

Rittal – The System.

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Air/water heat exchangers



SK 3378.200

SK 3378.280

Assembly and operating instructions

ENCLOSURES

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SOFTWARE & SERVICES

FRIEDHELM LOH GROUP



Download options



Hinweis:

Die Montage-, Installations- und Bedienungsanleitung ist auch als Download unter www.rittal.de verfügbar.



Note:

The assembly and operating instructions are available for downloading from www.rittal.com.



Remarque :

La notice de montage, d'installation et d'emploi peut être téléchargée depuis le site www.rittal.fr.



Opmerking:

De montage-, installatie- en gebruikshandleiding is ook te downloaden via www.rittal.nl.



Obs:

Montage-, installations- och bruksanvisningarna kan även laddas ner på www.rittal.se.



Nota:

Las instrucciones de montaje, instalación y puesta en marcha también están disponibles para su descarga en www.rittal.es.



Nota:

Le istruzioni di montaggio, installazione e uso possono anche essere scaricate dal sito www.rittal.it.



注記：

この取扱説明書 (組立・設置および運用マニュアル) は、www.rittal.co.jp からダウンロードできます。





Warn- und Sicherheitshinweise

DE

Warnung!

Bitte beachten Sie die maximal zulässigen Hebegewichte für Personen. Ggf. ist eine Hebevorrichtung zu verwenden. Arbeiten an elektrischen Anlagen oder Betriebsmitteln dürfen nur von einer Elektrofachkraft oder von unterwiesenen Personal unter Leitung und Aufsicht einer Elektrofachkraft den elektrotechnischen Regeln entsprechend vorgenommen werden.

Der Luft/Wasser-Wärmetauscher darf erst nach Lesen dieser Informationen von den o. g. Personen angeschlossen werden!

Es darf nur spannungsisoliertes Werkzeug benutzt werden.

Die Anschlussvorschriften des zuständigen Stromversorgungsunternehmens sind zu beachten.

Der Luft/Wasser-Wärmetauscher muss über eine allpolige Trennvorrichtung nach Überspannungskategorie III (IEC 61 058-1) an das Netz angeschlossen werden.

Der Luft/Wasser-Wärmetauscher ist erst nach Trennung von allen Spannungsquellen spannungsfrei! Schalten Sie den Luft/Wasser-Wärmetauscher vor dem Öffnen der Elektro-Anschlussbox und vor Arbeiten am Wasserkreislauf spannungsfrei und sichern Sie ihn gegen versehentliches Wiedereinschalten.

Die Spannungszuschaltung darf erst erfolgen, wenn das Abdeckblech der Elektro-Anschlussbox ordnungsgemäß verschraubt ist.

Vorsicht!

Verwenden Sie niemals brennbare Flüssigkeiten zur Reinigung des Luft/Wasser-Wärmetauschers.

An nicht vollständig entgrateten Bohrungen und Ausschnitten besteht Schnittgefahr, insbesondere bei der Montage des Luft/Wasser-Wärmetauschers.



Safety instructions and warnings

EN

Warning!

Please note the maximum weights that may be lifted by individuals. It may be necessary to use lifting gear.

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 above-mentioned personnel have read this information!

Use only insulated tools.

Follow the connection regulations of the appropriate electrical supply company.

The air/water heat exchanger must be connected to the mains via an all-pin isolating 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!

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

The power supply must not be switched back on until the cover plate of the electrical connection box has been properly screw-fastened into position.

Caution!

Never use flammable liquids for cleaning the air/water heat exchanger.

There is a risk of cutting injury around all drill holes and cut-outs which have not been fully deburred, especially during mounting of the air/water heat exchanger.



Consignes de sécurité

FR

Avertissement !

Veuillez tenir compte du poids de levage maximal autorisé pour les personnes et le cas échéant utilisez un appareil de levage.

Seuls les électriciens spécialisés ou les personnes dûment instruites opérant sous la direction et la surveillance d'un électricien spécialisé, sont autorisés à pratiquer des interventions sur les installations ou appareils électriques, conformément aux règles de l'électrotechnique.

Les personnes mentionnées ci-dessus ne sont autorisées à raccorder l'échangeur thermique air/eau qu'après avoir lu ces informations !

Utiliser exclusivement des outils isolés. Respecter les directives de raccordement du fournisseur d'électricité compétent.

L'échangeur thermique air/eau doit être raccordé au réseau par l'intermédiaire d'un dispositif de coupure monophasé de catégorie III de surtension (CEI 61 058-1).

L'échangeur thermique air/eau est hors tension uniquement après avoir débranché toutes les sources de tension !

Mettre l'échangeur thermique air/eau hors tension avant d'ouvrir le boîtier de raccordement électrique ou de travailler sur le circuit d'eau et prévenir toute remise en circuit inopinée.

La mise sous tension doit avoir lieu uniquement lorsque la face avant en tôle du boîtier de raccordement électrique est correctement vissée.

Prudence !

Ne jamais utiliser de liquides inflammables pour le nettoyage de l'échangeur thermique air/eau.

Il y a risque de coupures au niveau des perçages et découpes qui ne sont pas complètement ébavurés, en particulier lors du montage de l'échangeur thermique air/eau.

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 2004/108/EC. 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.



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.
- Only use the air/water heat exchanger within the prescribed water inlet and operating temperature range.
- 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 4.3.2 "Mounting options").
- 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 air/water heat exchanger must only be connected to the mains with the system de-energised. Connect the prefuse specified on the rating plate.
- Always disconnect the air/water heat exchanger from the supply voltage before servicing or maintenance work.

3 Device description

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3 Device description

3.1 Overview

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.

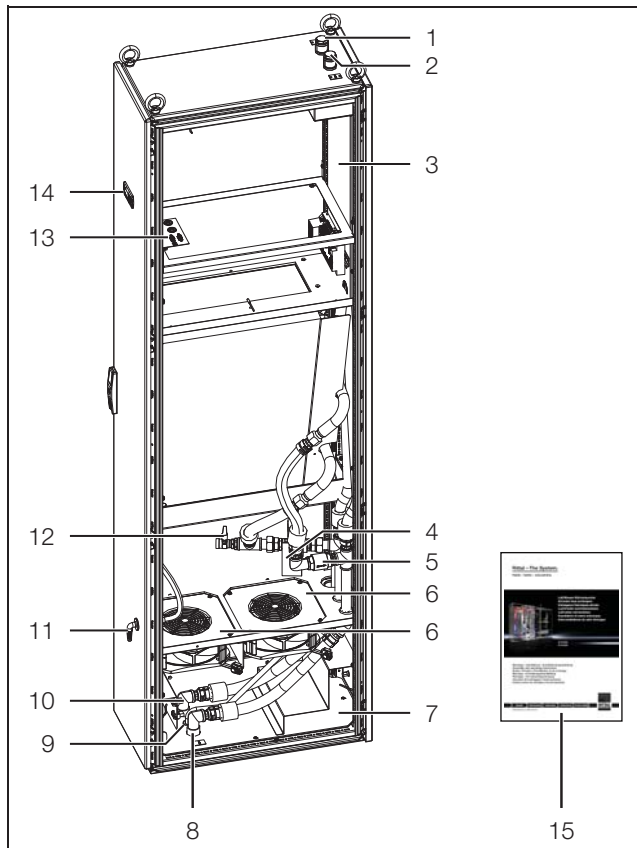


Fig. 1: Device description

Key

- 1 Water inlet, top
- 2 Water outlet, top
- 3 Gland for cables and busbars, top
- 4 Magnetic valve
- 5 Non-return valve
- 6 Fan
- 7 Gland for cables and busbars, bottom (PE and N)
- 8 Water outlet, bottom
- 9 Condensate overflow
- 10 Water inlet, bottom
- 11 Condensate water discharge
- 12 Drain cock
- 13 Cable entry
- 14 Display
- 15 Assembly and operating instructions

3.2 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 +5°C to +70°C where com-

parable 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.

The air/water heat exchanger is integrated into a TS 8 frame and can be incorporated flexibly into a TS 8 buying system (to either side or between two TS 8 enclosures, see section 4.3.2 "Mounting options").

3.2.1 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

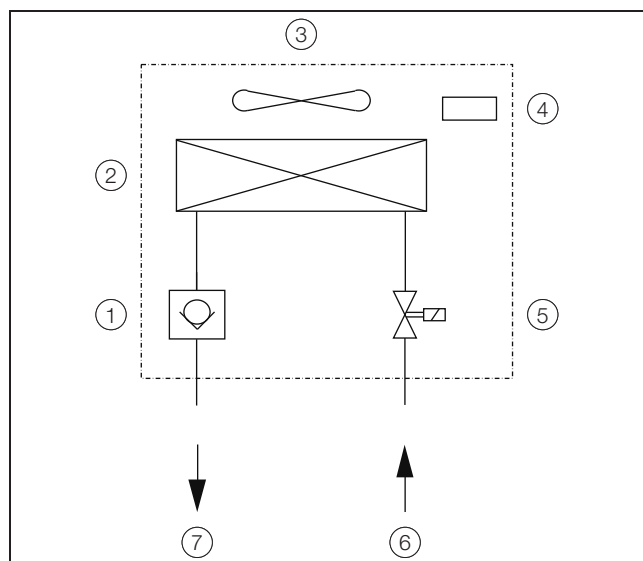


Fig. 2: Air/water heat exchanger

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.

