

Rittal – The System.

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Air/water heat exchangers



SK 3209.XXX
SK 3210.XXX

Assembly and operating instructions

ENCLOSURES

POWER DISTRIBUTION

CLIMATE CONTROL

IT INFRASTRUCTURE

SOFTWARE & SERVICES

FRIEDHELM LOH GROUP



Contents

EN

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1 Notes on documentation

1.1 CE label

Rittal GmbH & Co. KG confirms the conformity of the air/water heat exchanger with the European Union's Machinery Directive 2006/42/EC and EMC Directive 2014/30/EU. A corresponding declaration of conformity has been issued and enclosed with the unit.



1.2 Storing the documents

The assembly and operating instructions as well as all other applicable documents are an integral part of the product. They must be issued to everyone who works with the air/water heat exchanger and must always be available and on hand for operating and maintenance personnel.

1.3 Symbols used in these operating instructions

The following symbols are used in this documentation:



Warning!

Hazardous situation which may lead to death or serious injury if the instructions are not followed.



Caution!

Hazardous situation which may lead to (minor) injuries if the instructions are not followed.



Attention!

Potential threat to the product and the environment.



Note:

Important notices and indication of situations which may result in material damage.

- This symbol indicates an "Action Point" and shows that you should perform an operation/procedure.

1.4 Other applicable documents

Assembly and operating instructions exist as paper documents for the air/water heat exchanger described here and are enclosed with the equipment.

We cannot accept any liability for damage associated with failure to observe these instructions. Where applicable, the instructions for any accessories used also apply.

2 Safety instructions

Please observe the following general safety notes when assembling and operating the unit:

- Assembly, installation and servicing may only be performed by properly trained specialists.
- The minimum water inlet temperature of +1°C must not be reduced at any point in the water cycle. Otherwise there is danger of frost damage!
- Use antifreeze agents only with the manufacturer's consent.
- Do not obstruct the air inlet and air outlet of the air/water heat exchanger inside the enclosure (see section 4.3.1 "Assembly instructions").
- The heat loss of the components installed in the enclosure must not exceed the specific useful cooling output of the air/water heat exchanger.
- The air/water heat exchanger must always be transported in a vertical position.
- Use only original spare parts and accessories.
- Do not make any changes to the air/water heat exchanger other than those described in these instructions or associated instructions.
- The mains connector of the air/water heat exchanger must only be connected and disconnected with the system de-energised. Connect the pre-fuse specified on the rating plate.
- Other than these safety instructions, ensure you also observe the specific safety instructions when performing the tasks described in the following chapters.

3 Device description

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3 Device description

Depending on the model chosen, your air/water heat exchanger may vary in appearance from the illustrations contained in these instructions. However, the functions are identical in principle.

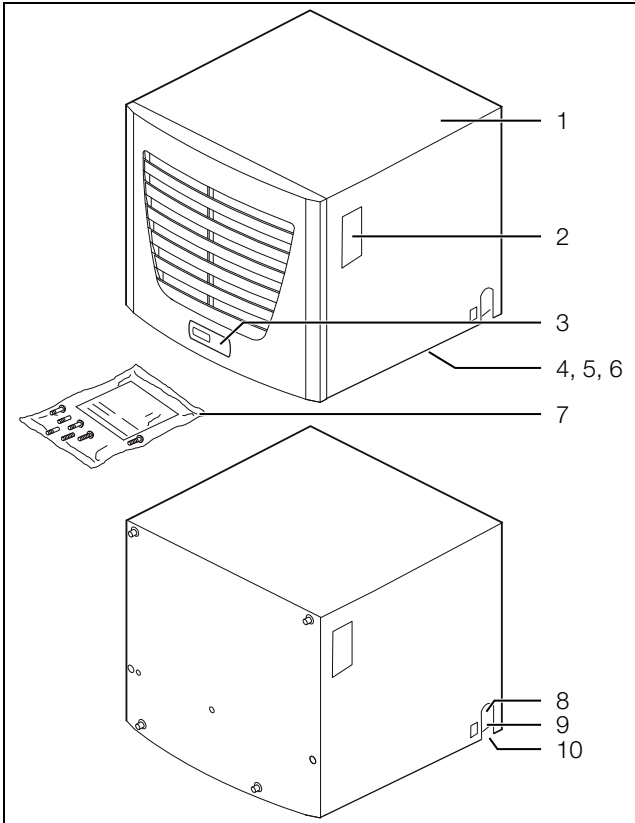


Fig. 1: Device description

Key

- 1 Cover
- 2 Rating plate
- 3 Display
- 4 X2 master/slave connection (e-Comfort controller)
- 5 X1 terminal strip (underside of the unit)
- 6 X3 optional serial interface (underside of the unit)
- 7 Dispatch bag
- 8 Cooling water inlet
- 9 Cooling water return
- 10 Condensate discharge

3.1 Functional description

Air/water heat exchangers are designed and built to dissipate heat from enclosures by cooling the air inside the enclosure and so protect the temperature sensitive components.

Air/water heat exchangers are particularly appropriate for the temperature range of up to +70°C where comparable units, such as air/air heat exchangers, enclosure cooling units or fan-and-filter units, cannot be used for system reasons to effectively and economically dissipate heat loss. It is mounted on the roof of an enclosure.

3.1.1 How it works

The air/water heat exchanger comprises three main components (see fig. 2):

- Heat exchanger package (item 2),
- fan (item 3) and
- magnetic valve (item 5),

connected with each other using pipes.

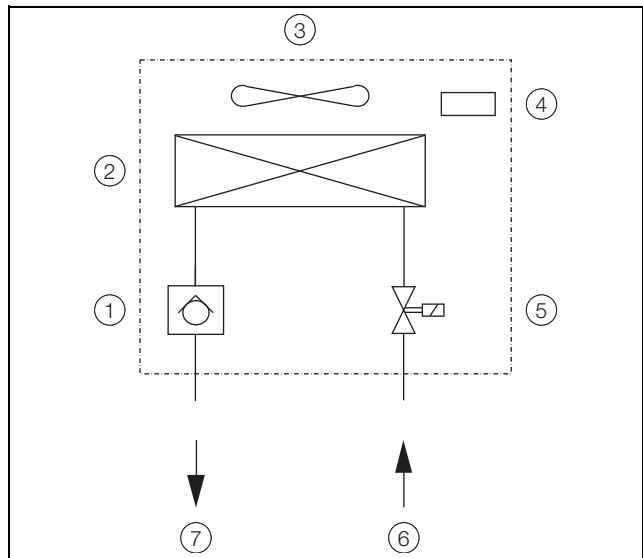


Fig. 2: Air/water heat exchanger

Key

- 1 Non-return valve
- 2 Heat exchanger
- 3 Fan
- 4 Temperature control
- 5 Magnetic valve
- 6 Cooling water inlet
- 7 Cooling water return

The heat loss of the enclosure is dissipated in a membrane heat exchanger to the water coolant. A fan (item 3) blows the internal enclosure air over the heat exchanger (item 2); except for the inlet and outlet water and the condensed water discharge, the unit is closed to the environment.

The magnetic valve (item 5) controls the cooling output by changing the water flow volume depending on the required target temperature and the water inlet temperature.

3.1.2 Control

Rittal air/water heat exchangers are fitted with a controller for setting the functions of the heat exchanger. Depending on the design, this is either a Basic controller or an e-Comfort controller (display plus extended functions, see section 6 "Operation").

3.1.3 Bus mode (e-Comfort controller only)

The serial interface X2 allows you to create a bus connection with up to ten air/water heat exchangers using the master-slave cable (shielded, four-wire cable, Model No. 3124.100).

This allows you to implement the following functions:

- Parallel unit control (the air/water heat exchangers in the network can be switched on and off simultaneously)
- Parallel door status message ("door open")
- Parallel collective fault message

Data is exchanged via the master-slave connection.

During commissioning, assign an address to each unit that also includes the identifier "master" or "slave" (see section 6.2.9 "Setting the Master-slave identifier").

3.1.4 Safety equipment

- To protect against overcurrent and overtemperature, the fan is equipped with a thermal winding protection.
- The device has floating contacts on the connection pins (terminals 1 – 3), via which system messages from the device may be polled, e.g. using a PLC (1 x change-over contact Basic controller, 2 x normally open contacts e-Comfort controller).
- The air/water heat exchanger has a leak and condensate warning.

3.1.5 Condensation

At high levels of humidity and low cooling water temperatures inside the enclosure, condensation may form on the heat exchanger.

Any condensation that forms on the heat exchanger (with high humidity and low water temperatures) is routed to the right and/or rear out of the unit via a drain opening in the plastic tray. For this purpose, a hose must be connected to one of the two condensate nozzles (see section 4.3.4 "Connecting the condensate discharge"). The drain which is not required should be tightly sealed. The condensate must be able to run off freely. The hose used for draining off condensate must be laid free from kinks and checked for correct drainage.

Condensate hoses are available as accessories (refer also to the accessories section in the Rittal Catalogue).

3.1.6 Leak detection

If a leakage or pipe breakage occurs in the water circuit of the air/water heat exchanger, a magnetic valve stops the cooling water supply and the fault signal contact is activated. For units with e-Comfort controller, the fans are switched off additionally.

Basic controller: The warning "IA" appears on the display.

e-Comfort controller: The warning "A08" appears on the display.

3.1.7 Door limit switch (e-Comfort controller only)

The air/water heat exchanger may be operated with a door limit switch connected. The door limit switch is not included with the supply (available as an accessory, Model No. 4127.010).

The door limit switch function causes the fan and the magnetic valve in the air/water heat exchanger to be switched off after approximately 15 seconds when the enclosure door is opened (contacts 1 and 2 closed). This prevents the formation of condensation inside the enclosure while the enclosure door is open.

The fan will start up after about 15 seconds on closure of the door.



Note:

The door limit switches must only be connected free from potential. No external voltages!

3.1.8 Additional interface X3 (e-Comfort controller only)



Note:

The electrical signals at the interface are of an extra-low voltage (not extra-low safety voltages to EN 60 335).

An additional interface card may be connected to the 9-pole SUB-D connector X3 in order to incorporate the air/water heat exchanger into higher-level monitoring systems (available as an accessory, interface card Model No. 3124.200).

3.2 Proper use, foreseeable misuse

The air/water heat exchanger is designed for cooling closed enclosures. Under no circumstances should the limit values specified in the technical specifications (see section 9) be exceeded. Assembly, installation and servicing may only be performed by properly trained specialists.

Improper use may cause hazards. Improper use may be for example:

- Use of the cooling unit for a long period with an open enclosure
- Use of accessories not approved by Rittal GmbH & Co. KG
- Use of an incorrect cooling medium

3.3 Scope of supply

The unit is supplied in a packaging unit in a fully assembled state.

- Please check the scope of supply for completeness.

Qty.	Description
1	Air/water heat exchanger

Tab. 1: Scope of supply

4 Installation

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Qty.	Description
1	Dispatch bag:
1	– Plug-in terminal strip
1	– Sealing frame
1	– Sealing plate
1	– Assembly and installation instructions
2	– Hose sleeves (1/2")
2	– Sealing ring (R 3/8")
11	– Twin-threaded bolt including assembly parts
5	– Screw-in elbow
1	– Angle screw socket
1	– Right-angle connector
1	Drilling template

Tab. 1: Scope of supply

4 Installation

4.1 Safety instructions



Warning!

Please observe the maximum permissible weight to be lifted by one person. Use suitable lifting devices, if needed.



Warning!

Work on electrical systems or equipment may only be carried out by an electrician or by trained personnel under the guidance and supervision of an electrician. All work must be carried out in accordance with electrical engineering regulations.

The air/water heat exchanger may only be connected after the aforementioned personnel have read this information!

Use only insulated tools.

The connection regulations of the appropriate power supply company are to be followed.



Warning!

The air/water heat exchanger must be connected to the mains via an all-pole disconnecting device to overvoltage category III (IEC 61 058-1).

The air/water heat exchanger is not de-energised until all of the voltage sources have been disconnected!

4.2 Choosing the installation site

When choosing the installation site for the enclosure, please observe the following:

- The air/water heat exchanger must be installed and operated in a vertical position.
- The ambient temperature must not exceed +70°C.
- It must be possible to fit a condensate discharge (see section 4.3.4 "Connecting the condensate discharge").
- It must be possible to fit a cooling water supply and return (see section 4.4 "Connecting the water connection").
- The mains connection data as stated on the rating plate of the unit must be guaranteed.

4.3 Assembly procedure

4.3.1 Assembly instructions

- Check the packaging carefully for signs of damage. Packaging damage may be the cause of a subsequent functional failure.
- The enclosure must be sealed on all sides (IP 54). Increased condensation will occur if the enclosure is not airtight.
- The air inlet and outlet must not be obstructed on the inside of the enclosure.
- In order to avoid excessive condensation inside the enclosure, we recommend installing a door limit switch (e.g. 4127.010) which deactivates the air/water heat exchanger when the enclosure door is opened (see section 3.1.7 "Door limit switch (e-Comfort controller only)").

