeplate

Tab. 3: 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.

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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 ₂)	mg/l	< 0.1
Hardness	°dH	4-8.5
Sulphur ions		not measurable
Sodium ions (Na ⁺)	mg/l	< 100
Iron ions (Fe ²⁺)	mg/l	< 0.1
Manganese ions (Mn ²⁺)	mg/l	< 0.05
Ammonia ions (NH ₄ ⁺)	mg/l	< 0.1
Chlorine ions (Cl)	mg/l	< 100
CO ₂		< 50
Sulfate ions (SO ₄ ²⁻)	mg/l	< 50
Nitrite ions (NO ₂ ⁻)	mg/l	< 50
Nitrate ions (NO ₃ ⁻)	mg/l	< 50

Tab. 4: Water quality

**WARNING!****Note the maximum flow temperatures to protect the fan!**

Long periods of idleness with high water temperatures can lead to the impermissible heating up of the fan motor. The flow temperatures should therefore be limited depending on the application and the motor model.

If temperature limitation is impossible or inappropriate for the specific purpose, there is also an option of using suitable valves (thermoelectric, motorised or solenoid) to shut off the heating medium.

This can interrupt the flow of medium before the fan is switched off and the heat exchanger cools down.

Appropriate speed controllers with a fan delay shut-off relay and connection terminals for the shut-off valve are available on request.

**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.

**DANGER!****Risk of fatal injury from electrocution!**

- ▶ When multiple fans are connected in parallel, there is an electrical charge (>50 C) between the line conductor and protective earth conductor when the power is switched off. Before working on the electrical wiring, short-circuit the mains connections and PE!
- ▶ The terminals and connectors are still energised even when the unit is switched off. Use a two-pin voltage tester to establish that the unit has been de-energised. Only open the unit 5 minutes after all poles of the voltage have been switched off.
- ▶ The protective earth carries high leakage currents (depending on the frequency, intermediate voltage and motor capacity). Therefore, check EN-compliant earthing under test conditions (EN 50178, Art. 5.2.11). Without earthing, hazardous voltages can occur on the motor housing. In the event of a fault, electrical voltage will be present at the rotor and impeller. Rotor and impeller are base-insulated. Do not touch!

2.4 Personnel requirements - Qualifications

Expertise

The installation of this product requires specialist expertise in heating, cooling, ventilation, installation and electrical engineering. As this knowledge is normally acquired through professional training in one of the above fields, it is not dealt with further here.

Damage caused by improper installation is the responsibility of the operator or installer. Installers of these units should have adequate knowledge of the following based on their qualifications

- ▶ Safety and accident prevention regulations
- ▶ Guidelines and recognised technical regulations, i.e. VDE regulations (Association of German Electricians, 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.

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?

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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.

4 Technical data

Unit	TOP				
Series	44	45	46	47	48
Water content [l]	1.6 - 6.1	2.2 - 8.2	3.4 - 11.5	4.8 - 16.8	5.3 - 17.0
Weight [kg]	25 – 62	32 -92	45 – 125	53 – 158	73 – 204
Sound pressure level ⁴ [dB(A)]	13 – 56	19 – 64	20 – 62	22 - 61	26-63

Tab. 5: Technical data, TOP

Unit	TOP C			
Series	44	45	46	47
Water content [l]	2.1 – 2.6	3.0 – 3.8	4.5 – 5.6	6.2 – 7.6
Weight [kg]	33.4 – 37.9	43.6 – 50.0	61.4 – 67.0	80.9 – 86.0
Sound pressure level ⁴ [dB(A)]	13 – 56	19 – 64	20 – 62	22 – 61

Tab. 6: Technical data, TOP C

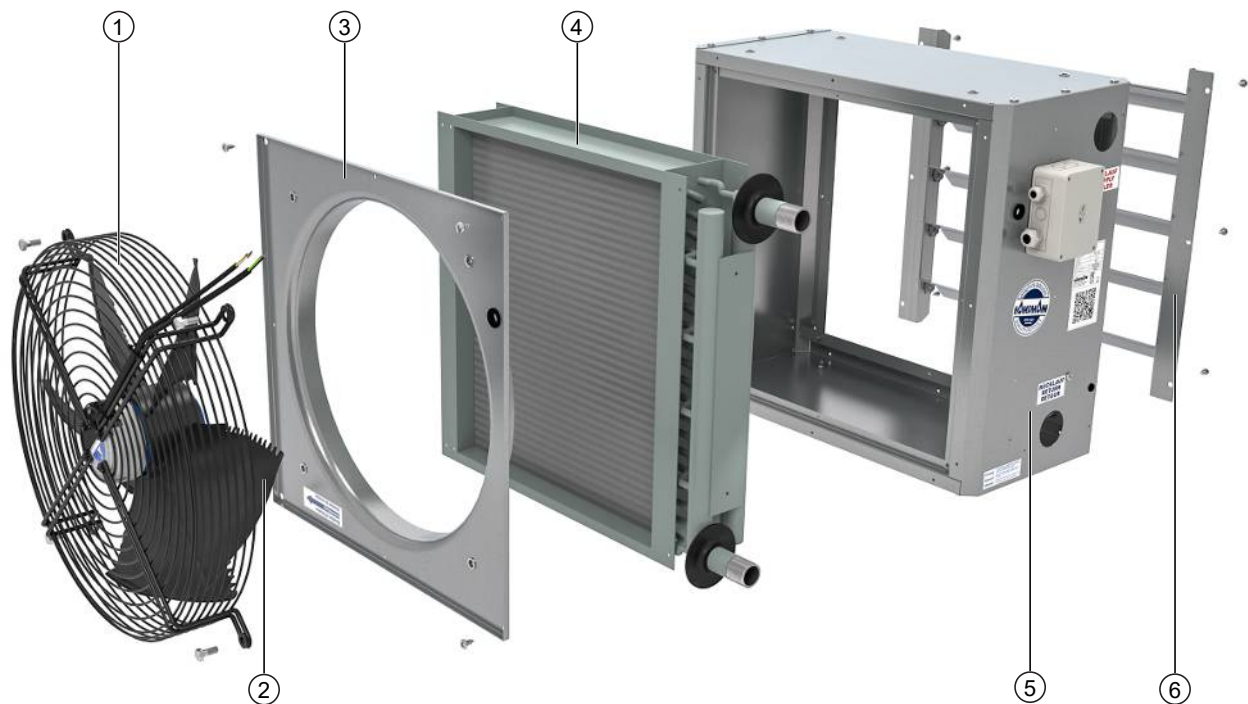
⁴ The sound pressure level was calculated with an assumed room insulation of dB(A). This corresponds to a distance of m, a room volume of m³ and a reverberation time of s (in accordance with VDI 2081).

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5 Construction and function


5.1 Overview



5.2 Brief description

TOP unit heaters are used for the decentralised heating or cooling and ventilation of high-ceilinged buildings, either wall- or ceiling-mounted. Air is drawn in through the EC fan and blown through the heat exchanger into the room through the standard single-row louvre. The air can optionally be discharged through a double-row louvre or other air diffuser (see Accessories).

5.3 Wear parts list

Figure	Article	Properties	Suitable for	Art. no.
	ISO Coarse 90% spare filter cartridge	Type 3*611 Suitable for filter box type 3*010	Series 44	198000034611
			Series 45	198000035611
			Series 46	198000036611
			Series 47	198000037611

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 wall/ceiling is sufficiently load-bearing to take the weight of the unit (Technical data [► 13]).
- ▶ 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 [► 28]).
- ▶ There is a power supply on site (Maximum electrical rating values [► 33]).
- ▶ If need be, provide a condensation connection with a sufficient gradient on site.

6.2 Minimum clearances

Air heaters can be installed free-standing or suspended on the wall using the supplied wall brackets or suspended from the ceiling using the supplied ceiling brackets (Exception: Series 48 for ceiling mounting only). Installation using existing wall or ceiling brackets is likewise possible.

A minimum clearance L in accordance with the table below must be respected between unit suction area and wall/ceiling! If you do not leave this minimum clearance, the air heater output will be reduced and the noise level will increase.

Be sure to observe the minimum clearances when using accessories or for maintenance purposes!

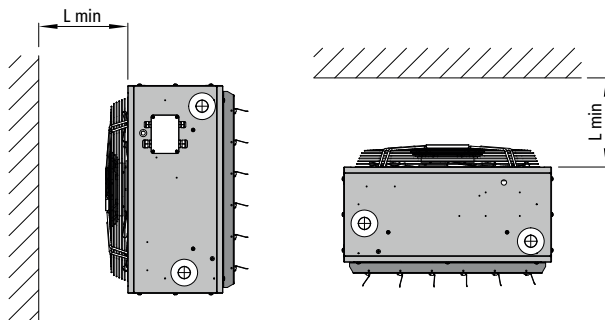


Fig. 1: Minimum clearances TOP

Series	Type	Minimum clearance L min.	Standard clearance L*
44	44_58 / 44_56	160 mm	285 mm
45	45_58 / 45_56	180 mm	285 mm
46	46_58	230 mm	335 mm
47	47_58 / 47_56	300 mm	345 mm
48	48_68	620 mm	660 mm

Tab. 7: Type overview with minimum clearances

* when using wall brackets, type 3_044 (Series 44 - 47) / type 38042 (Series 48)

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6.3 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.

6.3.1 Installation of sheet steel accessories

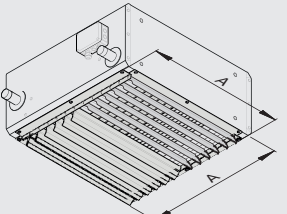
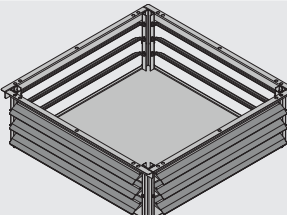
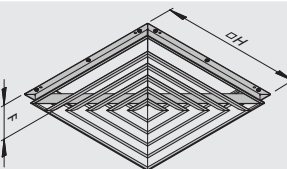
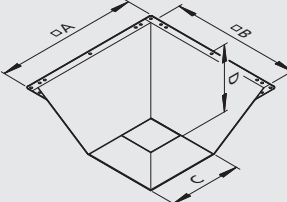
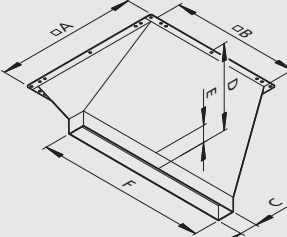
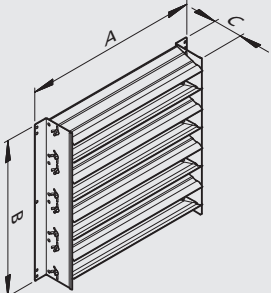
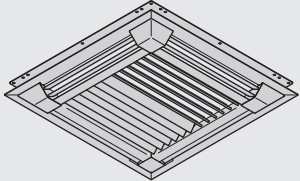
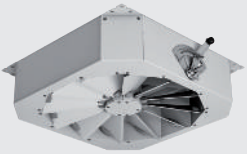
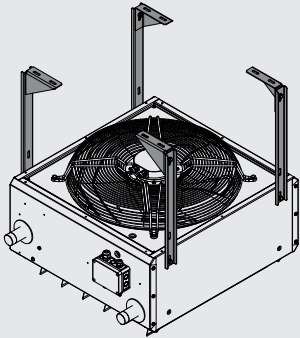
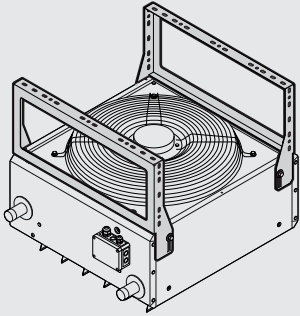
Figure	Description	Dimensions [mm]						Suitable for
	2-row louvre, type 3*002	A						
		495						Series 44
		595						Series 45
		695						Series 46
		795						Series 47
	Air diffuser in 4 directions, type 3*004							Series 44-47
	Diffuser screen, type 3*005	H		F				
		500		70				Series 44
		600		70				Series 45
		700		70				Series 46
		800		70				Series 47
	Discharge nozzle, type 3*006	A	B	C	D			
		450	500	250	230			Series 44
		550	600	300	260			Series 45
		650	700	350	290			Series 46
		750	800	400	320			Series 47
		850	900	500	350			Series 48
	Wide nozzle, type 3*007	A	B	C	D	E	F	
		500	450	60	300	50	600	Series 44
		600	550	90	340	50	700	Series 45
		700	650	120	380	50	800	Series 46
		800	750	150	420	50	900	Series 47

Figure	Description	Dimensions [mm]			Suitable for
		A	B	C	
	Induction louvre, type 3*101	495	425	100	Series 44
		595	525	100	Series 45
		695	625	100	Series 46
		795	725	100	Series 47
	RaDeck ceiling air outlet, type 3*087				Series 44-47
	KaMAX air outlet, type 3*111				All series
	Universal 4-point brackets, type 30042				Series 44-47
	Universal 4-point brackets, type 38042				Series 48
	Ceiling to wall brackets, type 3*049				Series 44-47

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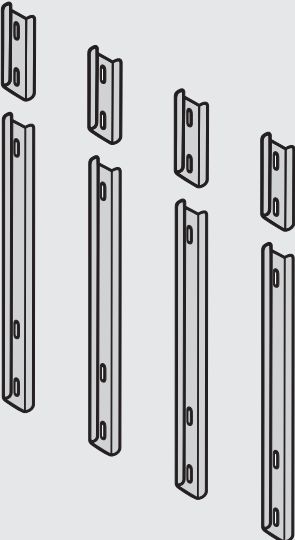
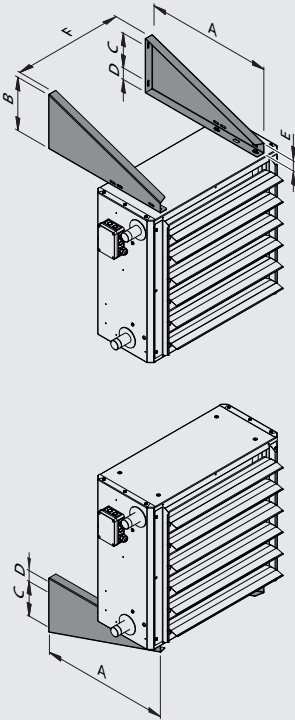
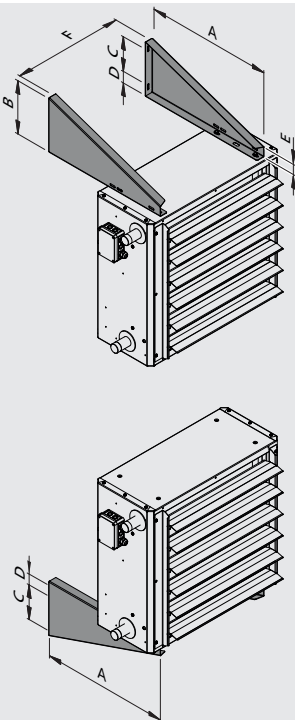
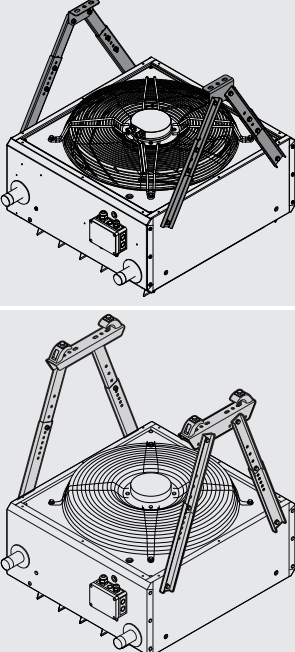
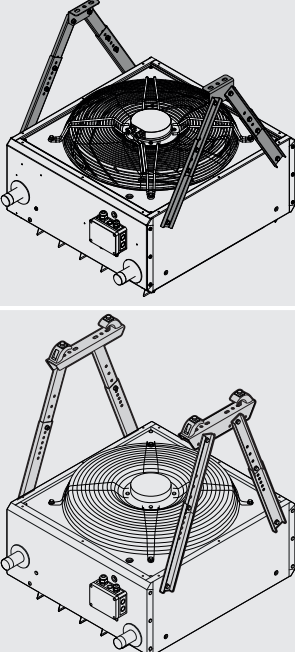
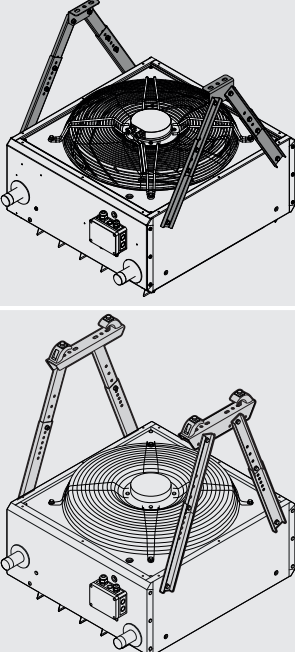
Figure	Description	Dimensions [mm]						Suitable for
	Universal bracket extension, type 30043							All series
	Wall bracket, type 34044	A	B	C	D	E	F	Series 44
		585	251	160	40	50	340	
	Wall bracket, type 35044	A	B	C	D	E	F	Series 45
		585	251	160	40	50	440	
	Wall bracket, type 36044	A	B	C	D	E	F	Series 46
		635	268	187	40	50	540	
	Wall bracket, type 37044	A	B	C	D	E	F	Series 47
		685	286	204	40	50	640	