3.2.2 Control

Rittal air/water heat exchangers are fitted with an e-Comfort controller for setting the functions of the heat exchanger.

3.2.3 Bus mode

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 6.9 "Setting the master-slave identifier").

3.2.4 Safety equipment

- The EC fan is protected against overcurrent and over-temperature by the integral electronics.
- The device has two integral floating contacts on the terminal block 3 – 5, via which system messages from the heat exchanger may be polled e.g. via a PLC (2 x normally-open contacts).
- The air/water heat exchanger has a leak and condensate warning. The device also has an overflow via its base.

3.2.5 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 front out of the unit via a drain opening in the heat exchanger tray. For this purpose, a hose must be connected to the condensate nozzle (see section 4.3.3 "Connecting the condensate discharge"). 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).

3.2.6 Leak detection

If a leakage or pipe breakage occurs in the water circuit of the air/water heat exchanger, a magnetic valve immediately stops the cooling water supply, the floating change-over contact activated and the fan switched off. The warning "A08" appears on the display.

3.2.7 Door limit switch

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. The connection is made at terminals 1 and 2. The extra-low voltage is supplied by the internal power pack; the current is approx. 30 mA DC.



Note:

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

3.2.8 Additional interface X3



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 board 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 board Model No. 3124.200).

3.3 Proper use

Rittal enclosure air/water heat exchangers were developed and designed in accordance with the state of the art and the recognised rules governing technical safety. Nevertheless, if used improperly, they may pose a threat to life and limb or cause damage to property. The unit is only intended for cooling enclosures. Any other use is deemed improper. The manufacturer will not be liable for any damages caused as a result of improper use, or for incorrect assembly, installation or use.

All risk is borne solely by the user. Proper usage also includes the observation of all valid documents and compliance with the inspection and servicing conditions.

3.4 Scope of supply

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

- Please check the delivery for completeness:

Qty.	Description
1	Air/water heat exchanger
1	Dispatch bag:
1	– Assembly and operating instructions

Tab. 1: Scope of supply

4 Installation

4.1 Safety instructions



Warning!
Please note the maximum weights that may be lifted by individuals. It may be necessary to use lifting gear.



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.

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

Use only insulated tools.

Follow the connection regulations of the appropriate electrical supply company.

The air/water heat exchanger must be connected to the mains via an all-pin isolating 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 Siting location requirements

- 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 4.3.3 "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.
 - Clearance of at least 1 m must be left in front of the door to guarantee convenient access in case of servicing.

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.
- 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.

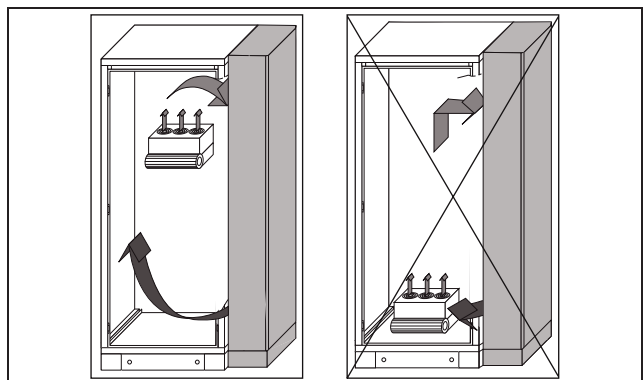


Fig. 3: Never direct the cold airflow at active components

- 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).
- Never site the air/water heat exchanger directly adjacent to the mounting plate. If such installation is unavoidable, appropriate measures must be taken to optimise the air routing.
- 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.

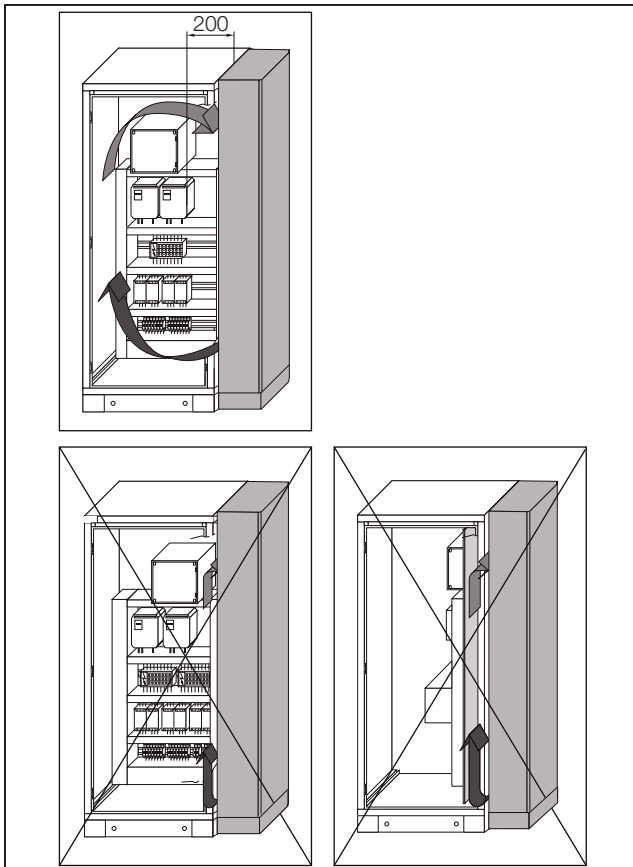


Fig. 4: Targeted air routing inside the enclosure

4.3.2 Mounting options

The air/water heat exchanger enclosure can be placed either within or to the right or left of an existing TS 8 enclosure suite (observe TS 8 dimensions!).



Note:
Use the assembly parts included with the Rittal system accessories to ensure secure baying.

Baying on the left or right

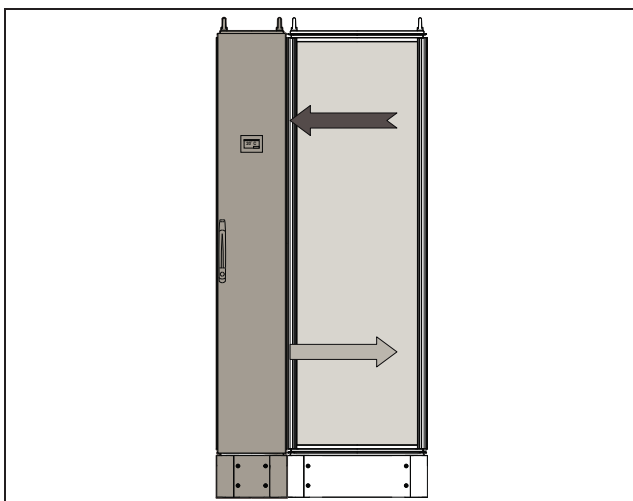


Fig. 5: Baying on the left or right

If the air/water heat exchanger is bayed on the left or right, the left side or right side of the air/water heat exchanger (as appropriate) must be sealed with a side panel for TS 8 enclosure systems (Model No. 8106.235 for SK 3378.200 or 8108.235 for SK 3378.280).

Baying in the middle of an enclosure suite

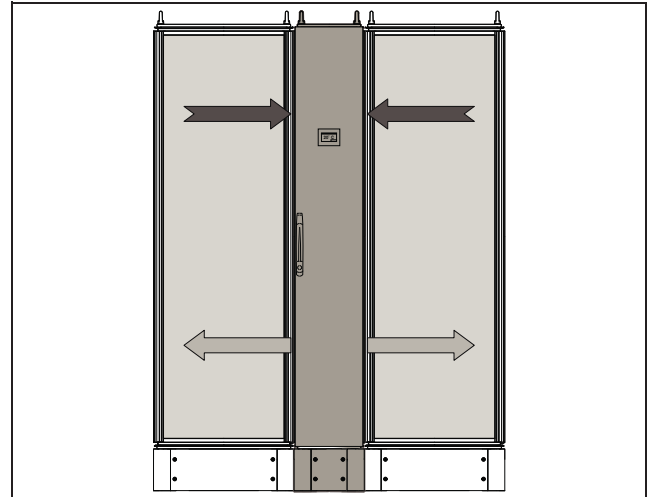


Fig. 6: Baying in the middle of an enclosure suite

In case of installation within an enclosure suite, it is not necessary to seal the air/water heat exchanger to the left or right.

Baying between two TS 8 enclosures

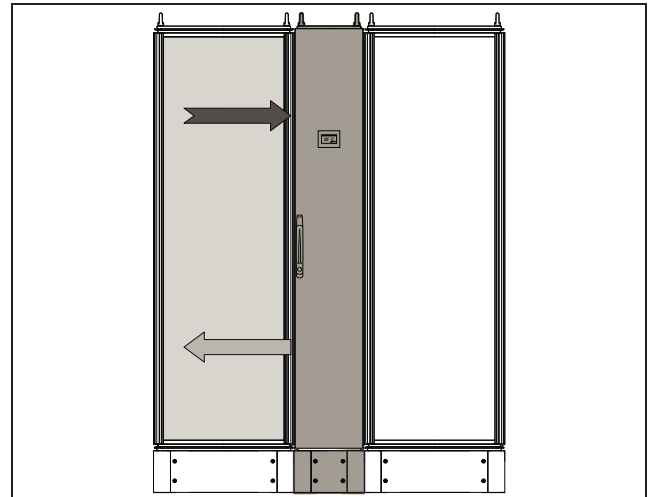


Fig. 7: Baying between two TS 8 enclosures

If the air/water heat exchanger is placed between two TS 8 enclosures, but cooling is only required on one side, the air inlet opening can be closed with an optional metal cover.



