RITTAL TOP—THERM PLUS




Schaltschrank-Kühlgerät

Cooling unit

Climatiseur

Koelaggregaat

Kylaggregat

Condizionatori per armadi di comando

Refrigerador para armarios

エンクロージャー用クーリングユニット

SK 3302.xxx
SK 3302.3xx
SK 3303.xxx
SK 3304.xxx
SK 3305.xxx
SK 3328.xxx
SK 3329.xxx
SK 3332.xxx
SK 3361.xxx
SK 3366.xxx
SK 3377.xxx

Montage-, Installations- und Bedienungsanleitung

Assembly and operating instructions

Manuel d'installation et de maintenance

Montage- en bedieningshandleiding

Montage- och hanteringsanvisning

Istruzioni di montaggio

Instrucciones de montaje

取扱説明書

FRIEDHELM LOH GROUP

RITTAL®

GB

Contents

GB

1 Notes on documentation

These assembly instructions are aimed at tradespersons who are familiar with assembly and installation of the cooling unit, and at trained specialists who are familiar with operation of the cooling unit.

1.1 Associated documents

There are two sets of instructions for the unit types described here:

– Assembly and installation instructions enclosed with the unit in the form of a paper document.
– Assembly, installation and operating instructions enclosed with the unit in the form of a PDF file (Adobe Acrobat) on CD-ROM.

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

1.2 CE labelling

The declaration of conformity is supplied with the unit as a separate document.

1.3 Retention of documents

These instructions and all associated documents shall constitute an integral part of the product. They must be supplied to the plant operator. The plant operator shall be responsible for storage of the documents, to ensure that they are readily available when needed.

1.4 Symbols used

Please observe the following safety instructions and other notes in this guide:

Symbol for an instructed action:

• The bullet point indicates that you should perform an action.

Safety and other instructions:

Danger!
Immediate danger to life and limb!

Caution!
Potential threat to the product and its environment.

Note:
Useful information and special features.

2 Safety notes

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

– Assembly, installation and servicing must only be carried out by properly trained specialists.
– Screw the enclosure to the floor to prevent it from tipping over when the cooling unit is installed.
– Do not obstruct the air inlet and air outlet of the cooling unit inside and outside the enclosure (see also section 4.2.2).
– To ensure problem-free opening and closing of the enclosure door, use a ride-up door roller (refer to the accessories in the Rittal Catalogue). This raises the door slightly and balances out the weight of the cooling unit, to prevent buckling of the door and associated seal problems.
– The heat loss of the components installed in the enclosure must not exceed the specific useful cooling output of the cooling unit.
– When transporting the enclosure with the cooling unit externally mounted, always use an additional shipping brace to support the cooling unit.
– The cooling unit must always be transported in an upright position.
– Only use original spare parts and accessories.
– Do not make any changes to the cooling unit other than those described in these instructions or associated instructions.
– Risk of burn injuries! For cooling units with automatic condensate evaporation, the surface of the thermal element will get very hot during operation, and will remain so for some time afterwards.
– The mains connector of the cooling unit must only be connected and disconnected with the system de-energised. Connect the pre-fuse specified on the rating plate.

3 Device description

Depending on the model chosen, your cooling unit may vary in appearance from the illustrations contained in these instructions. However, the functions are identical in principle.

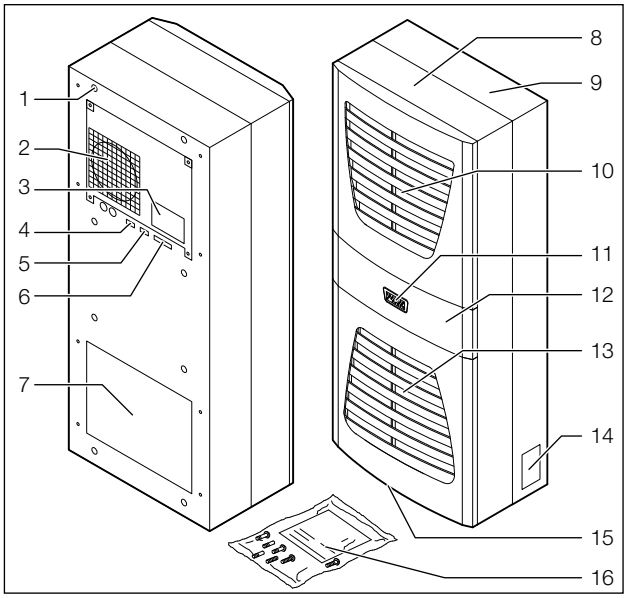


Fig. 1: Device description

Key

1 Blind nut
2 Evaporator fan
3 Electrical wiring plan
4 X2 master/slave connection
5 X3 optional serial interface
6 X1 terminal strip
7 Air outlet hole
8 Front half of the enclosure
9 Rear half of the enclosure
10 Louvred grille for air outlet
11 Controller
12 Infill panel
13 Louvred grille for air inlet
14 Rating plate
15 Condensate discharge
16 Dispatch bag

3.1 Functional description

Enclosure cooling units are designed to dissipate heat from enclosures by cooling the air inside the enclosure and protecting temperature-sensitive components. They are built into the side or rear panel or into the door of the enclosure.

3.1.1 How it works

The cooling unit (compression refrigeration system) is comprised of four main components (see Fig. 2): the evaporator (1), the coolant compressor (2), the condenser (3), and the control or expansion valve (4), which are connected by suitable pipework. This circuit is filled with a readily boiling substance, the refrigerant. Coolant R134a (CH_2FCF_3) is chlorine-free. Its ozone destruction potential is 0, making it very eco-friendly. A filter dryer (5) which is integrated into the hermetically sealed cooling circuit provides effective protection against moisture, acid, dirt particles, and foreign bodies within the cooling circuit.

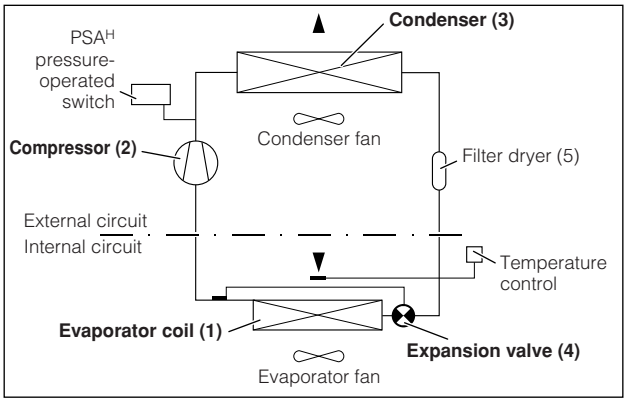


Fig. 2: Cooling circuit

In the evaporator coil (1), the liquid coolant is converted to a gaseous state. The energy needed for this purpose is taken from the enclosure air in the form of heat, which has the effect of cooling the enclosure air. In the compressor (2), the coolant is heavily compressed, so that it achieves a higher temperature inside the condenser (3) than the ambient air. This means that excess heat may be emitted to the ambient air via the surface of the condenser, as a result of which the temperature of the coolant drops and it is converted back into liquid. It is re-injected into the evaporator coil via a thermostatic expansion valve (4), which causes it to cool down further, and is then once again able to absorb the energy from the enclosure air in the evaporator coil. The whole cycle begins again.

3.1.2 Controller

Rittal enclosure cooling units are fitted with a controller for setting the functions of the cooling unit. Depending on the design, this is either a Basic controller (display of the operating status via LED) or a Comfort controller (display plus extended functions, see chapter “6 Operation”, page 22).

3.1.3 Bus mode (Comfort controller only)

The serial interface X2 allows you to create a bus connection with up to 10 cooling units using the master/slave cable (shielded, four-wire cable, Model No. SK 3124.100). This allows you to implement the following functions:

– Parallel unit control (the cooling units 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, an address is assigned to each device which also includes the identifier “master” or “slave”.

3.1.4 Safety equipment

– In the cooling cycle, the cooling unit has a tested pressure-operated switch to EN 12 263 which is set to maximum PS (admissible pressure); this operates via an automatic reset device whenever the pressure drops again.
– Temperature monitoring prevents the evaporator coil from icing over. If there is a risk of icing over, the compressor switches itself off and automatically switches itself on again at higher temperatures.
– The refrigerant compressor and the fans are equipped with thermal winding shields to protect against excess current and excess temperatures.
– In order to allow a reduction of pressure inside the compressor and hence a safe restart, once it has been switched off (e.g. upon reaching the set temperature via the door limit switch function or via de-energising), the device will switch back on with a delay of 180 seconds.
– The device has one (in the case of the Basic controller) or two (in the case of the Comfort controller) integral floating contacts on the connection clamp (system message relay with changeover contact, terminal 3 – 5) which may be used to retrieve messages from the cooling unit, e.g. via PLC.

3.1.5 Condensation

At high levels of humidity and low temperatures inside the enclosure, condensation may form on the evaporator coil.

The cooling units (except SK 3302.xxx, SK 3303.xxx and SK 3361.xxx) have automatic, electric condensate evaporation. The thermal component used for this purpose is based on self-regulating PTC technology. Condensation arising on the evaporator coil is collected in a tank in the external circuit of the cooling unit, and partially evaporated via the airflow. When the water level rises, the water enters the PTC thermal component and is evaporated (through-flow principle). The water vapour flows out of the cooling unit with the airflow from the external fan.

The PTC thermal component is permanently connected and has no switchpoint. It is protected against short-circuits with miniature fuses. If the fuse has tripped, any condensation is drained off via the safety overflow.

For unit types SK 3302.xxx, SK 3303.xxx and SK 3361.xxx, the condensation is routed downwards out of the unit via a drain pipe on the evaporator coil divider panel. For this purpose, a hose must be connected to the condensate nozzle (see “4.4 Connecting the condensate drain”, page 11). External condensate evaporators are available as accessories for these unit types (refer also to the accessories in the Rittal Catalogue).

3.1.6 Filter mats

The entire condenser in the cooling units is finished with a dirt-repelling, easy-to-clean RiNano coating. In many cases, therefore, the use of filter media is unnecessary, particularly in the case of dry dusts.

For coarse dust and lint in the enclosure air, we recommend installing an additional PU foam filter mat (available as an accessory) in the cooling unit. Depending on the incidence of dust, you will need to replace the filter from time to time.

For air containing oil condensation, we recommend the use of metal filters (also available as an accessory). These may be cleaned with suitable detergents and reused.

Function of the filter mat monitor:

Dirt on the filter mat is automatically determined by measuring the temperature difference in the external circuit of the cooling unit. As the level of filter mat soiling rises, the temperature difference will increase. The nominal value of the temperature difference in the external circuit adapts automatically to the relevant operating points in the performance diagrams. Hence there is no need to readjust the nominal value for different unit operating points.