Figure	Description	Dimensions [mm]						Suitable for
	Wall brackets, extended, type 30022	A	B	C	D	E	F	Series 44
	Wall brackets, extended, type 30024	785	321	123	40	50		
	Wall brackets, extended, type 30026	A	B	C	D	E	F	Series 45
	Wall brackets, extended, type 30020	885	355	143	40	50		
	Universal 2-point brackets, Type 30041	A	B	C	D	E	F	Series 46
	Universal 2-point brackets, Type 38041	1080	422	175	40	50		
	Universal 2-point T-brackets, type 30047	Dimensions depending on bracket length						Series 47
	Universal 2-point brackets, Type 30041							Series 44-47
	Universal 2-point brackets, Type 38041							Series 48
	Universal 2-point T-brackets, type 30047							Series 44-47

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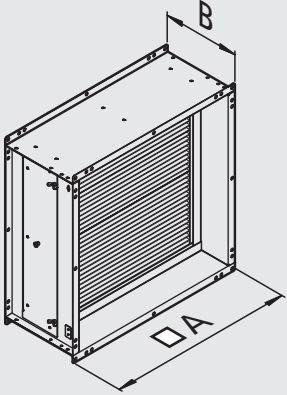
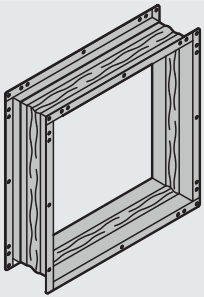
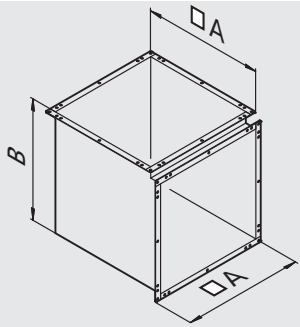
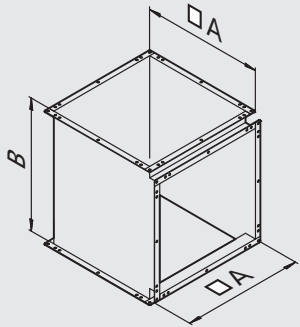
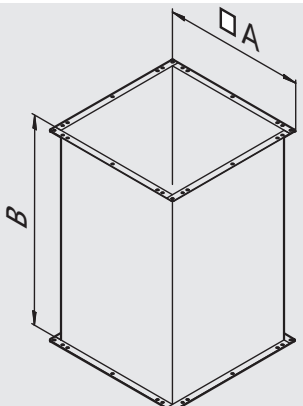
Figure	Description	Dimensions [mm]		Suitable for
		A	B	
	Filter box, filter ISO Coarse 90%. Type 3*010	500	250	Series 44
		600	250	Series 45
		700	250	Series 46
		800	250	Series 47
	Sailcloth connection, type 3*013			Series 44-47
	Air duct 90°, type 3*021	A	B	
		500	450	Series 44
		600	550	Series 45
		700	650	Series 46
		800	750	Series 47
	Air duct T, type 3*022	A	B	
		500	450	Series 44
		600	550	Series 45
		700	650	Series 46
		800	750	Series 47

Figure	Description	Dimensions [mm]		Suitable for
	Air duct, type 3*015	A	B	
		500	Variable	Series 44
		600	Variable	Series 45
		700	Variable	Series 46
		800	Variable	Series 47

Tab. 8: Air-side sheet steel accessories

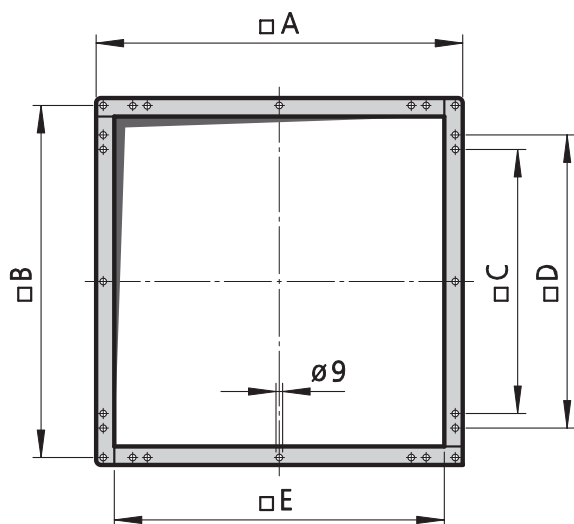


Fig. 2: Connecting frame dimensions

Series	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
44 ____	500	480	360	400	450
45 ____	600	580	460	500	550
46 ____	700	680	560	600	650
47 ____	800	780	660	700	750
48 ____	900	880	760	800	850

Tab. 9: Dimensions

Note: With Series 48, a connection is possible only on the air outlet side.

TOP [TOP C]

Assembly, installation and operating instructions

Factory-fitted accessories

Description	Add-on to unit heater type
Frost protection thermostat F
Repair switch R
KaControl module, incl. repair switch C1

Tab. 10: Factory-fitted accessories

6.3.2 Suspension points

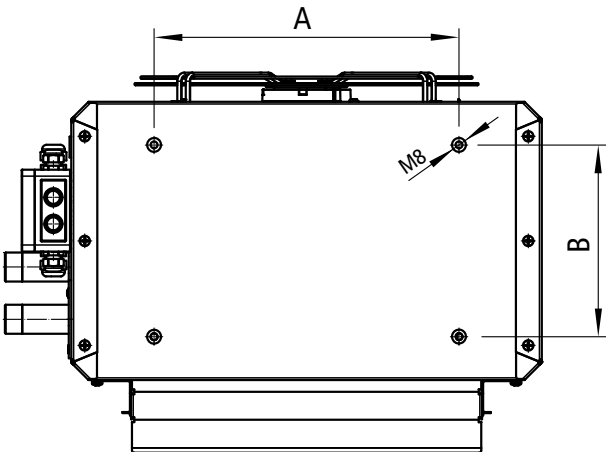


Fig. 3: TOP suspension points

Air heater series	A [mm]	B [mm]
44	350	220
45	450	220
46	550	220
47	650	220
48	750	220

Tab. 11: Suspension points for wall/ceiling installation

6.3.3 Universal 2-point brackets type 30041

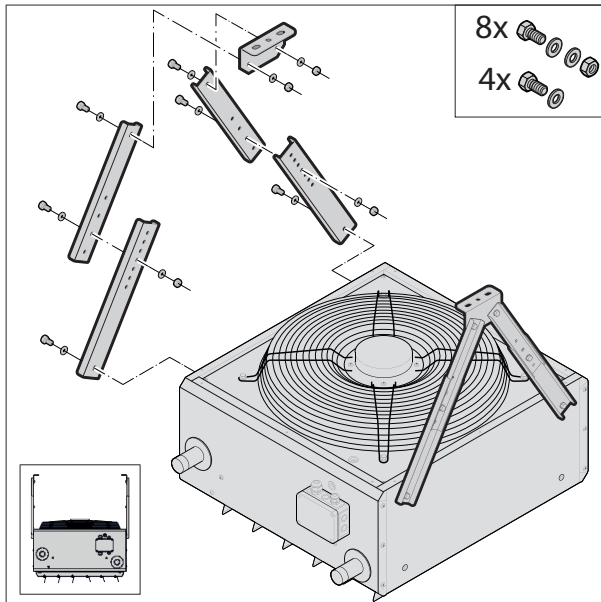


Fig. 4: Universal 2-point brackets, series 44-47

6.3.4 Universal 2-point brackets type 38041

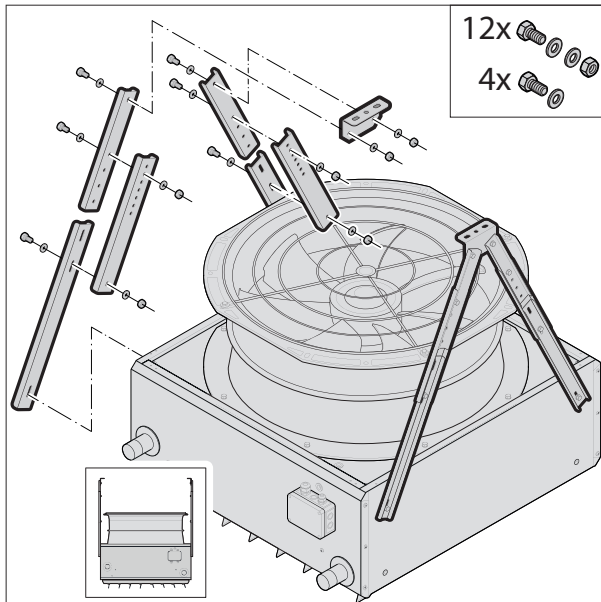


Fig. 5: Universal 2-point brackets, series 48

TOP [TOP C]

Assembly, installation and operating instructions

6.3.5 Universal 4-point brackets type 30042

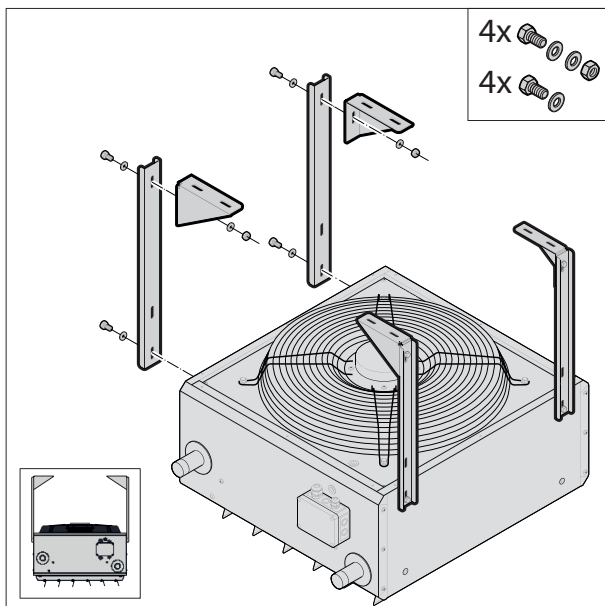


Fig. 6: Universal 4-point brackets, series 44-47

6.3.6 Universal 4-point brackets type 38042

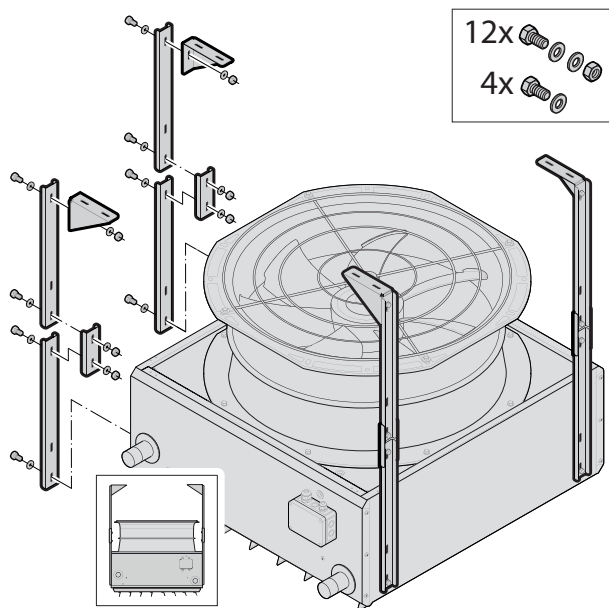


Fig. 7: Universal 4-point brackets, series 48

6.3.7 Universal 2-point T-brackets type 30047

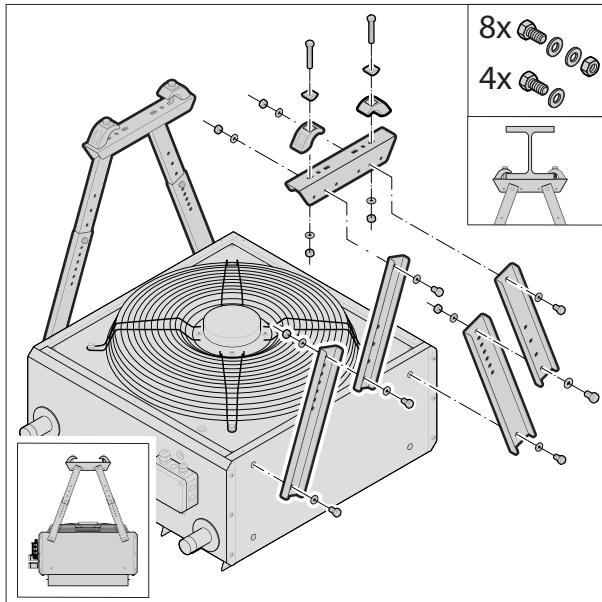


Fig. 8: Universal 2-point T-brackets, series 44-47

6.3.8 Wall brackets, type 3*044, type 3002*

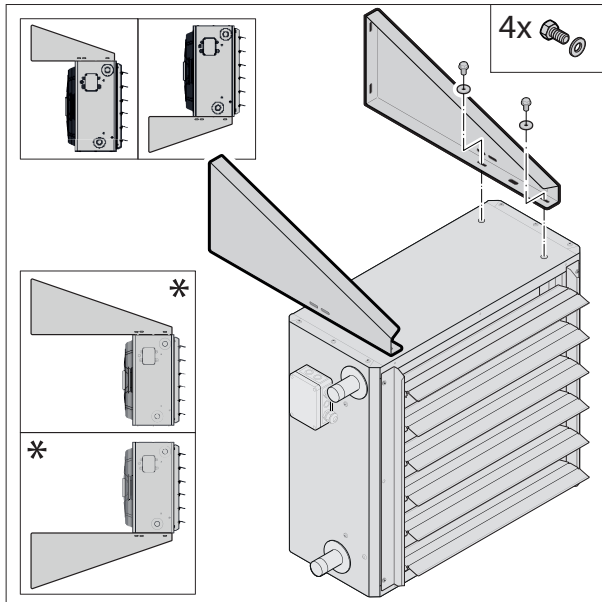


Fig. 9: Wall brackets

* Wall bracket, extended (type 002*)

TOP [TOP C]

Assembly, installation and operating instructions

6.3.9 Ceiling to wall brackets type 3*049

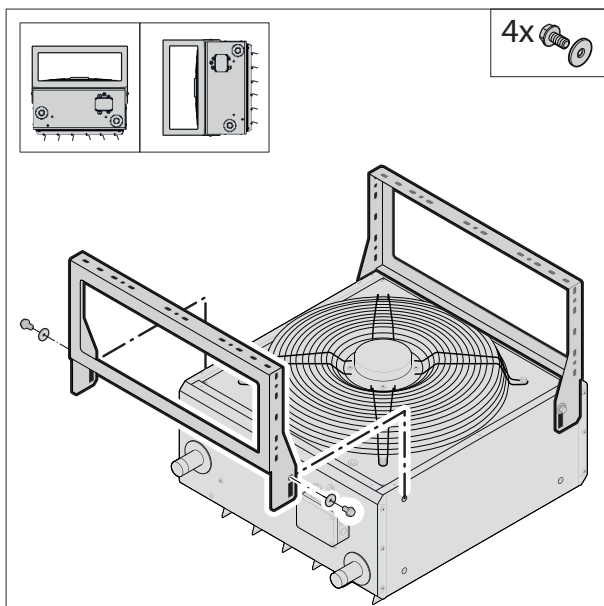


Fig. 10: Ceiling to wall bracket installation

6.3.10 Louvres

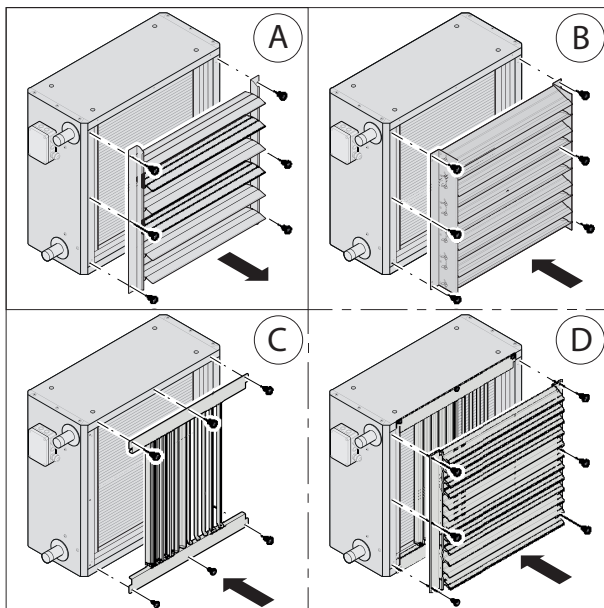


Fig. 11: Louvres

- ▶ Induction louvre mounting (type 3*101): A + B
- ▶ Induction louvre mounting, 2-row (type 3*002): A + C + D

6.4 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.

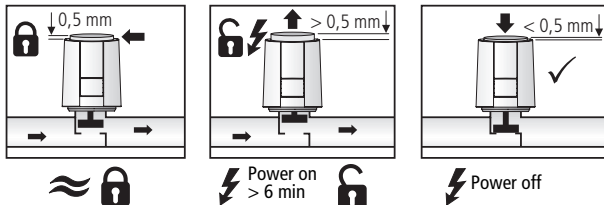


Fig. 12: "First Open" function

Hydraulic connection

Note the following points when connecting the hydraulic side:

- ▶ Install and test safety components (expansion vessels, pressure relief valves and overflow valves).
- ▶ Route condensation lines with a sufficient cross-section without bends and narrow sections with a gradient to the in situ waste water pipe.
- ▶ Allow adequate space for the air flow (air inlet and outlet).