Note:
The enclosure must be sealed on all sides. In particular, in the area of the cable inlet openings and the enclosure base.

4 Installation

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Note:

The air/water heat exchanger may be fitted on a base/plinth system (refer also to Accessories in the Rittal Catalogue).

4.3.3 Connecting the condensate discharge

A flexible condensate hose, dia. 12 mm (1/2"), can be fitted to the air/water heat exchanger to drain any condensate into a collecting bottle.

The condensate discharge

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

The condensate hose (3301.612), condensate collecting bottle (3301.600) and external condensate evaporator (3301.500 or 3301.505) are available as accessories (see also Accessories in the Rittal Catalogue).

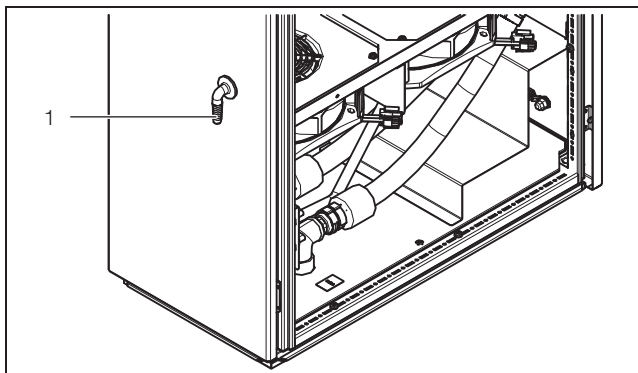


Fig. 8: Connecting the condensate discharge

Key

- 1 Connecting the condensate discharge

- Connect a suitable hose to the condensate nozzle (at the bottom of the door) and secure it with a hose clip (with 2 Nm torque).
- Lay the condensate hose, e.g. into a drain.

4.4 Connecting the water connection

The water hoses may optionally be connected to the top or bottom of the device (3/4" internal thread).

- First, remove the sealing caps using an SW 22 open-jawed spanner.

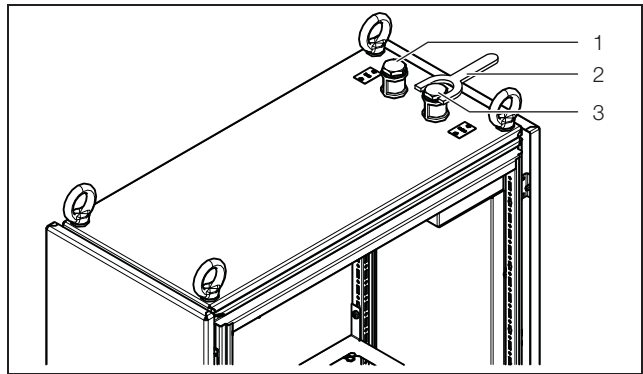


Fig. 9: Removing the sealing caps at the top

Key

- 1 Water inlet, top
2 Open-jawed spanner
3 Water outlet, top

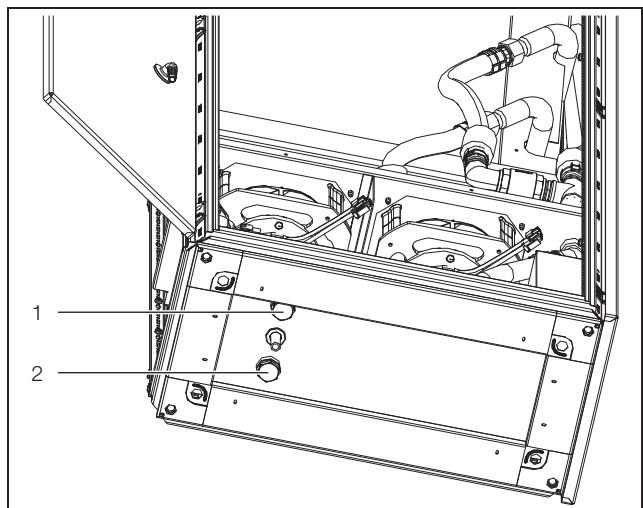


Fig. 10: Removing the sealing caps at the bottom

Key

- 1 Water outlet, bottom
2 Water inlet, bottom

The cooling water hose

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



Warning!

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



Note:

The water inlet temperature should be selected to prevent the formation of critical condensation in the enclosure being cooled.



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



Note:
Volumetric flows >3,000 l/h may cause damage to the device. Suitable measures should be taken to regulate the volumetric flow, such as flow regulator valves. Damage caused by excessive volumetric flows will not be covered by Rittal's warranty.



Note:
No increase in cooling output is achieved with flow rates >3,000 l/h.



Note:
Observe the flow direction and check for leaks!

The units do not have any separate ventilation. They may be vented using the water connections on the top of the device (either manually or by installing suitable vent devices).

4.4.1 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 micro-biological contamination may occur.

4.4.2 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
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 Routing busbars

Busbars and cables may be routed through the unit at the top or bottom.

Routing at the top



Fig. 11: Routing at the top

4 Installation

EN



Note:

Under no circumstances should you drill holes into the water pipe cover e.g. in order to fit brackets.



Note:

When using other busbar systems, the cut-outs in the base section should be designed to ensure compliance with the clearances and creepage distances to EN 61 439.

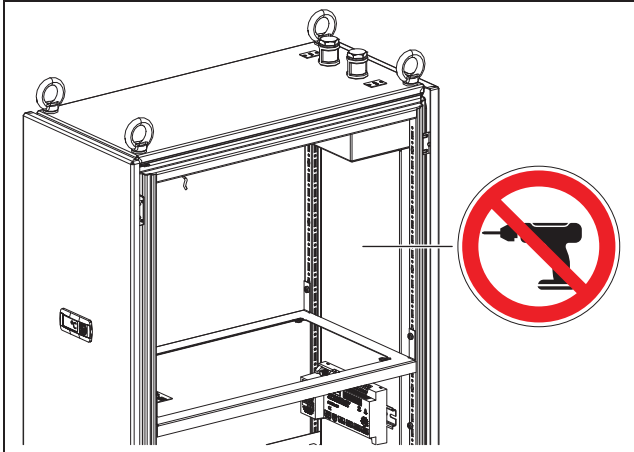


Fig. 12: Cover in front of the water pipes

Routing at the bottom

When using the Rittal busbar system RiLine, pre-prepared cut-outs in the base area may be used for routing N and PE bars.



Fig. 13: Routing at the bottom

- First, cut out the insulation using the template printed in section 13.2 "Drawings".
- Next, press out the metal along the nominal break points.



Caution!

Drilled holes and cut-outs that have not been fully deburred may cause cut injuries, particularly when assembling the air/water heat exchanger.

4.6 Electrical connection

4.6.1 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 EC fan is protected against overcurrent and over-temperature by the integral electronics. The same also applies to all transformer versions and to special-voltage units which are equipped with a transformer.
- Install the slow pre-fuse specified on the rating plate (miniature circuit-breaker with "C" characteristic, motor circuit-breaker or transformer circuit-breaker) to protect the cable and equipment from short-circuits.
- Select a suitable motor circuit-breaker/transformer circuit-breaker in accordance with the information spec-

ified on the rating plate: Set it to the minimum specified value.

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.

Potential equalisation

Rittal recommends connecting a conductor with a nominal cross-section of at least 6 mm² to the potential equalisation connection point in the air/water heat exchangers, and incorporating it into the potential equalisation system.

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

4.6.2 Install the power supply

■ Open the door of the air/water heat exchanger and remove the cover plate from the electrical connection box.

The board for connecting the electricity supply line is attached to the rear of the cover.

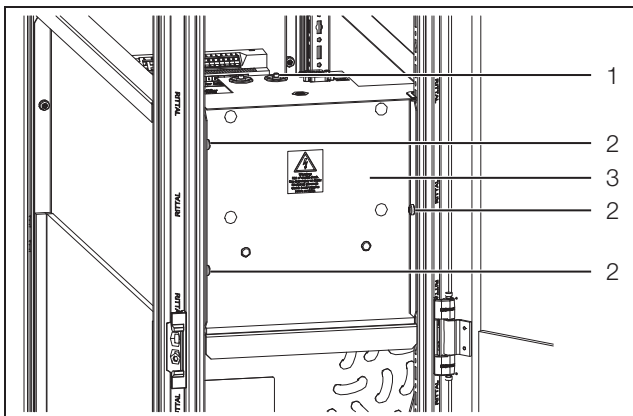


Fig. 14: Remove the cover

Key

- 1 Cable gland
- 2 Assembly screws
- 3 Cover

- Route the electricity supply line through the cable glands from above.
- Following the circuit diagram behind the open door of the air/water heat exchanger, complete the electrical installation.