3.1.7 Door limit switch

The cooling unit 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. PS 4127.000).

The door limit switch function causes the fans and the compressor 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. In order to prevent damage to the unit, it is equipped with an ON delay: The evaporator fan cuts back in with a delay of approximately 15 seconds after the door has been closed, while the condenser fan and compressor switch on after approximately 3 minutes.

Note:
For Basic controller cooling units with 230/115 V and 400 V/2-phase connection, the evaporator fan remains operational even with the door open.

3.1.8 Additional interface X3

Note:
The electrical signals at the interface are extra-low voltages (not safety extra-low 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 cooling unit into superordinate monitoring systems (available as an accessory, interface card Model No. SK 3124.200).

3.2 Proper usage

Rittal enclosure cooling units were developed and designed in accordance with the state of the art and the recognized rules governing technical safety. Nevertheless, if used improperly, they may pose a threat to life and limb or cause damage to property. The device is only intended for cooling enclosures. Any other use shall be 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 shall be borne solely by the user.

Proper usage shall also include the observance of all valid documents and compliance with the inspection and servicing conditions.

3.3 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	Enclosure cooling unit
1 1 1 1 1 4 – 10 1	Dispatch bag: – Assembly and installation instructions – Assembly, installation and operating instructions on CD-ROM – Self-adhesive tape – Connector X1 – Threaded rods – Declaration of conformity – Nuts, washers
1	Drilling template

Tab. 1: Scope of supply

4 Assembly and connection

4.1 Choosing an installation site

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

– The installation site and the positioning of the cooling unit must be selected in such a way as to ensure good ventilation (distances between units and distances between the unit and the wall must be at least 200 mm in each case).
– The cooling unit must be installed and operated in a vertical position (maximum deviation: 2°).
– The site must be free from excessive contamination and moisture.
– The ambient temperature must not exceed 55°C.
– It must be possible to create a condensate drain (see “4.4 Connecting the condensate drain”, page 11).
– The mains connection data as stated on the rating plate of the device must be guaranteed.

4.2 Assembly instructions

4.2.1 General

– Check the packaging carefully for signs of damage. Traces of oil on damaged packaging are an indication of refrigerant loss and leakages. Any packaging damage may be the cause of a subsequent functional failure.
– The enclosure must be sealed on all sides (IP 54). Condensation will occur if the enclosure is not airtight.
– In order to avoid excessive condensation in the enclosure, we recommend installing a door limit switch (e.g. PS 4127.000) which deactivates the cooling unit when the enclosure door is opened (see “3.1.7 Door limit switch”, page 6).

GB

4.2.2 Layout of the electronic components in the enclosure

Note:
Risk of condensation!
When arranging the electronic components inside the enclosure, please ensure that the cold airflow from the cooling unit is not directed at active components. Please ensure that the cold airflow is not pointing directly 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 cooling unit's internal safety devices to cease cooling operation.

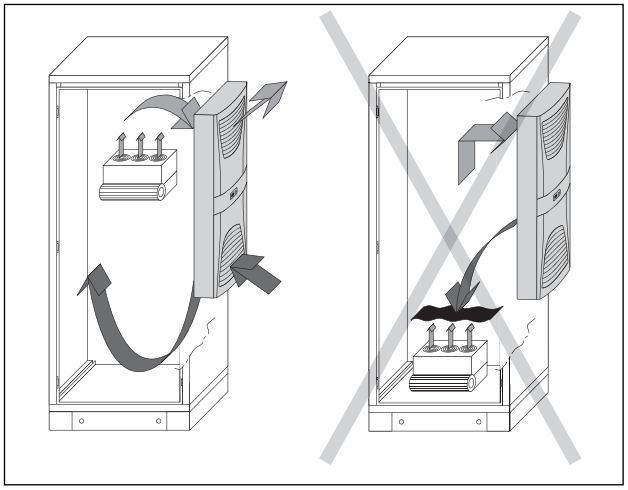


Fig. 3: Never direct the cold air flow at active components

Air diversion components are available as accessories – please refer to the Rittal Catalogue under "System climate control".

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. Measure the distance "x" (see Fig. 4) from electronic components and other installed enclosures so that the required air circulation is not obstructed and prevented.

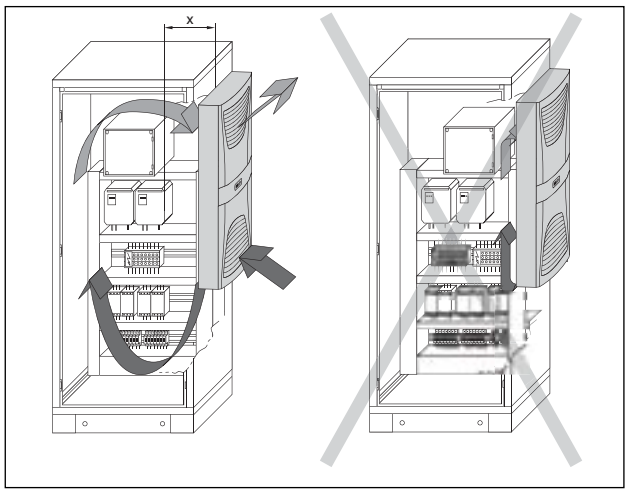


Fig. 4: Air circulation inside the enclosure

4.3 Fitting the cooling unit

The enclosure cooling unit may optionally be externally mounted on the enclosure (1), partially internally mounted (2) or fully internally mounted (3):

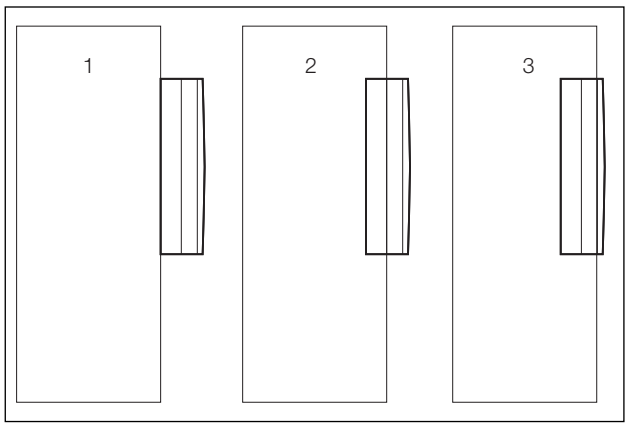


Fig. 5: Installation method

To this end, cut the side panel or door of the enclosure as per the drilling template included with the supply, and drill the relevant holes.

Note:
Units of type SK 3302.xxx can only be either externally mounted or fully internally mounted.
Units of type SK 3332.xxx can only be either externally mounted or partially internally mounted.
For mounting the units SK 3328.xxx, SK 3329.xxx and SK 3332.xxx in the TS side panel or rear panel, we recommend the use of enclosure panel fasteners TS 8800.071 (see Rittal Catalogue).

4.3.1 Cutting out the enclosure

- Stick the supplied drilling template onto the side panel or door of the enclosure using adhesive tape.

There are dimensioning lines on the drilling template to suit the various installation options for your cooling unit.

- Using the dimension drawings (see Appendix), identify the valid lines and dimensions for your installation type on the drilling template.

Risk of injury!
Carefully deburr all drilled holes and cut-outs to prevent injuries caused by sharp edges.

- Mark, drill and deburr the holes.
- Make the cut-outs including the line width as per the drilling template.
  Deburr the cut-outs.

4.3.2 External mounting of the cooling unit

- Cut the supplied sealing tape to the correct length and stick it carefully along the back of the unit so that no gaps are left at the joints.

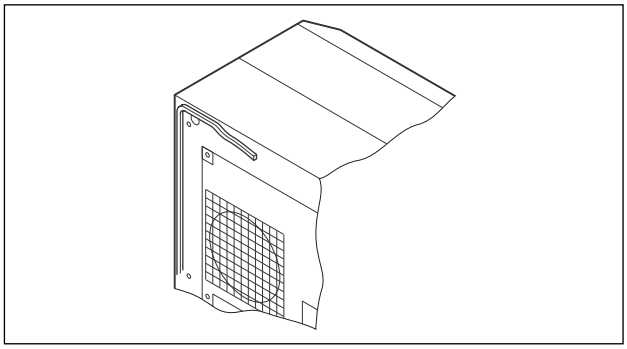


Fig. 6: Attach the sealing tape

- Screw the supplied grub screws into the blind nuts on the rear of the unit.
- Secure the unit using the washers and nuts supplied.

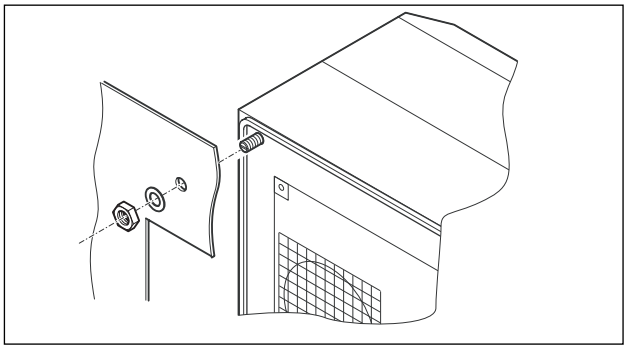


Fig. 7: Secure the cooling unit (all models except SK 3302.1xx)

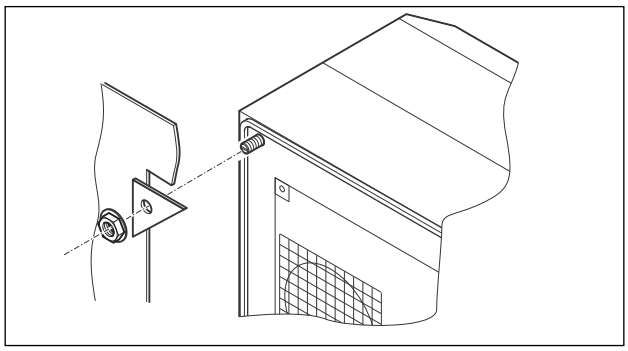


Fig. 8: Secure the cooling unit (SK 3302.1xx only)

Only for SK 3302.xxx:

- Before installing, remove the four screws as shown.