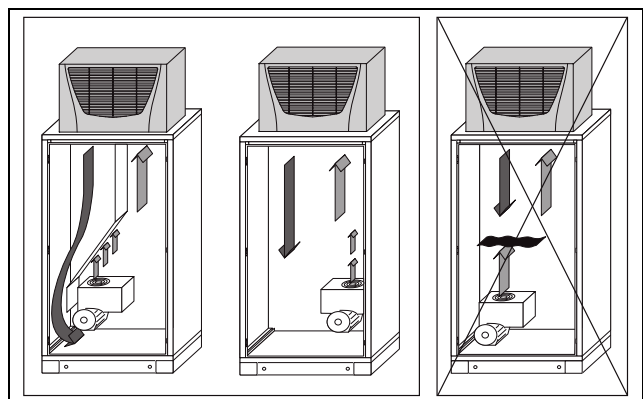


Fig. 3: Never direct the cold airflow at active components

- When arranging the components inside the enclosure, please ensure that the cold airflow from the air/water heat exchanger is not directed at active components.
- Please also ensure that the cold airflow is not directed at the warm exhaust airflow from active components such as converters.

This may lead to an air short-circuit and therefore prevent adequate climate control, or may even cause the air/water heat exchanger's internal safety devices to cease cooling operation.

- Exercise particular caution with the airflow from the blowers of built-in electronic components (fig. 3). Components for targeted air routing are available as accessories – please refer to the Rittal Catalogue.
 - When using an air duct system, care must be taken to ensure that it is laid straight and without kinks wherever possible.
This minimises the resistance to the cold airflow.
 - It is important to ensure even air circulation inside the enclosure.
Under no circumstances should air inlet and outlet openings be obstructed, otherwise the cooling performance of the unit will be reduced.
 - Ensure a suitable distance from electronic components and other installed enclosures so that the required air circulation is not obstructed and prevented.
- One cold air outlet from the air/water heat exchanger must be kept open at all times when operating with the air duct, to prevent the accumulation of cold air inside the unit.

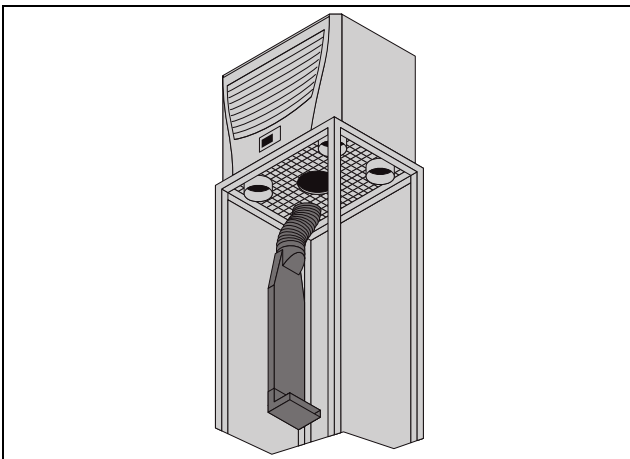


Fig. 4: Targeted air routing inside the enclosure



Note:
When using the cover bungs, no more than 2 cold air outlets should be sealed.

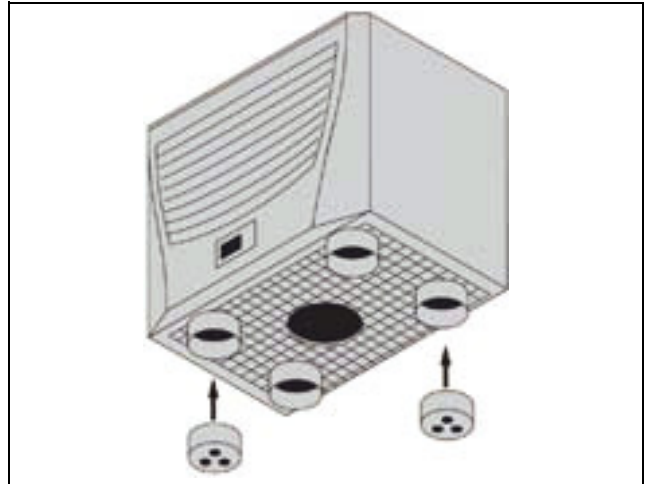


Fig. 5: Cover bungs

4.3.2 Make a mounting cut-out

The enclosure air/water heat exchanger is fitted on the roof of the enclosure. To this end, the roof plate must be cut out as per the drilling template included with the supply.



Note:
Pre-configured, reinforced roof plates with cut-outs to match your enclosure are available as accessories; refer to the Rittal Catalogue.

- Stick the supplied drilling template onto the roof of the enclosure using adhesive tape.
There are dimensioning lines on the drilling template to suit the installation type for your air/water heat exchanger.
- Drill all the required holes and make the mounting cut-out.
- Carefully deburr all drilled holes and the cut-out to prevent injuries caused by sharp edges.



Caution!
Drilled holes and cut-outs that have not been fully deburred may cause cut injuries, particularly when assembling the cooling unit.

4.3.3 Assembling the air/water heat exchanger

- Stick the supplied sealing frame onto the cut out roof plate.

4 Installation

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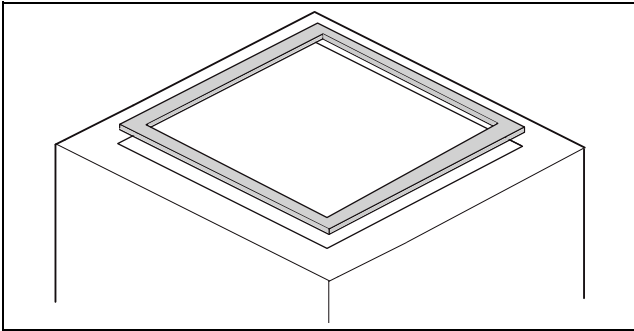


Fig. 6: Sealing frame on roof plate

- Stick the supplied sealing plate onto the underside of the unit.
- Mount the air/water heat exchanger on the enclosure roof.
- Screw the supplied twin-threaded bolts into the holes in the plastic base on the underside of the device.
- Secure the unit using the supplied washers and nuts.



Note:

In order to achieve a permanent seal between the air/water heat exchanger and the enclosure, the mounting surface should be reinforced or supported if necessary. This is particularly applicable with large roof areas.

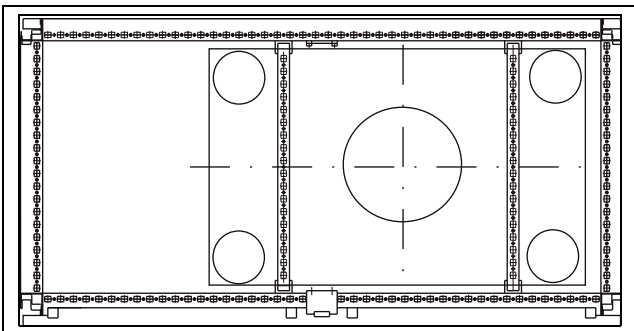


Fig. 7: Roof plate reinforcement for the TS 8 enclosure

Accessories for roof plate reinforcement with TS (refer also to Accessories in the Rittal Catalogue):

- Punched rail
- U nut
- Fastening bracket
- Threaded block

4.3.4 Connecting the condensate discharge

A flexible condensate discharge hose \varnothing 12 mm (1/2") can be fitted to the air/water heat exchanger.

The condensate discharge

- must be laid with a suitable and constant gradient (no siphoning)
- must be laid without kinks
- must not have a reduced cross-section if extended

The condensate hose is available as an accessory (refer also to Accessories in the Rittal Catalogue).

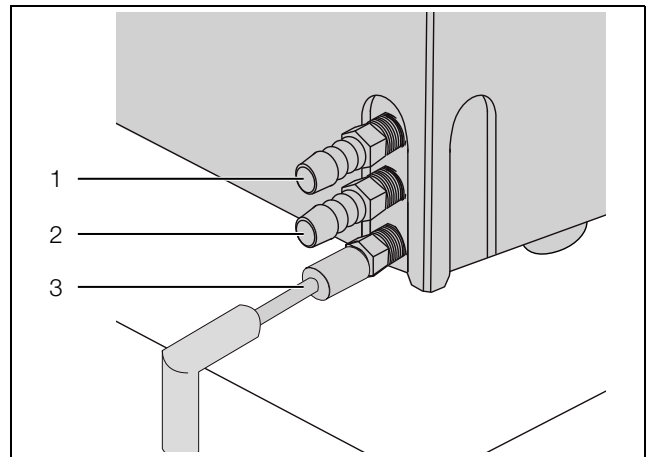


Fig. 8: Connect the condensate discharge to the side of the unit

Key

- 1 Cooling water connection (inlet)
- 2 Cooling water connection (return)
- 3 Condensate water discharge

- Connect a suitable hose from the right or rear to the condensate nozzle screwed into the unit, and secure it with a hose clip (with 2 Nm torque).
- Lay the condensate hose, e.g. into a drain. Alternatively, the condensate discharge can also be connected on the rear of the unit.
- In this case, proceed as described in section 4.4.2 "Connection on the rear of the unit".



Note:

To avoid kinking of the condensate hose, use the angled connector contained in the scope of supply.

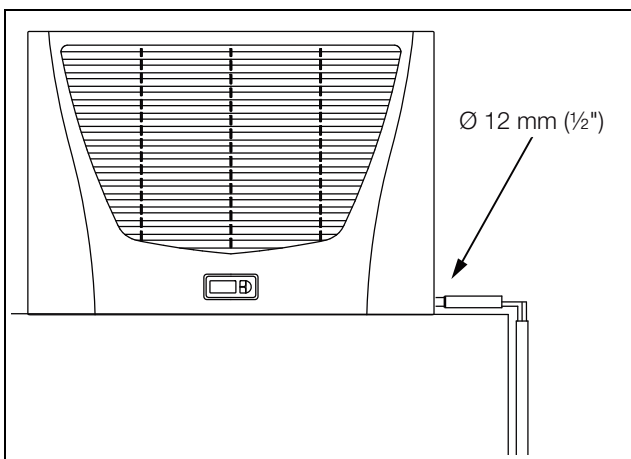


Fig. 9: Lay the condensate discharge to the side of the unit

4.4 Connecting the water connection

A compression-proof flexible condensate discharge hose \varnothing 12 mm (1/2") for both the supply and the return can be fitted to the air/water heat exchanger.

The cooling water hose

- must be laid without kinks
- must not have a reduced cross-section if extended and
- must be insulated, if necessary.

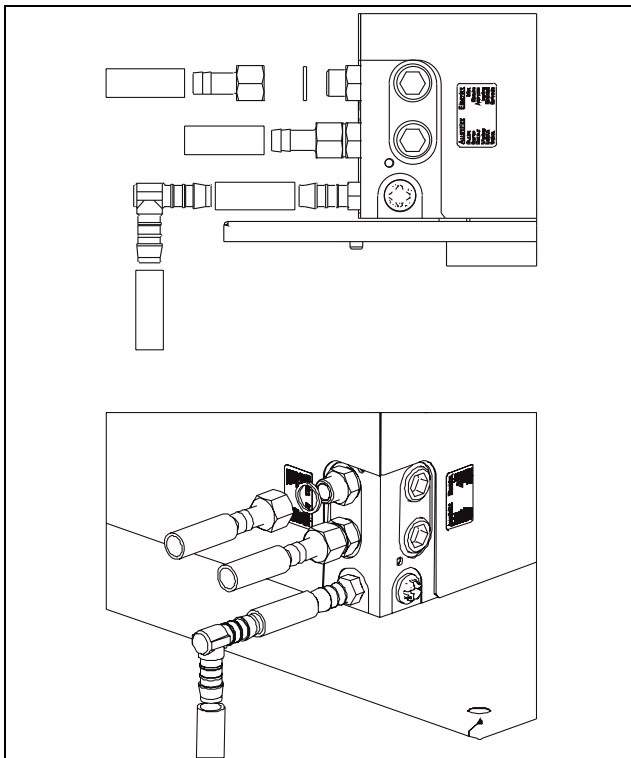


Fig. 10: Connect the cooling water inlet (top) and return (centre) to the side of the unit

4.4.1 Connection on the side of the unit

- Push the sealing rings onto the screw connector and tighten the nozzles contained in the accessory pack with min. 25 Nm and max. 30 Nm.

- When doing so, ensure that the pre-assembled screw connector is not loosened from the unit (SW 22 spanner).
- Connect a suitable hose to each of the two cooling water connection nozzles (at the side or rear of the unit) and secure each one with a hose clip (with 25 Nm torque).

4.4.2 Connection on the rear of the unit

- Remove the sealing bung.
- Screw-in the threaded connector that is far from the device side and seal the joints with Teflon tape or hemp and sealing compound.
- Proceed as described in section 4.4.1 "Connection on the side of the unit".
- Subsequently use the sealing bungs to close the open connector holes on the side of the unit.



Warning!

Switch off the power supply to the air/water heat exchanger before working on the water circuit and take suitable precautions against it being accidentally switched on again.



Note:

The water circuit should be protected from ingress of dirt or excess pressure (maximum permitted operating pressure 10 bar)!



Attention!

Volumetric flows > 400 l/h may cause damage to the device. Suitable measures should be taken to regulate the volumetric flow, such as flow regulator valves (Model Nos. 3301.930/.940, 3201.990). Damage caused by excessive volumetric flows will not be covered by Rittal's warranty.



Note:

No considerable increase in cooling output is achieved with flow rates > 400 l/h.



Note:

Observe the flow direction and check for leaks!



Note:

The unused cooling water connecting pieces must be closed appropriately with sealing bungs.

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The units do not have any separate ventilation.

- For pressure-sealed systems, install the appropriate ventilation equipment on the water side.

4.4.3 Notes on water quality

To ensure the reliable operation of the above-mentioned units, the VBG guidelines for cooling water must be observed (VGB R 455 P).