TOP [TOP C]

Assembly, installation and operating instructions

Observe the following additional points for cooling operation:

- ▶ Install continuous, vapor diffusion-tight insulation on all water-bearing components (piping, valves, connections), in each case up to the unit.
- ▶ Select suitable pipe hangers (cold clamps) for cooling operation.
- ▶ Sufficiently dimension the diameter of the condensate pipe.
- ▶ Protect siphons (if any) in the condensate pipe from drying out.

6.4.1 Connection to the pipe network

The flow and return connections protrude laterally from the housing. The heat exchanger connection dimensions for copper/aluminium, galvanised and cross-current heat exchangers are:

- ▶ 1" (series 44+45)
- ▶ 1 1/4" (series 46)
- ▶ 1 1/2" (series 47+48)
- ▶ Heat exchanger, steam: Steam connection 1 1/2", condensate connection 1"

Proceed as follows when connecting up the unit's hydraulic pipework:

- ▶ Disconnect supply line from the medium.
- ▶ Connect up the pipework.
- ▶ Remove protective caps from the flow and return.
- ▶ Seal the valve connections and screw in place.

Important! Use an appropriate tool (e.g. pipe wrench) to protect connecting piece from being sheared off and twisted. The connections must be installed without tension!

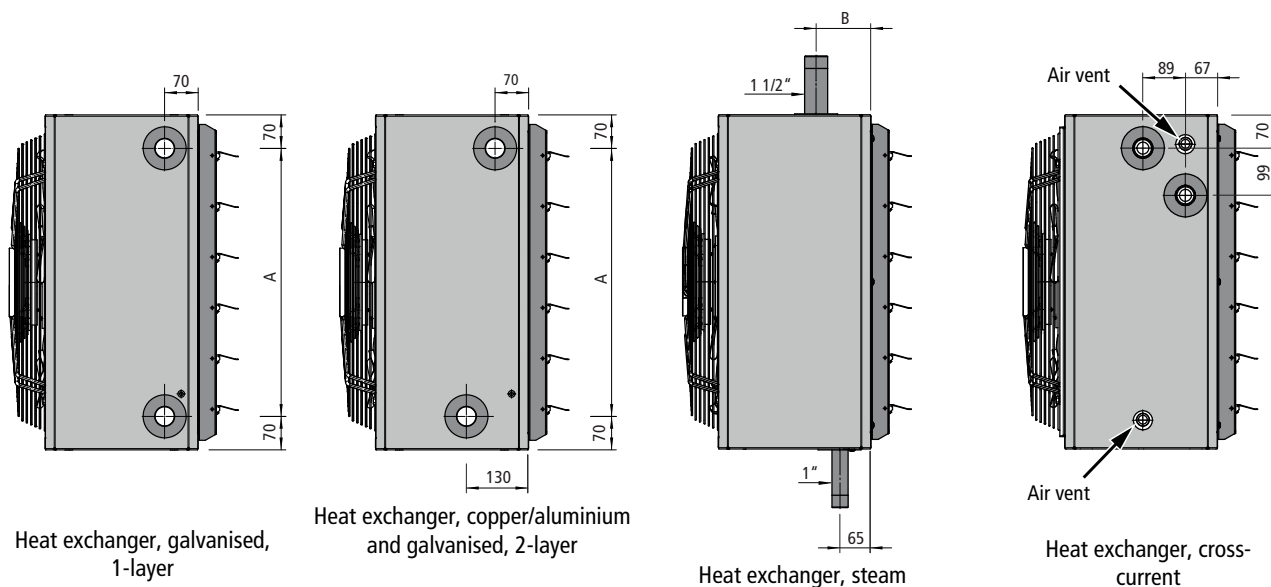


Fig. 13: TOP heat exchanger versions

Series	A [mm]	B [mm] type 4*22	B [mm] type 4*32
44	360	85	115
45	460	85	115
46	560	85	115
47	660	85	115
48	760	85	115

6.4.2 Condensation connection

TOP C models are equipped as standard with a droplet separator with drain connection. A built-in condensate pump with float switch is optionally available.

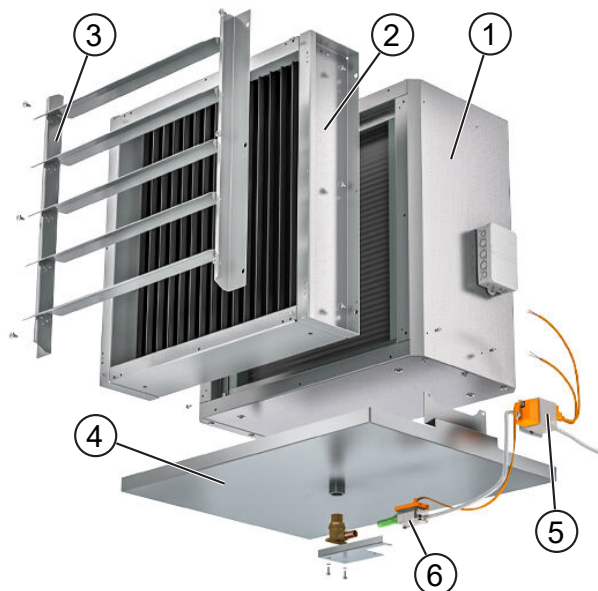


Fig. 14: TOP C

1	TOP C	2	Droplet separator
3	Louvre 1-row	4	Condensate tray
5	Condensate pump (optional)	6	Float switch (optional)

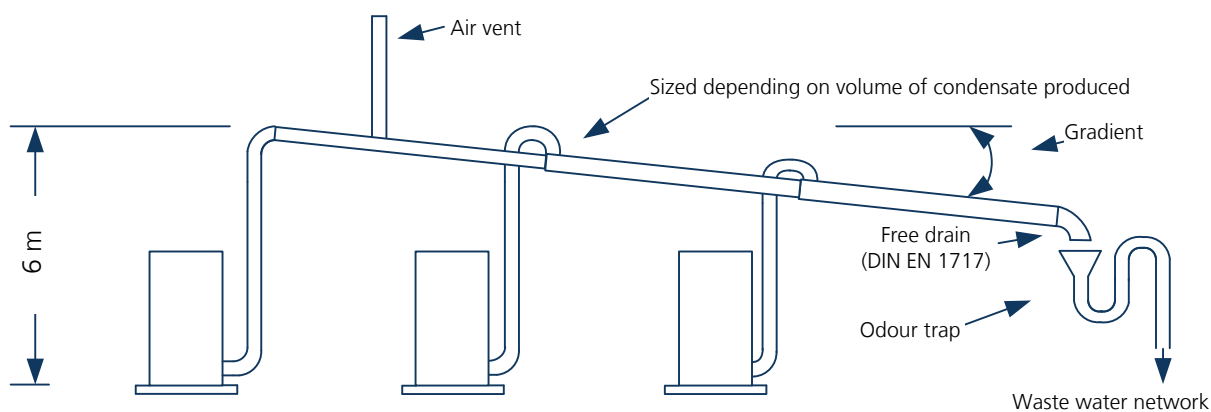


Fig. 15: Laying the condensate drain lines

TOP [TOP C]

Assembly, installation and operating instructions

6.4.2.1 Condensation drain with natural gradient

Provide a suitable condensate line on site and fix in place to drain the condensate with a free drain. A drain connection with a 3/4" female connection is available under the condensate tray for this purpose. Fit the drain with a gradient and with a minimum 1 cm/m incline (in accordance with DIN EN 12056; formerly: DIN 1986-100). Take into account all applicable regulations, such as the use of a ball trap, when connecting the condensate line to the sewer system. Protect the trap from drying out. Consider using water vapour-impermeable insulation depending on the pipe material used for the condensate drain. You will need a condensate pump should a natural gradient be impossible on site. This is used to pump the condensate into higher collection or discharge equipment. When the TOP C version is ordered, the condensate pump with float switch is factory-fitted to the unit.

6.4.2.2 Condensate drainage using a condensate pump

Connecting the condensate pump

Push the suction hose as far as it will go and fix in place with a cable tie to prevent the pump from running dry.

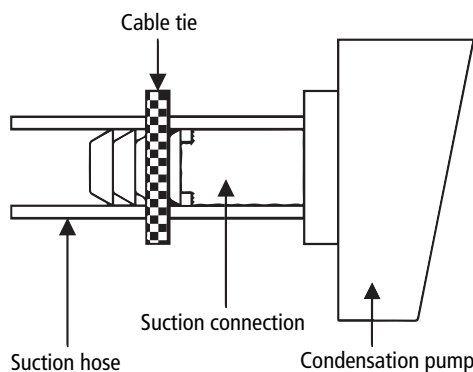


Fig. 16: Fixing the suction hose

- ▶ Supply power and wire alarm contact (separate cable with plug) as per the wiring diagram.
- ▶ Connect the hose to the condensate drain (separate). Direction of flow: refer to the arrow on the side of the housing

Operating voltage [V]	120	230
Mains frequency [Hz]	60	50/60
Electrical supply [A / W]	0.29 / 15	0.17 / 16
Max. delivery volume 0 m / ft per hour [l / US gal]	12 / 3.2	12 / 3.2
Max. delivery height [m / ft]	10 / 33	10 / 33
Noise level at a distance of 1 m / 3.3 ft	25	21
Operating mode	S1: Continuous operation	S1: Continuous operation
Protection class	II	II
Maximum output [kW / Btu/h]	9 / 30000	9 / 30000
Max. water temperature [°C / °F]	40 / 104	40 / 104
Inner diameter of drain hose [mm / "]	6 / 1/4	6 / 1/4
Suction height [m / ft]	1 / 3.3	1 / 3.3

Tab. 12: Technical data for condensate pump

- ▶ Potential-free alarm contacts, 3 A, normally closing, sound power for inductive loads 5 A at 230 V
- ▶ Hall effect semiconductor-based level sensors, excellent safety
- ▶ Integrated thermal cut-out
- ▶ Fully sealed
- ▶ Fuse 1 A (by others)

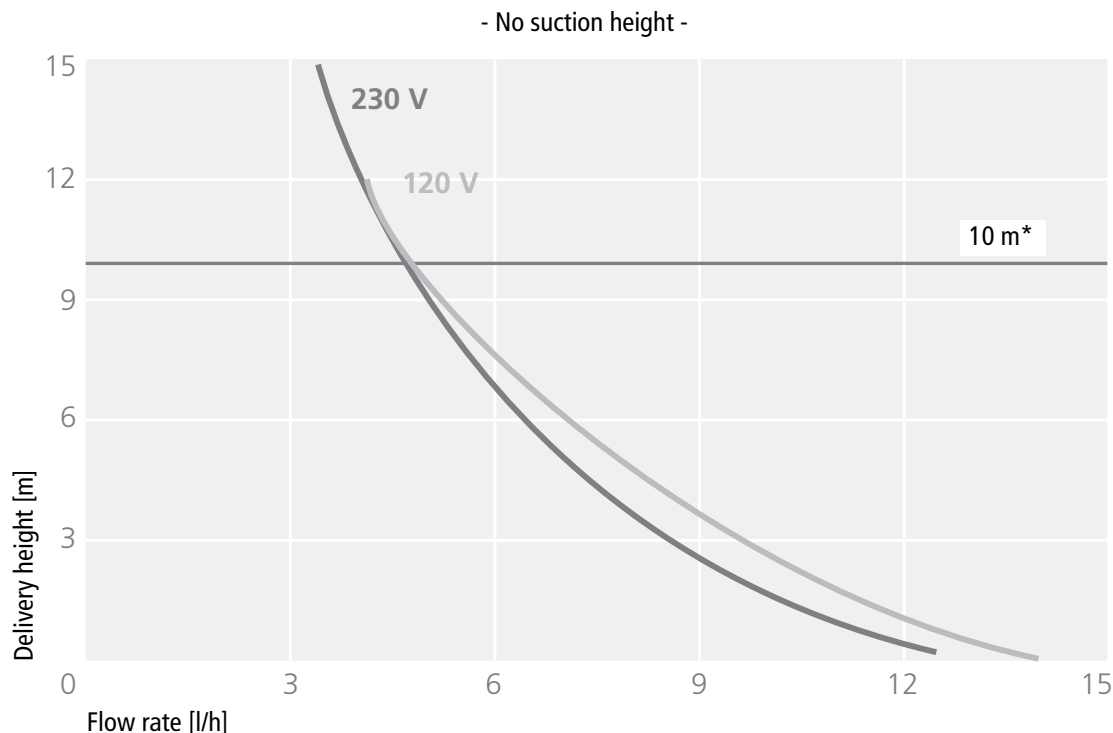


Fig. 17: Characteristic curves of the condensate pump

* Maximum recommended operating delivery height

Any condensate produced on the TOP C with a factory-fitted condensate pump is drawn in by suction by the condensate pump via the connected float head and discharged via a hose to be fitted on the pressure side (supplied loose). Depending on conditions on site, the water can be discharged into drainage lines, possibly with a trap connection.

In the event of a fault with the condensate drain, the water level will continue to rise until the float switch triggers an alarm contact. The contact can be analysed by external signalling devices.

We recommend automatically terminating cooling mode, possibly with a shut-off valve, if the alarm contact is triggered to prevent the condensate tray from overflowing.

Condensate drainage on site with a natural gradient

- ▶ The further drainage of condensate from the condensate pump must be provided along a natural gradient with an adequate cross-section (minimum 1/2"). Increase the cross-section of the line with longer condensate lines.
- ▶ Check whether the condensate line needs to be insulated to prevent the build-up of condensate along the line.
- ▶ Do not use a rigid transition to the on-site condensate drain, as this would reduce the delivery height of the pump. We would recommend a free overflow into a trap.

Installation, cabling of the condensate pump

The condensate pump needs a separate power supply 230 V/50 Hz. We would generally advise against connecting it via the room thermostat, as residual condensate could be produced after it has been shut down. Additional wires are needed to analyse the alarm contact.

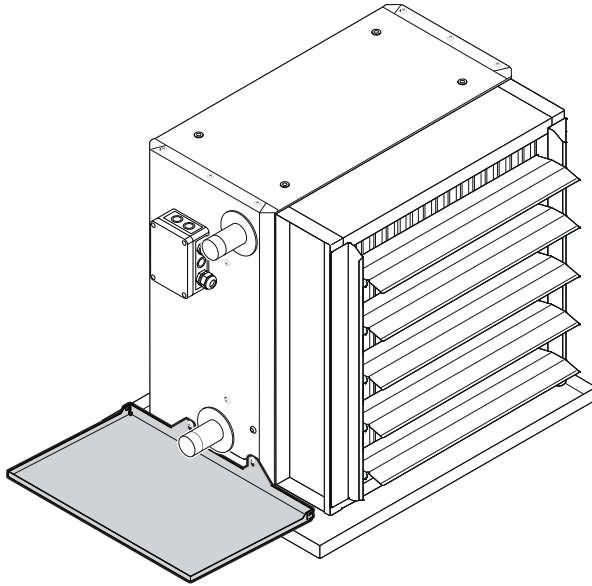
Use the following types of cable:

- ▶ Mains supply: NYM-J, 1.5 mm²
- ▶ Alarm contact: The cable for the alarm contact depends on the kind of alarm analysis used (e.g. shielded cable).

TOP [TOP C]

Assembly, installation and operating instructions

Fitting the valve condensate drip tray (optional for TOP C)



- ▶ Loosen the screws of the main condensate tray.
- ▶ Fasten the valve condensate tray to the main condensate tray at the slotted holes using the screws.

7 Electrical connection



IMPORTANT NOTE!

Condensation formation in the cooling unit!

In the event of on-site valve control, the cooling valve must be closed when the fans are switched off.



IMPORTANT NOTE!

Switch the unit on and off at the control input!

Do not switch the unit on and off at the mains, since a fault message is generated for up to 10 seconds after the mains power is switched on! After this time, the EC fan's electronic circuit is ready for operation and a reliable status message is possible. If no fault is detected, the relay is energised after the initialisation period. The fan restarts automatically when control voltage or the stored speed setpoint is applied, after a mains power failure for example.



IMPORTANT NOTE!

Integrated overload protection for EC fans

All EC fans have integrated overload protection. An upstream motor protective device is not required. First connect the protective earth "PE" conductor to the motor junction box or to the KaControl recirculation air module. When disconnecting, be sure to disconnect the earth terminal last. Connect up the unit in accordance with the valid connection diagram.

To ensure that the switch-on current limit is active, wait until the mains power has been disconnected for at least 90 seconds before restarting!



IMPORTANT NOTE!

Special conditions for use in IT systems

Use in IT systems is governed by special conditions, and these are set out in the EC fan operation manual!



IMPORTANT NOTE!

Only connect up units with a circuit breaker that switches off all poles from the mains power supply with a contact gap of at least 3 mm! Only connect the unit to permanently installed lines. The operator of the unit is responsible for ensuring EMC compliance of the entire system in accordance with the locally applicable standards.

TOP [TOP C]

Assembly, installation and operating instructions

7.1 Maximum electrical rating values

Electromechanical model (type ... 58/56/68), KaControl model (type ...58C1/56C1/68C1)

Type	Nominal voltage [V]	Mains frequency [Hz]	Active power [kW]	Nominal current [A]	Leakage current [mA]	Maximum pre-fusing [A]	IP protection rating	Protection class
44**56 44**56C1	230	50/60	0.14	1.27	<3.5	B10	54	I
44**58 44**58C1	230	50/60	0.17	1.46	<3.5	B10	54	I
45**56 45**56C1	230	50/60	0.17	1.51	<3.5	B10	54	I
45**58 45**58C1	230	50/60	0.39	1.74	<3.5	C16	54	I
46**58 46**58C1	230	50/60	0.46	2.13	<3.5	C16	54	I
47**56 47**56C1	230	50/60	0.37	1.69	<3.5	C16	54	I
47**58 47**58C1	230	50/60	0.85	3.83	<3.5	C16	54	I
48**68 48**68C1	230	50/60	0.68	3.11	<3.5	C16	54	I

Tab. 13: Electrical data for TOP, without KaControl and valve actuator

type	Quantity
Speed controller, type 30510	10
Room thermostat, type 30155	5
Clock thermostat 230 V, type 30256	5
Electronic speed controller, type 30515	10

Tab. 14: Maximum number of air heaters with EC fan that can be connected per speed control

7.2 Electromechanical control type ...58/56/68

EMC-compliant installation of control cables

To avoid interference, ensure there is sufficient clearance between the mains power and control cables. When using a shielded cable, make sure that the shield is connected just on one side, i.e. only to the signal source with the protective earth (as short and low inductance as possible)!