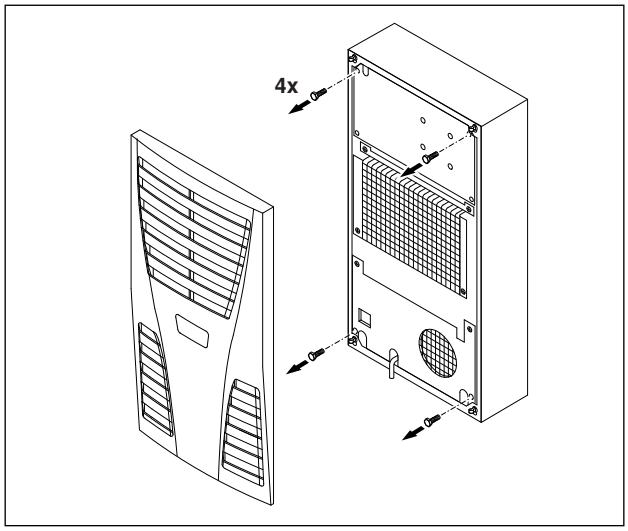


Fig. 9: Only for SK 3302.xxx: Remove the four screws

4.3.3 Partial internal mounting of the cooling unit

- Carefully remove the louvred grille and, where applicable, the infill panel, from the enclosure by pulling forwards.
- Carefully disconnect the connector from the rear of the display and gently push it inwards through the cable gland.

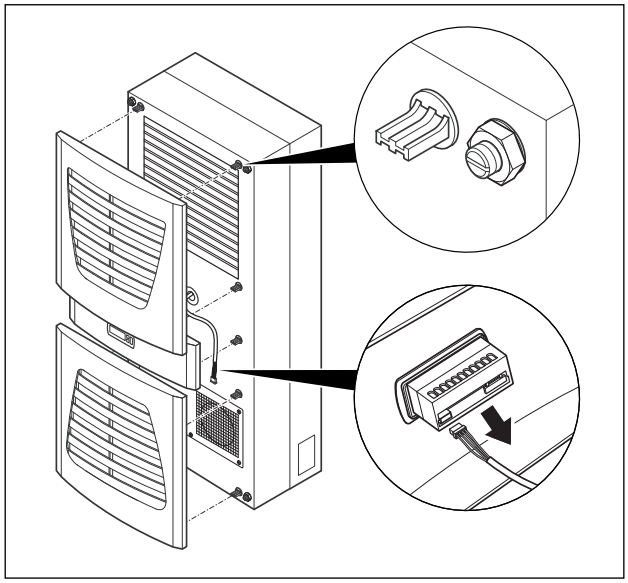


Fig. 10: Remove the louvred grille & disconnect the display

4 Assembly and connection

Risk of damage!
Stability of the cooling unit is only guaranteed in its assembled state. Brace the rear enclosure half to prevent it from falling over before removing the front enclosure half.

- Loosen the four nuts on the front enclosure half and pull the enclosure forwards by approx. 5 cm.
- Loosen the flat-pin connectors of the PE conductor between the two enclosure halves.
- Disconnect the fan connection.
- Remove the front enclosure tray completely.

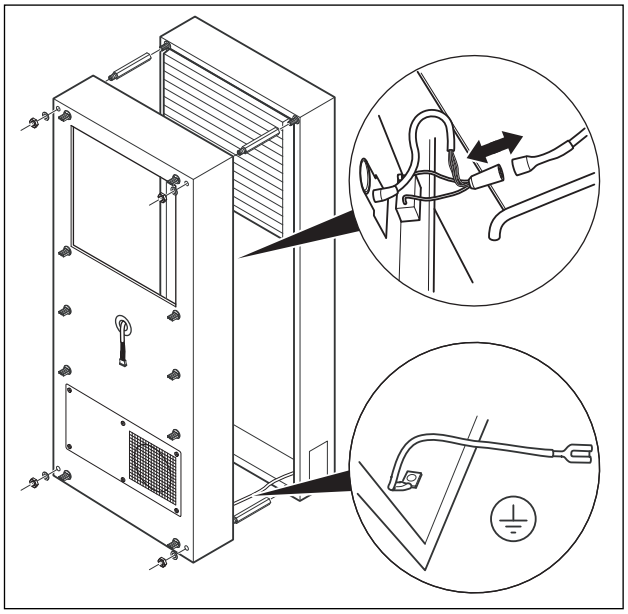


Fig. 11: Remove the cover

- Remove the four spacer bolts.
- Cut the supplied sealing tape to the correct length and stick it carefully along the inside of the rear enclosure half so that no gaps are left at the connection points.

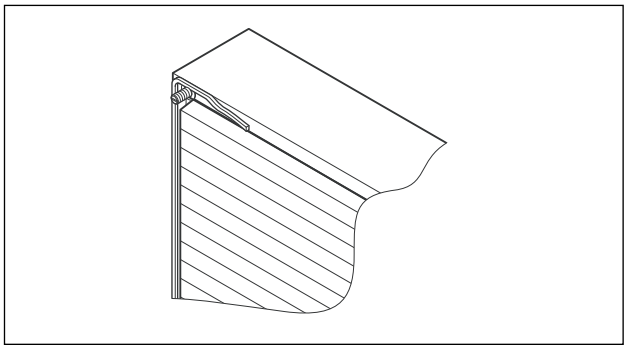


Fig. 12: Attach the sealing tape

- Push the rear enclosure half into the mounting cut-out and secure it with the four spacer bolts.
- Push the display cable through the cable gland of the front enclosure half.

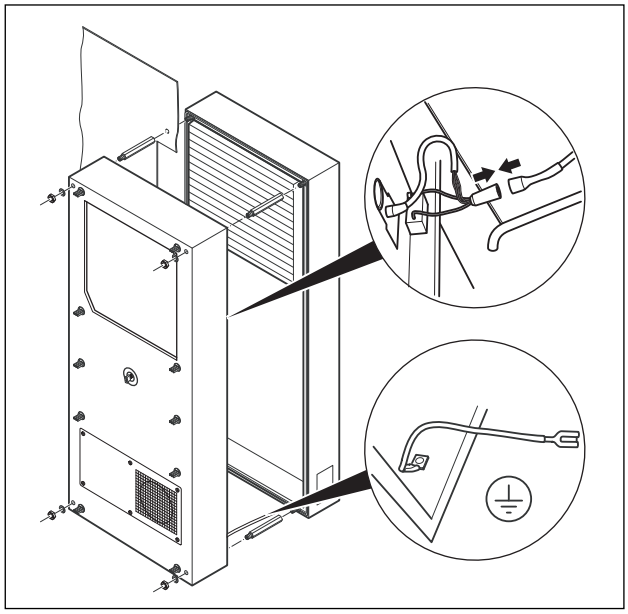


Fig. 13: Secure the cooling unit

- Connect the fan connector and PE conductor.
- Mount the front enclosure tray using the washers and nuts.

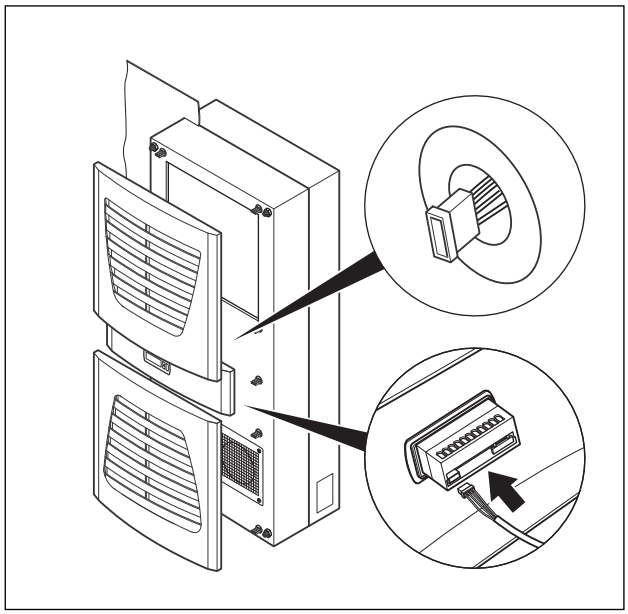


Fig. 14: Connect the display connector

- Carefully connect the display connector.
- Push the louvred grille and, where applicable, the infill panel, onto the enclosure.

4.3.4 Full internal mounting of the cooling unit

- Carefully remove the louvred grille and the infill panel from the enclosure by pulling forwards.
- Carefully disconnect the connector from the rear of the display.

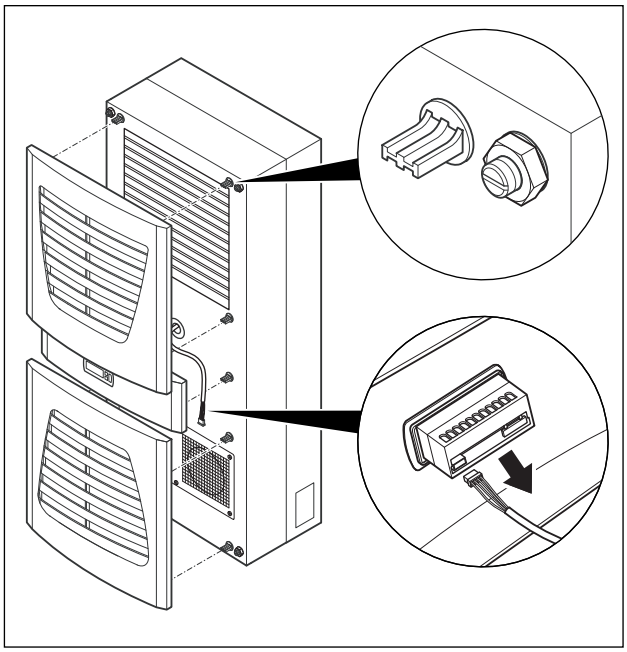


Fig. 15: Remove the louvred grille and disconnect the display

- Cut the supplied sealing tape to the correct length and stick it carefully along the front enclosure half so that no gaps are left at the connection points.

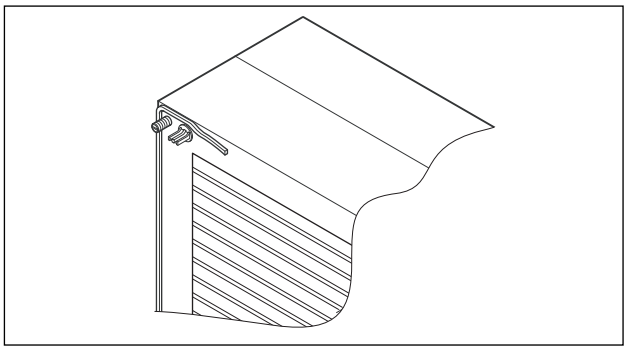


Fig. 16: Attach the sealing tape

- Loosen the four nuts and washers from the front enclosure half.
- Push the unit into the mounting cut-out from the inside of the enclosure, and secure it to the enclosure from the outside using the washers and nuts.