The cooling water must not contain any limescale deposits; in other words, it should have a low level of hardness, in particular, a low level of calcium hardness. In particular, for recooling within the plant, the calcium hardness should not be too high. On the other hand, the water should not be so soft that it attacks the materials. When recooling the cooling water, the salt content should not be allowed to increase excessively due to the evaporation of large quantities of water, since electrical conductivity increases as the concentration of dissolved substances rises, and the water thereby becomes more corrosive.

- Always add the appropriate volume of fresh water.
- Always remove part of the enriched water.

The following criteria for the cooling water must be observed:

- Water with high gypsum content is unsuitable for cooling purposes because it has a tendency to form boiler scale that is particularly difficult to remove.
- The cooling water should be free from iron and manganese, otherwise deposits may occur that accumulate in the pipes and block them.
- At best, organic substances should only be present in small quantities, otherwise sludge deposits and microbiological contamination may occur.

4.4.4 Preparation and maintenance of the water in recooling systems

Depending on the type of installation to be cooled, certain requirements are placed on the cooling water with respect to purity. According to the level of contamination and the size and design of the recooling systems, a suitable process is used to prepare and/or maintain the water.

The most common types of contamination and most frequently used techniques to eliminate them in industrial cooling are:

Contamination of the water	Procedure
Mechanical contamination	Filter the water using: <ul style="list-style-type: none"> – Mesh filter – Gravel filter – Cartridge filter – Precoated filter
Excessive hardness	Water softening via ion exchange

Tab. 2: Contamination and procedures for eliminating it

Contamination of the water	Procedure
Moderate content of mechanical contaminants and hardeners	Addition of stabilisers and/or dispersing agents to the water
Moderate content of chemical contaminants	Addition of passifiers and/or inhibitors to the water
Biological contaminants, slime bacteria and algae	Addition of biocides to the water

Tab. 2: Contamination and procedures for eliminating it

4.5 Electrical connection

4.5.1 Notes on electrical installation

- When carrying out the electrical installation, it is important to observe all valid national and regional regulations as well as the provisions of the responsible power supply company.

The electrical installation must comply with EN 61 439 and may only be carried out by a qualified electrician who is responsible for compliance with the applicable standards and regulations.

Connection data

- The connected voltage and frequency must correspond to the values stated on the rating plate.
- The air/water heat exchanger must be connected to the mains via a category III all-pole disconnecting device (IEC 61 058-1) that ensures at least 3 mm contact opening when switched off.
- No additional temperature control may be connected upstream of the unit at the supply end.
- The mains connection must ensure low-noise potential equalisation.

Overvoltage protection and supply line load

- The unit does not have its own overvoltage protection. Measures must be taken by the operator at the supply end to ensure effective lightning and overvoltage protection. The mains voltage must not exceed a tolerance of $\pm 10\%$.
- In accordance with IEC 61 000-3-11, the unit is intended solely for use at sites with a continuous current-carrying capacity (incoming mains power supply) of more than 100 A per phase and with a supply voltage of 400/230 V. If necessary, the power supply company must be consulted to ensure that the continuous current-carrying capacity at the point of connection to the public grid is sufficient for connection of such a unit.
- The fans in single- and three-phase units are intrinsically safe (thermal winding protection). The same also applies to all transformer versions and to special-voltage units which are likewise equipped with a transformer.

- Install the pre-fuse specified on the rating plate to protect the cable and equipment from short circuits.
- Select a suitable motor circuit-breaker/transformer circuit-breaker in accordance with the information specified in the rating plate: Set it to the rated current. This will achieve the best short-circuit protection for cables and equipment.

Example: Specified setting range MS/TS 6.3 – 10 A; set to 6.3 A.

4.5.2 Door limit switch (e-Comfort controller only)

- Each door limit switch must only be assigned to one air/water heat exchanger.
- Several door limit switches may be connected in parallel and operated on one air/water heat exchanger.
- The minimum cross-section for the connection cable is 0.3 mm² for a cable length of 2 m. We recommend the use of a shielded cable.
- The line resistance to the door limit switch must not exceed a maximum of 50 Ω.
- The door limit switch only supports a floating connection; no external voltages.
- The contact of the door limit switch must be closed when the door is open.

The safety extra-low voltage for the door limit switch is provided by the internal power pack: Current approx. 30 mA DC.

- Connect the door limit switch to terminals 1 and 2 of the connector.



Note:

The door limit switch is available as an accessory (Model No. 4127.010).

4.5.3 Potential equalisation

If, for EMC reasons, the unit is to be integrated into the customer's existing potential equalisation system, a conductor can be connected to the potential equalisation connection point. The connection point is marked with a schematic symbol.



Note:

According to the standard, the PE conductor in the mains connection cable is not classified as an equipotential bonding conductor.

4.5.4 Install the power supply

- Use the electrical circuit diagram to complete the electrical installation within the air/water heat exchanger.
- If you would like the system messages from the air/water heat exchanger to be evaluated via the system message relay, you should also connect a suitable low-voltage cable to connection terminals 3 – 5 (1 x change-over contact Basic controller, 2 x normally open contacts e-Comfort controller).

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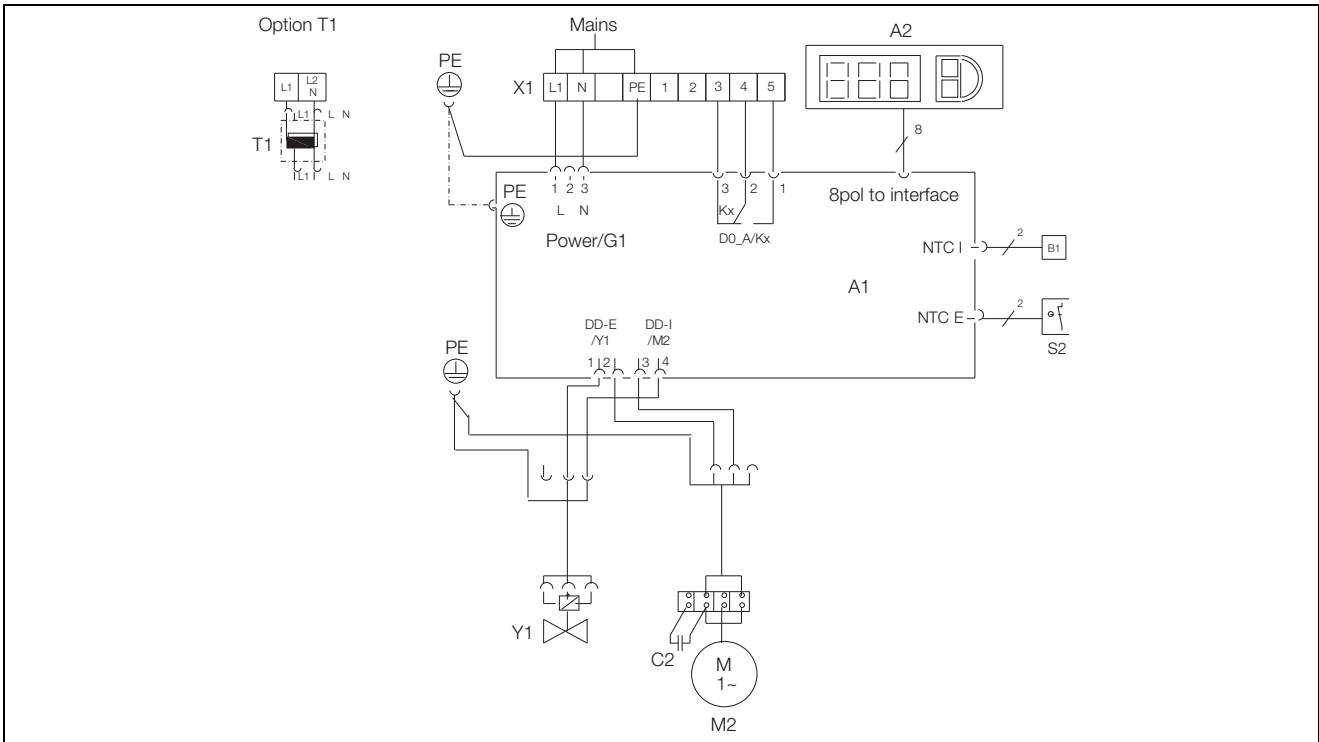


Fig. 11: SK 3209.1XX, SK 3210.1XX: Electrical wiring plan no. 1

Key

- A1 Power PCB (Basic 2)
- A2 Display terminal
- B1 Internal temperature sensor
- C2 Operating capacitors
- Kx Collective fault relay
- M2 Fan
- S2 Float-actuated switch
- T1 Transformer (optional)
- X1 Main terminal strip
Terminals 1 and 2 are free
- Y1 Magnetic valve

Contact data Kx (Basic controller)

AC $\cos \phi = 1$	DC Res. Load
$I_{\max} = 4 \text{ A}$ $U_{\max} = 250 \text{ V}$	$I_{\max} = 4 \text{ A}$ $I_{\min} = 100 \text{ mA}$ $U_{\max} = 200 \text{ V}$ $U_{\min} = 10 \text{ V}$

Tab. 3: Contact data Kx

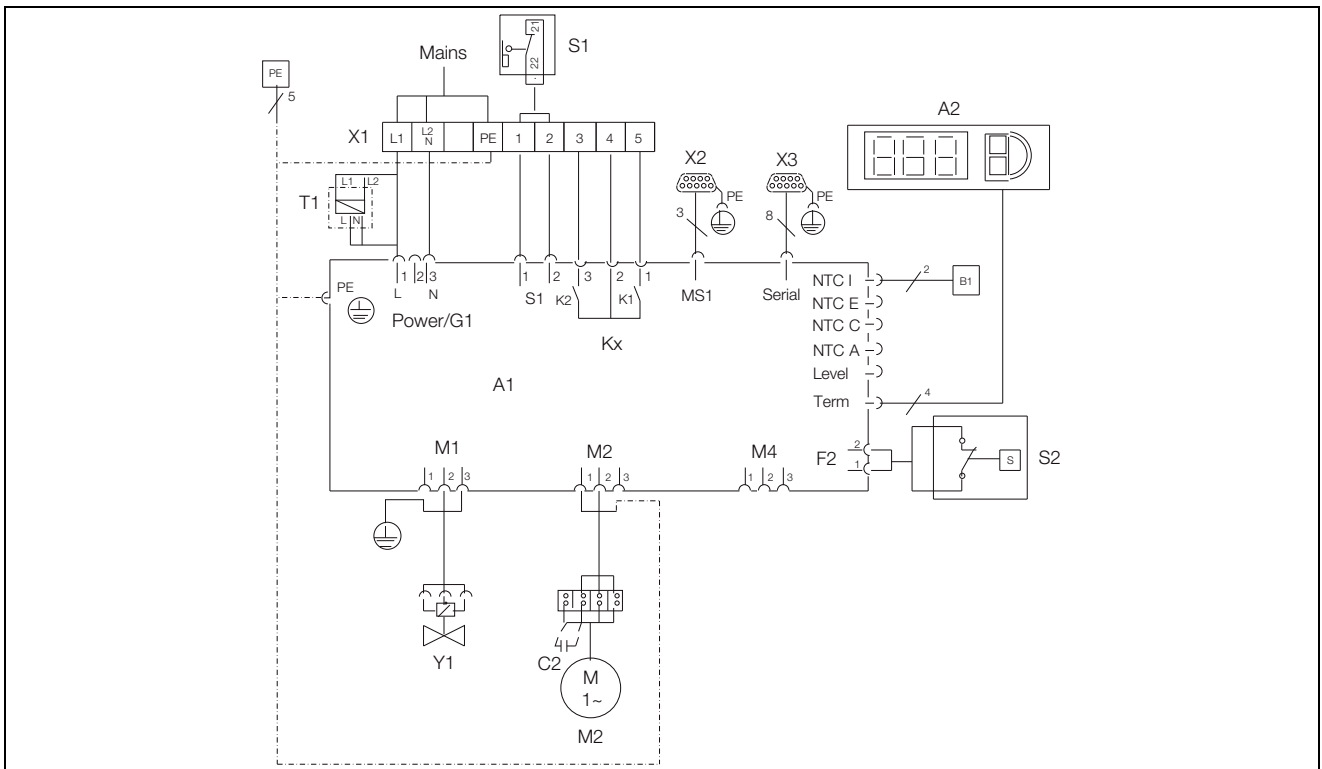


Fig. 12: SK 3209.5XX, SK 3210.5XX: Electrical wiring plan no. 2

Key

- A1 Power PCB (Comfort)
- A2 Display terminal
- B1 Temperature sensor, internal temperature
- C2 Operating capacitors
- Kx Relay K1 collective fault 1
Relay K2 collective fault 2
- M2 Fan
- S1 Door limit switch
(without door limit switch: terminal 1, 2 open)
- S2 Float-actuated switch (closed without water)
- T1 Transformer (optional)
- X1 Main terminal strip
- X2 Master-slave connection
- X3 Serial interface (optional)
- Y1 Magnetic valve



Note:
For technical data, refer to the rating plate.

Contact data K1, K2 (e-Comfort controller)

AC cos φ = 1	DC Res. Load
$I_{max} = 2 \text{ A}$ $U_{max} = 250 \text{ V}$	$I_{max} = 1 \text{ A}$ $U_{max} = 30 \text{ V}$

Tab. 4: Contact data K1, K2

5 Commissioning

■ Once all the assembly and installation work is complete, switch on the power supply and the water supply to the air/water heat exchanger.