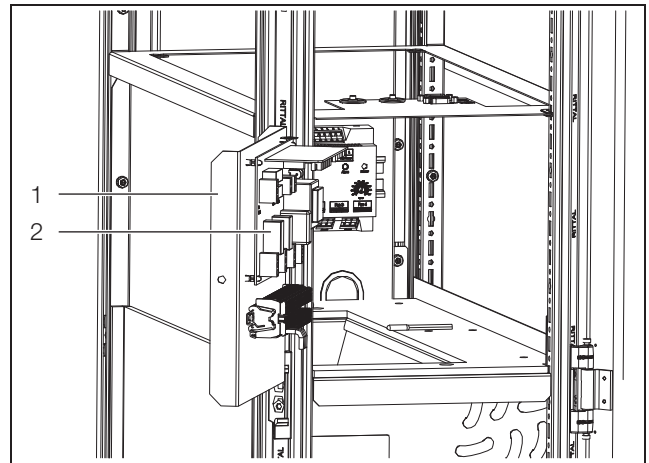


Fig. 15: Opened cover

Key

- 1 Cover
- 2 Board at the rear

■ Close the electrical connection box with the cover.

When connecting the air/water heat exchanger to NFPA 70 (NEC):

- Use only copper conductors to connect the electricity supply line.
- If you would like 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 the relevant terminals as shown in the circuit diagram (see section 13.3 "Circuit diagram").



Warning!

The power supply must not be switched back on until the cover plate of the electrical connection box has been properly screw-fastened into position.

5 Commissioning

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

The air/water heat exchanger starts running: 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 assign the network identifier, etc. (see section 6 "Operation").

6 Operation

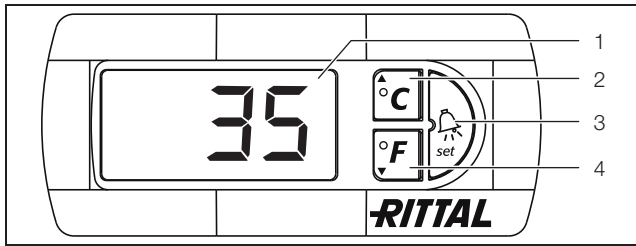


Fig. 16: Display and system analysis of the e-Comfort controller

Key

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

6.1 Properties

- Door limit switch function
- Monitoring of all motors (fans)
- Master-slave function with a maximum of ten units. One device 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 (see 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 1). 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 alternates with the temperature display.

The unit is programmed using buttons 2 – 4 (fig. 16). The relevant parameters also appear in the display.

6.2 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 2 (°C) and 3 ("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.

6.3 General programming information

Using buttons 2, 3 and 4 (fig. 16) you can change the parameters within the preset ranges (min. value, max. value).

Tables 3 and 4 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 3 ("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 3 and 4).

- Press button 3 ("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 3 ("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 3 ("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".

- To exit programming mode, press button 3 ("Set") again for approximately 5 seconds. "Acc" will appear in the display to indicate that the changes have been saved. The display then switches 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.

6.4 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. Also to reliably measure the internal temperature 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. 3). The fan then runs continuously.

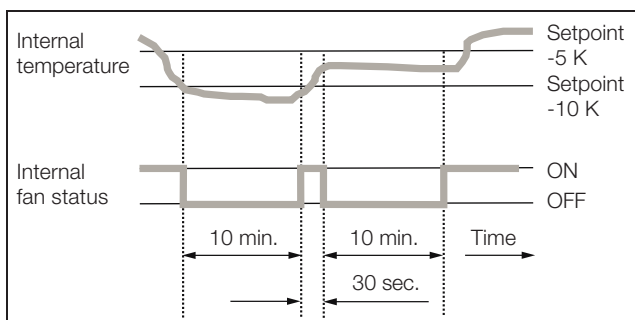


Fig. 17: Diagram of eco-mode

6 Operation

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6.5 Editable parameters

See also fig. 20.

Progr. level	Display screen	Parameters	Min. value	Max. value	Factory setting	Description
1	St	Internal enclosure temperature set-point 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	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. To use this control mode, the Eco parameter must be changed from 1 (on) to 0 (off).
3	Ad	Master-slave identifier	0	19	0	See section 6.9 "Setting the master-slave identifier"
4	CF	Change-over °C/°F	0	1	0	The temperature display can be switched from °C (0) to °F (1). The corresponding LED displays the current temperature unit.
5	H1	Setting for 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 of 3 – 15 K.
26	ECO	Eco-mode operation	0	1	1	Eco-mode OFF: 0 / Eco-mode ON: 1

Tab. 3: Editable parameters

6.6 Bus connection

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.

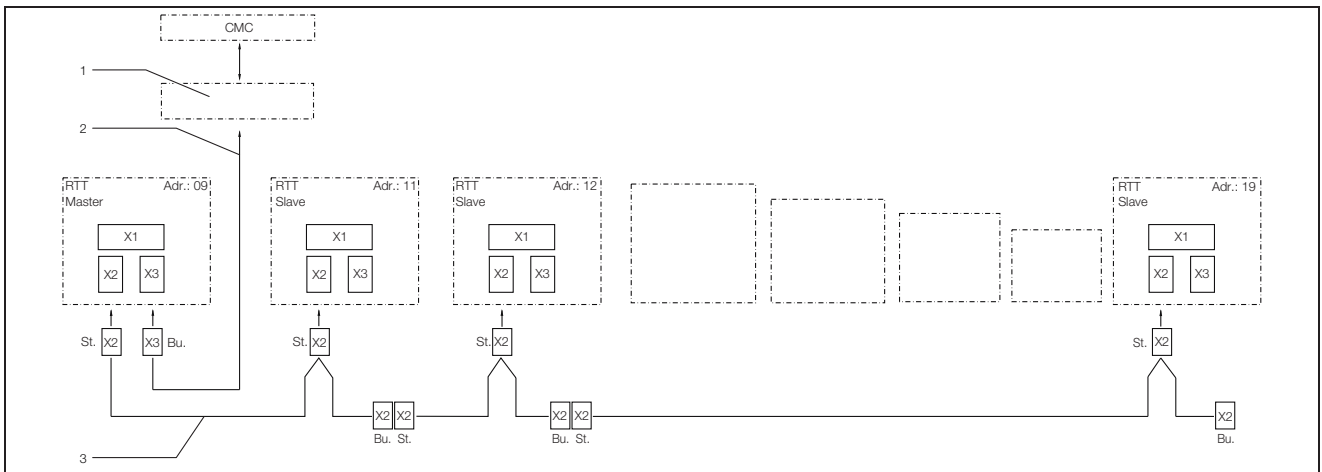


Fig. 18: Connection example: Master-slave operation

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

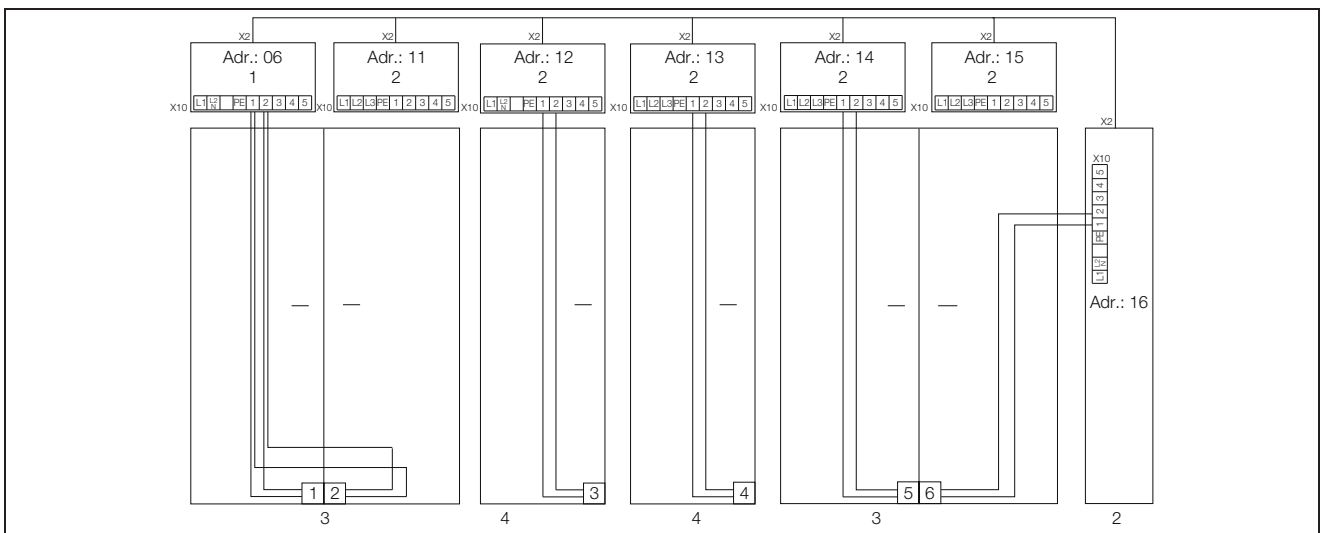


Fig. 19: Connection example: Door limit switch and master-slave operation

- | | |
|------------|---|
| 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 Operation