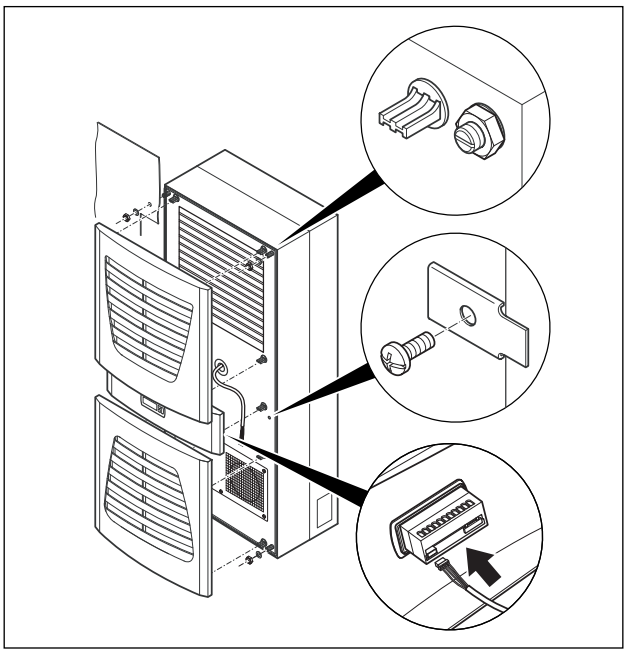


Fig. 17: Secure the cooling unit

- Where necessary, additionally secure the unit using the supplied mounting plates as shown in Fig. 17.
- Carefully connect the display connector.
- Push the louvred grille and, where applicable, the infill panel, onto the enclosure.

4.4 Connecting the condensate drain

Unit types SK 3302.xxx, SK 3303.xxx and SK 3361.xxx support the installation of a condensate discharge hose (Ø $^1/_2$″).

The condensate drain

– 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 to Accessories in the Rittal Catalogue).

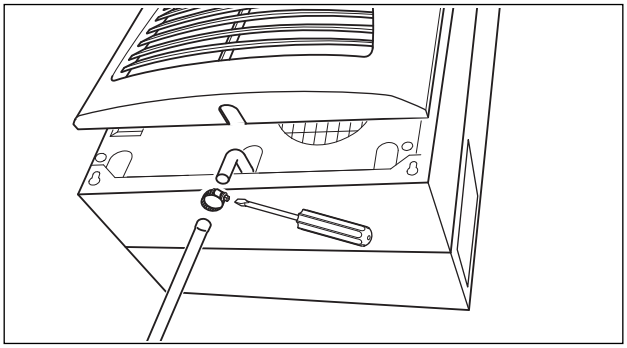


Fig. 18: Connect the condensate drain

- Connect a suitable hose to the condensate nozzle and secure it with a hose clip.
- Lay the condensate hose into a pay-off or into the external condensate evaporator (refer to Accessories in the Rittal Catalogue).

4.5 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. Electrical installation must only be carried out by a qualified electrician who is responsible for compliance with the existing standards and regulations.

4.5.1 Connection data

– The connection voltage and frequency must match the values specified on the rating plate.
– The cooling unit must be connected to the mains via an all-pin isolating device, which ensures at least 3 mm contact opening when switched off.
– No additional temperature control must be connected upstream of the device at the supply end.
– Install the pre-fuse cited on the rating plate (miniature circuit-breaker “K” characteristic or slow fuse) to protect the cable and equipment from short-circuits.
– The mains connection must ensure noiseless potential equalisation.

4.5.2 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 ±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 and compressors in single- and three-phase units are intrinsically safe (thermal winding protection). This also applies to the transformer versions of types SK 3304.110, SK 3304.510, SK 3305.110, SK 3305.510, SK 3328.110, SK 3328.510, SK 3329.110 and SK 3329.510 and to special-voltage units which are likewise equipped with a transformer.
– Install the pre-fuse cited on the rating plate (miniature circuit-breaker with “K” characteristic, motor circuit-breaker or transformer circuit-breaker) to protect the cable and equipment from short-circuits. Select the motor circuit-breaker/transformer circuit-breaker in accordance with the information supplied on the rating plate: Set it to the minimum value specified. 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.

4.5.3 Three-phase devices

– The three-phase variant of models SK 3304.xxx, SK 3305.xxx, SK 3328.xxx, SK 3329.xxx and SK 3332.xxx must be connected to a TN grid with earthed star point (current setting as per rating plate). Special-voltage three-phase units must be protected with a transformer circuit-breaker (category AC-3) as per the rating plate.
– Units designed for three phase 400/460 V have additional monitoring of the rotary field or the absence of a phase. If the rotary field is incorrect or a phase is absent, the unit will not run.

4.5.4 Door limit switch

– Each door limit switch must only be assigned to one cooling unit.
– Several door limit switches may be connected in parallel and operated on one cooling unit.
– The minimum cross-section for the connection cable is 0.3 mm^2 for a cable length of 2 m.
– 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.

4.5.5 Notes on the flicker standard

The flicker limits specified in standard EN 61 000-3-3 or -3-11 are adhered to, provided the supply impedance is less than approx. 1.5 Ω. Where necessary, the unit operator should measure his connected impedance or consult the responsible power supply company. If there is no way of influencing the supply impedance and sensitive installed components (e.g. BUS) experience interference, a line reactor or starting-current limiting device should be connected upstream of the cooling unit to restrict the startup current of the cooling unit.

4.5.6 Potential equalisation

Rittal recommends connecting a conductor with a nominal cross-section of at least 6 mm^2 to the potential equalisation connection point in wall-mounted cooling units, and incorporating it into the existing 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 Carrying out the electrical installation

4.6.1 Bus connection (only in conjunction with several units with a Comfort controller)

When using several cooling units, the serial device interface can be used to connect up to 10 cooling units with the bus cable (Model No. SK 3124.100).

Note:
The electrical signals at the X2 interface are extra-low voltages (not safety extra-low voltages to EN 60 335-1).

When interconnecting, please note the following:
– De-energise the cooling units 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.

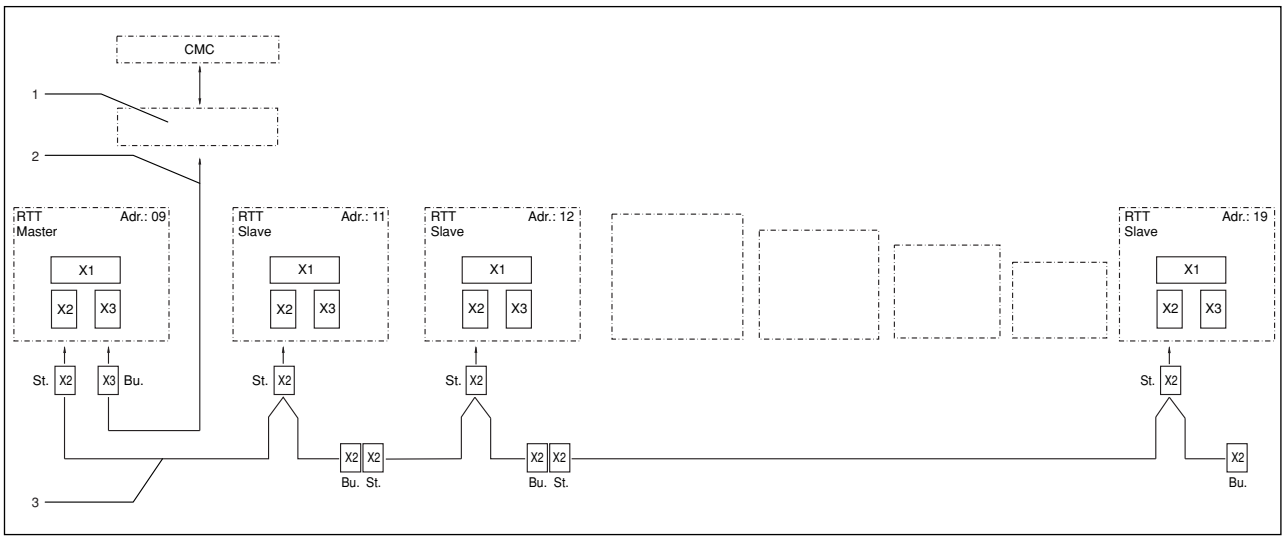


Fig. 19: Connection example: Master/slave operation

Key

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

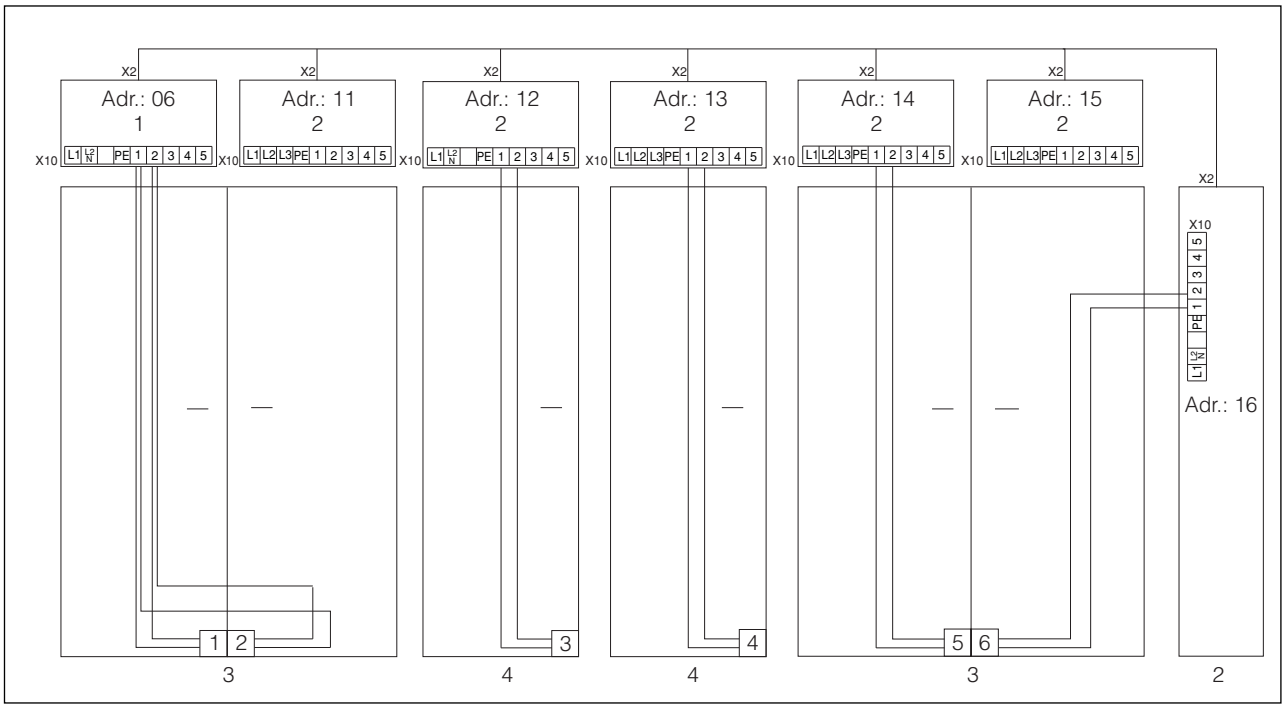


Fig. 20: Connection example: Door limit switch and master/slave operation

Key

1 Master cooling unit
2 Slave cooling units
3 Twin-door enclosure with two door limit switches
4 Enclosure with door limit switch

4.6.2 Installing the power supply

- Complete the electrical installation by following the wiring plan on the rear of the cooling unit (see Fig. 1 on page 5, for key see page 20).
- If you would like the system messages from the cooling unit to be evaluated via the system message relay, you should also connect a suitable low-voltage cable to connection clamps 3 – 5.