The air/water heat exchanger starts running:

- **With Basic controller:** The enclosure internal temperature is displayed.
- **With e-Comfort controller:** The software version of the controller first appears for approx. 2 sec., then the enclosure internal temperature appears in the 7-segment display.

You can now make your individual settings on the unit, e.g. set the temperature or (with e-Comfort controller only) assign the network identifier, etc. (see section 6 "Operation").

6 Operation

You can operate the air/water heat exchanger using the controller on the front of the unit (fig. 1, item 3).

6.1 Control using the Basic controller

6.1.1 Display and system analysis

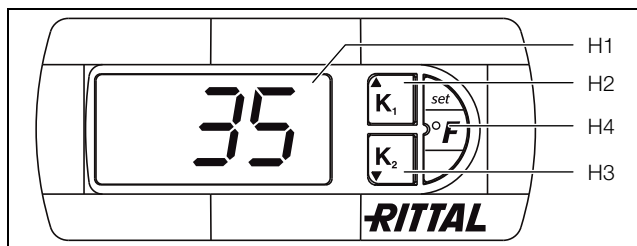


Fig. 13: Display and system analysis of the Basic controller

Key

- H1 Display terminal
- H2 Key ▲ K₁
- H3 Key ▼ K₂
- H4 Key "set/°F"

6.1.2 Properties

The air/water heat exchanger operates automatically, i.e. after switching on the power supply, the fan (see fig. 2, item 3) will run continuously and permanently circulate the internal enclosure air.

The magnetic valve controls the cooling water flow as specified by the temperature setpoint. The built-in Basic controller ensures automatic normal shut-down operation of the air/water heat exchanger by the value of the fixed preset switching difference of 5 K.

6.1.3 General programming information

Using buttons H2, H3 and H4 (fig. 13) you can change 3 parameters within the preset ranges (setpoint, min. value, max. value).

Tables 6 and 7 show the parameters which can be altered.

6.1.4 Operation of the basic controller

The display terminal "H1" consists of a 3-position 7-segment display which indicates the temperature in °C as well as any system messages. The current enclosure internal temperature is usually displayed permanently. In the event of a system message, this will alternate with the internal temperature display.



Note:

With the Basic controller, the temperature is preset at the factory to +35°C. In order to save energy, do not set the temperature lower than that actually necessary.

6.1.5 Setting the temperature

The setting of the enclosure internal temperature is preset at the factory to 35°C.

- To change the value press key "H2" (▲ K₁) or "H3" (▼ K₂) for one second until °1 appears in the display, then confirm with the H4 "set" key.
- The set value can then be altered within the preset parameters (+20°C to +55°C) via the keys "H2" (▲ K₁) or "H3" (▼ K₂).
- Press the "H4" set key for 5 seconds to save the new value. The current enclosure internal temperature is displayed again.

Alarm no.	System message	Cause	Remedy
HI	Internal temperature of enclosure too high	Cooling capacity inadequate/unit undersized/unit defective	Check cooling capacity/check unit
LO	Internal temperature of enclosure too low	Ambient temperature too low/no heat loss in the enclosure	Check unit
IA	Leakage warning/condensate warning	Heat exchanger leaky/condensate discharge kinked or blocked	Check heat exchanger for leaks/check condensate discharge
E0	Temperature sensor faulty	Malfunction, disconnection or temperature sensor failure	Check and, if necessary, replace the sensor cable

Tab. 5: Warning messages on the display

6.1.6 Setting of system messages

- To change the system messages keep the "H4" set key pressed for 5 seconds.

The controller is now in programming mode.

While in programming mode, if you do not press any buttons for approx. 60 sec., the display will first flash, then the controller will switch back to normal display mode.

- You can then navigate in the levels with the "H2" (▲ K₁) or "H3" (▼ K₂) keys (see table 6 and 7).
- The level is selected by pressing the "H4" set key – the parameters are changed with the "H2" (▲ K₁) or "H3" (▼ K₂) keys.

- Press the "H4" set key for 5 seconds to confirm the new value.

6.1.7 Programming and control of the Basic controller

See also fig. 15 on page 16.

Progr. level	Display screen	Parameters	Min. Value	Max. Value	Factory setting	Description
0	Ps	–	–	–	–	No function
1	°1	Setpoint Enclosure internal temperature Ti T _i	20	55	35	The setting of the enclosure internal temperature is preset at the factory to 35°C and may be altered within a range of +20 °C to +55 °C. When the setpoint is reached, the "H2" (▲ K ₁) key is lit continuously.

Tab. 6: Setting the setpoint

Progr. level	Display screen	Parameters	Min. Value	Max. Value	Factory setting	Description
2	H5	Software version number	–	–	–	Displays the current version number of the device software.
3	AH	Alarm – maximum temperature	AL	+150	50	Maximum temperature alarm (NOT in relation to the nominal value). HI is displayed alternating with the internal temperature. The "HI" alarm is displayed when the internal temperature > AH. The alarm stops when the internal temperature > AH-2K.
4	AL	Alarm – minimum temperature	-50	AH	20	Minimum temperature alarm (NOT in relation to the nominal value). LO is displayed alternating with the internal temperature. The "LO" alarm is displayed when the internal temperature < AL. The alarm stops when the internal temperature > AL+2K.
5	r8	Reset of r6 and r7	0	1	0	Reset of r6 and r7. Set this parameter to 1 to reset the stored maximum and minimum values of r6 and r7 to the respective current actual value.
6	r7	Querying of the min. internal temperature	-50	+150	0	Stores the min. internal enclosure temperature occurring after > 1 min.
7	r6	Querying of the max. internal temperature	-50	+150	0	Stores the max. internal enclosure temperature occurring after > 1 min.

Tab. 7: Setting the system messages, monitoring of the min./max. enclosure internal temperature

6.1.8 Reset of r6 and r7 (min./max. internal temperature)

- To reset the stored internal temperatures keep the "H4" set key pressed for 5 seconds.
- Navigate to level r8 with the "H2" (▲ K₁) or "H3" (▼ K₂) keys.
- Press the "H4" set key and change the parameter from 0 to 1 using the "H2" (▲ K₁) or "H3" (▼ K₂) keys.

- Press the "H4" set key for 5 seconds to confirm resetting the values.

6.1.9 System message contact (K1; floating)

The relay is normally closed. All assigned system messages lead to the relay dropping out – and likewise to loss of the control voltage.

Terminal strip X1 provides the connection.

6 Operation

EN

For contact data and occupancy – see the wiring diagram in section 4.5.4 "Install the power supply".

K1 fault signal relay (normally open contact/ changeover contact)

– Terminal 3: NC (normally closed)

- Terminal 4: C (connection of the supply voltage to the fault signal relay)
- Terminal 5: NO (normally open)

The NC and NO definitions refer to the de-energised state. Switch position of terminals is changing under mains voltage.

6.1.10 Programming overview of Basic controller

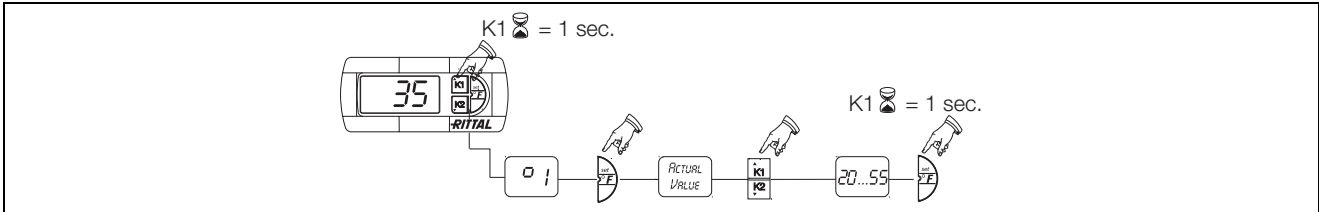


Fig. 14: Setpoint

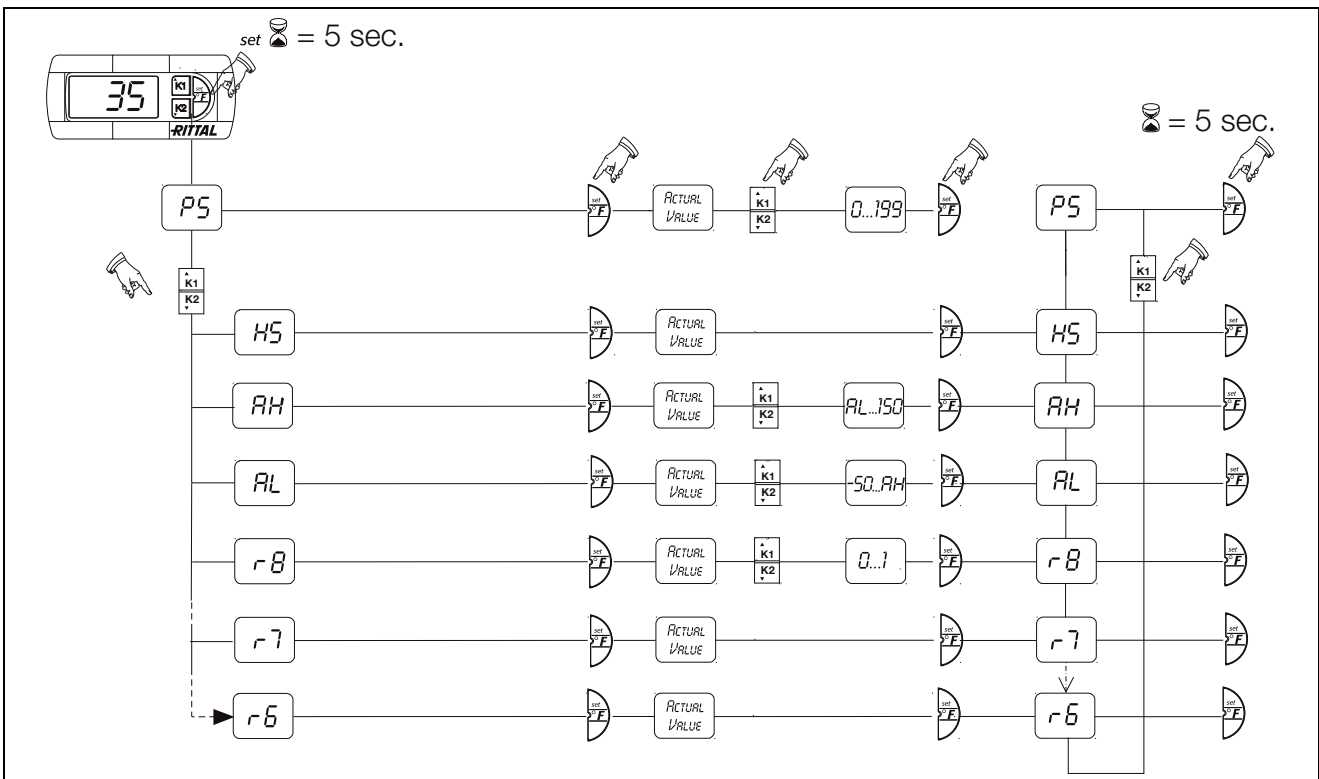


Fig. 15: Programming overview of Basic controller

6.2 Control using the e-Comfort controller

For unit types SK 3209.5XX and SK 3210.5XX.

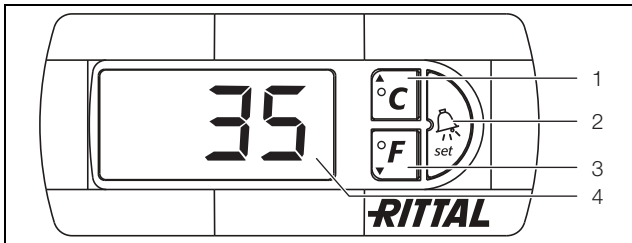


Fig. 16: Display and system analysis of the e-Comfort controller

Key

- 1 Programming button, also display of the set temperature unit (degrees Celsius)
- 2 Set button
- 3 Programming button, also display of the set temperature unit (degrees Fahrenheit)
- 4 7-segment display

6.2.1 Properties

- Integral start-up delay and door limit switch function
- Monitoring of all motors (fans)
- Master-slave function with a maximum of ten units. One unit functions as a master unit. Once the set temperature is reached by one of the connected slave units or in the event of the door limit switch function, the affected slave unit will report to the master unit, which will switch all the other air/water heat exchangers on or off as required.
- Switching hysteresis: Adjustable from 2 – 10 K, preset to 5 K.
- Visualisation of the current enclosure internal temperature and all error messages in the 7-segment display.

The air/water heat exchanger operates automatically, i.e. after switching on the power supply, the fan (fig. 2, item 3) will run continuously and permanently circulate the internal enclosure air. The fan and the magnetic valve are controlled by the e-Comfort controller.

The e-Comfort controller has a 7-segment display (fig. 16, item 4). After switching on the power supply, the current software version initially appears on this display for approx. 2 seconds. In regular operation, the display shows both the temperature (in degrees Celsius or Fahrenheit – users may switch between the two) and any error messages.

The current enclosure internal temperature is usually displayed permanently. In the event of an error message, this will alternate with the temperature display.

The unit is programmed using buttons 1 – 3 (fig. 16). The relevant parameters also appear in the display.

6.2.2 Launching test mode

The e-Comfort controller is equipped with a test function, whereby the air/water heat exchanger commences cooling operation independently of the set temperature or door limit switch function.