7.2.1 Connection (**00)

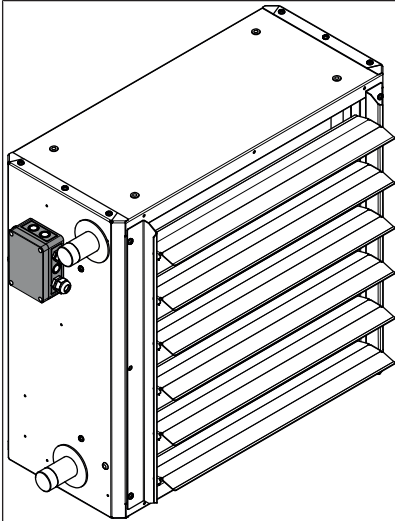


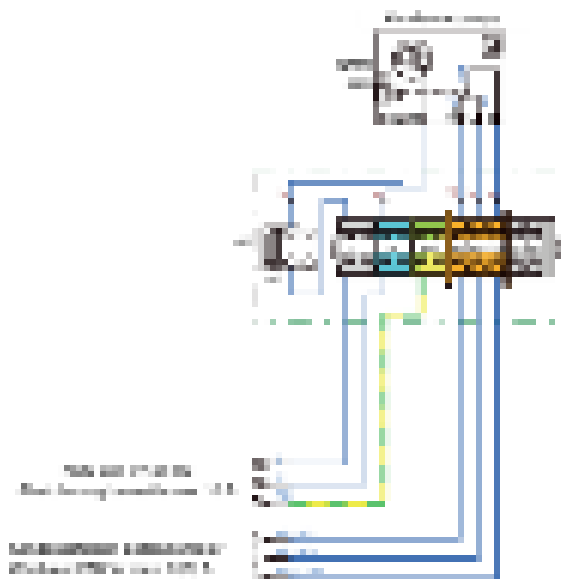
Fig. 18: TOP with motor junction box

Power supply and control

All sizes require a power supply of 230 V / 50/60 Hz and can be activated via a control input of 0-10 VDC ($R_i > 49 \text{ KO}\Omega$). Types 45xx58, 46xx58, 47xx5x and 48xx68 can alternatively be operated via an integral MODBUS RTU interface. The shield of the Bus line can be wired through to terminal SH, if required.

The motor junction box contains a relay with a potential-free changeover contact, 24 to 250 V/ 2 A. This signals an error message from the EC fan or a power failure. In fault-free operation, the relay is energised (Contact C – NO closed). In the event of a fault, the relay becomes de-energised (Contact C – NO open). The fault signalling chain in types 45xx58, 46xx58, 47xx5x and 48xx68 is protected by a relay with a unit fuse $\varnothing 5 \times 20 \text{ mm}$, T0,1A.

Terminal configuration for control of unit heater with EC fan (46xx58)



Control via 0 - 10 VDC

The 0 - 10 VDC control signal is interpreted for speed according to the following values:

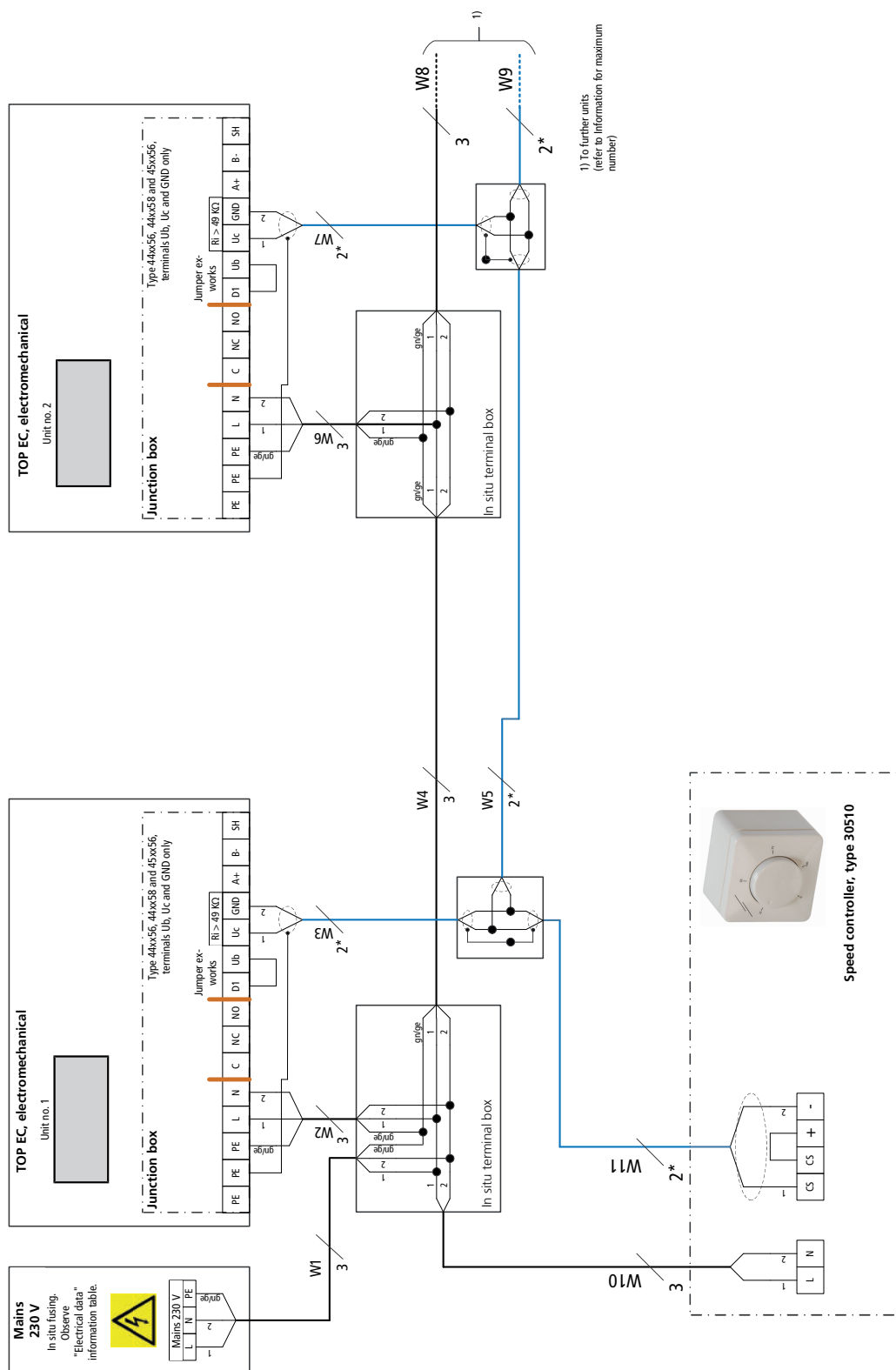
Control signal	Function
0 V	Off
2 - 10 V	$n_{(2V)} - 100\%$

The speed can be limited to approx. 50% of the maximum speed by the potentiometer in the junction box.

Refer to these points in the following installation diagrams with electromechanical control:

- ▶ 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 0.8 mm, max. 100 m between the fan speed controller and the last unit heater; provide a shield on one side when longer than 20 m. Lay separately from high voltage lines.
- ▶ With **: Sensor connection cable 1.5 mm² e.g. J-Y(ST) Y, 4 x 2 x 0.8 mm, max. 100 m. Lay separately from high voltage lines.
- ▶ With ***: J-Y(ST)Y, 0.8 mm, max. 50 m. Lay separately from high voltage lines.
- ▶ With ****: J-Y(ST)Y, 0.8 mm, max. 100 m. 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 mm².
- ▶ When using residual current circuit breakers, they need to be at least mixed frequency-sensitive (type F) for types 44xx5x and 45xx56, and all current-sensitive (type B) for all other types. When the power supply to the unit is switched on, pulsed charging currents of the capacitors in the integrated EMC filter can cause residual current safety devices to trip.
- ▶ Note the electrical data when rating the in-situ mains power supply and fuse.

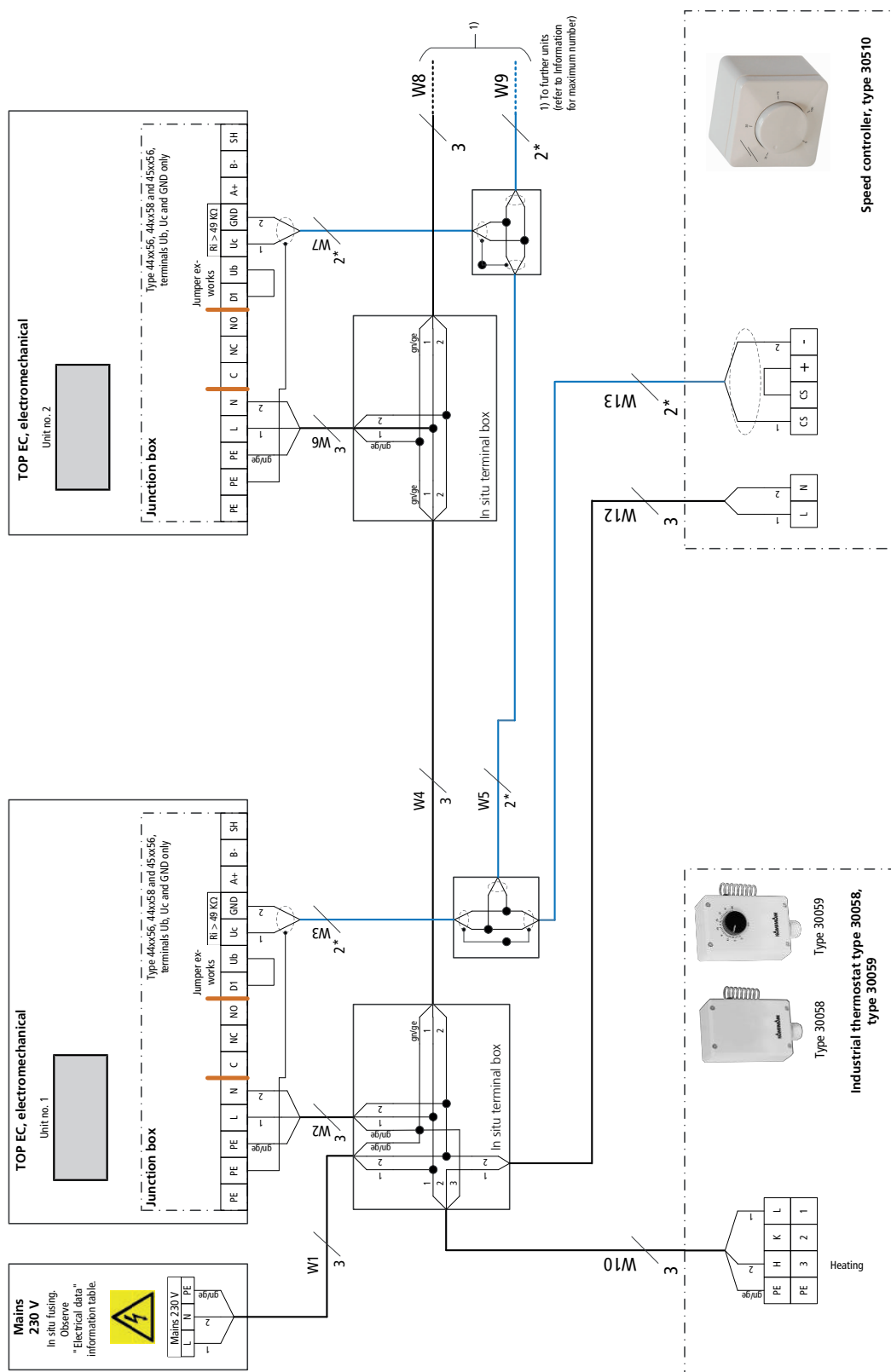
7.2.2 Cabling of TOP (**00), actuation by speed controller type 30510



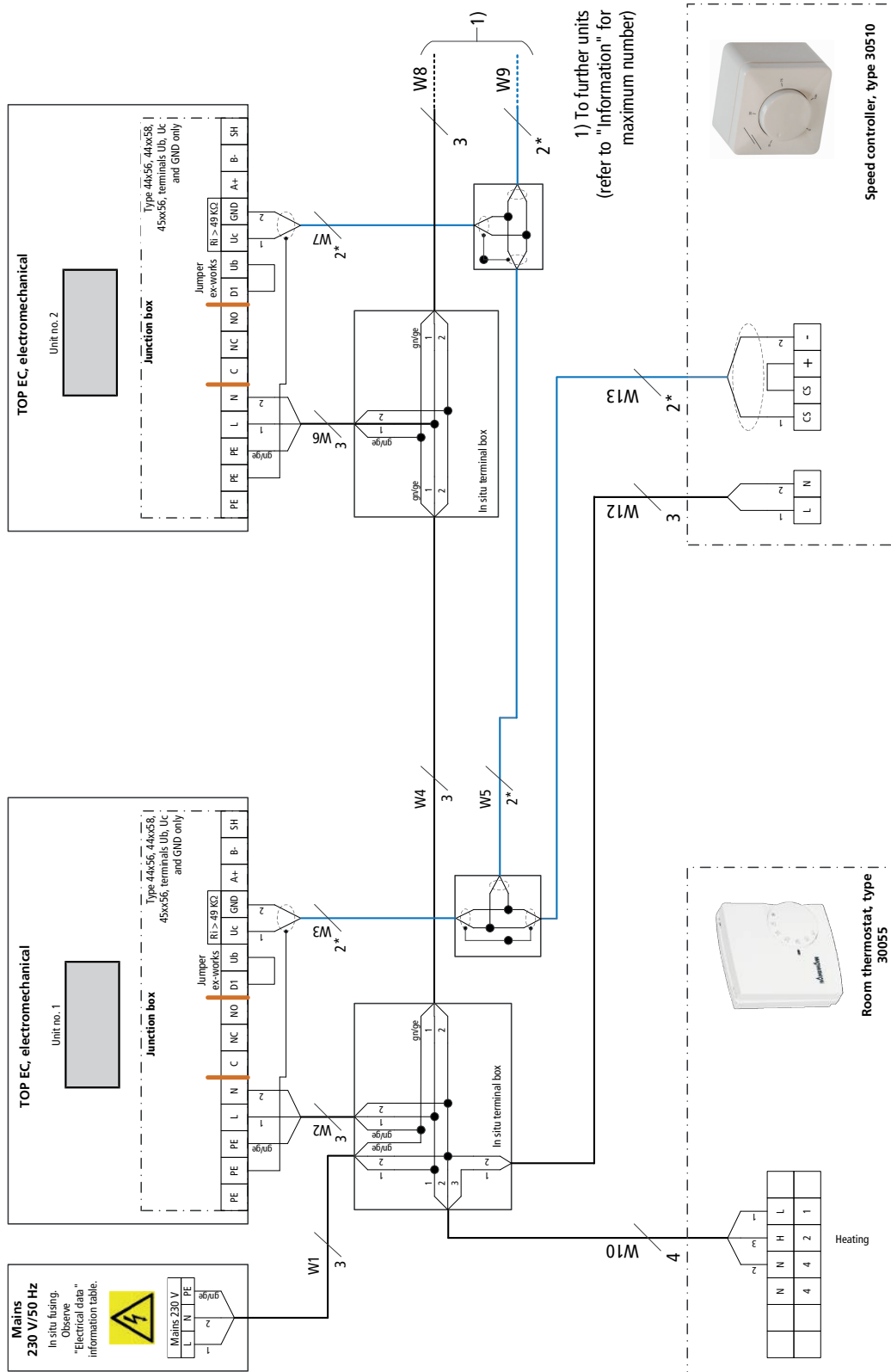
TOP [TOP C]