EN

6.7 Programming overview of e-Comfort controller

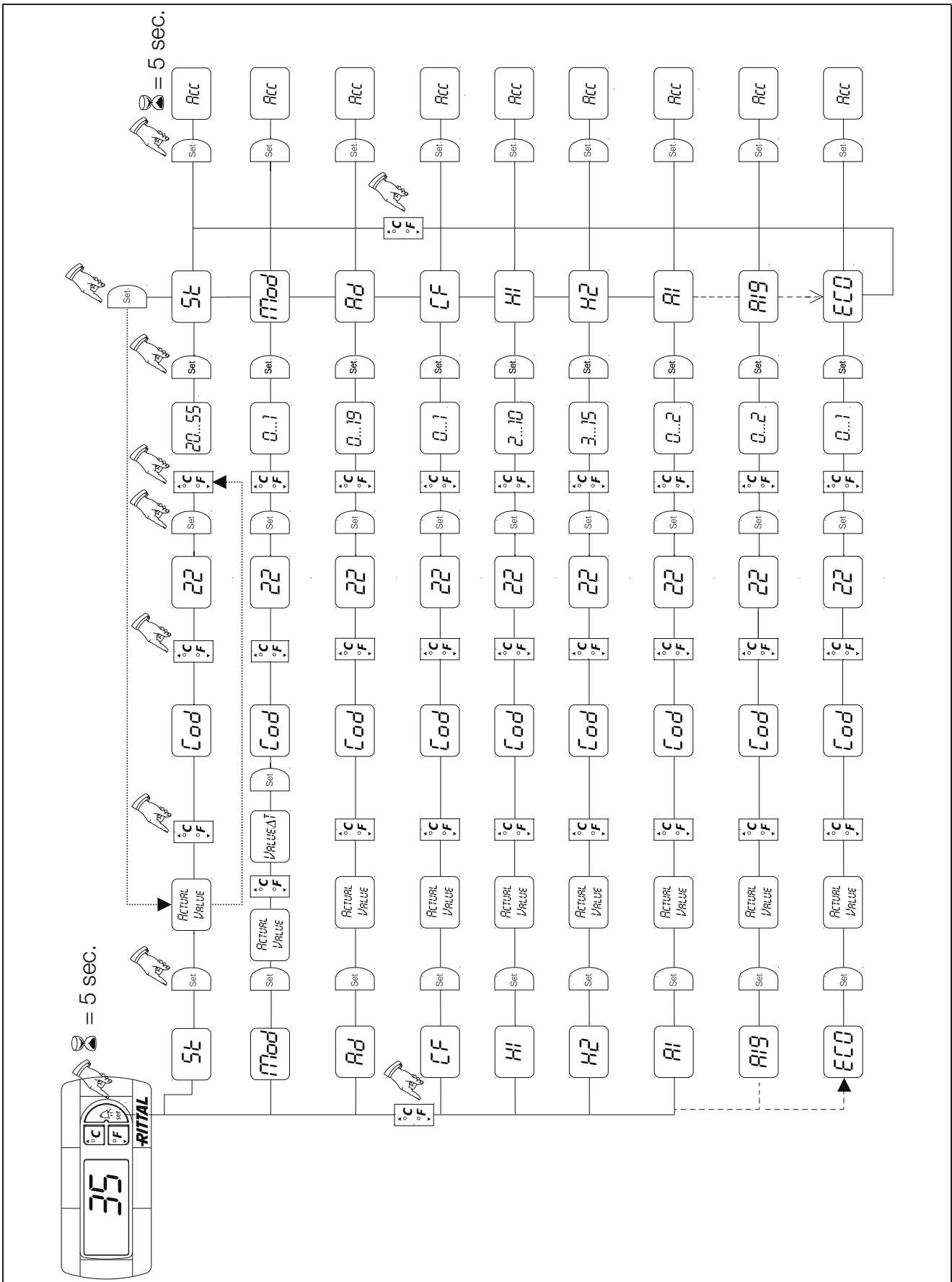


Fig. 20: Programming overview of e-Comfort controller

6.8 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 6.10 "Evaluating system messages" (see also fig. 20).

Progr. level	Display screen	Min. value	Min. value	Factory setting	Type or location of fault
7	A01	0	2	0	Enclosure door open
8	A02	0	2	0	Internal temperature of enclosure too high
9	A08	0	2	1	Condensate warning
10	A10	0	2	1	Fan blocked or defective
11	A16	0	2	1	Internal temperature sensor
12	A18	0	2	1	EPROM
13	A19	0	2	0	LAN/Master-Slave
14	A20	0	2	0	Voltage drop

Tab. 4: 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. System message relays with normally open contact, see wiring diagrams at section 4.6.2 "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 2
- **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)

6.9 Setting the master-slave identifier

When several air/water heat exchangers are connected together (maximum 10), 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 exchanger
- 03: Master with 3 slave air/water heat exchanger
- 04: Master with 4 slave air/water heat exchanger
- 05: Master with 5 slave air/water heat exchanger
- 06: Master with 6 slave air/water heat exchanger
- 07: Master with 7 slave air/water heat exchanger
- 08: Master with 8 slave air/water heat exchanger
- 09: Master with 9 slave air/water heat exchanger

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

7 Inspection and maintenance

- 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

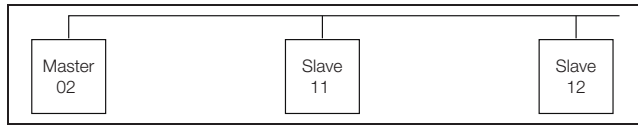


Fig. 21: Master-slave connection (example)

For details of how to set the identifier, see section 6.5 "Editable parameters" or section 6.7 "Programming overview of e-Comfort controller", parameter "Ad".

6.10 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 drainage; correct any kinks or blockages in the hose
A10	Fan	Blocked or defective	Clear the blockage; replace if necessary
A16	Internal temperature sensor	Open or short-circuit	Replace
A18	EPROM error	New board installed incorrectly	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 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	Replace the boards

Tab. 5: Troubleshooting with the e-Comfort controller

7 Inspection and maintenance



Warning!

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

7.1 General

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 60,000 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 the air/water heat exchanger.

Sequence of maintenance measures:

- Check the level of dirt.
- Check the noise generation of the fan.

7.2 Fan replacement

- Open the door of the air/water heat exchanger.
- On the front of the cover, pull out the two connectors "Signal" and "Power" for the fan you wish to replace.

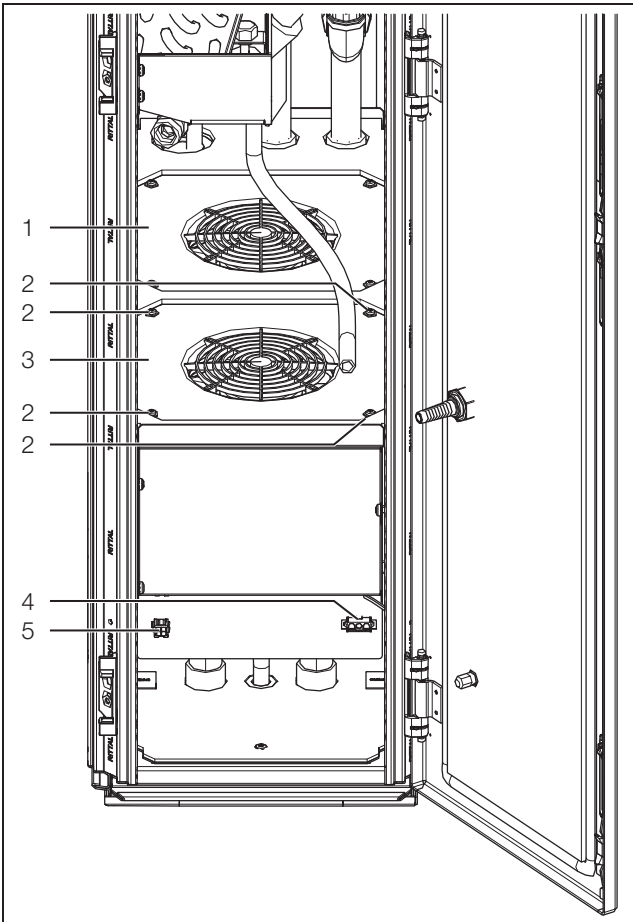


Fig. 22: Fan replacement

Key

- 1 Rear fan
- 2 Assembly screws, front fan
- 3 Front fan
- 4 "Power" connector
- 5 "Signal" connector

- Loosen and remove the fan's four assembly screws.
- Pull the fan forwards and upwards out of the air/water heat exchanger.
- Fit a new fan in the reverse order.

8 Draining, 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.

During storage and transportation below freezing point, the air/water heat exchanger should be drained:

- Open the inlet and return on the top of the device.
- Open the drain valve (fig. 1, item 12).
- Open the magnetic valve by simultaneously pressing keys 2 (°C) and 3 ("Set") (fig. 16) on the e-Comfort controller for 5 seconds.

The magnetic valve will then be opened for approximately 5 minutes.

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

9 Technical specifications

EN

9 Technical specifications

- 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.