- Simultaneously press buttons 1 (°C) and 2 ("Set") (fig. 16) for at least 5 seconds.

The air/water heat exchanger starts running. After approximately 5 minutes or upon reaching 15°C, test mode will end. The unit switches off and changes to normal operation.

6.2.3 General programming information

Using buttons 1, 2 and 3 (fig. 16) you can change 24 parameters within the preset ranges (setpoint, min. value, max. value).

Tables 8 and 9 show the parameters which can be altered. Fig. 20 shows which buttons must be pressed.



Note on switching hysteresis:

With a low hysteresis and short switching cycles, there is a risk that cooling may not be adequate or that only partial sections of the enclosure are cooled.



Note on temperature settings:

With the e-Comfort controller, the temperature is preset at the factory to +35°C. In order to save energy, do not set the temperature lower than that actually necessary.

In principle, the programming is identical for all editable parameters.

To enter programming mode:

- Press button 2 ("Set") for approx. 5 seconds.

The controller is now in programming mode.

While in programming mode, if you do not press any buttons for approx. 30 sec., the display will first flash, then the controller will switch back to normal display mode. The "Esc" display indicates that any changes made have not been saved.

- Press the programming buttons "▲" (°C) or "▼" (°F), to switch back and forth between the editable parameters (see tables 8 and 9).

- Press button 2 ("Set") to select the displayed parameter for editing.

The current value of this parameter is displayed.

- Press one of the programming buttons "▲" (°C) or "▼" (°F).

The "Cod" display will appear. In order to be able to change a value, you must enter the authorisation code "22".

- Keep the programming button "▲" (°C) held down until "22" appears.

- Press button 2 ("Set") to confirm the code.

You can now alter the parameter within the preset limits.

- Press one of the programming buttons "▲" (°C) or "▼" (°F) until the required value appears.

- Press button 2 ("Set") to confirm the change.

You can now alter other parameters in the same way.

There is no need to re-enter the authorisation code "22".

6 Operation

EN

■ To exit programming mode, press button 2 ("Set") again for approximately 5 seconds.

"Acc" will appear in the display to indicate that the changes have been saved. The display will then switch back to regular operation (enclosure internal temperature).

You can also program the e-Comfort controller using a diagnosis software package (Model No. 3159.100), the supply of which also includes a connection cable to the PC. The cable connector on the rear of the e-Comfort controller display serves as an interface.

6.2.4 Eco-mode

All Rittal TopTherm heat exchangers with e-Comfort controller from firmware 3.2 have the energy-saving eco-mode, which is activated in the delivered state. The eco-mode is used to save energy in the heat exchanger if there is no thermal load, or there is a low thermal load in the enclosure (e.g. standby operation, no production or weekend). During this process the heat exchanger fan in the internal circuit is switched off as appropriate if the actual enclosure internal temperature drops to 10 K below the setpoint temperature set. To reliably measure the internal temperature also during this process, the fan starts cyclically for 30 sec. every 10 minutes (fig. 17). If the internal temperature reaches the range 5 K below the setpoint set again, the fan switches back to continuous operation.

If required, the eco-mode can be deactivated via the control display. For this purpose switch the parameter from 1 to 0 in the programming level (tab. 8). The fan then runs continuously.

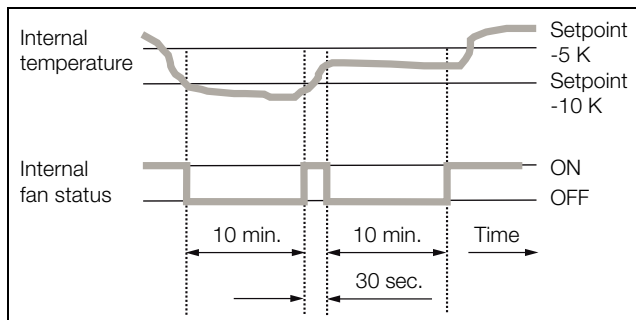


Fig. 17: Diagram of eco-mode

6.2.5 Editable parameters

See also fig. 20.

Progr. level	Display screen	Parameters	Min. value	Max. value	Factory setting	Description
1	St	Setpoint enclosure internal temperature T_i	20	55	35	The setting of the enclosure internal temperature is preset at the factory to 35°C and may be altered within a range of 20 – 55°C.
2	Mod	Control mode	0	1	0	Control mode setting. The temperature control is made as factory setting with the magnetic valve (0). It is, however, possible to change the temperature control by starting and stopping the internal fan (1); the magnetic valve then remains permanently open. You must obtain the manufacturer's consent before changing to control mode (1).
3	Ad	Master-slave identifier	0	19	0	See section 6.2.9 "Setting the Master-slave identifier"
4	CF	Changeover °C/°F	0	1	0	The temperature display can be switched from °C (0) to °F (1). The corresponding LED displays the current unit of temperature.
5	H1	Setting switching difference (hysteresis)	2	10	5	The air/water heat exchanger is preset in the factory to a switching hysteresis of 5 K. This parameter should only be changed in consultation with us. Please contact us for advice.
6	H2	Differential for error message A2	3	15	5	If the internal enclosure temperature exceeds the set value by more than 5 K, then error message A2 (enclosure internal temperature too high) appears on the display terminal. If necessary, the differential may be altered here within the range from 3 – 15 K.
26	ECO	Eco-mode operation	0	1	1	Eco-mode OFF: 0 / Eco-mode ON: 1

Tab. 8: Editable parameters

6.2.6 Bus connection (only when interconnecting several units with an e-Comfort controller)

When using several air/water heat exchangers, the serial unit interface can be used to connect up to ten air/water heat exchangers with the bus cable (Model No. 3124.100).



Note:

The electrical signals at the X2 interface are of an extra-low voltage (not extra-low safety voltages in accordance with EN 60 335-1).

■ When interconnecting, please note the following:

- De-energise the air/water heat exchangers to be connected.
- Ensure proper electrical insulation.
- Make sure the cables are not laid in parallel to power lines.
- Make sure that the lines are short.

6 Operation

EN

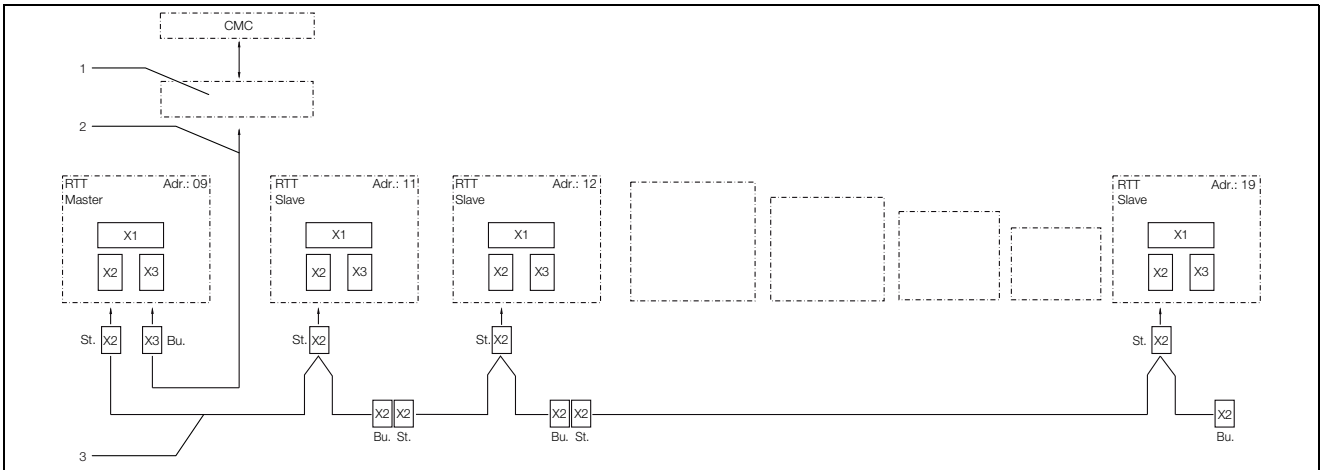


Fig. 18: Connection example: Master-slave operation

Key

- | | | | |
|-----|---|------|---------------------------------------|
| 1 | Serial interface | X2 | Master-slave connection Sub-D, 9-pole |
| 2 | Serial interface cable | X3 | Serial interface Sub-D, 9-pole |
| 3 | Master-slave bus cable (Model No. 3124.100) | St. | Sub-D connector, 9-pole |
| RTT | Rittal TopTherm air/water heat exchanger | Bu. | Sub-D jack, 9-pole |
| X1 | Supply connection/door limit switch/alarms | Adr. | Address |

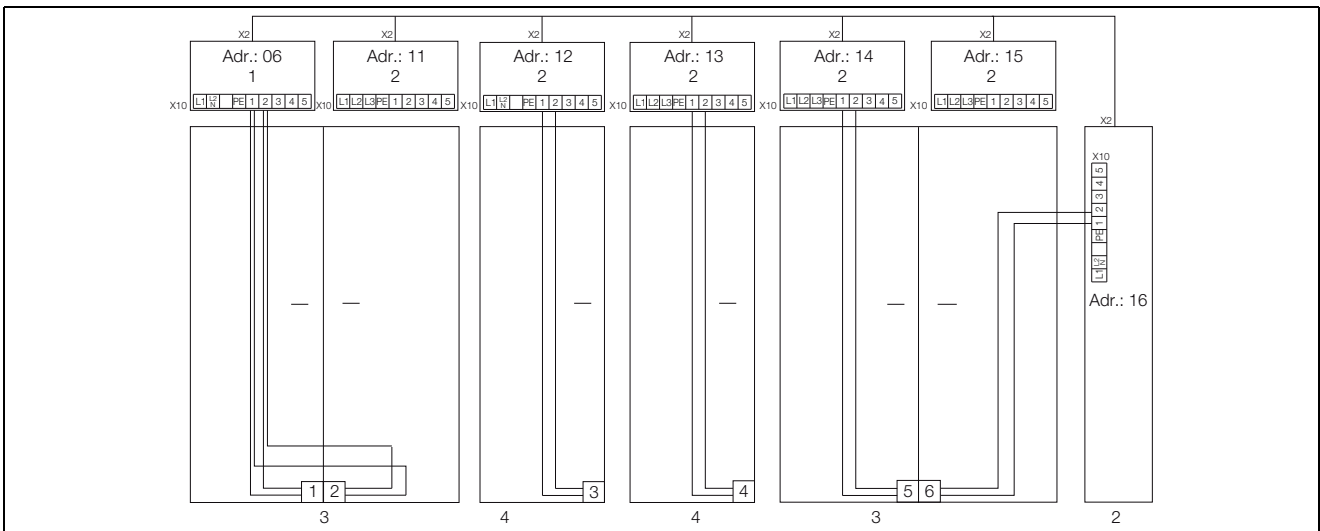


Fig. 19: Connection example: Door limit switch and Master-slave operation

Key

- | | |
|---|---|
| 1 | Master air/water heat exchanger |
| 2 | Slave air/water heat exchanger |
| 3 | 2-door enclosure with two door limit switches |
| 4 | Enclosure with door limit switch |

6.2.7 Programming overview of e-Comfort controller

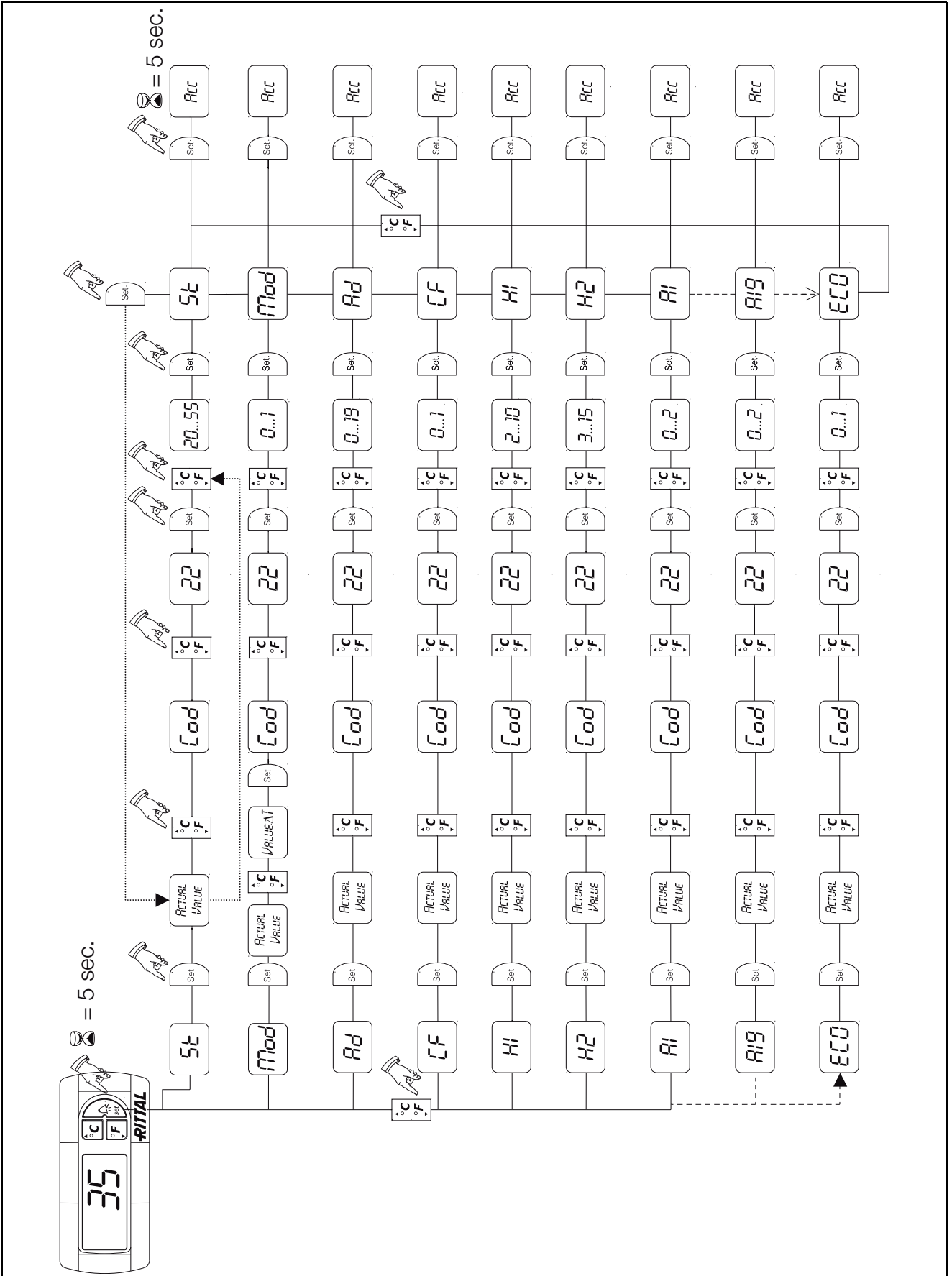


Fig. 20: Programming overview of e-Comfort controller

6.2.8 Defining system messages for evaluation

System messages are shown on the display screen of the e-Comfort controller via the displays A1 to A20 and E0.