GB

SK 3302.100/.110, SK 3303.100/.110, SK 3302.200/.210, SK 3303.200/.210, SK 3302.300/.310, SK 3361.100/.110, SK 3361.200/.210

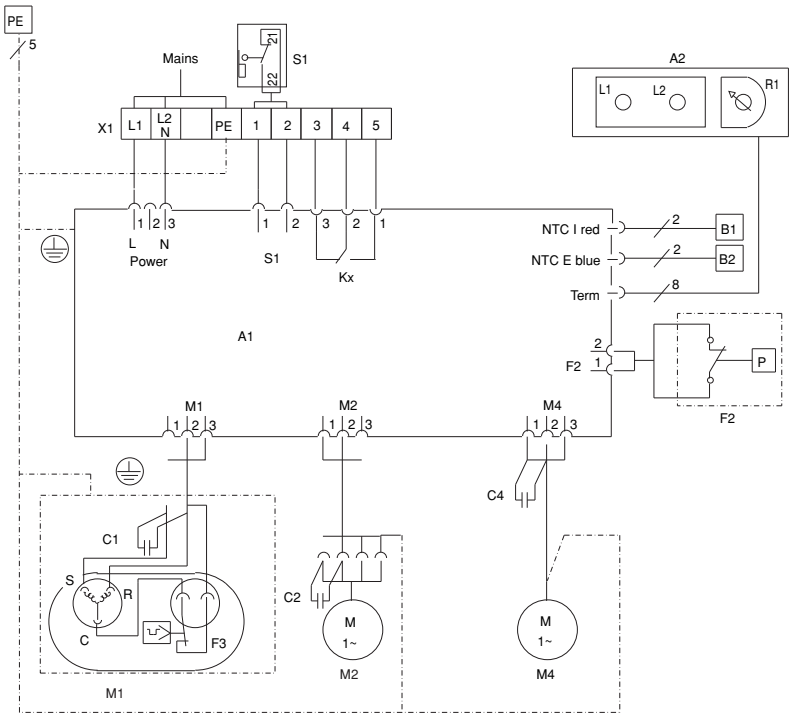


Fig. 21: Electrical wiring plan no. 1

SK 3303.500/.510, SK 3303.600/.610, SK 3361.500/.510, SK 3361.600/.610

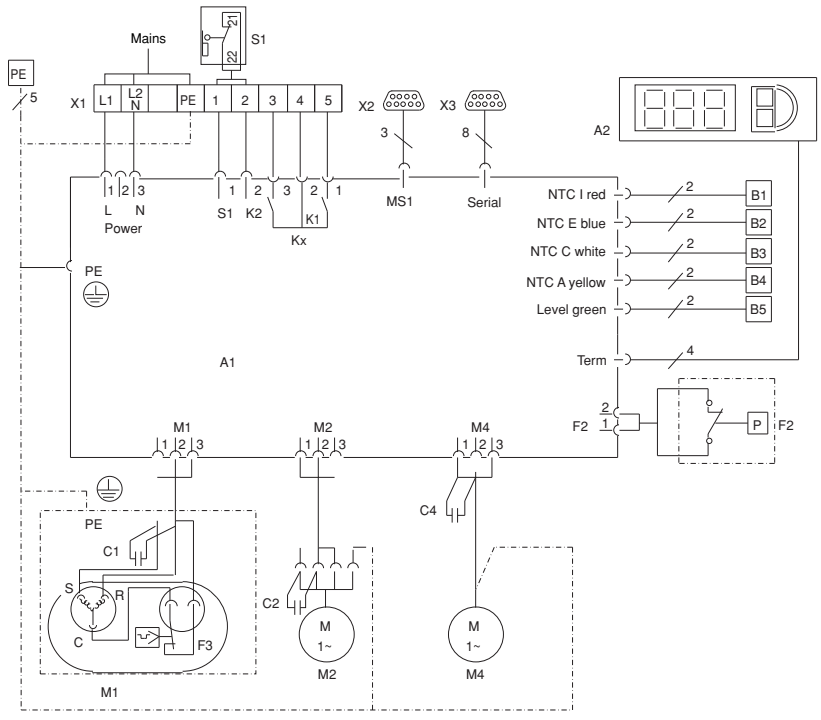


Fig. 22: Electrical wiring plan no. 2

GB

SK 3361.540/.640

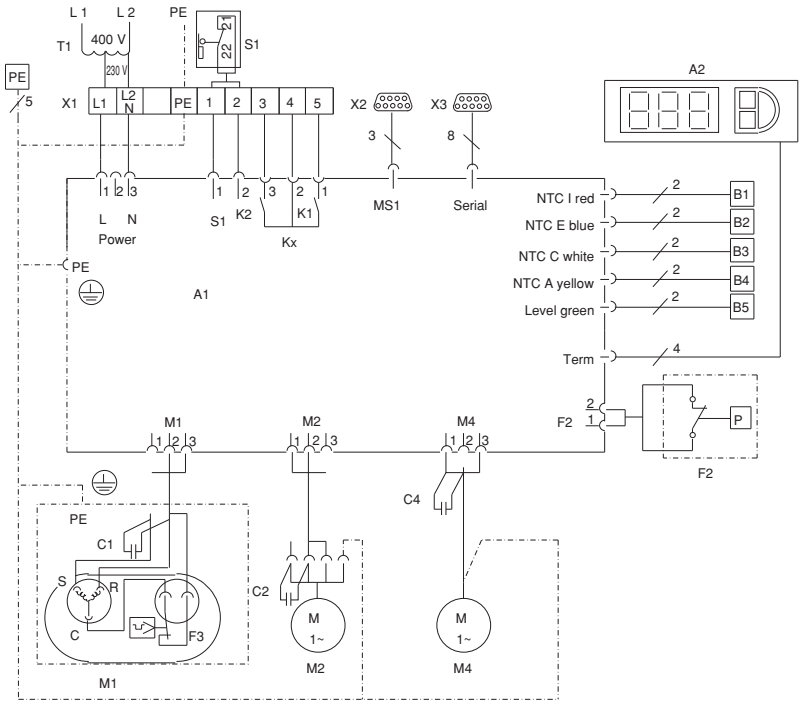


Fig. 23: Electrical wiring plan no. 3

SK 3304.100/.200

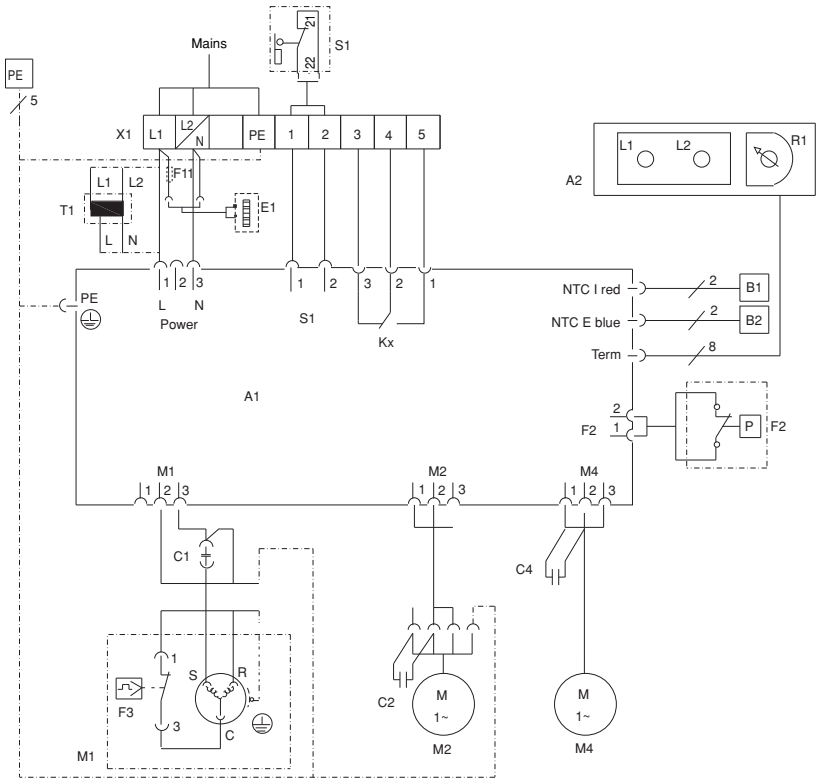


Fig. 24: Electrical wiring plan no. 4

GB

SK 3305.100/.110, SK 3328.100/.110, SK 3329.100/.110, SK 3305.200/.210, SK 3328.200/.210, SK 3329.200/.210, SK 3366.100/.110, SK 3377.100/.110, SK 3366.200/.210, SK 3377.200/.210

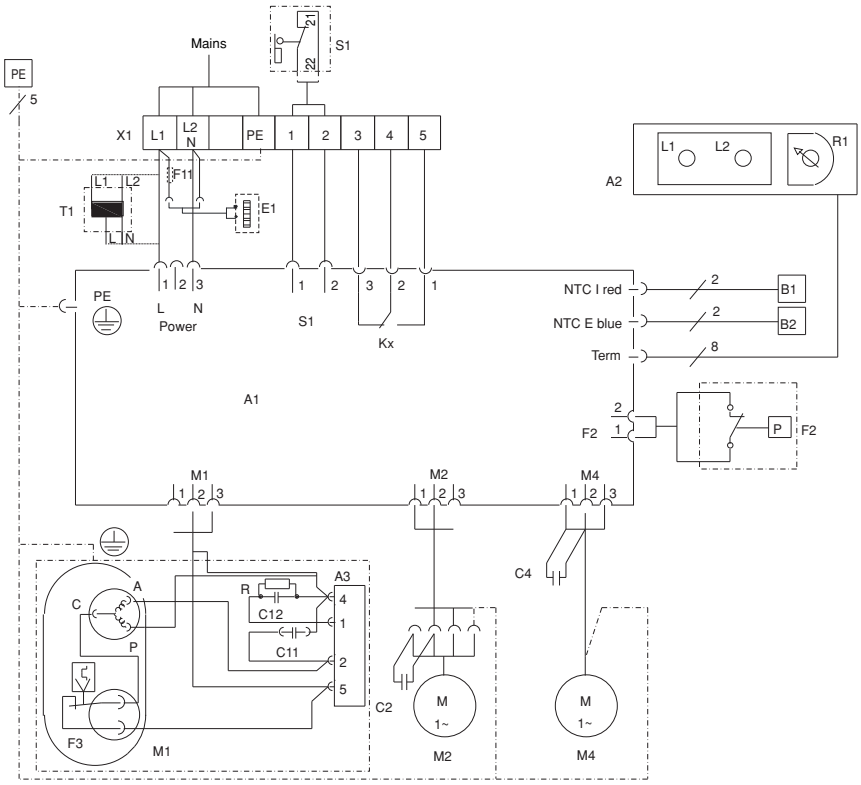


Fig. 25: Electrical wiring plan no. 5

SK 3304.140, SK 3304.142, SK 3305.140, SK 3305.142, SK 3328.140, SK 3329.140, SK 3304.240, SK 3305.240, SK 3328.240, SK 3329.240, SK 3366.140/.240, SK 3377.140/.240