Technical specifications		
General specifications		
Model number	SK 3378.200	SK 3378.280
Dimensions (width x height x depth) [mm]	300 x 2000 x 600	300 x 2000 x 800
Weight [kg]	106	115
Noise pressure level L _p [dB(A)]	<60	
Cooling output		
Cooling medium	Water (see section 11 "Hydrological data")	
Water connection	¾" internal thread	
Useful cooling output [kW] L35 W10, 2000 l/h	9.5	
Air throughput of fans (unimpeded air flow) [m ³ /h]	975 per fan	
Water inlet temperature [°C]	>+7...+30	
Permissible operating pressure p. max. [bar]	1...6	
Operating temperature [°C]	+5...+70	
Setting range [°C]	+20...+55	
Electrical specifications		
Electrical connection	Wiring on terminal strip	
Rated operating voltage [V, ~]	230	
Rated frequency [Hz]	50/60	
Rated current [A]	2.65/2.62	
Pre-fuse T	4	
Power consumption P _{el} to DIN 3168 [W]	350/350	
Protection category to IEC 60 529	IP 55	
Duty cycle	100 %	

Tab. 6: Technical specifications

10 List of spare parts

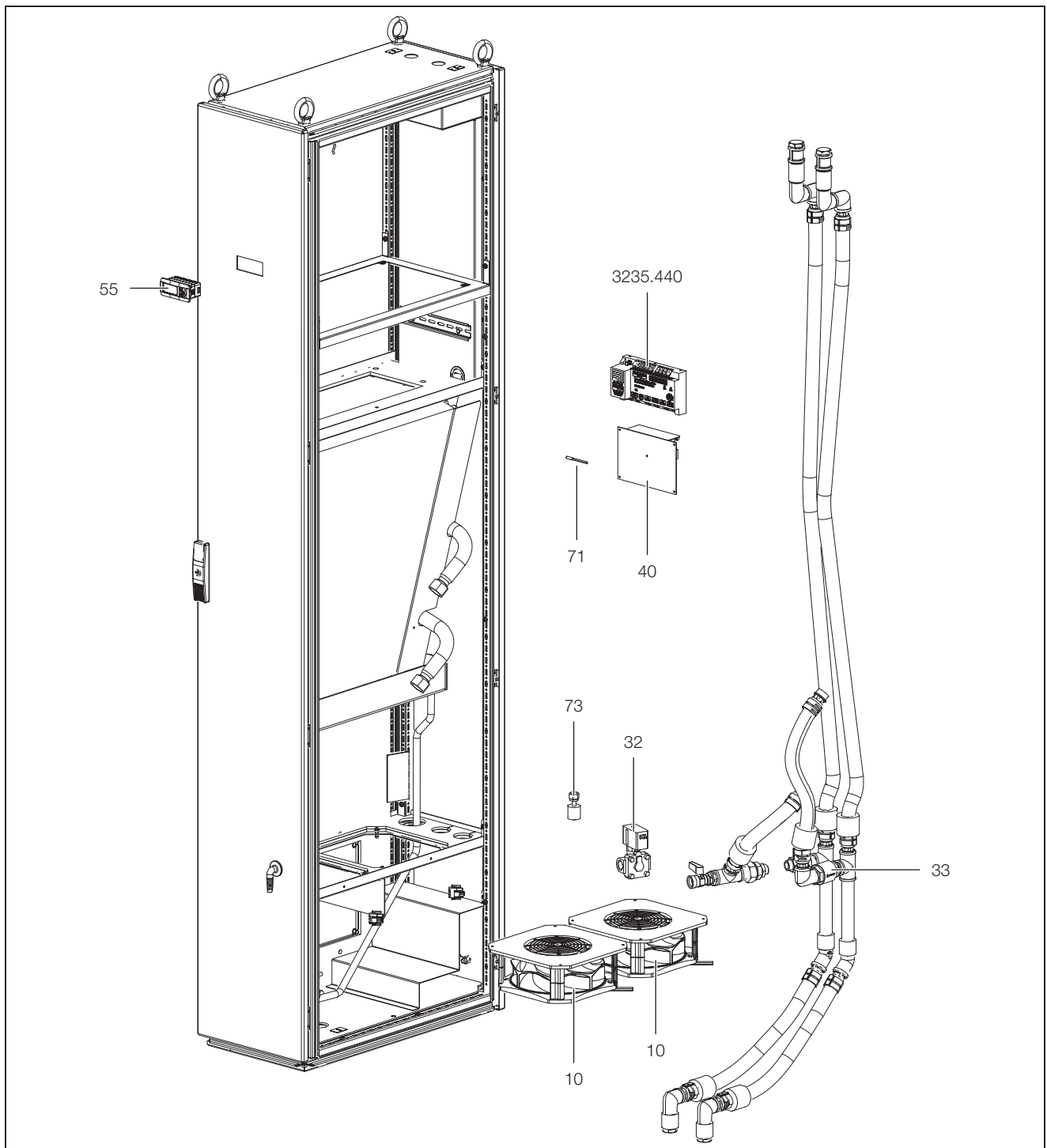


Fig. 23: List of spare parts

Key

- 10 Fan
- 32 Magnetic valve
- 33 Non-return valve
- 40 Controller board
- 55 Display
- 71 Temperature sensor
- 73 Leak detection
- 3235.440 Control unit for EC fan (optional/accessory)



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	Limits
pH value		7...8.5
Calcium hardness	°dH	>3 ...<8
Free carbonic acid	mg/dm ³	8...15
Corresponding carbonic acid	mg/dm ³	8...15
Aggressive carbonic acid	mg/dm ³	free
Sulphides	mg/dm ³	free
Oxygen	mg/dm ³	<10
Chloride ions	mg/dm ³	<50
Sulphate ions	mg/dm ³	<250
Nitrates and nitrites	mg/dm ³	<10
COD	mg/dm ³	<7
Ammonia	mg/dm ³	<5
Iron	mg/dm ³	<0.2
Manganese	mg/dm ³	<0.2
Conductivity	µS/cm	<2200
Residue on evaporation	mg/dm ³	<500
Potassium perman-ganate	mg/dm ³	<25
Suspended matter	mg/dm ³	<5
	mg/dm ³	>3...<15; partial current puri- fication recom- mended
	mg/dm ³	>15; continuous purifi- cation recom- mended

Tab. 7: 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 Application example

Parallel connection of air/water heat exchangers with cold water supply via a recooling system.

Overflow valves and bypass control should be integrated into the recooling system and the customer's own pipeline system respectively.

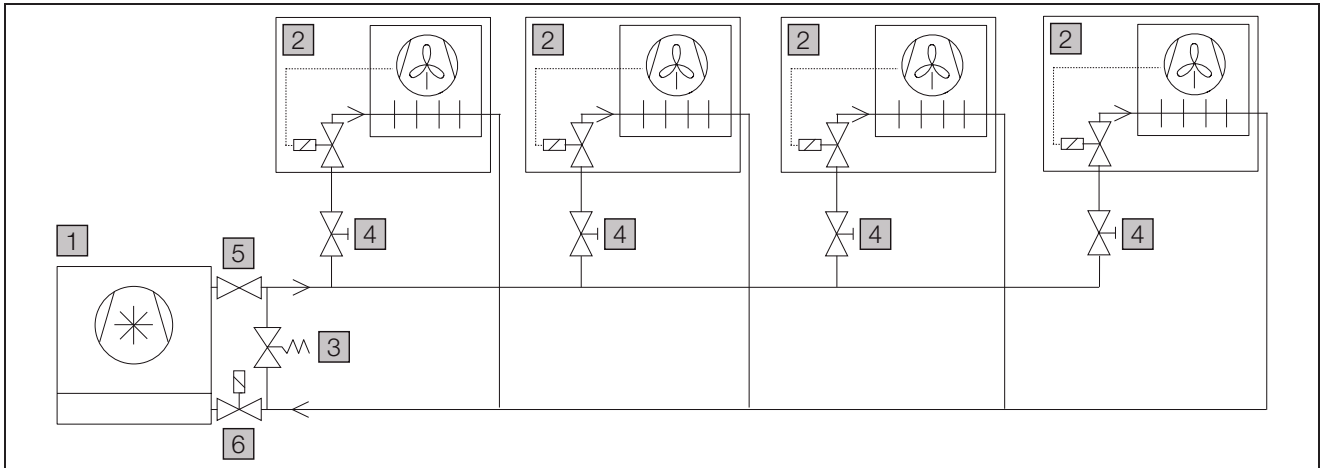


Fig. 24: Parallel connection of 4 air/water heat exchangers

Key

- 1 Recooling system
- 2 Air/water heat exchanger
- 3 Overflow valve (bypass function with closed magnetic valve in the air/water heat exchanger)
- 4 Flow regulator valve (for volumetric flow control for air/water heat exchangers)
- 5 Non-return valve (optional)
- 6 Magnetic valve (optional)