A more detailed explanation of the system messages may be found in section 6.2.10 "Evaluating system messages" (see also fig. 20).

Progr. level	Display screen	Min. value	Max. value	Factory setting	Type or location of fault
7	A01	0	3	0	Enclosure door open
8	A02	0	3	0	Internal temperature of enclosure too high
9	A08	0	3	1	Condensate warning
10	A10	0	3	1	Fan blocked or defective
11	A16	0	3	1	Internal temperature sensor
12	A18	0	3	1	EPROM
13	A19	0	3	0	LAN/Master-Slave
14	A20	0	3	0	Voltage drop

Tab. 9: System messages which may be evaluated via relays

The system messages A01 – A20 may additionally be evaluated via two floating system message relays. In this way, one of the two system message relays may be allocated to each system message. See wiring diagrams at section 4.5.4 "Install the power supply":

- Terminal 3: NO (normally open, relay 2)
- Terminal 4: Connection of the supply voltage to the system message relay
- Terminal 5: NO (normally open, relay 1)

The definition NO refers to the de-energised state. As soon as power is applied to the air/water heat exchanger, both system message relays (relay 1 and 2) energise. This is the normal operating state of the air/water heat exchanger.

As soon as a system message occurs or the power supply is interrupted, the corresponding relay will drop out and open the contact.

Program system messages with the value

- 0:** System message is not sent to the system message relays, but merely appears in the display
- 1:** System message is evaluated by relay 1
- 2:** System message is evaluated by relay 1
- 3:** System message is neither sent to the system message relay, nor does it appear in the display (setting can only be made using RiDiag software).

6.2.9 Setting the Master-slave identifier

When several air/water heat exchangers are connected together (maximum ten), one of the air/water heat exchangers must be defined as the "master" and the others as "slaves". For this purpose, assign a corresponding identifier (address) to each air/water heat exchanger which will enable the air/water heat exchanger to be identified in the network.

If one of the slave units reaches the set temperature or if the door limit switch function is activated, the affected slave unit will report to the master unit, which then deactivates all the other air/water heat exchangers.



Note:

- Only one unit may be configured as master, and its identifier must match the number of connected slave units.
- The slave units must have different identifiers.
- The identifiers must be numbered in ascending order without any gaps.

On the **master air/water heat exchanger** (00 = factory setting), set the number of slave units present in the network:

- 01: Master with 1 slave air/water heat exchanger
- 02: Master with 2 slave air/water heat exchangers
- 03: Master with 3 slave air/water heat exchangers
- 04: Master with 4 slave air/water heat exchangers
- 05: Master with 5 slave air/water heat exchangers
- 06: Master with 6 slave air/water heat exchangers
- 07: Master with 7 slave air/water heat exchangers
- 08: Master with 8 slave air/water heat exchangers
- 09: Master with 9 slave air/water heat exchangers

On the **slave air/water heat exchanger**

(00 = factory setting), set its own address:

- 11: Slave air/water heat exchanger no. 1
- 12: Slave air/water heat exchanger no. 2
- 13: Slave air/water heat exchanger no. 3
- 14: Slave air/water heat exchanger no. 4
- 15: Slave air/water heat exchanger no. 5
- 16: Slave air/water heat exchanger no. 6
- 17: Slave air/water heat exchanger no. 7
- 18: Slave air/water heat exchanger no. 8
- 19: Slave air/water heat exchanger no. 9

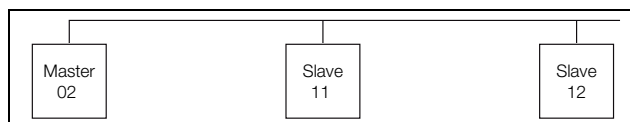


Fig. 21: Master-slave connection (example)

For further connection examples, see section 6.2.6 "Bus connection (only when interconnecting several units with an e-Comfort controller)".

For details of how to set the identifier, see section 6.2.5 "Editable parameters" or section 6.2.7 "Programming overview of e-Comfort controller", parameter "Ad".

6.2.10 Evaluating system messages

In the e-Comfort controller, system messages are indicated by a number in the display.

Display screen	System message	Possible cause	Measures to rectify the fault
A01	Enclosure door open	Door open or door limit switch incorrectly positioned	Close door, position door limit switch correctly, check connection if necessary
A02	Internal temperature of enclosure too high	Cooling capacity inadequate/unit undersized	Check cooling capacity
A08	Condensate warning	Condensate discharge kinked or blocked	Check condensate discharge; repair any kinks or blockages in the hose
A10	Fan	Blocked or defective	Clear the blockage; replace if necessary
A16	Temperature sensor internal temperature	Open or short-circuit	Replace
A18	EPROM error	New board obstructed	Software update needed (only following board installation with more recent software): Enter the programming level with Code 22; press button 1 and confirm with "Set" until "Acc" appears. Next, disconnect the unit from the mains and reconnect.
A19	LAN/Master-Slave	Master and slave not connected	Check setting and/or cable
A20	Voltage drop	Error display not shown	Event is stored in the log file
E0	Display message	Connection problem between the display and the controller board	Reset: Switch power supply off, then switch on again after approx. 2 sec.
		Cable defective; connection loose	Exchange the boards

Tab. 10: Troubleshooting with the e-Comfort controller

7 Inspection and maintenance

EN

7 Inspection and maintenance



Warning!

Switch off the power supply to the air/water heat exchanger before working on the water circuit, and take suitable precautions against it being accidentally switched on again.

The air/water heat exchanger is largely maintenance-free. The water circuit is checked at the factory for leaks and subjected to a function trial run.

The installed maintenance-free fan is mounted on ball bearings, protected against moisture and dust, and fitted with a temperature monitor. The life expectancy is at least 30,000 operating hours. The air/water heat exchanger is consequently largely maintenance-free. If dirt is present in the cooling water, a filter must be fitted. Maintenance interval: 2,000 operating hours.



Caution!

Never use flammable liquids for cleaning.

Sequence of maintenance measures:

- Check the level of dirt.
- Cooling membranes soiled? Clean if necessary.
- Activate test mode; cooling function OK?
- Check the noise generation of the fan.

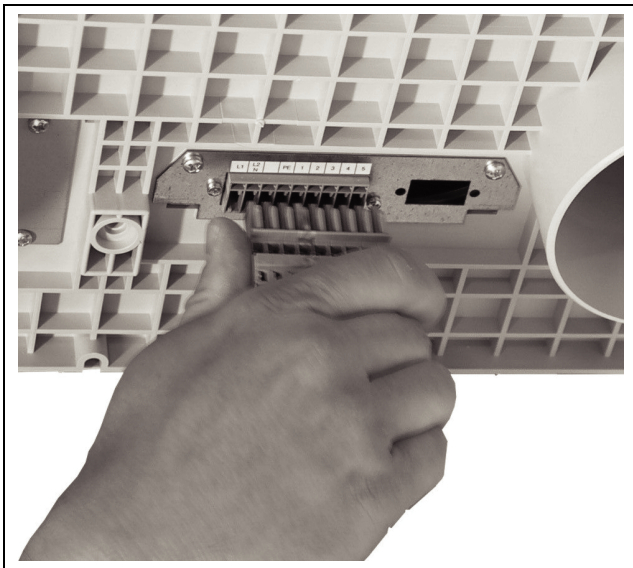


Fig. 22: Disconnect the mains plug



Fig. 23: Release the louvred grille



Fig. 24: Remove the louvred grille

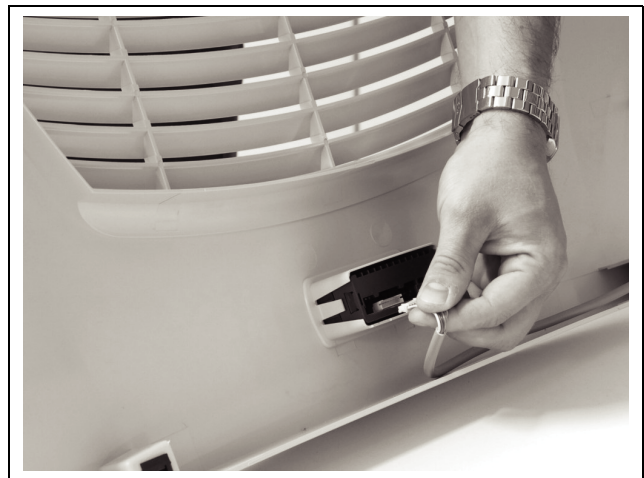


Fig. 25: Disconnect the connector from the display

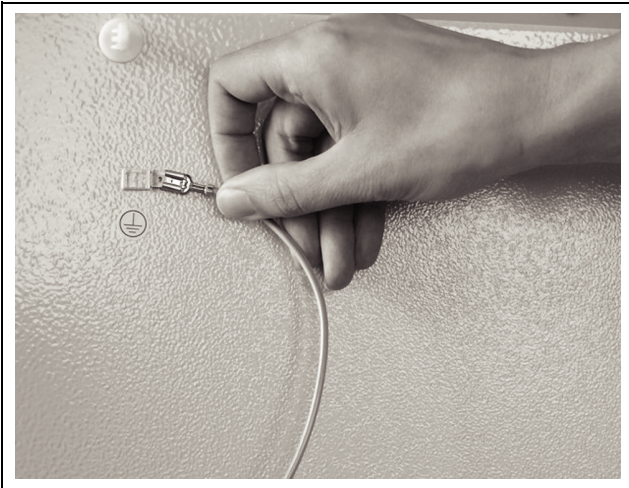


Fig. 26: Disconnect the earthing cable

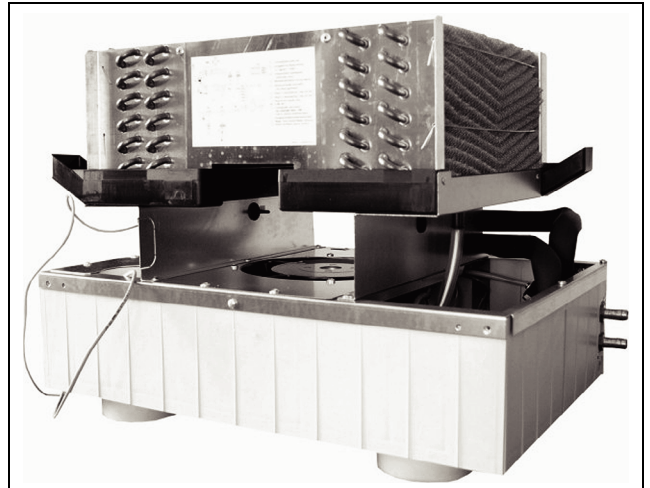


Fig. 29: Air/water heat exchanger without cover (front view)



Fig. 27: Remove the assembly screws from the cover (loosen four screws)



Fig. 30: Air/water heat exchanger without cover (rear view)



Fig. 28: Remove the cover

8 Emptying, storage and disposal

EN

8 Emptying, storage and disposal



Note:

The air/water heat exchanger must not be subjected to temperatures above +70°C during storage.

During storage, the air/water heat exchanger must stand upright.

Disposal can be performed at the Rittal plant.

Please contact us for advice.

Emptying:

During storage and transportation below freezing point, the air/water heat exchanger should be drained completely in the water supply direction using compressed air.

e-Comfort controller

- Open the magnetic valve by simultaneously pressing keys 1 (°C) and 2 ("Set") (fig. 16) on the e-Comfort controller for 5 seconds.

The magnetic valve is then opened for approximately five minutes.

- Use compressed air to drain the heat exchanger in the direction of the water outlet.

Basic controller

For the basic controller, the temperature of the air intake area (intake area of the fan) must be artificially raised over the setpoint value (e.g. using a hot air blower) so that the magnetic valve opens.

- Use compressed air to drain the heat exchanger in the direction of the water outlet.