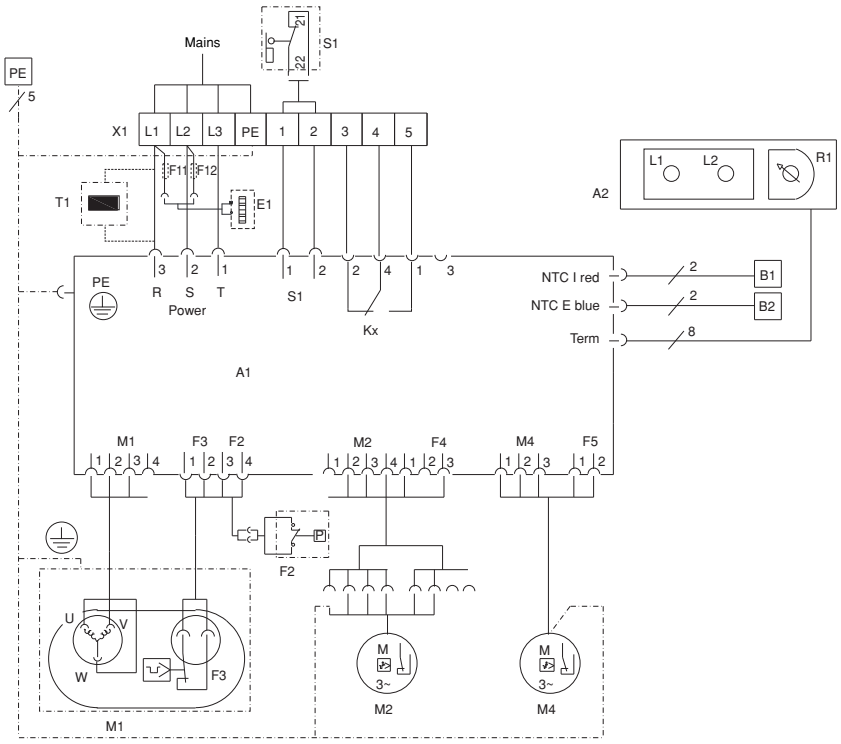


Fig. 26: Electrical wiring plan no. 6

GB

SK 3304.500/.600

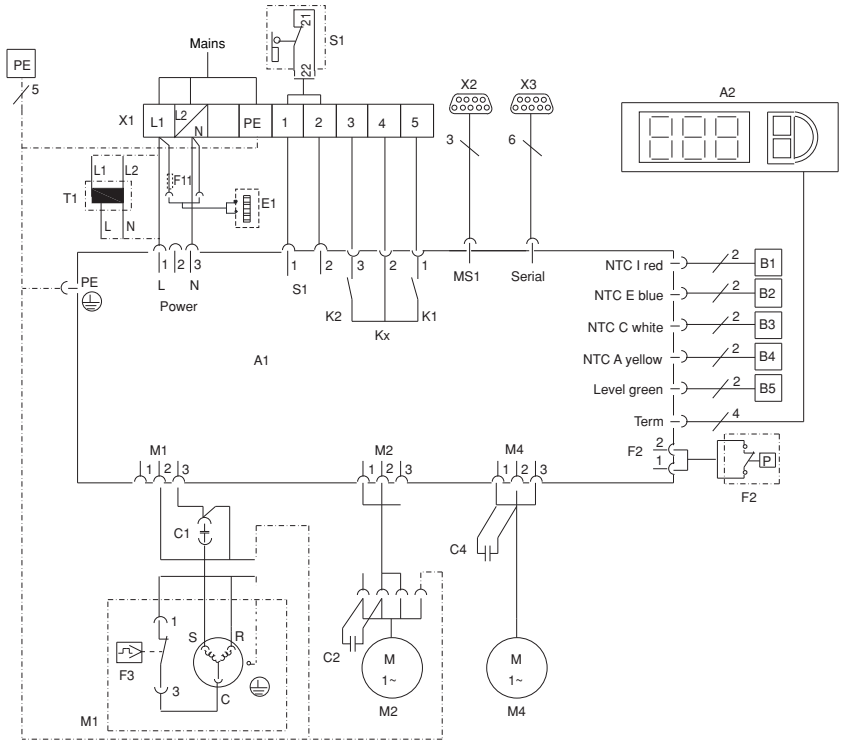


Fig. 27: Electrical wiring plan no. 7

SK 3305.500/.510, SK 3328.500/.510, SK 3329.500/.510, SK 3305.600/.610, SK 3328.600/.610, SK 3329.600/.610, SK 3366.500/.510, SK 3377.500/.510, SK 3366.600/.610, SK 3377.600/.610

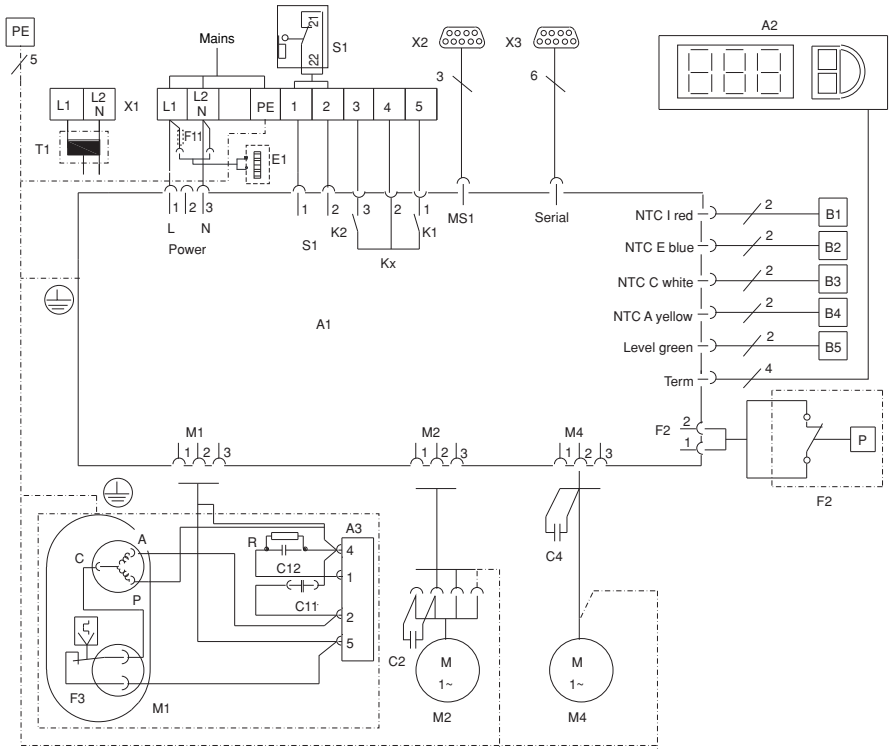


Fig. 28: Electrical wiring plan no. 8

GB

SK 3304.540, SK 3304.542, SK 3305.540, SK 3305.542, SK 3328.540, SK 3329.540, SK 3304.640, SK 3305.640, SK 3328.640, SK 3329.640, SK 3366.540, SK 3377.540, SK 3366.640, SK 3377.640