13 Appendix

13.1 Characteristic curves

13.1.1 Water resistance

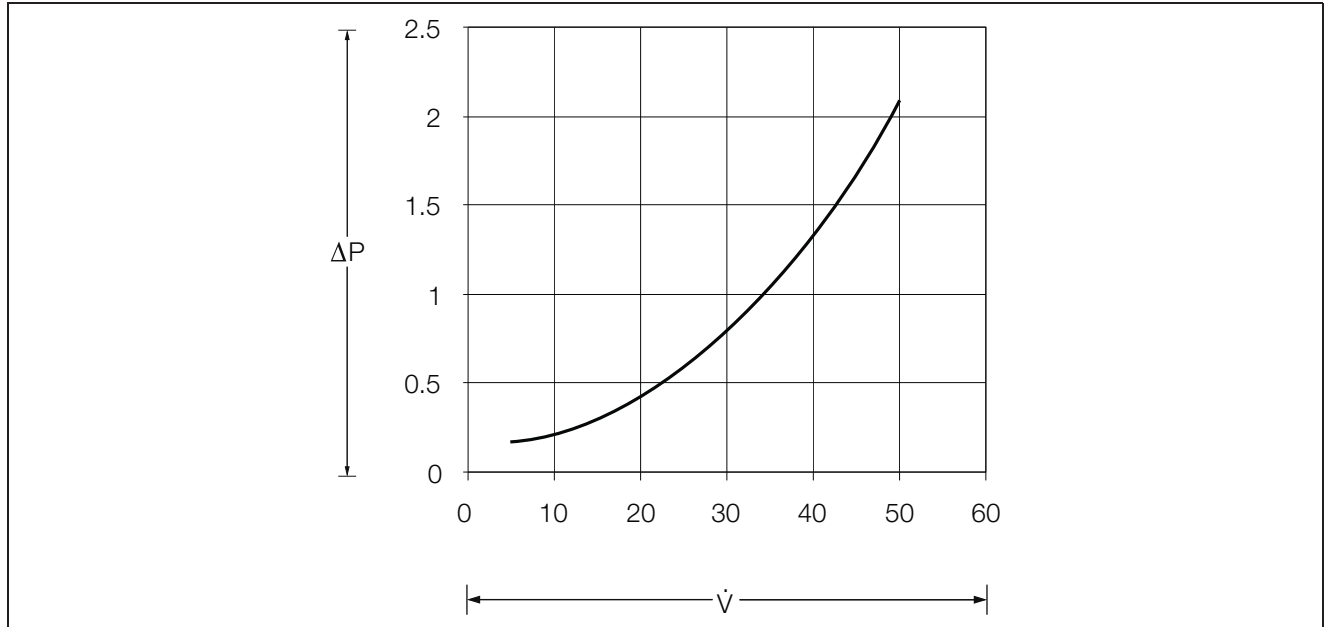


Fig. 25: Water resistance

Key

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

13.2 Drawings

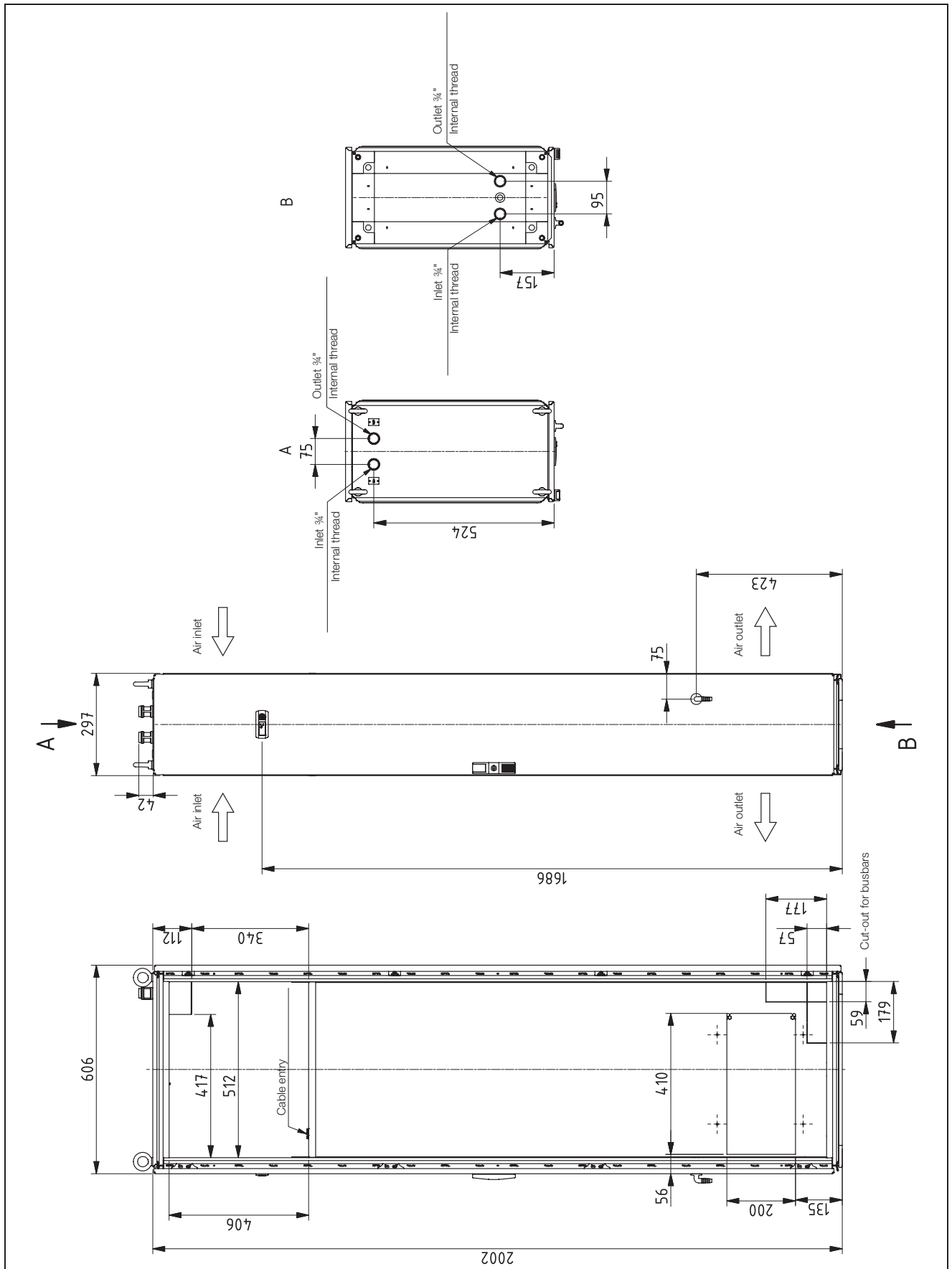


Fig. 26: 3378.200

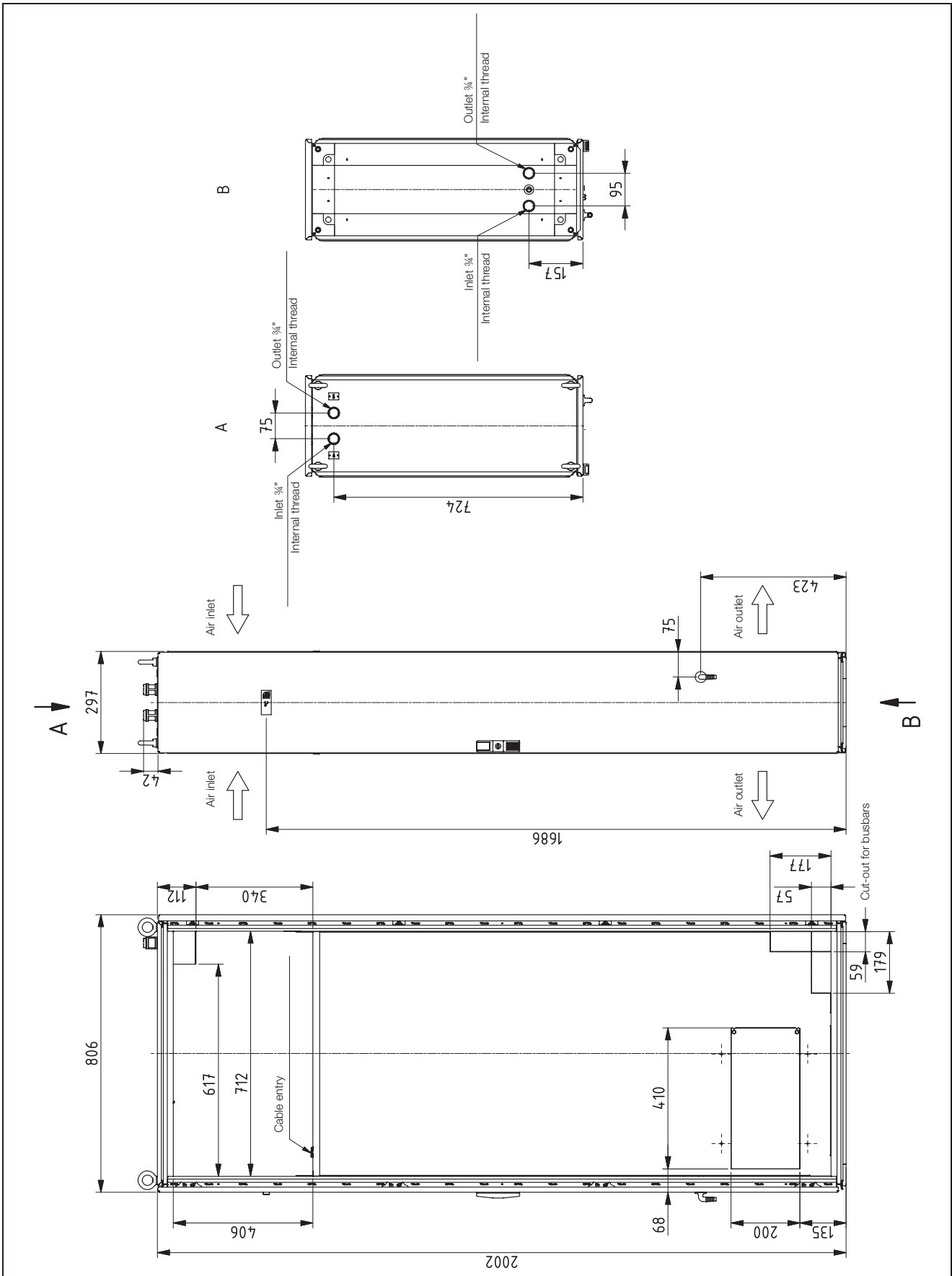


Fig. 27: 3378.280

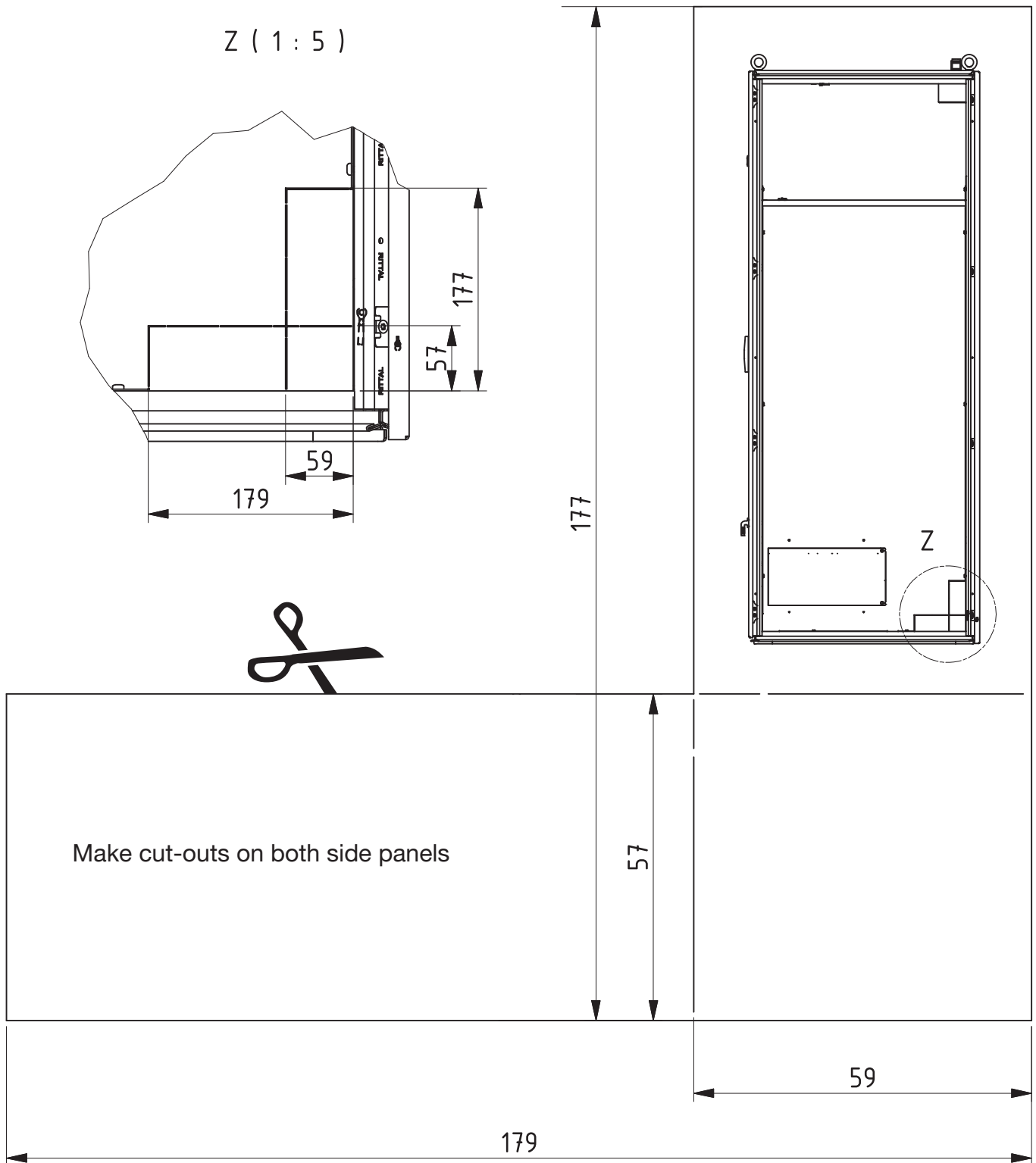


Fig. 28: Template

13.3 Circuit diagram

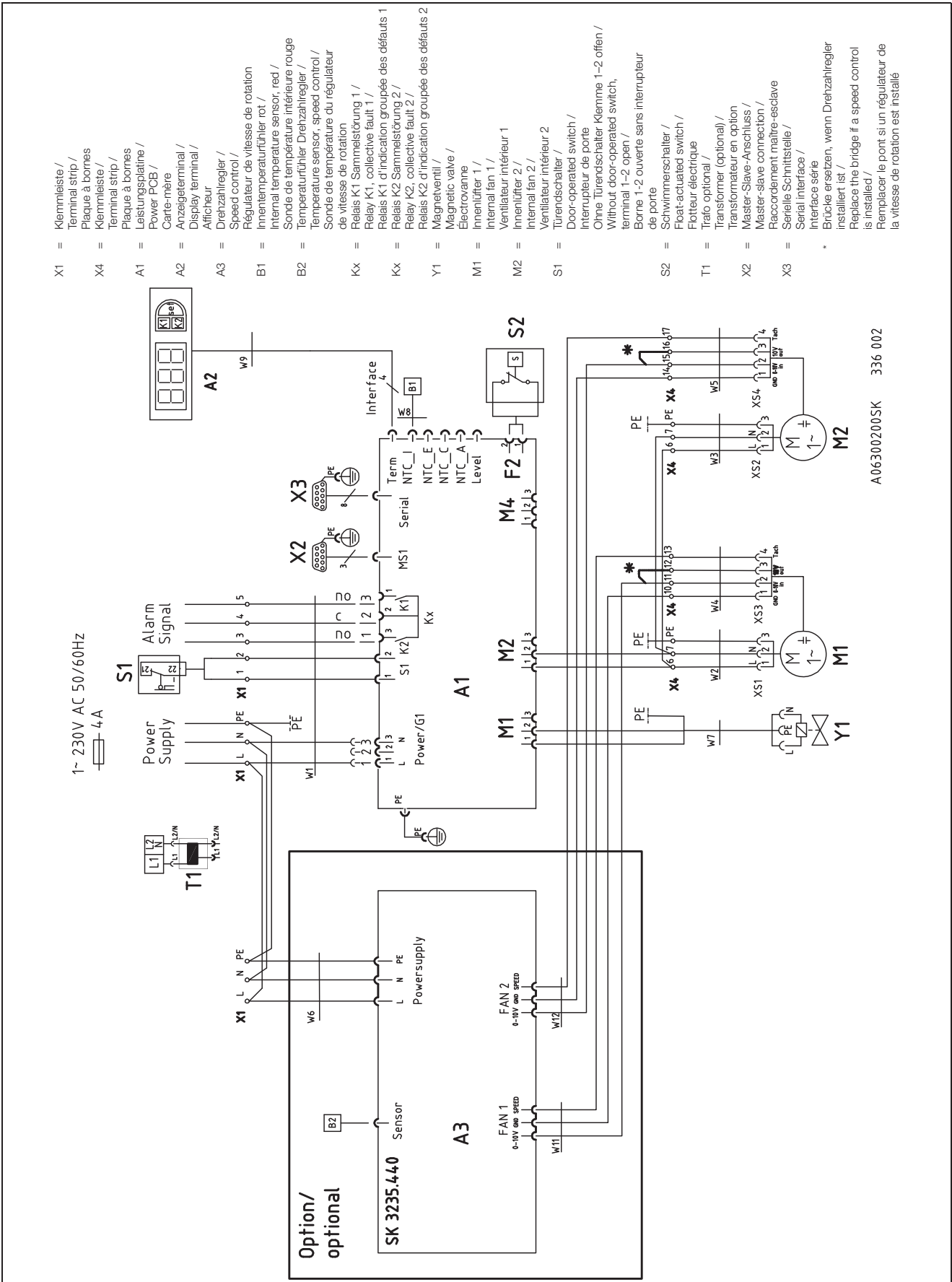


Fig. 29: Circuit diagram

14 Declaration of conformity

EG-Konformitätserklärung
Maschinenrichtlinie 2006/42/EG Anhang II A
EC Declaration of Conformity
Machinery Directive 2006/42/EC Annex II A

Dri161780500



Wir
We

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

erklären hiermit, dass die Produkte
hereby declare that the products

Liquid Cooling Package LCP Rack Industry

SK 3378.200, SK 3378.280, SK 3378.209, SK 3378.289

folgender Richtlinie entsprechen:
conform with 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:

EMV-Richtlinie 2014/30/EU
EMC Directive 2014/30/EU

Angewandte harmonisierte Normen:
Applied harmonised standards

EN ISO 12100	Sicherheit von Maschinen (<i>Safety of machinery</i>)
EN 378-2	Kälteanlagen und Wärmepumpen (<i>Refrigerating systems and heat pumps</i>)
EN 60335-2-40	Sicherheit elektrischer Geräte (<i>Electrical appliances - safety</i>)
EN 61000-6-2:2005	Elektromagnetische Verträglichkeit (<i>Electromagnetic compatibility</i>)
EN 61000-6-3:2007, A1:2011	Elektromagnetische Verträglichkeit (<i>Electromagnetic compatibility</i>)

Weitere angewandte Normen:
Additionally applied standards:

UL 1995 ed. 4	Heiz- und Kühleinrichtungen (<i>Heating and cooling equipment</i>)
EN 14511-3	Flüssigkeitskühlsätze und Wärmepumpen - Prüfverfahren (<i>Liquid chilling packages and heat pump – test methods</i>)

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, 29.02.2016

Verantwortlich für Dokumentation
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Fig. 30: Declaration of conformity

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