9 Technical specifications

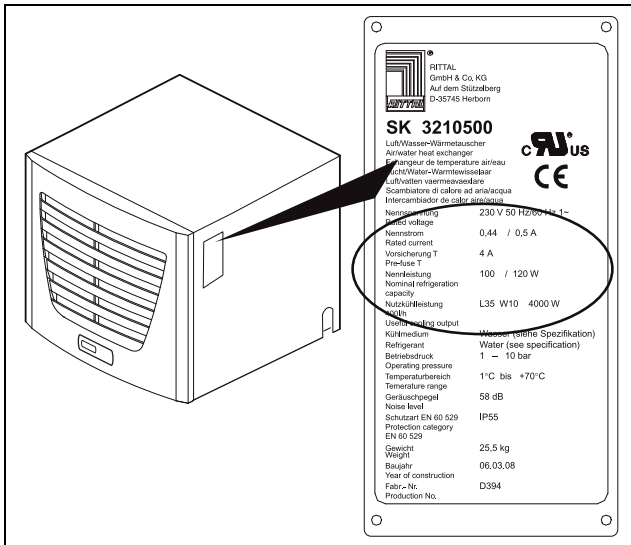


Fig. 31: Rating plate (technical data)

- Observe the mains connection data (voltage and frequency) as per the rating plate.
- Observe the pre-fuse as per the specifications on the rating plate.

	Unit	Model No. SK					
Basic controller, RAL 7035	–	3209.100	3209.110	3209.140	3210.100	3210.110	3210.140
e-Comfort controller, RAL 7035	–	3209.500	3209.510	3210.540	3210.500	3210.510	3210.540
Rated voltage	V Hz	230, 1~ 50/60	115, 1~ 50/60	400, 2~ 50/60	230, 1~ 50/60	115, 1~ 50/60	400, 2~ 50/60
Rated current	A	0.40/0.48	0.85/0.95	0.25/0.30	0.44/0.50	0.90/1.0	0.25/0.30
Pre-fuse T	A	4.0/4.0					
Transformer circuit-breaker	–	–	3.5...5		–	3.5...5	
Miniature circuit-breaker or fuse gG (T)		■					
Useful cooling output Pc L35 W10 400 l/h in accordance with DIN 14511	kW	2.5			4.0		
Power consumption Pel in accordance with DIN 14511	kW	0.095/0.110		0.098/0.115			
Admissible pressure	bar	1...10					
Operating temperature	°C	+1...+70					
Setting range	°C	+20...+55					
Noise level	dB (A)	58					
Protection category to IEC 60 529	–	IP 55					
Dimensions (width x height x depth)	mm	597 x 417 x 475					
Weight	kg	23.5	27.5		25.5	29.5	

Tab. 11: Technical specifications

9 Technical specifications

EN

	Unit	Model No. SK					
Basic controller, RAL 7035	–	3209.104	3209.114	3209.144	3210.104	3210.114	3210.144
e-Comfort controller, RAL 7035	–	3209.504	3209.514	3210.544	3210.504	3210.514	3210.544
Rated voltage	V Hz	230, 1~ 50/60	115, 1~ 50/60	400, 2~ 50/60	230, 1~ 50/60	115, 1~ 50/60	400, 2~ 50/60
Rated current	A	0.40/0.48	0.85/0.95	0.25/0.30	0.44/0.50	0.90/1.0	0.25/0.30
Pre-fuse T	A	4.0/4.0					
Transformer circuit-breaker	–	–	3.5...5		–	3.5...5	
Miniature circuit-breaker or fuse gG (T)	–	■					
Useful cooling output Pc L35 W10 400 l/h in accordance with DIN 14511	kW	1.88			3.0		
Power consumption Pel in accordance with DIN 14511	kW	0.100/0.120		0.102/0.125			
Admissible pressure	bar	1...10					
Operating temperature	°C	+1...+70					
Setting range	°C	+20...+55					
Noise level	dB (A)	58					
Protection category to IEC 60 529	–	IP 55					
Dimensions (width x height x depth)	mm	597 x 415 x 475					
Weight	kg	23.5	27.5		25.5	29.5	

Tab. 12: Technical specifications

10 List of spare parts

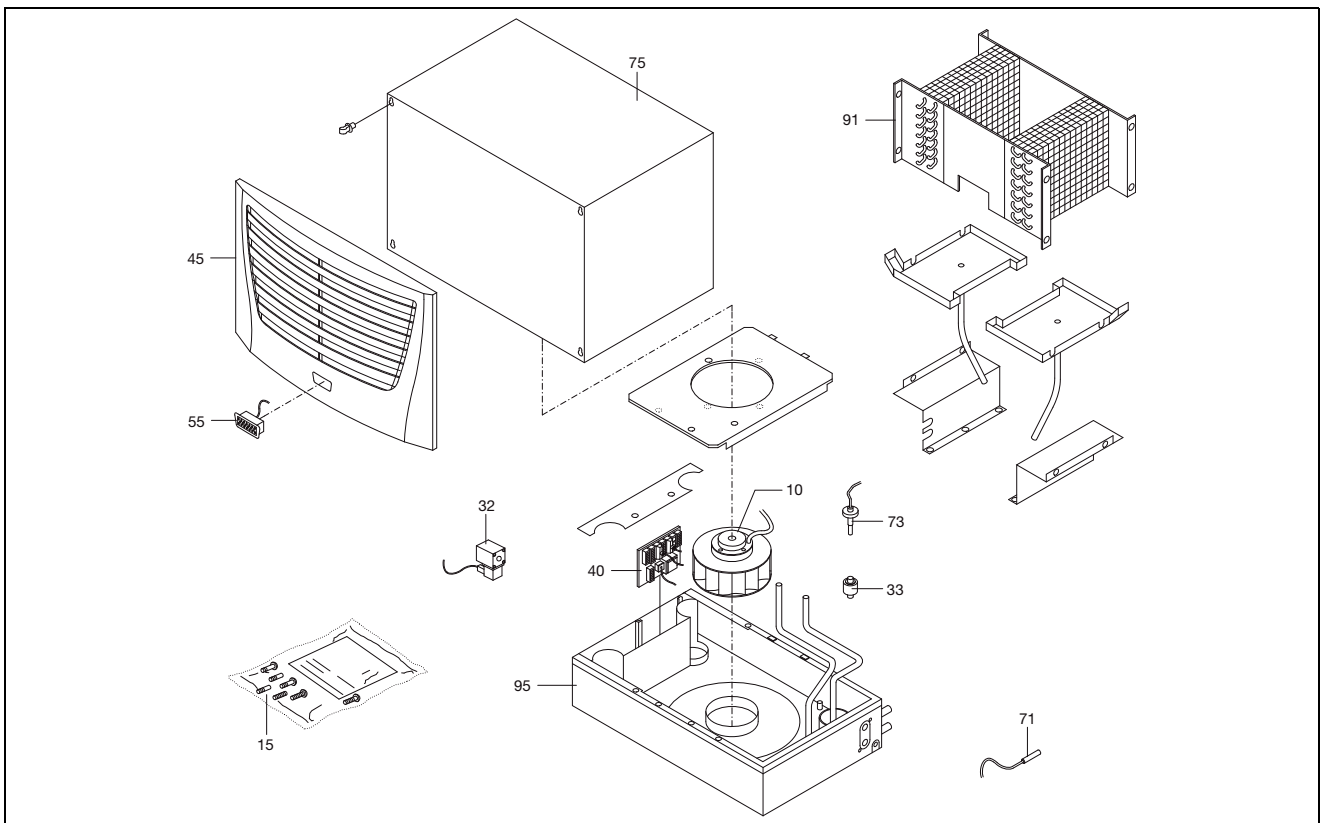


Fig. 32: List of spare parts SK 3209.XXX, SK 3210.XXX

Key

- 10 Fan, complete
- 15 Dispatch bag
- 32 Magnetic valve, complete
- 33 Non-return valve
- 40 Controller board
- 45 Louvred grille
- 55 Display
- 71 Temperature probe
- 73 Float-actuated switch
- 75 Cover
- 91 Heat exchanger
- 95 Base tray

**Note:**

As well as the spare part number, when ordering spare parts the following information must be provided:

- Unit model
- Fabrication number
- Date of manufacture

This information may be found on the rating plate.

11 Hydrological data

EN

11 Hydrological data

To avoid system damage and to ensure safe operation, Rittal GmbH & Co. KG recommends the use of system water or an additive whose composition does not differ from that presented in the following summary.

Hydrological data	Unit	Model No. SK	Model No. SK
	-	3209.100/3209.110/3209.140 3209.500/3209.510/3209.540 3210.100/3210.110/3210.140 3210.500/3210.510/3210.540	3209.104/3209.114/3209.144 3209.504/3209.514/3209.544 3210.104/3210.114/3210.144 3210.504/3210.514/3210.544
pH value		7...8.5	6...9
Calcium hardness	°dH	>3 ...<8	1...12
Free carbonic acid	mg/dm ³	8...15	1...100
Corresponding carbonic acid	mg/dm ³	8...15	free
Aggressive carbonic acid	mg/dm ³	0	0...400
Sulphides	mg/dm ³	free	free
Oxygen	mg/dm ³	<10	<10
Chloride ions	mg/dm ³	<50	<200
Sulphate ions	mg/dm ³	<250	<500
Nitrates and nitrites	mg/dm ³	<10	<100
COD	mg/dm ³	<7	<40
Ammonia	mg/dm ³	<5	<20
Iron	mg/dm ³	<0.2	free
Manganese	mg/dm ³	<0.2	free
Conductivity	µS/cm	<2200	<4000
Residue on evaporation	mg/dm ³	<500	<2000
Potassium perman- ganate	mg/dm ³	<25	<40
Suspended matter	mg/dm ³	<3	
	mg/dm ³	>3...<15; partial current purification recommended >15; continuous purification recommended	

Tab. 13: Hydrological data

The complete absence of corrosion under experimental conditions suggests that solutions with a significantly higher salt content and greater corrosion potential (such as seawater) can still be tolerated.