Assembly, installation and operating instructions

7.2.3 Cabling TOP (**00), activation via speed controller type 30510 with industrial thermostat type 30058/ 30059



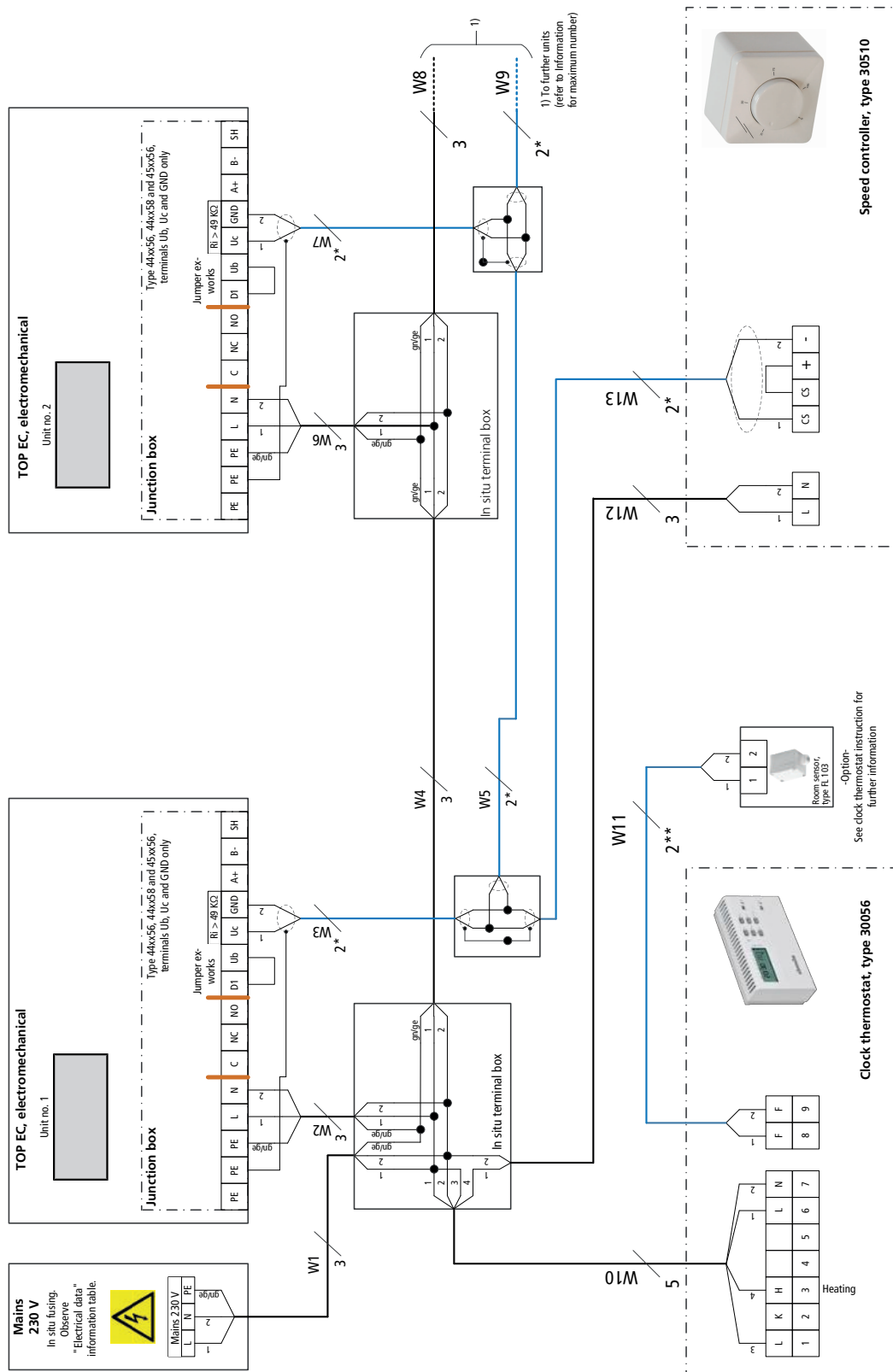
7.2.4 Cabling of TOP (**00), actuation by speed controller type 30510 with room thermostat type 30055



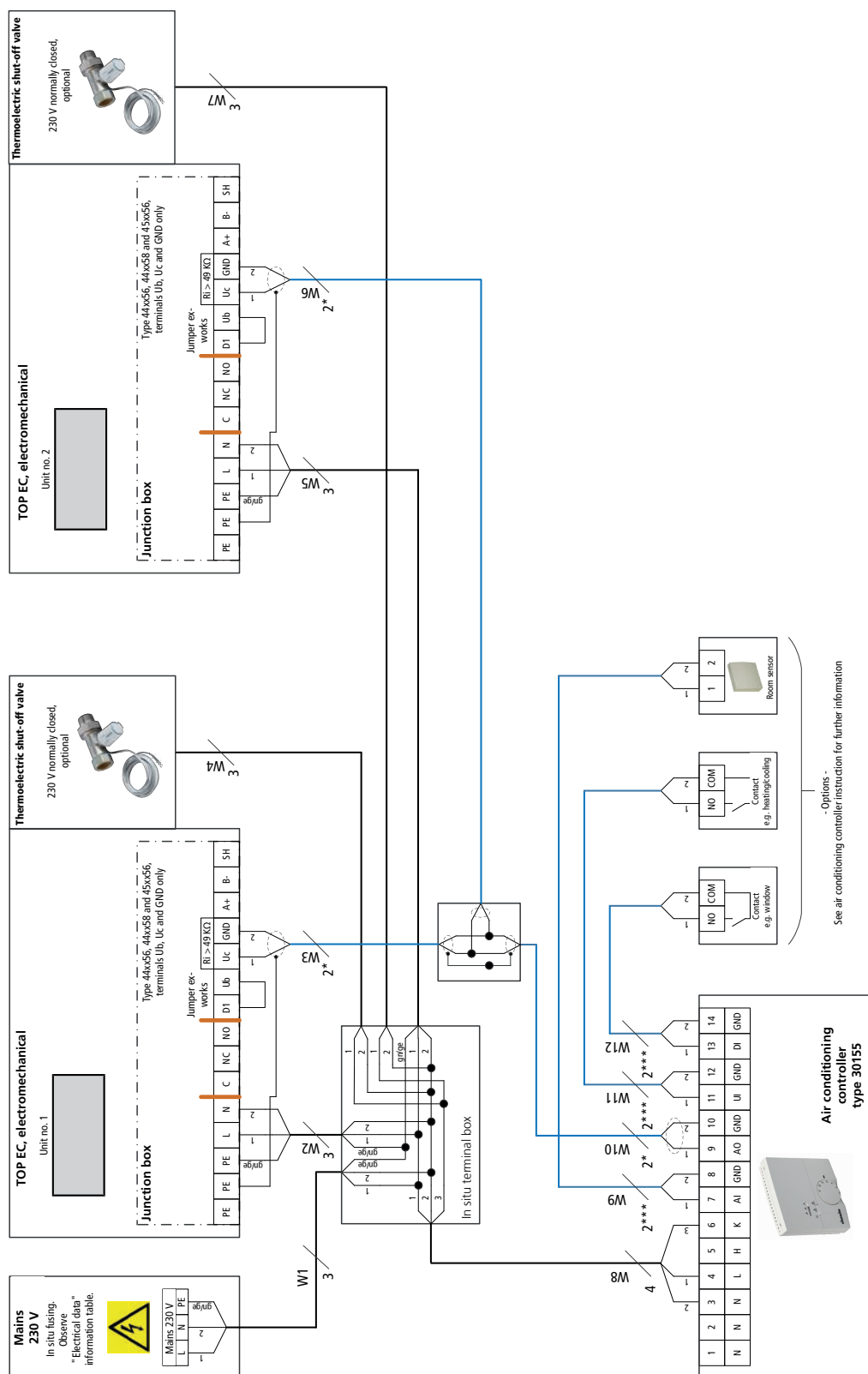
TOP [TOP C]

Assembly, installation and operating instructions

7.2.5 Cabling of TOP(**00), actuation by speed controller type 30510 with clock thermostat type 30056



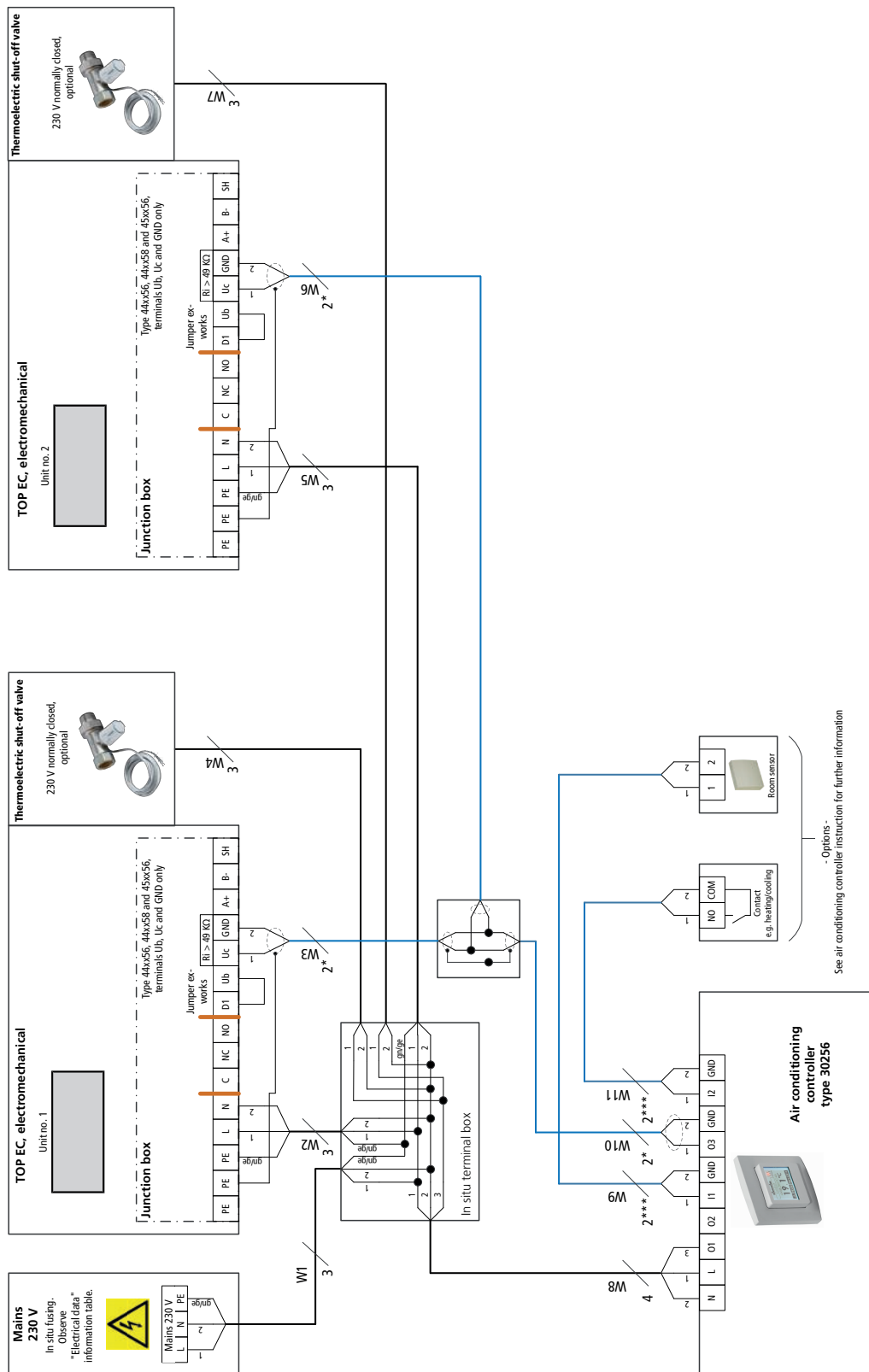
7.2.6 Cabling of TOP (**00), actuation by climate controller type 30155, 2-pipe valve actuator 230 V AC, Open/Close



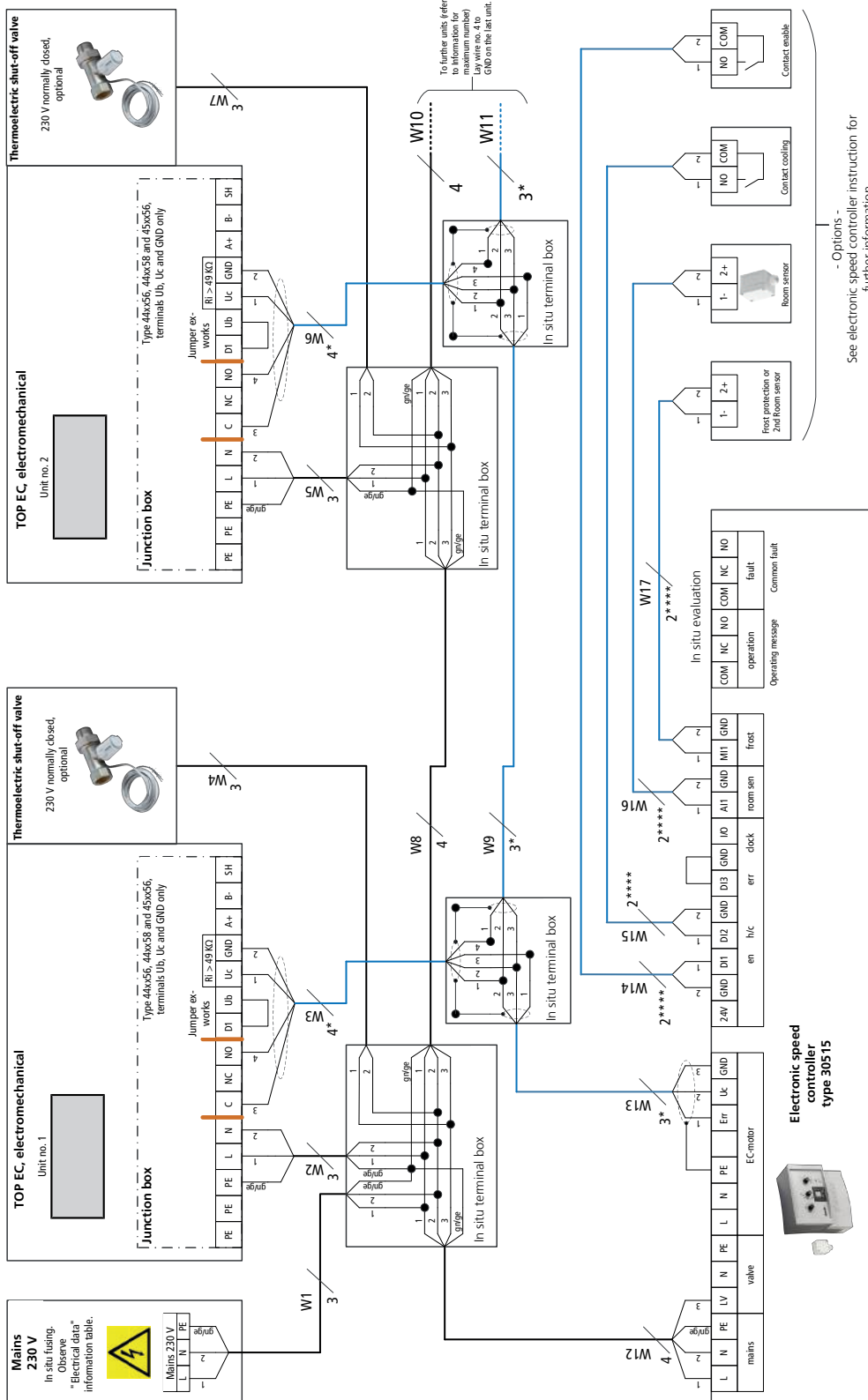
TOP [TOP C]

Assembly, installation and operating instructions

7.2.7 Cabling of TOP (**00), actuation by climate controller type 30256, 2-pipe valve actuator 230 V AC, Open/Close



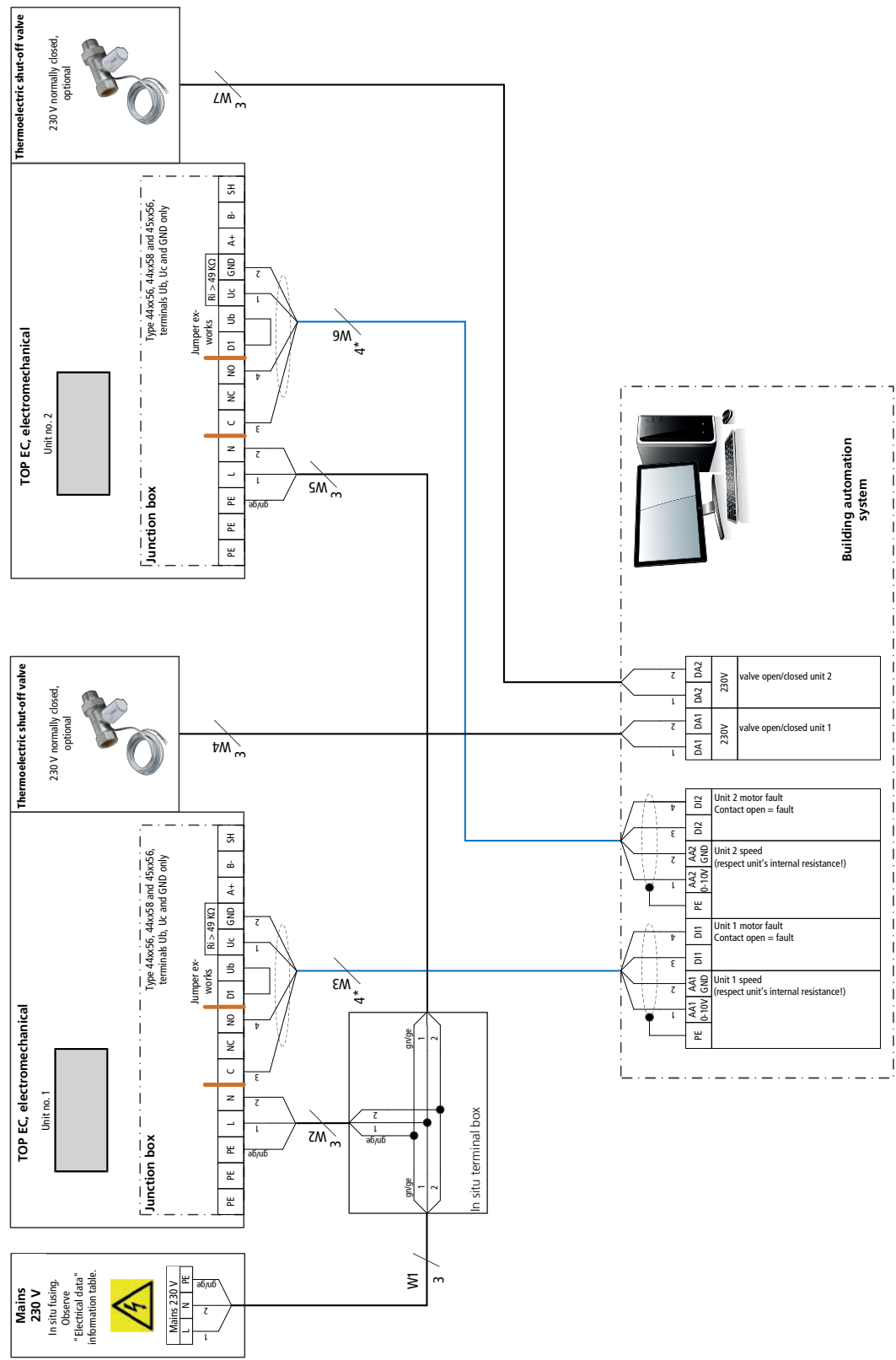
7.2.8 Cabling of TOP (*00), actuation by speed controller type 30515