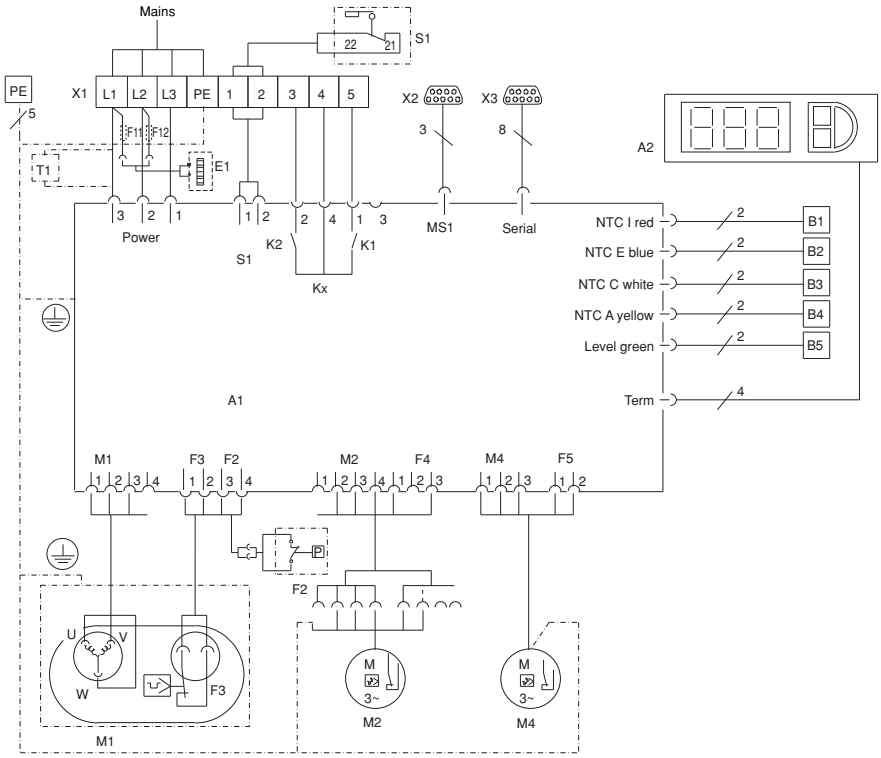


Fig. 29: Electrical wiring plan no. 9

SK 3332.140/.240

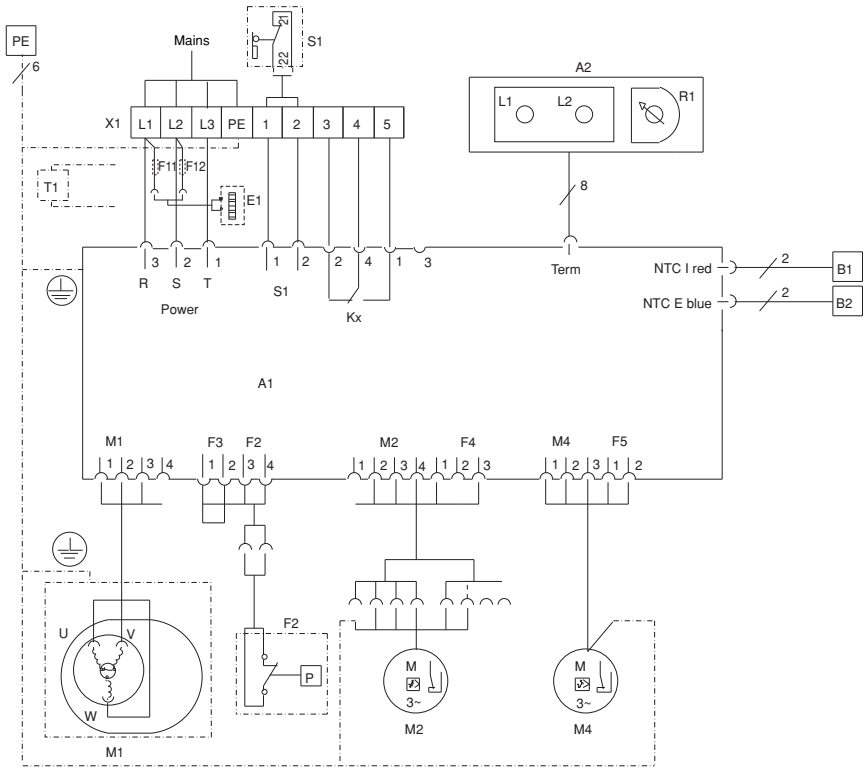


Fig. 30: Electrical wiring plan no. 10

GB

SK 3332.540/.640

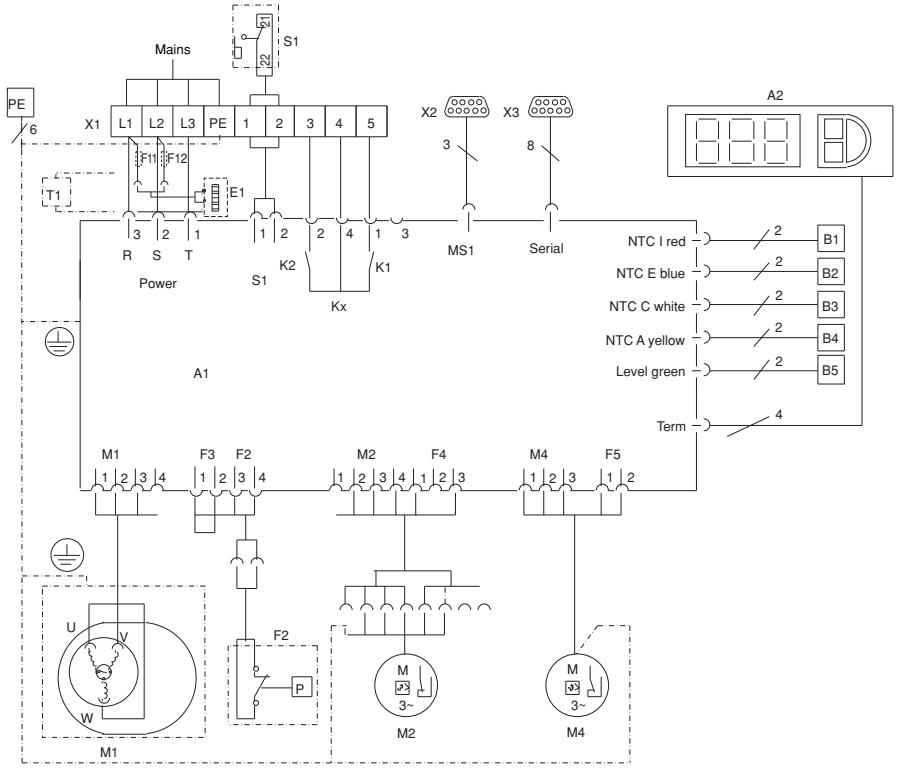


Fig. 31: Electrical wiring plan no. 11

Key

A1	Power PCB
A2	Basic or Comfort controller
A3	Starter relay and RC element
B1	Temperature sensor, internal temperature
B2	Icing hazard temperature sensor
B3	Temperature sensor, external 1
B4	Temperature sensor, external 2
B5	Condensate warning sensor (optional)
C1 – C4	Running capacitors
E1	Condensate evaporator
F2	PSA^H pressure-operated switch (3302.1x0 has bridge instead of pressostat)
F3	Bimetal contact compressor
F11/F12	Miniature fuse
K1	Relay collective fault 1
K2	Relay collective fault 2
L1	LED operational green
L2	LED alarm red
M1	Compressor
M2	Condenser fan
M4	Evaporator fan
R1	Potentiometer for setting the temperature
S1	Door limit switch (without door limit switch: terminal 1, 2 open)
T1	Transformer (optional)
X1	Main connection clamping strip
X2	Master/slave connection
X3	Optional interface

Note:
For technical data refer to rating plate.

AC cos f = 1	DC L/R = 20 ms
I max. = 2 A U max. = 250 V	I min. = 100 mA U max. = 200 V U min. = 18 V I max. = 2 A

Tab. 2: Contact data

4.7 Finalising assembly

4.7.1 Installing the filter media

The entire condenser in the cooling units is finished with a dirt-repelling, easy-to-clean RiNano coating. In many cases, therefore, the use of filter media is unnecessary, particularly in the case of dry dusts.
For dry, coarse dust and lint in the air, we recommend installing an additional PU foam filter mat (available as an accessory) in the cooling unit. For air containing oil condensation, we recommend the use of metal filters (also available as an accessory).
When used in textile plants with heavy lint contamination, lint screens should be used (available as an optional extra).

- Pull the louvred air inlet grille from the enclosure.
- Insert the filter mat into the louvred grille as shown in Fig. 32 and push it back onto the enclosure.

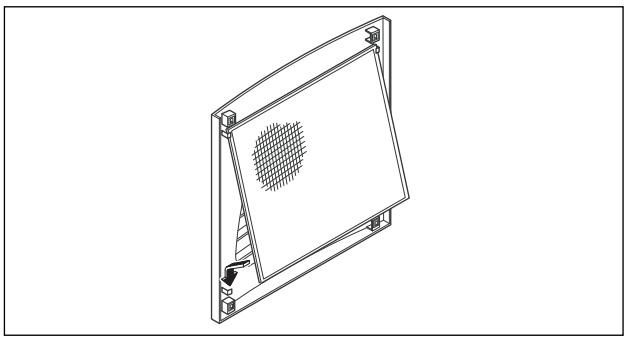


Fig. 32: Installing the filter mat

4.7.2 Fitting the cooling unit

For partial and full internal mounting only.

- Connect the connector to the rear of the display.
- Place the louvred grille onto the unit at the front, and press it down until you hear it snap into place.

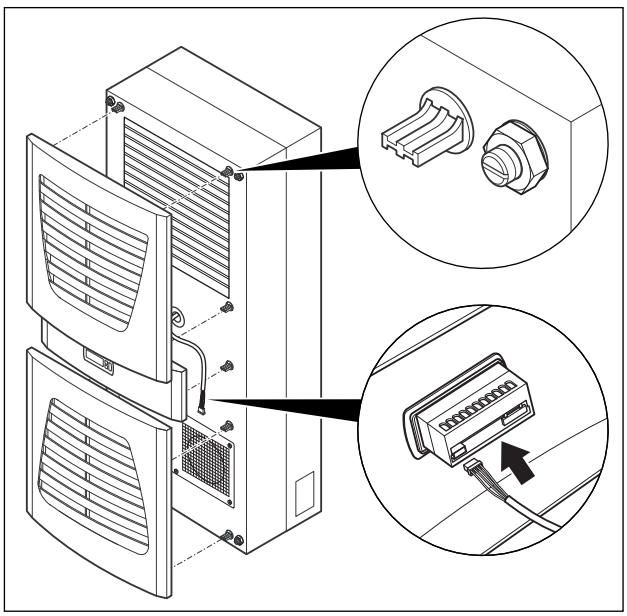


Fig. 33: Attach the louvred grille and connect the display

4.7.3 Setting the filter mat monitor (only with Comfort controller)

Function of the filter mat monitor:
Dirt on the filter mat is automatically determined by measuring the temperature difference in the external circuit of the cooling unit (see “6.2.5 Programming overview”, page 27). As the level of filter mat soiling rises, the temperature difference will increase. The nominal value of the temperature difference in the external circuit adapts automatically to the relevant operating points in the performance diagrams. Hence there is no need to readjust the nominal value for different operating points of the cooling unit.

5 Commissioning

Caution! Risk of damage!
The oil must collect in the compressor in order to ensure lubrication and cooling. Do not operate the cooling unit for at least 30 min. after assembling the equipment.

- Once all the assembly and installation work is complete, switch on the power supply to the cooling unit.

The cooling unit will commence operation:

– With Basic controller: The green operating LED (“line”) is illuminated.
– With Comfort controller: First the software version of the controller will appear for approx. 2 sec., then the enclosure internal temperature will appear in the 7-segment display.

You can now make your individual settings on the unit e.g. set the temperature or (with Comfort controller only) assign the network identifier etc. (refer to the chapter on “Operation”).

GB

6 Operation

You can operate the cooling unit using the controller on the front of the device (page 5, Fig. 1, no. 11). Depending on the model, the unit is equipped with a Basic or Comfort controller.

6.1 Control using the Basic controller

For Model Nos. SK xxxx.100/.110/.140 and SK xxxx.200/.210/.240/.300/.310.