12 Appendix

12.1 Characteristic curves

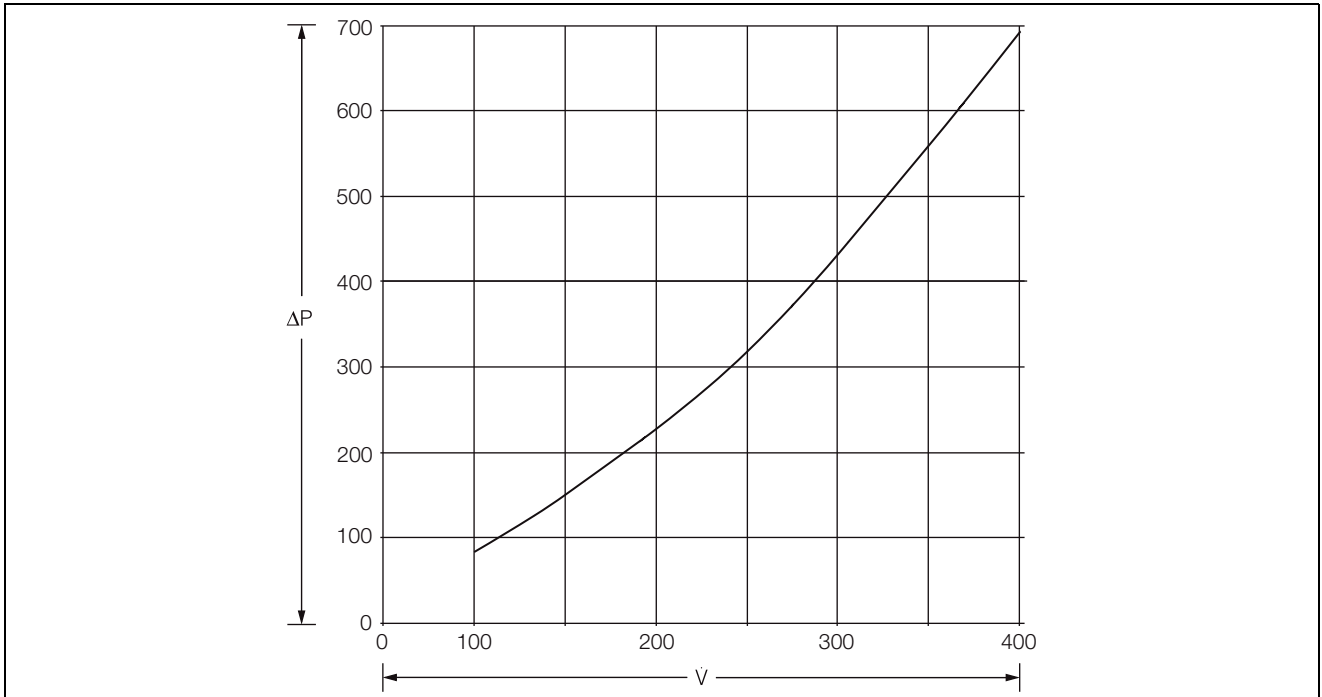


Fig. 33: Water resistance SK 3209.XX0

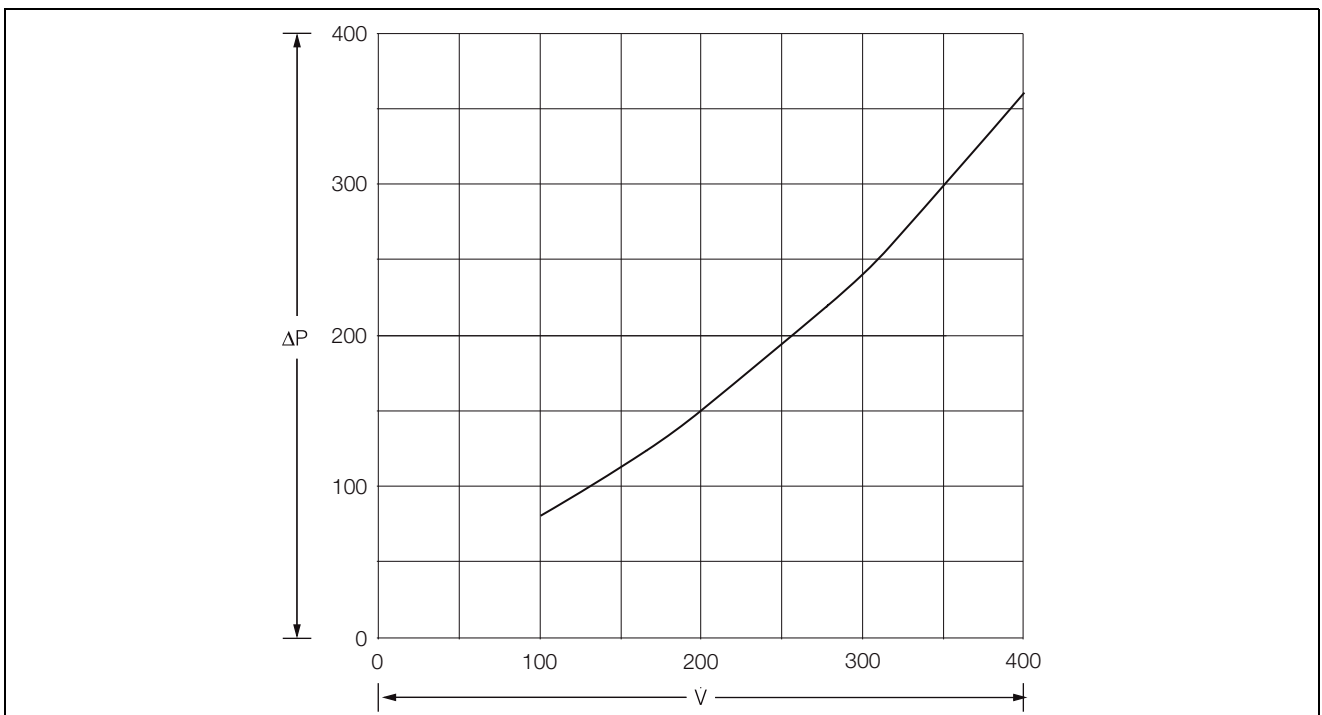


Fig. 34: Water resistance SK 3209.XX4

Key

ΔP Water resistance [mbar]

V Volumetric flow [l/min]

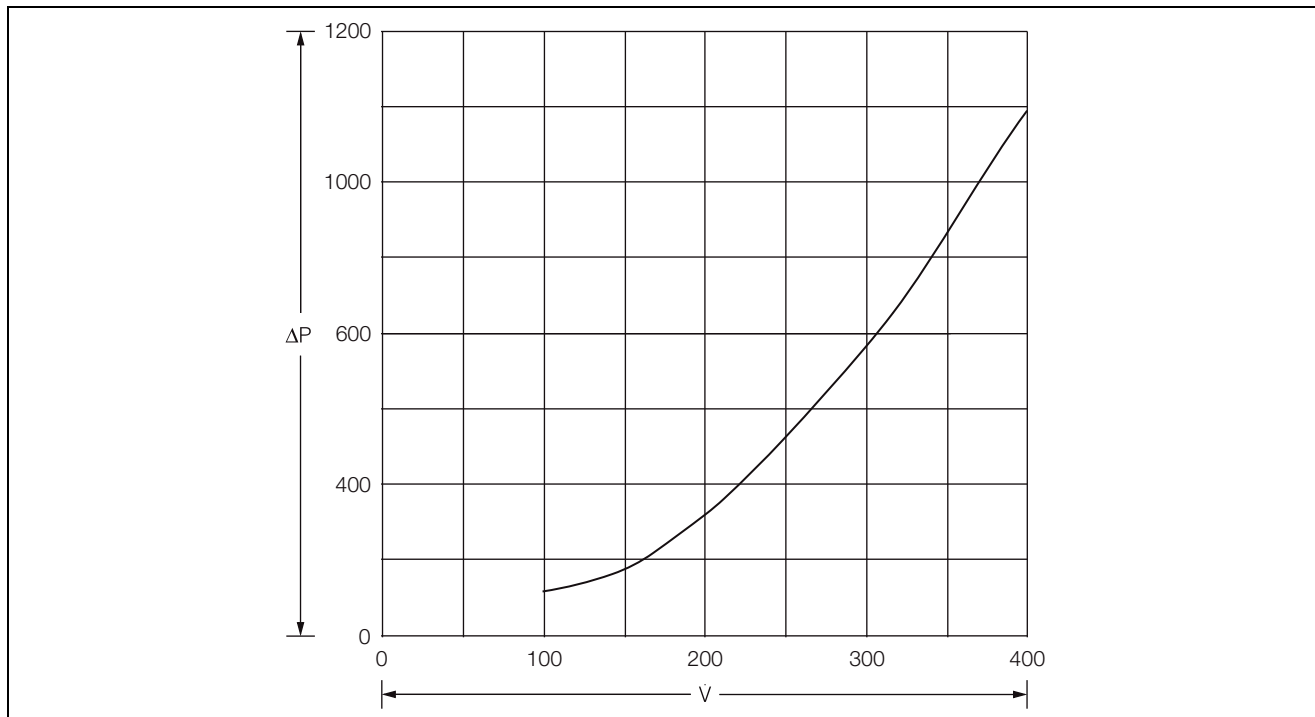


Fig. 35: Water resistance SK 3210.XX0

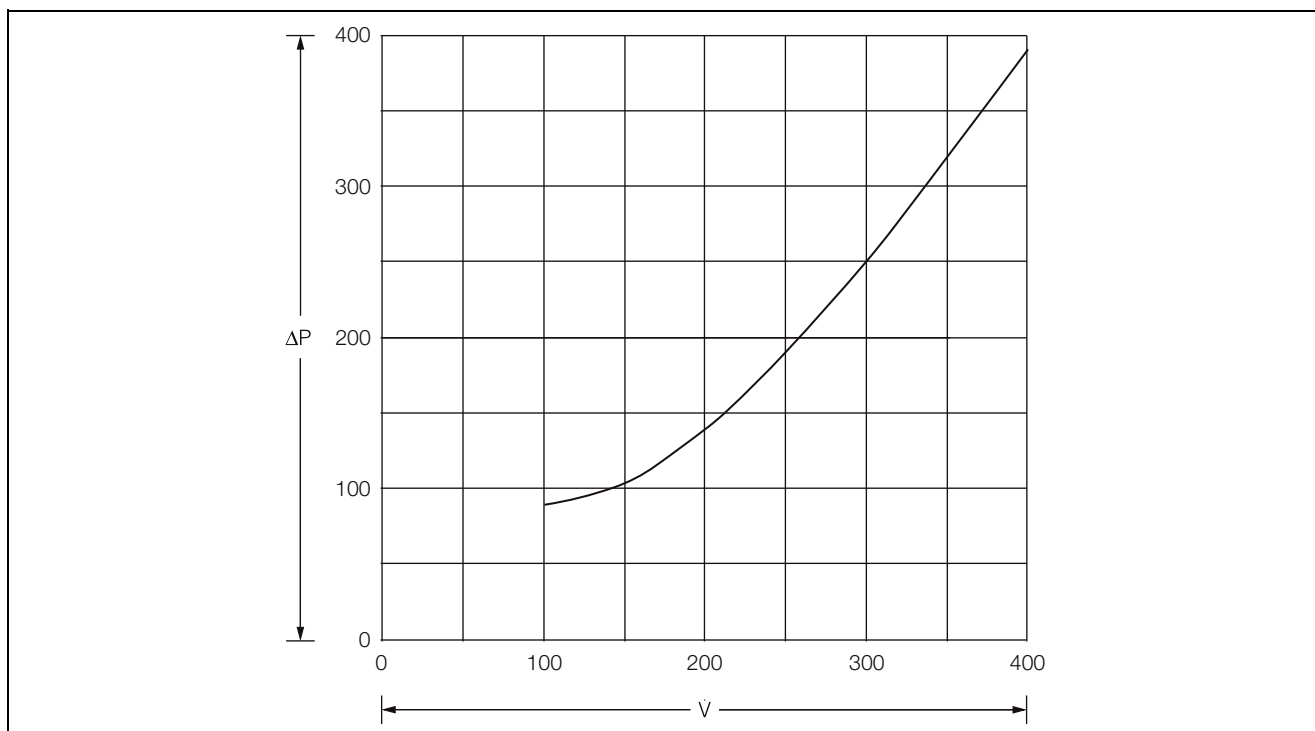


Fig. 36: Water resistance SK 3210.XX4

Key

- ΔP Water resistance [mbar]
- \dot{V} Volumetric flow [l/min]

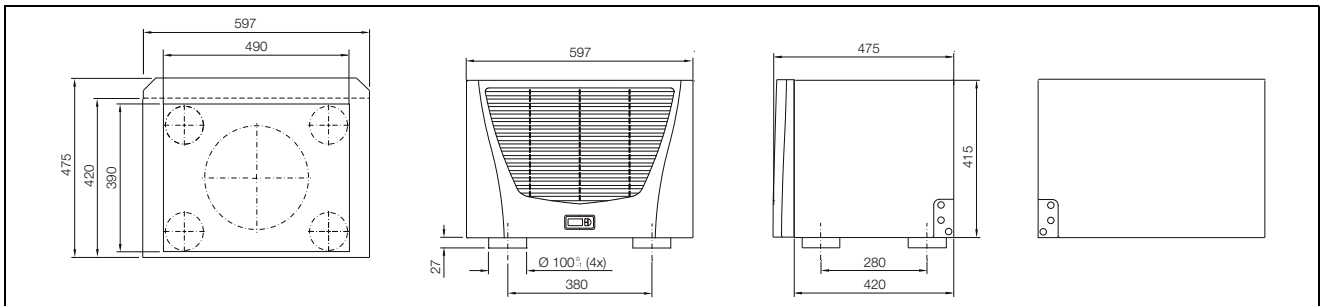
12.2 Dimensions

Fig. 37: SK 3209.XXX/SK 3210.XXX assembly

13 Declaration of conformity

EU-Konformitätserklärung / EU Declaration of Conformity

dri161782500



Hiermit erklären wir, (We,)

Rittal GmbH & Co. KG, Auf dem Stützelberg, 35745 Herborn

dass die Luft/Wasser-Wärmetauscher: *(hereby declare that the Air/Water Heat Exchangers:)*

SK 3209.xxx SK 3210.xxx SK 3363.xxx SK 3364.xxx SK 3373.xxx SK 3374.xxx SK 3375.xxx

"xxx" steht für ("xxx" applies for):

100, 104, 109, 110, 114, 119, 140, 144, 149, 500, 504, 509, 510, 513, 514, 540, 544, 549, 555, 556, 557, 558, 908, 910, 950, 951, 952, 953, 954, 102

E-Schaltplan, Zusammenbauzeichnung und Beschreibung (Wiring diagram, assembly drawing and specification)
siehe Montageanleitung (see assembly instructions)

folgender Richtlinie entsprechen: (conform to the following Directive)

Maschinenrichtlinie 2006/42/EG (Machinery Directive 2006/42/EC)

Zusätzlich entsprechen die oben genannten Produkte auch folgenden Richtlinien:
(In addition, the above mentioned products also conform to the following Directives:)

Elektromagnetische Verträglichkeit 2014/30/EU (Electromagnetic Compatibility 2014/30/EU)

Angewandte harmonisierte Normen: (Applied harmonised standards)

EN ISO 12100	Sicherheit von Maschinen (Safety of machinery)
EN ISO 13857	Sicherheitsabstände gegen das Erreichen von Gefährdungsbereichen mit den oberen und unteren Gliedmaßen (Safety distances to prevent hazard zones being reached by upper and lower limbs)
EN 60204-1	Elektrische Ausrüstung von Maschinen (Electrical equipment of machinery)
EN 60529	IP Schutzarten durch Gehäuse (IP code)
EN 60335-1	Sicherheit elektrischer Geräte (appliances -safety)
EN 60335-2-40	Sicherheit elektrischer Geräte (appliances -safety)
EN 61000-6-2:2005	Elektromagnetische Verträglichkeit (Electromagnetic compatibility)
EN 61000-6-3:2007	Elektromagnetische Verträglichkeit (Electromagnetic compatibility)
A1:2011	

Bei einer nicht mit uns abgestimmten Änderung der Maschine verliert diese EG-Konformitätserklärung ihre Gültigkeit.

This declaration of EC conformity shall become null and void when the assembly is subjected to any modification that has not met with our approval.

Herborn, 23.05.2016

Verantwortlich für Dokumentation
(responsible for documentation)

Frank Himmelhuber
Geschäftsbereichsleiter FuE
Executive Vice President R&D

Rittal GmbH & Co. KG
Auf dem Stützelberg
35745 Herborn

Id. Nr. 316656
D-0000-00000222



Fig. 38: Declaration of conformity

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