TOP [TOP C]

Assembly, installation and operating instructions

7.2.9 Cabling of TOP (**00), actuation by DDC/BMS, 2-pipe valve actuator 230 V AC, Open/Close



7.3 KaControl (*C1)

7.3.1 KaController installation

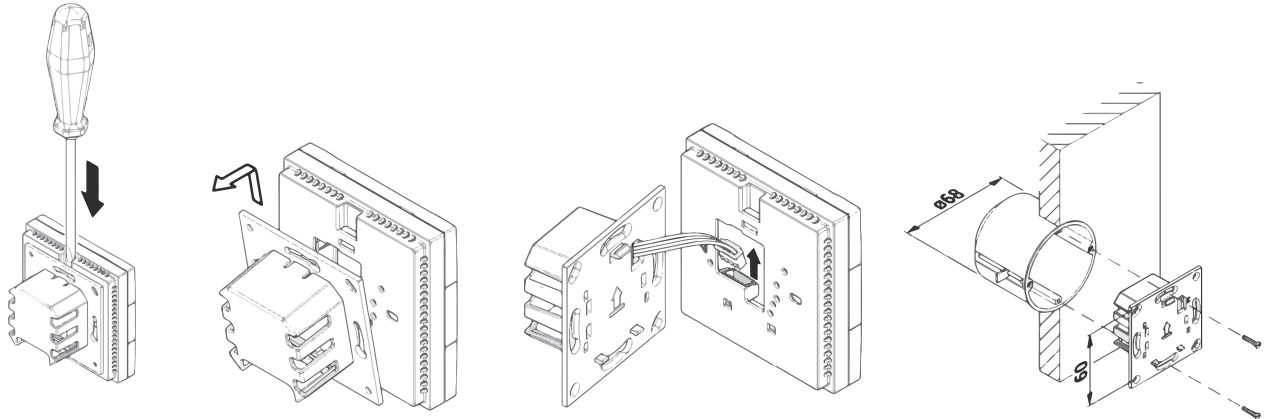


Fig. 19: Installation of flush-mounted back box

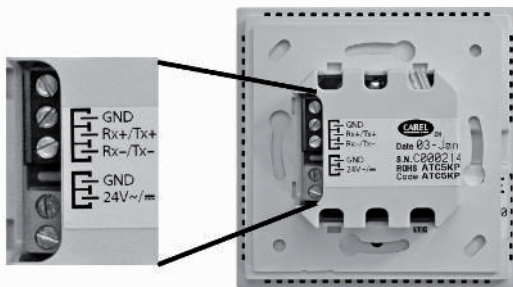


Fig. 20: KaController terminals

Electrical connection

- 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.
- The respective KaControl automatically becomes the master unit in the control circuit when a KaController is connected to it.

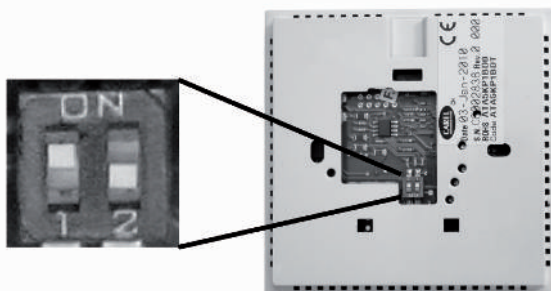


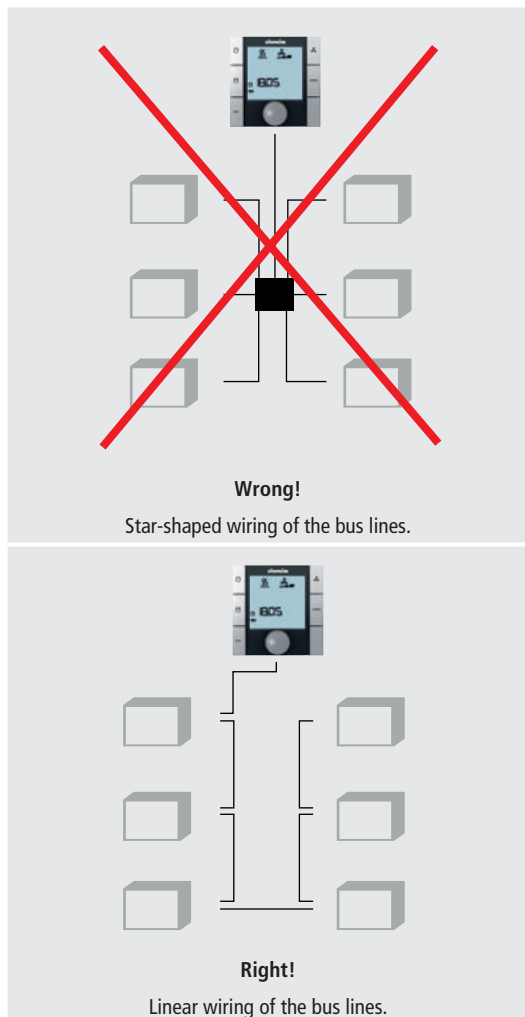
Fig. 21: DIP switch setting on KaController

DIP switch setting

The DIP switches on the rear of the KaController should be set according to the illustration:

- DIP switch 1: ON
- DIP switch 2: OFF

7.3.2 Connection (*C1)



General information

- ▶ Route all low voltage cables along the shortest route.
- ▶ Ensure that low-voltage and power cables are separated, using metal partitions on cable harnesses.
- ▶ Use only shielded cables as low-voltage and bus cables.
- ▶ Lay all BUS cables in a linear pattern. Star-shaped wiring is not permitted.
- ▶ The KaController is connected via a bus connection to the respective control PCB on the unit.

Tab. 15: 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!

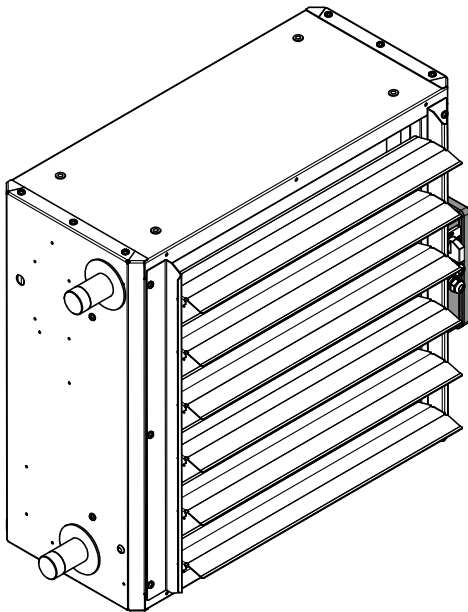
Description of wiring

Fig. 22: TOP with KaControl module

The KaControl module offers the option of controlling the fan motor and valve actuator either via a 0 - 10 VDC signal or via the KaController. The EC fan and the KaControl recirculation air module can be disconnected from the mains power supply via the integral master switch. **None** of the additional attachments are disconnected from the mains power supply via the main switch.

Voltage supply and fusing

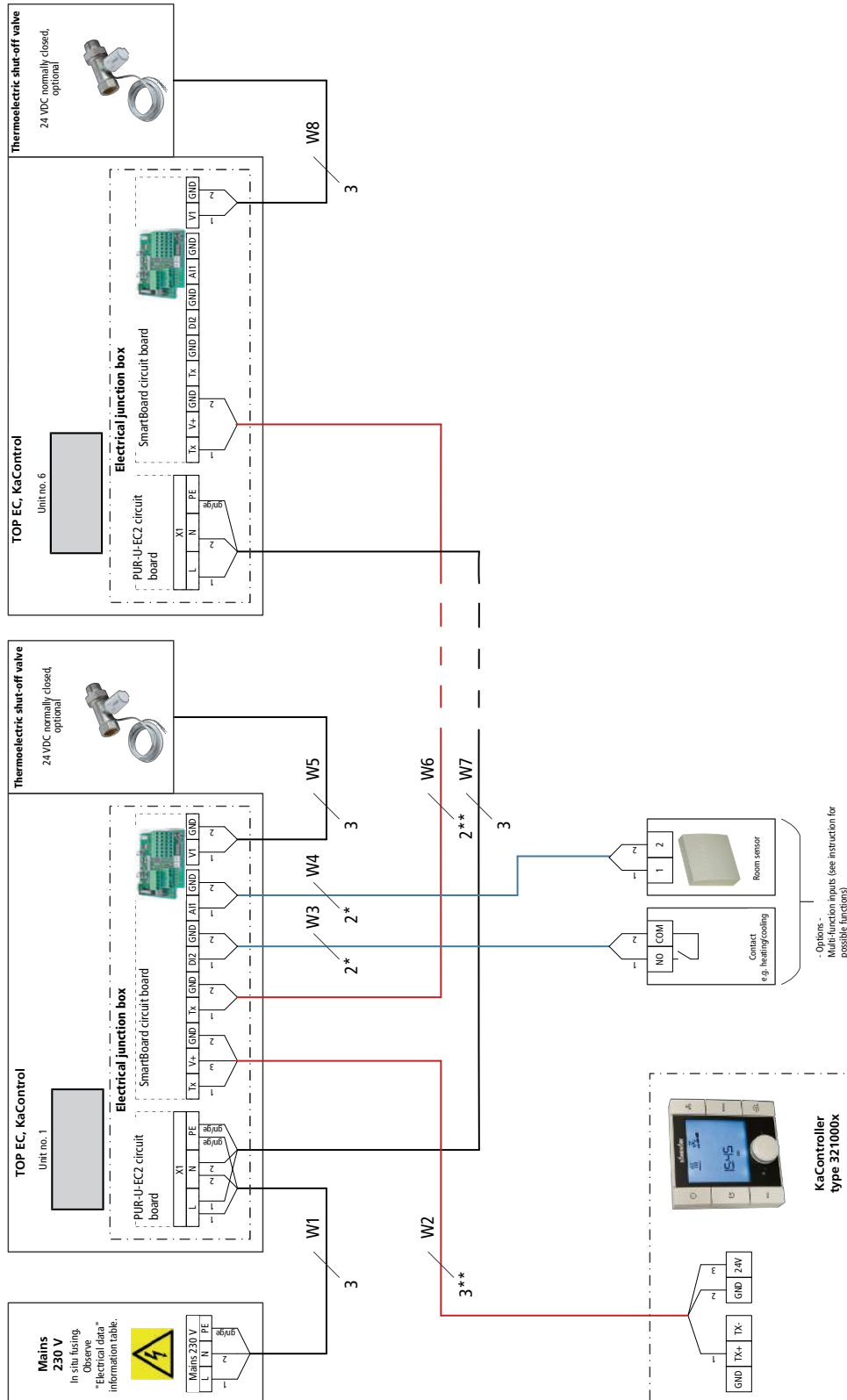
EC fan and KaControl recirculation air module are supplied together with 230 V/50 Hz voltage via a supply line. An operating indicator LED is located on the terminal circuit board in the KaControl module. Also installed on the terminal circuit board is a unit fuse Ø5 x 20 mm on the primary side for the control voltage, as well as on the secondary side for the 24 V voltage and a unit fuse Ø5 x 20 mm on the SmartBoard.

Control voltage (terminal circuit board)	24 V – voltage (terminal circuit board)	SmartBoard
T 1.0 A	T 315 mA	T 5.0 A

Observe these points in the following installation diagrams 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 mm² or similar separately from high voltage lines.
- ▶ If other types of cables are used, they must be at least equivalent.
- ▶ Length of Bus line from the KaController to unit 1: max. 30 m.
- ▶ Maximum number of parallel units: 2 units. With a CAN bus card type 3260301 (see Accessories) needed for each unit and a terminal resistor on the first and last unit, maximum 30 no.
- ▶ Length of Bus line from unit 1 to unit 2 max. 30 m. With each unit, requisite CAN bus card type 3260301 (see Accessories), maximum 500 m.
- ▶ Length of cable for room sensor and switching contact maximum 30 m, 1 mm², maximum 100 m
- ▶ The terminals on the unit for the mains power supply are suitable for a maximum wire cross-section of 2.5 mm².
- ▶ When using residual current circuit breakers, they need to be at least mixed frequency-sensitive (type F) for types 44xx5x and 45xx56, and all current-sensitive (type B) for all other types. When the power supply to the unit is switched on, pulsed charging currents of the capacitors in the integrated EMC filter can cause residual current safety devices to trip.
- ▶ The electrical data needs to be respected when rating the in-situ mains power supply and fusing.

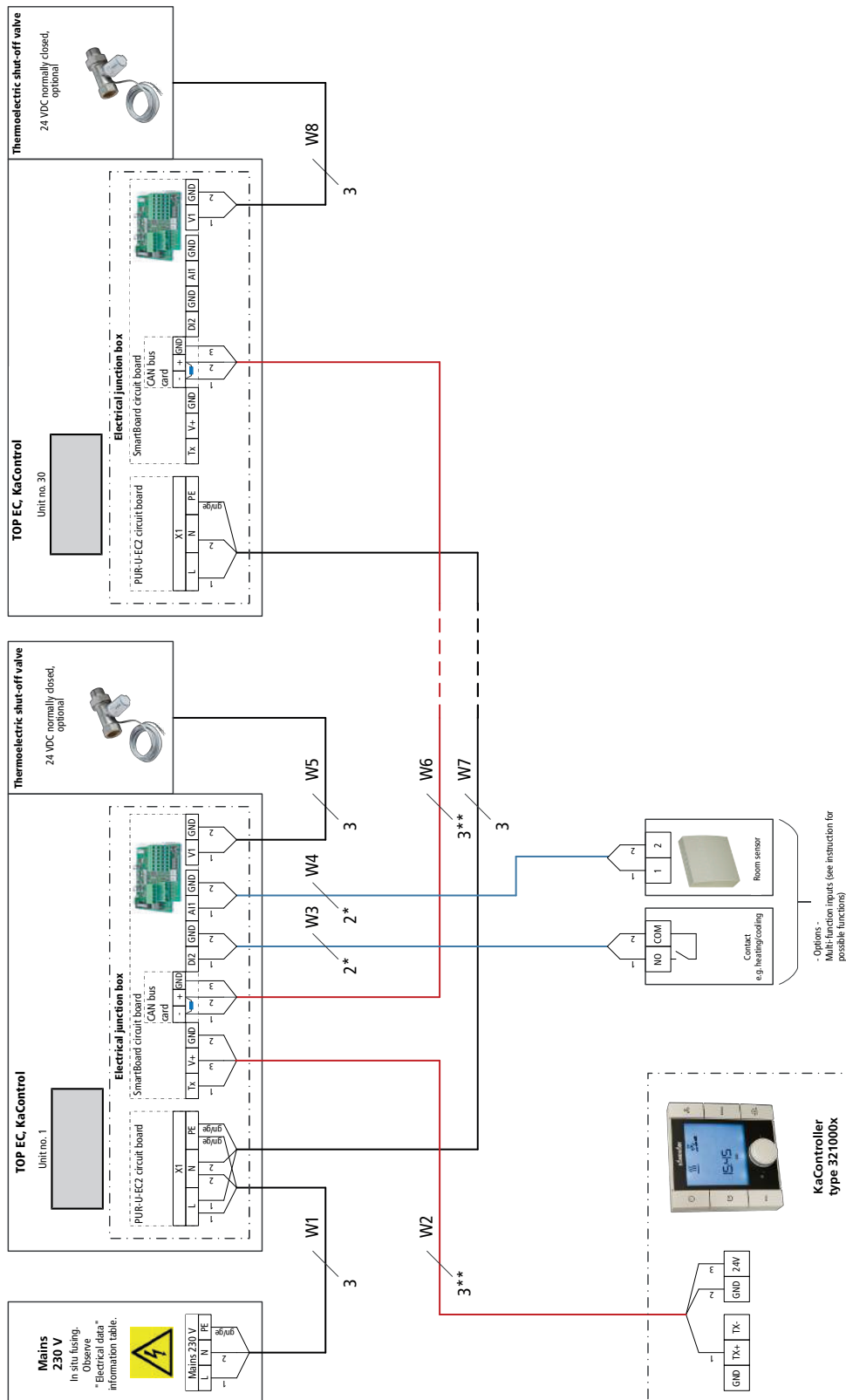
7.3.3 Cabling TOP (*C1), activation via KaController type 321000x, 2-wire, valve 24 VDC, open/closed



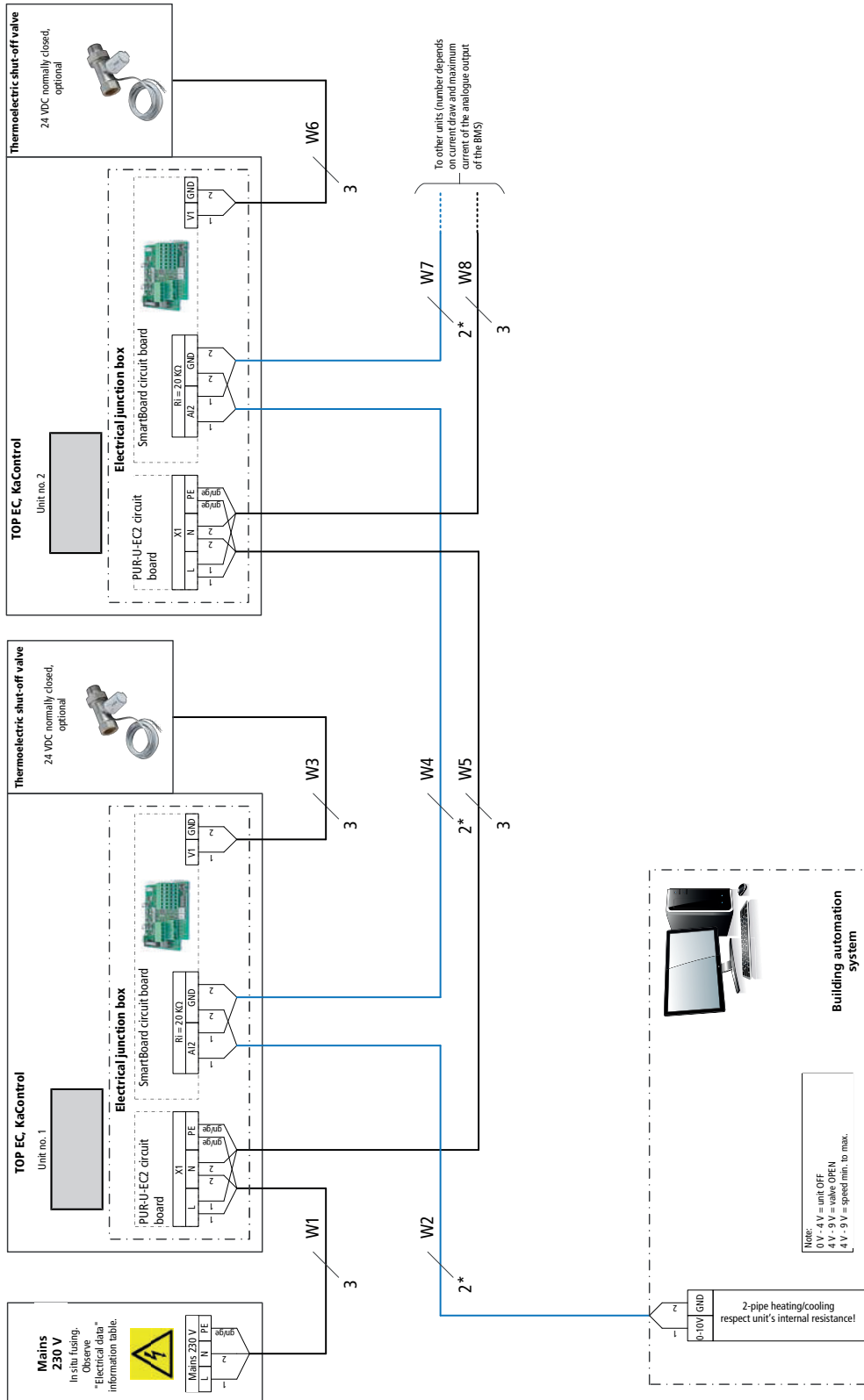
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7.3.4 Cabling TOP (*C1), activation via KaController type 321000x, 2-wire, valve 24 VDC, open/closed, with CAN bus card



7.3.5 Cabling TOP (*C1), activation via in situ 0-10 VDC signal



8 Pre-commissioning checks

During initial commissioning, it must be ensured that all necessary requirements are met so that the appliance can function safely and as intended.

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 air ducts are mechanically fixed in place.
- ▶ 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.

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" [► 55].

9 Operation

9.1 Operation of electromechanical control



Fig. 25: Speed controller, type 30510

Speed controller, type 30510

The speed controller is used to activate the fan and pre-set the fan speed. Actuation of a thermoelectric shut-off valve is not possible.



Fig. 26: Electronic fan speed controller type 30515

Electronic fan speed controller, type 30515

- ▶ With integrated digital timer, IP class IP 40
- ▶ 230 V, EC, with day, night, week programme, continuously variable fan operation 0 to 100 %, manual or automatic, 0-10 VDC, recirculation air, including sensor
- ▶ Suitable for: EC units, electromechanical, max. number of connectible units: ten TIP, TOP, Resistent, Ultra or Venkon, two KaCool D AF or KaCool W



Fig. 27: Room thermostat, type 30155

Room thermostat, type 30155

- ▶ Electronic room thermostat with 3-stage automatic function for 2- and 4-pipe applications, surface-mounted wall installation on a flush-mounted box in visually unobtrusive design
- ▶ simple operation using a large rotary dial for temperature setting with mechanical range limitation of the temperature setpoint, operating mode selector switch, Standby, Manual fan, Automatic fan, 3-stage switch for pre-selecting the fan speed when the operating mode selector switch is in the "Manual fan" position
- ▶ option for external room sensor connection
- ▶ control input for heating/cooling changeover with 2-pipe applications
- ▶ digital input can be set to Comfort/ECO or ON/OFF switchover



Fig. 28: Clock thermostat type 30256

Clock thermostat 230 V, type 30256

- ▶ Electronic clock thermostat for 2- and 4-pipe applications, surface-mounted wall installation on a flush-mounted box in visually unobtrusive design
- ▶ Operation using 4 sensor keys
- ▶ Timer with automatic summer/winter changeover
- ▶ Option for external room sensor
- ▶ Control input for heating/cooling changeover with 2-pipe applications
- ▶ Digital input can be set to Comfort/ECO or ON/OFF switchover
- ▶ Parallel operation of 2 units is possible

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.

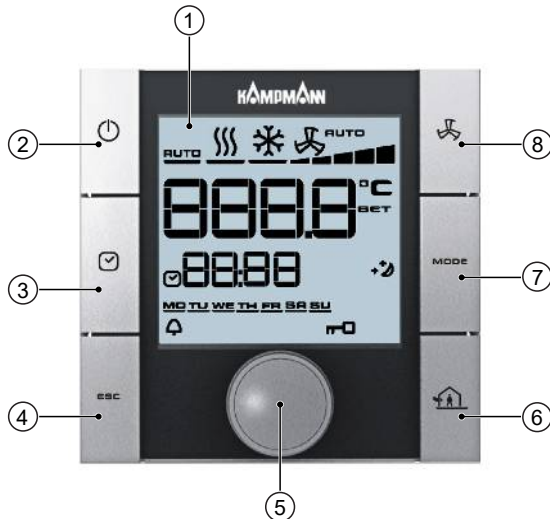




Fig. 29: KaController with function keys, type 3210002

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. 30: KaController type 3210001</p>	<p>KaController without operating keys (one-button operation) type 3210001</p> <ol style="list-style-type: none"> Display with LED background lighting Navigator dial <ul style="list-style-type: none"> ► Change settings ► Call up menus
 <p>Fig. 31: KaController black, type 3210006</p>	<p>KaController, black without function keys (one-button operation) type 3210006</p> <ol style="list-style-type: none"> Display with LED background lighting Navigator dial <ul style="list-style-type: none"> ► Change settings ► Call up menus

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

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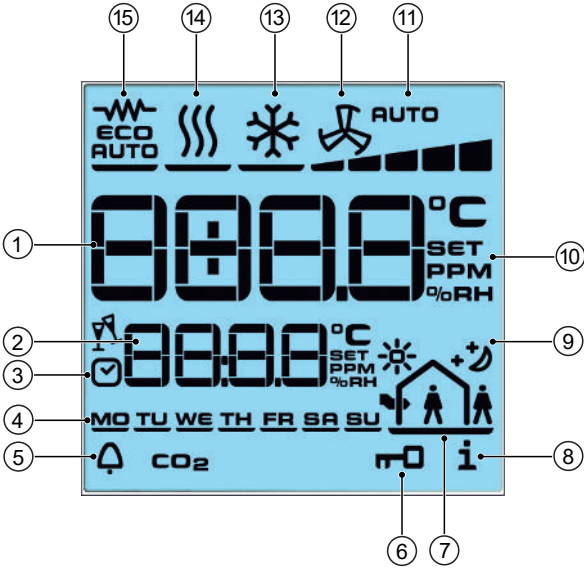


Fig. 32: Display

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		

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

10.3 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.

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DANGER!

Risk of injury from burning

High temperatures are produced at the fan's electronic housing. Avoid direct contact!



IMPORTANT NOTE!

Do not use aggressive cleaning agents!

Aggressive cleaning agents that can damage the paintwork must not be used on the fan. Water is not permitted to enter the inside of the motor or the electronics (through direct contact with seals or motor openings, for example), respect the protection rating (IP). Check the condensate drain holes (if present), positioned to suit the installation situation, for clearance. Run the fan for at least 1 hour at 80 to 100% of maximum speed before cleaning to prevent moisture accumulating in the motor! Run the fan for a minimum of 2 hours at 80 to 100% of maximum speed after the cleaning process!

10.4 Replacing the filter.



CAUTION!

Risk of injury from sharp metal housing!

The inner metal of the casing can have sharp edges.

- Wear suitable protective gloves.

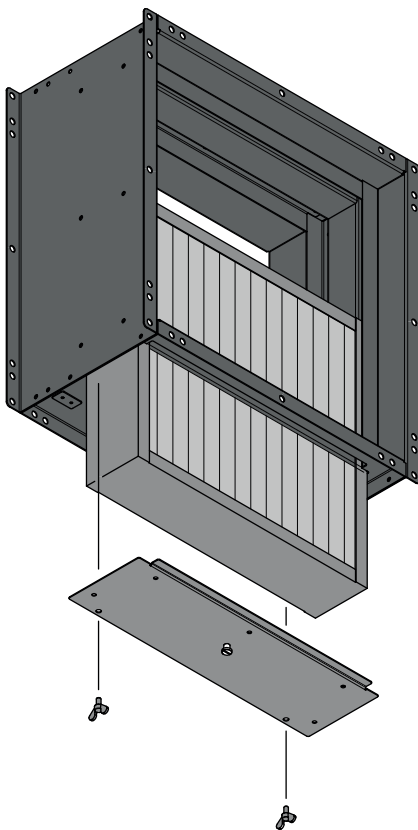


Fig. 33: Changing the ISO Coarse 90% filter cartridge

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 [► 62] provides information on who is authorised to rectify and remedy faults.

Status output via flash code

The EC fans are blockage protected. Protective functions that trigger an automatic shut-off in case of a fault are integrated. These depend on the fan type.

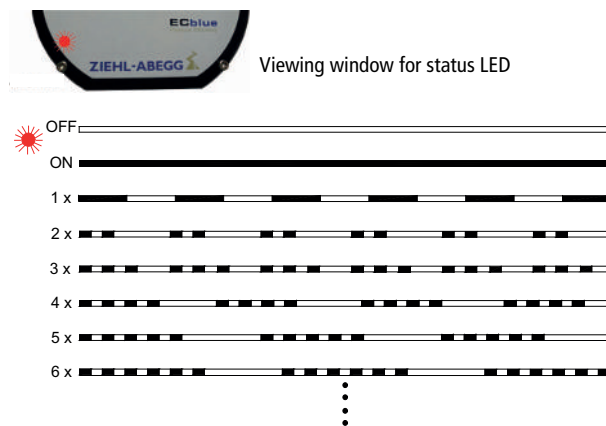


Fig. 34: Flash code

LED code	Relay in the fan*	Cause
OFF	0	No mains power
ON	1	Normal operation without faults
1x	1	No enable = OFF
2x	1	Temperature management active
4x	0	Phase failure (3 ~ types only)
5x	0	Motor blocked
6x	0	Power module fault
7x	0	Intermediate circuit, undervoltage
8x	0	Intermediate circuit, overvoltage
9x	1	Cool down phase, power module
11x	0	Fault, motor start
12x	0	Mains power too low
13x	0	Mains power too high
14x	0	Fault, peak current

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LED code	Relay in the fan*	Cause
17x	0	Temperature alarm
20x	0	MODBUS communication fault

Tab. 16: Status via flash code

* Relay in the fan with factory-programmed function (fault message not inverted)

0 relay de-energised

1 relay energised

11.1 Fault table

Fault	Possible cause	Remedy
No function.	No power supply.	Check voltage, switch on repair switch.
		Replace fuse.
Fan is not running.	Unit is switched off.	Switch on the unit via the controller.
	No mains voltage or mains voltage does not correspond to the unit version.	Check the power supply and restore, if necessary.
	Electrical cable not connected or incorrectly connected.	Check electrical connection and correct if necessary.
	No request from controller, hence fans switch off.	Change controller settings, if required.
	Fan blocked.	Clean dirt from fan.
	Impermissible operating pressure (e.g. excessive back pressure)	Correct operating point. Allow unit to cool down. Switch off the mains power for min. 25 s and switch on again to reset the error message. Alternatively, reset error message by applying a control signal of <0.5 V to DIN1 or by short circuiting DIN1 to GND.
	Temperature monitor has tripped.	Allow the motor to cool down, find and rectify the cause of the fault and release restart lock if necessary.
System water leakage	Motor winding interrupted.	Replace unit.
	Heat exchanger defect.	Replace heat exchanger if necessary.
Unit not heating or cooling sufficiently (LPHW/ CHW)	Hydraulic connection not correct.	Check flow and return, retighten if necessary.
	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	Fan speed too high.	Set a lower fan speed, if possible.
	Air intake / air discharge opening is obstructed.	Free air routes.
	Filter dirty.	Replace filter.

Fault	Possible cause	Remedy
	Rotating parts unbalanced	Clean and/or replace impeller. Make sure that no balancing brackets are removed during cleaning.
	Fan dirty.	Clean dirt from fan.
	dirty.	Clean dirt from the .

11.2 Fault table, electromechanical control type ..58/56/68

Fault	Possible cause	Remedy
EC fan does not rotate when power is applied to the module and control signal > approx. 2 VDC	Mechanical blockage.	Switch off, de-energise and remove the mechanical blockage.
	Control voltage poles switched.	Connect the control voltage correctly.
Fan does not rotate 100% at max. control signal 10 VDC	Maximum limit set incorrectly.	Change potentiometer setting in the motor junction box.
	Active temperature management effective (motor or electronics overheated).	Check that the airways are clear; remove any foreign bodies, impeller is blocked or dirty; check supply air temperature; check installation location (air speed over heat sink).
Fault alarm (Contact C – NO open) and EC fan operational	Electronics in motor junction box faulty.	Replace the motor junction box.
	Fault signal chain fuse faulty.(45xx58. 46xx58. 47xx5x. 48xx68)	Replace fuse.

11.3 Fault table, KaControl, type ...58C1/ 56C1/ 68C1

Fault	Possible cause	Remedy
EC fan does not rotate when power is applied to the module and control signal > 4 VDC	Mechanical blockage.	Switch off, de-energise and remove the mechanical blockage.
	Control voltage fuse on terminal circuit board, 24 V power fuse on terminal circuit board and/or fuse on the SmartBoard faulty.	Replace fuses.
	Control voltage poles switched.	Connect the control voltage correctly.
EC fan does not rotate 100% at max. control signal 10 VDC	Potentiometer for maximum limit incorrectly set on SmartBoard.	Change potentiometer setting.
	Active temperature management effective (motor or electronics overheated).	Check that the airways are clear; remove any foreign bodies, impeller is blocked or dirty; check supply air temperature; check installation location (air speed over heat sink).

11.4 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. 17: 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. 18: KaController alarms



IMPORTANT NOTE!

Important note!

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

11.5 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 TOP parameter list

Parameter	Function	Standard	Min.	Max.	Unit	TOP ¹¹
P000	Software version	24	0	255	-	24
P001	Base setpoint for setpoint input $\pm 3K$	22	8	32	°C	22
P002	Switching on / off hysteresis for valves	3	0	255	K/10	1
P003	Neutral zone in a 4-pipe system (only in automatic mode)	3	0	255	K/10	3
P004	Cooling without fan assistance (natural convection)	0	0	255	K/10	0
P005	Heating without fan assistance (natural convection)	5	0	255	K/10	0
P006	Fan On/Off hysteresis (only in ventilation mode)	5	0	255	K/10	5
P007	P-band, heating	20	0	100	K/10	20
P008	P-band, cooling	20	0	100	K/10	20
P009	Offset to the base setpoint for setpoint input $\pm 3K$	3	0	10	C	3
P010	Clip-on sensor: limit temperature to enable fan stages 1 and 2 in heating mode	26	0	255	°C	26
P011	Clip-on sensor: limit temperature to enable fan stages 3 and 4 in heating mode	28	0	255	°C	28
P012	Clip-on sensor: limit temperature to enable fan stage 5 in heating mode	30	0	255	°C	30
P013	Clip-on sensor: hysteresis for limit temperatures P010, P011, P012, P014	10	0	255	K/10	10
P014	Clip-on sensor: limit temperature for enabling the fan stages in cooling mode	18	0	255	°C	18
P015	Function of input AI1	0	0	19	-	0
P016	Function of input AI2	0	0	19	-	0
P017	Function of input AI3	0	0	9	-	0
P018	Temperature increase of cooling setpoint in Eco mode	30	0	255	K/10	30
P019	Temperature decrease of heating setpoint in Eco mode	30	0	255	K/10	30
P020	ADC limit coefficient	6	0	15	-	6
P021	ADC average coefficient	6	0	15	-	6
P022	Activation/disabling of sun symbol in Comfort mode	0	0	1	-	0
P023	Difference for compensation during cooling	0	-99	127	K/10	0
P024	Coefficient for compensation during heating	0	-20	20	1/10	0
P025	Difference for compensation during heating	0	-99	127	K/10	0
P026	Coefficient for compensation during heating	0	-20	20	1/10	0
P027	Fan setting: maximum run-time for manual fan mode	0	0	255	min	0
P028	Flushing function: fan stage during the flushing function	2	1	5	-	2
P029	Activation of continuous fan mode	0	0	1	-	0
P030	Vent temperature enable	12	0	255	°C	12
P031	Vent interval	27	0	255	°C	27
P032	Flushing function: maximum idle time of fan	15	0	255	min	15
P033	Flushing function: duration of flushing function	120	0	255	s	120
P034	Flushing function: activation in operating modes	0	0	3	-	0
P035	Fan run-on time after operating mode is switched to stage 1	0	0	255	s	0

¹¹

Parameter key TOP, SAP no. 9000812, dated 01.02.2018

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Parameter	Function	Standard	Min.	Max.	Unit	TOP ¹¹
P036	Type of setpoint	0	0	1	-	0
P037	Display	1	0	7	-	1
P038	Lock/disable function on control unit	72	0	255	-	72
P039	Function of digital output V2 (in 2-pipe system)	0	0	3	-	0
P040	Valve actuation via pulse width modulation	0	0	1	-	0
P041	Reset time of PI controller to activate the fan in automatic fan mode	0	0	20	min	0
P042	Fan setting: lock and activate fan stages	0	0	127	-	2
P043	Function of digital input DI1	0	0	22	-	5
P044	Function of digital input DI2	0	0	22	-	0
P045	Threshold voltage for potentiometer that switches on the unit	10	0	100	kOhm	10
P046	Temperature setting corresponds to minimum resistance value = 10 kOhm in the potentiometer	18	12	34	°C	18
P047	Temperature setting corresponds to maximum resistance value = 100 kOhm in the potentiometer	24	13	35	°C	24
P048	Threshold voltage for potentiometer for starting the fans	10	0	100	kOhm	10
P049	Threshold voltage for potentiometer for maximum fan speed	90	0	100	kOhm	90
P050	Fan setting: max. fan speed	100	0	100	%	100
P051	Fan setting: min. fan speed	0	0	90	%	0
P052	Fan setting: enable speed limit	0	0	1	-	0
P053	Valve activation via pulse width modulation of valve switching cycle	15	10	30	min	15
P054	Configuration of bus system	0	0	2	-	0
P055	Display of heating/cooling symbols in automatic mode	0	0	1	-	0
P056	DI2 setting (polarity) when DIP 4 = ON	1	0	1	-	1
P057	Reset setpoint to the value of P01 (after changing an operating program)	0	0	1	-	0
P058	Sensor calibration: sensor AI1	0	-99	127	K/10	0
P059	Supply air temperature setpoint in heating mode	35	0	50	°C	35
P060	Supply air temperature setpoint in cooling mode	18	0	50	°C	18
P061	Sensor calibration: sensor in the KaController	0	-99	127	K/10	0
P062	Sensor calibration: sensor AI2	0	-99	127	K/10	0
P063	Outside temperature <P63 fan increase by P122	0	-99	127	°C	0
P064	Sensor calibration: sensor AI3	0	-99	127	K/10	0
P065	reserved	-	-	-	-	-
P066	Master/Slave assignment in CAN bus	0	0	1	-	0
P067	Serial CAN bus address	1	1	125	-	1
P068	Logic of hydronic algorithms	0	0	7	-	0
P069	Network address	1	0	207	-	1
P070	Dependence of the hydronic algorithms (on Slaves)	0	0	7	-	0
P071	Serial address of Slave 1	0	0	207	-	0
P072	Serial address of Slave 2	0	0	207	-	0
P073	Serial address of Slave 3	0	0	207	-	0
P074	Serial address of Slave 4	0	0	207	-	0
P075	Serial address of Slave 5	0	0	207	-	0
P076	Serial address of Slave 6	0	0	207	-	0
P077	Serial address of Slave 7	0	0	207	-	0

Parameter	Function	Standard	Min.	Max.	Unit	TOP ¹¹
P078	Serial address of Slave 8	0	0	207	-	0
P079	Serial address of Slave 9	0	0	207	-	0
P080	Serial address of Slave 10	0	0	207	-	0
P081	Dependence of the hydronic algorithms, Slave 1	0	0	7	-	0
P082	Dependence of the hydronic algorithms, Slave 2	0	0	7	-	0
P083	Dependence of the hydronic algorithms, Slave 3	0	0	7	-	0
P084	Dependence of the hydronic algorithms, Slave 4	0	0	7	-	0
P085	Dependence of the hydronic algorithms, Slave 5	0	0	7	-	0
P086	Dependence of the hydronic algorithms, Slave 6	0	0	7	-	0
P087	Dependence of the hydronic algorithms, Slave 7	0	0	7	-	0
P088	Dependence of the hydronic algorithms, Slave 8	0	0	7	-	0
P089	Dependence of the hydronic algorithms, Slave 9	0	0	7	-	0
P090	Dependence of the hydronic algorithms, Slave 10	0	0	7	-	0
P091	Load default values	0	0	255	-	0
P092	Password management	0	0	255	-	0
P093	Type of pre-comfort (room occupancy)	0	0	3	-	0
P094	Pre-comfort timer	60	1	255	min	60
P095	Disable DIP switch settings	0	0	1	-	0
P096	Digital outputs continuously activated	0	0	1	-	0
P097	Read DIP switch	-	0	63	-	-
P098	Activation 0..10V: switch on limit for valves	30	0	100	V/10	30
P099	Activation 0..10V: min. switch on limit for fan speed	40	0	100	V/10	40
P100	Activation 0..10V: max. switch on limit for fan speed	90	0	100	V/10	90
P101	Valve activation by pulse width modulation of P-band in heating mode	15	0	100	K/10	15
P102	Valve activation by pulse width modulation of P-band in cooling mode	15	0	100	K/10	15
P103	Valve activation by pulse width modulation of reset time of PI controller	0	0	20	min	0
P104	Minimum ON time with valve activation PWM	3	0	20	min	3
P105	Compensation: max. negative delta setpoint	50	0	150	K/10	50
P106	Compensation: max. positive delta setpoint	50	0	150	K/10	50
P107	Duration of valve open to check water temperature	5	0	255	min	5
P108	Duration of valve closed	240	35	255	min	240
P109	Dead zone PI control for 3-way valve	10	0	100	K/10	10
P110	Hysteresis to switch between heating/fan operation	0	0	20	°C	0
P111	Threshold for switching between heating/fan operation	0	0	50	°C	0
P112	reserved	-	-	-	-	-
P113	reserved	-	-	-	-	-
P114	reserved	-	-	-	-	-
P115	reserved	-	-	-	-	-
P116	reserved	-	-	-	-	-
P117	Lock function buttons on KaController	0	0	7	-	0
P118	On delay time	0	0	255	sec	0
P119	Off delay time	0	0	255	sec	0
P120	reserved	-	-	-	-	-
P121	reserved	-	-	-	-	-

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Assembly, installation and operating instructions

Parameter	Function	Standard	Min.	Max.	Unit	TOP ¹¹
P122	Relative fan speed increase via contact	2	0	5	-	2
P123	Maximum valve running time	150	0	255	sec	150
P124	Minimum P + I output variation for valve motion (0 to 10)	5	0	100	%	5
P125	reserved	-	-	-	-	-
P126	Weeks of operation	0	0	255	week	0
P127	Info weeks of operation reached (filter message)	0	52	255	week	0
P128	Reset weeks of operation counter	0	0	1	-	0
P129	Fan speed limiter activation in certain operating modes	0	0	1	-	0
P130	Absolute fan speed increase via contact	2	0	5	-	2
P131	External ventilation, delay time	0	0	255	min	0
P132	Operating level, master password	22	0	255	-	22
P133	Hysteresis for outside temperature for switching between heating/fan mode	0	0	255	K/10	0
P134	Threshold for outside temperature for switching between heating/fan mode	0	0	50	°C	0
P135	Enable virtual sensor	0	0	1	-	0
P136	Enable external ventilation	0	0	2	-	0

Tab. 19: Parameter key, SAP no. 9000812, dated 01.02.2018

12.2 KaController parameter list

Parameter	Function	Standard	Min.	Max.	Unit	Comment
t001	Serial address	1	0	207	-	Address in Mod-bus 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	-	

TOP [TOP C]

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:

TOP/TOP C

TIP

Resistent

Ultra

Ultra Allround

Bauheizer

44**; 45****; 46****; 47****; 48******

54**; 55****; 56******

84**; 85****; 86******

73**; 84****; 85****; 96****; 97******

3540*

54**; 55****; 56******

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 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

Elektromagnetische Verträglichkeit

Elektromagnetische Verträglichkeit

Elektromagnetische Verträglichkeit

**Sicherheit elektr. Geräte f. 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**EMV-Richtlinie****2014/35/EU****Niederspannungsrichtlinie****2009/125/EG****ErP-Richtlinie****2016/2281 EU****Durchführungsverordnung für Luftheizungsprodukte,
Kühlungsprodukte, Prozesskühler mit hoher Betriebstemperatur und
Gebläsekonvektoren****Frank Bolkenius****Lingen (Ems), den 06.03.2023****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

Information requirements for fan coils according to regulation (EU) No 2016/2281
 Informationsanforderungen für Fan Coils gemäß Verordnung (EU) Nr. 2016/2281

TOP Copper-aluminium Kupfer-Aluminium heating only nur heizen 2-pipe unit 2-Rohrsystem														
			Fan Speed Drehzahl	Motor code no. Motorennummer	cooling capacity (sensible)	Kühlleistung (sensibel)	cooling capacity (latent)	Kühlleistung (latent)	Heating capacity	Wärmeleistung	Total electric power input	Elektrische Gesamtleistungsaufnahme	Sound power level (per speed setting, if applicable)	Schallleistungspegel (ggf. je Geschwindigkeitseinstellung)
Fan Ventilator	heat exchanger Wärmetauscher	Series Serie			P _{rated,c} kW		P _{rated,c} kW		P _{rated,h} kW		P _{elec} kW		L _{WA} dB (A)	
EC, 230 V	20	44	high	58	-		-		5,2		0,165		45/54/62/68/73	
			low	56	-		-		4,7		0,124		42/51/59/66/71	
		45	high	58	-		-		9,2		0,400		34/56/66/75/81	
			low	56	-		-		7,5		0,162		43/52/61/68/72	
		46	high	58	-		-		12,5		0,420		34/55/66/74/80	
			low	56	-		-		16,6		0,685		34/56/68/76/81	
	30	47	high	58	-		-		14,6		0,340		30/49/61/70/75	
			low	56	-		-		19,8		0,617		33/54/66/75/80	
		44	high	58	-		-		6,1		0,165		43/52/60/66/71	
			low	56	-		-		5,4		0,124		40/49/57/64/69	
		45	high	58	-		-		11,0		0,400		32/54/64/73/79	
			low	56	-		-		8,8		0,162		41/50/59/66/70	
	40	46	high	58	-		-		16,0		0,420		32/53/64/72/78	
			low	56	-		-		20,0		0,685		32/54/66/74/79	
		47	high	58	-		-		17,4		0,340		28/47/59/68/73	
			low	56	-		-		26,8		0,617		31/52/64/73/78	
		44	high	58	-		-		7,7		0,165		41/50/58/64/69	
			low	56	-		-		6,4		0,124		38/47/55/62/67	
	40	45	high	58	-		-		15,1		0,400		30/52/62/71/77	
			low	56	-		-		11,1		0,162		39/48/57/64/68	
		46	high	58	-		-		19,8		0,420		30/51/62/70/76	
			low	56	-		-		29,4		0,685		30/52/64/72/77	
		47	high	58	-		-		23,8		0,340		26/45/57/66/71	
			low	56	-		-		37,0		0,617		29/50/62/71/76	

Standard rating conditions for fan coil units according to regulation (EU) No 2016/2281						
Norm-Prüfbedingungen für Gebläsekonvektoren gemäß Verordnung (EU) Nr. 2016/2281						
Cooling Test	Air temperature	27 °C (dry bulb) 19 °C (wet bulb)	Inlet water temperature	7 °C	Water temperature rise	5 °C
Test Kühlbetrieb	Lufttemperatur	27 °C (Trockenkugel) 19 °C (Feuchtkugel)	Wassertemperatur am Einlass		Anstieg der Wassertemperatur	
Heating Test	Air temperature	20 °C (dry bulb)	Inlet water temperature	45 °C for 2-pipe units 65 °C for 4-pipe units	Water temperature decrease	5 °C for 2-pipe units 10 °C for 4-pipe units
Test Heizbetrieb	Lufttemperatur	20 °C (Trockenkugel)	Wassertemperatur am Einlass	45 °C für 2-Rohrsysteme 65 °C für 4-Rohrsysteme	Sinken der Wassertemperatur	5 °C für 2- Rohrsysteme 10 °C für 4- Rohrsysteme
Sound power test		At ambient conditions without water flow				
Test Schallleistungspegel		Bei Umgebungsbedingungen ohne Wasserdurchsatz				

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Kontaktinformationen	Friedrich-Ebert-Straße 128-130, D-49811 Lingen (Ems), Germany

Information requirements for fan coils according to regulation (EU) No 2016/2281
 Informationsanforderungen für Fan Coils gemäß Verordnung (EU) Nr. 2016/2281

TOP galvanised steel Stahl verzinkt heating only nur heizen 2-pipe unit 2-Rohrsystem			Fan Speed Drehzahl		Motor code no. Motorenziffer	cooling capacity (sensible) Kühlleistung (sensibel)	cooling capacity (latent) Kühlleistung (latent)	Heating capacity Wärmeleistung	Total electric power input Elektrische Gesamtleistungsaufnahme	Sound power level (per speed setting, if applicable) Schallleistungspegel (ggf. je Geschwindigkeits- einstellung)
Fan Ventilator	heat exchanger Wärmetauscher	Series Serie			P _{rated,c} kW	P _{rated,c} kW	P _{rated,h} kW	P _{elec} kW	L _{WA} dB (A)	
EC, 230 V	21	44	high	58	-	-	5,0	0,165	46/55/63/69/74	
			low	56	-	-	4,5	0,124	43/52/60/67/72	
		45	high	58	-	-	8,7	0,400	35/57/67/76/82	
			low	56	-	-	7,3	0,162	44/53/62/69/73	
		46	high	58	-	-	10,7	0,420	35/56/67/75/81	
			low	56	-	-	14,9	0,685	35/57/69/77/82	
	31	44	high	58	-	-	13,1	0,340	31/50/62/71/76	
			low	56	-	-	19,5	0,617	34/55/67/76/81	
		45	high	58	-	-	6,0	0,165	45/54/62/68/73	
			low	56	-	-	5,2	0,124	42/51/59/66/71	
		46	high	58	-	-	10,5	0,400	34/56/66/75/81	
			low	56	-	-	8,6	0,162	43/52/61/68/72	
	41	44	high	58	-	-	14,6	0,420	34/55/66/74/80	
			low	56	-	-	18,5	0,685	34/56/68/76/81	
		45	high	58	-	-	16,2	0,340	30/49/61/70/75	
			low	56	-	-	26,7	0,617	33/54/66/75/80	
		46	high	58	-	-	7,5	0,165	43/52/60/66/71	
			low	56	-	-	6,3	0,124	40/49/57/64/69	
		45	high	58	-	-	13,7	0,400	32/54/64/73/79	
			low	56	-	-	10,5	0,162	41/50/59/66/70	
		46	high	58	-	-	17,9	0,420	32/53/64/72/78	
			low	56	-	-	24,4	0,685	32/54/66/74/79	
		47	high	58	-	-	19,8	0,340	28/47/59/68/73	
			low	56	-	-	37,1	0,617	31/52/64/73/78	

Standard rating conditions for fan coil units according to regulation (EU) No 2016/2281

Norm-Prüfbedingungen für Gebläsekonvektoren gemäß Verordnung (EU) Nr. 2016/2281

Cooling Test	Air temperature	27 °C (dry bulb) 19 °C (wet bulb)	Inlet water temperature	7 °C	Water temperature rise	5 °C
		27 °C (Trockenkugel) 19 °C (Feuchtkugel)	Wassertemperatur am Einlass		Anstieg der Wassertemperatur	
Heating Test	Air temperature	20 °C (dry bulb)	Inlet water temperature	45 °C for 2-pipe units 65 °C for 4-pipe units	Water temperature decrease	5 °C for 2-pipe units 10 °C for 4-pipe units
Test	Lufttemperatur	20 °C (Trockenkugel)	Wassertemperatur am Einlass	45 °C für 2-Rohrsysteme 65 °C für 4-Rohrsysteme	Sinken der Wassertemperatur	5 °C für 2- Rohrsysteme 10 °C für 4- Rohrsysteme
Sound power test		At ambient conditions without water flow				
Test Schallleistungspegel		Bei Umgebungsbedingungen ohne Wasserdurchsatz				

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