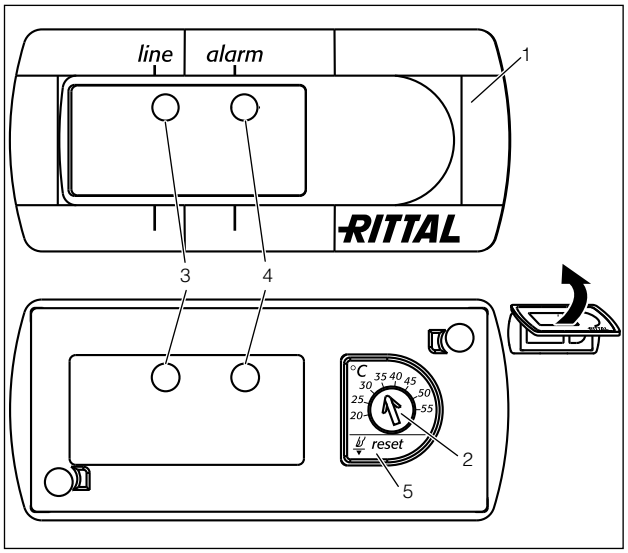


Fig. 34: Basic controller

Key

1 Controller trim panel
2 Temperature setting
3 LED green (“line”)
4 LED red (“alarm”)
5 Reset button

6.1.1 Properties

– Three voltage variants are supported:
  – 115 V
  – 230 V
  – 400/460 V, 3 phases
– Supports multiple voltages without rewiring
– Integral start-up delay and door limit switch function
– Protective function to prevent icing
– Monitoring of all motors (compressor, condenser fan, evaporator fan)
– Phase monitoring for three-phase units
– Visualisation of the operating status via LED display:
  – Voltage on, device operational
  – Door open (only if door limit switch installed)
  – Warning of overtemperature
  – High-pressure-operated switch has switched
– Switching hysteresis: 5 K
– Floating system message contact in case of overtemperature
– Temperature setting (setting range 20 – 55°C) via potentiometer
– Test function

The cooling unit operates automatically i.e. after switching on the power supply, the evaporator fan (see page 5, Fig. 2) will run continuously and permanently circulate the internal enclosure air. The built-in basic regulator ensures automatic normal shut-down operation of the cooling unit by the value of the fixed preset switching difference of 5 K.

6.1.2 Operating and error display

The Basic controller monitors and controls the cooling unit. It indicates the operating and error statuses via the green and red LEDs (Fig. 34, nos. 3 and 4):

LED	State	Cause	Solution
Green (line)	Illuminated	Power supply on, unit operational	–
	Flashing	Only with installed door limit switch: Enclosure door open	In order to avoid condensation, close the enclosure door as quickly as possible.
		Only with installed door limit switch: Enclosure door closed	Check the position of the door limit switch
Red (alarm)	Illuminated	The enclosure internal temperature is 5 K above the set temperature	Check the temperature setting. Check the condenser and clean if necessary. Check the filter mat and replace if necessary. Check the heat loss to be dissipated – it must not exceed the useful cooling output of the cooling unit.
	Flashing	High-pressure alarm in the cooling circuit	Check the temperature setting. Check the condenser and clean if necessary. Check the filter mat and replace if necessary. Check the heat loss to be dissipated – it must not exceed the useful cooling output of the cooling unit. After rectifying the fault, you will need to reset the Basic controller manually (see page 24 “6.1.5 Resetting the Basic controller”).
		Only for SK 3302.xxx: Connection to board interrupted	Check, replace board if necessary
Off	No display	No power	Check power supply
		Rotary current phase monitoring: “LED off” = Incorrect phase connection	Swap phases

Tab. 3: Operating and error display of the Basic controller

You may also request the overtermperature message (red LED illuminated) via an integral floating contact on the connection clamp of the cooling unit (system message relay with changeover contact, see connection diagrams under “4.6.2 Installing the power supply”, page 14):

– Terminal 3: NC (normally closed)
– Terminal 4: C (connection of the supply voltage to the system message relay)
– Terminal 5: NO (normally opened)

The definitions NC and NO refer to the de-energised state. As soon as voltage is applied to the cooling unit, the system message relay is picked up, so that the relay contacts change status (contact 3 – 4 open; contact 4 – 5 closed). This is the normal operating state of the cooling unit. As soon as an error message occurs or the power supply is interrupted, the relay drops out.

6.1.3 Test mode for the Basic controller

The Basic controller is equipped with a test function whereby the cooling unit commences cooling operation independently of the set temperature or door limit switch function.

First you must dismantle the trim panel of the controller.

- Switch off the mains voltage.
- Remove the louvred grille or infill panel in which the controller is installed.
- Release the display lock from behind and pull it forwards slightly.

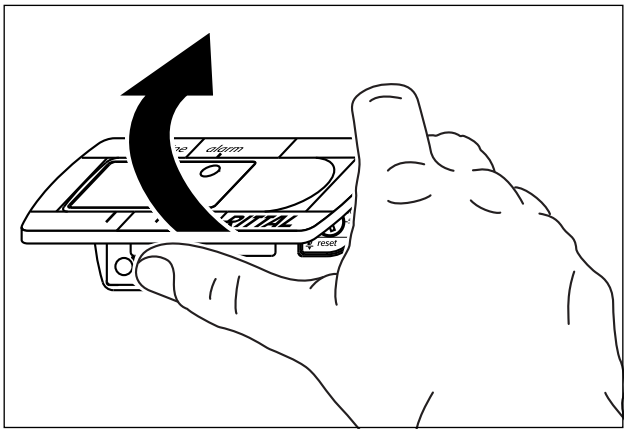


Fig. 35: Releasing the trim panel of the Basic controller

- Carefully raise the trim panel e.g. using your thumb or a flat screwdriver, and remove it.

Now you can start test mode.

- Hold the rubberised potentiometer display (see page 22, Fig. 34, item 5) down while you switch the mains power back on, and keep the button (5) held down for a further 5 seconds (for access to the potentiometer, see also 6.1.1).

The cooling unit will commence operation. After approximately 5 minutes or upon reaching 15°C, test mode will end. The device cuts out and changes to normal operation.

6.1.4 Setting the temperature

Note:
In the case of the Basic controller, the temperature is preset in the factory to +35°C.
In order to save energy, do not set the temperature any lower than is actually necessary.

To change the temperature setting:

- Dismantle the trim panel of the controller as described in “6.1.3 Test mode for the Basic controller”, page 23.
- Set the required temperature on the temperature setting device (page 22, Fig. 34).
- Carefully push the trim panel onto the display until you hear it snap into place.
- Re-insert the display into the infill panel or louvred grille.
- Re-attach the louvred grille or infill panel to the cooling unit.

6.1.5 Resetting the Basic controller

Following a high-pressure alarm in the cooling cycle, and once the cause has been rectified, you will need to manually reset the Basic controller:

- Dismantle the trim panel of the Basic controller as described in “6.1.4 Setting the temperature”, page 24.
- Press the reset button (Fig. 34, no. 5) for at least 3 sec.

The red LED is extinguished.

- Re-install the Basic controller.

6.2 Control using the Comfort controller

For Model Nos. SK xxxx.500/.510/.540 and SK xxxx.600/.610/.640.

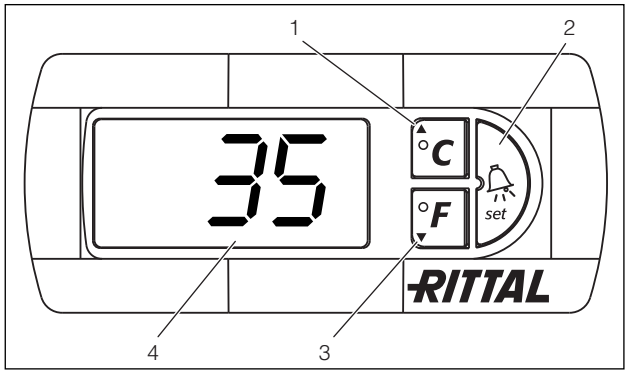


Fig. 36: Comfort controller

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

– Three voltage variants are supported:
  – 115 V
  – 230 V
  – 400/460 V, 3 phases
– Supports multiple voltages without rewiring
– Integral start-up delay and door limit switch function
– Protective function to prevent icing
– Monitoring of all motors (compressor, condenser fan, evaporator fan)
– Phase monitoring for three-phase units
– Master/slave function with up to 10 units. One device functions as a master unit. Once the set temperature is reached by one of the connected slave devices 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 cooling units on or off as required.
– Switching hysteresis: Settable from 2 – 10 K, preset to 5 K
– Visualisation of the current enclosure internal temperature and all fault messages in the 7-segment display
– Using an interface card (Model No. SK 3124.100), the unit may be incorporated into superordinate remote monitoring systems such as the Rittal Computer Multi Control CMC.

The cooling unit operates automatically i.e. after switching on the power supply, the evaporator fan (see page 5, Fig. 2) will run continuously and permanently circulate the internal enclosure air. The compressor and condenser fan are regulated by the Comfort controller.

The Comfort controller has a 7-segment display (Fig. 36, no. 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. 36). The relevant parameters likewise appear in the display.

6.2.2 Launching test mode

The Comfort controller is equipped with a test function whereby the cooling unit commences cooling operation independently of the set temperature or door limit switch function.

- Press buttons 1 and 2 simultaneously (Fig. 36) for at least 5 sec.

The cooling unit will commence operation.

After approximately 5 minutes or upon reaching 15°C, test mode will end. The device cuts out and changes to normal operation.

6.2.3 General information about programming

Using buttons 1, 2 and 3 (Fig. 36) you can change 24 parameters within the preset ranges (min. value – max. value).

Tables 4 and 5 show the parameters you are able to change. Fig. 37 of page 27 shows which buttons need to 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 Comfort controller, the temperature is preset in the factory to +35°C.
In order to save energy, do not set the temperature any lower than is actually necessary.

Note on useful cooling output:
Interactive performance diagrams for calculating the useful cooling output may be found at www.rittal.com.

In principle, programming is identical for all variable 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 seconds, the display will first flash, then the controller will switch back to normal display mode. The display “Esc” indicates that any amendments made have not been saved.

- Press the programming buttons ▲ (°C) or ▼ (°F) to switch between the settable parameters (see Tables 4 and 5).
- 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 display “Cod” 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 amendment.

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 2 (“Set”) for a further 5 seconds or so.

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

6.2.4 Variable parameters

See also Fig. 37 on page 27.

Progr. level	Display screen	Parameter	Min. value	Max. value	Factory setting	Description
1	St	Setting for enclosure internal temperature T_i	20	55	35	The nominal value of the internal enclosure temperature is preset at the factory to 35°C and may be altered within a range of 20 – 55°C.
2	Fi	Filter mat monitoring	10	60	99 (= off)	To activate filter mat monitoring, set the display to at least 10 K above the temperature differential displayed in programming mode “Fi”. Filter mat monitoring is preset to “deactivated” in the factory (99 = off).
3	Ad	Master/slave identifier	0	19	0	See “6.2.7 Setting the master/slave identifier”, page 29.
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 for switching difference (hysteresis)	2	10	5	The cooling unit is preset in the factory to a switching hysteresis of 5 K. This parameter should only be changed in consultation with ourselves. 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 (internal enclosure temperature too high) appears on the display terminal. If necessary, the differential may be altered here within the range from 3 – 15 K.

Tab. 4: Variable parameters

GB

6.2.5 Programming overview

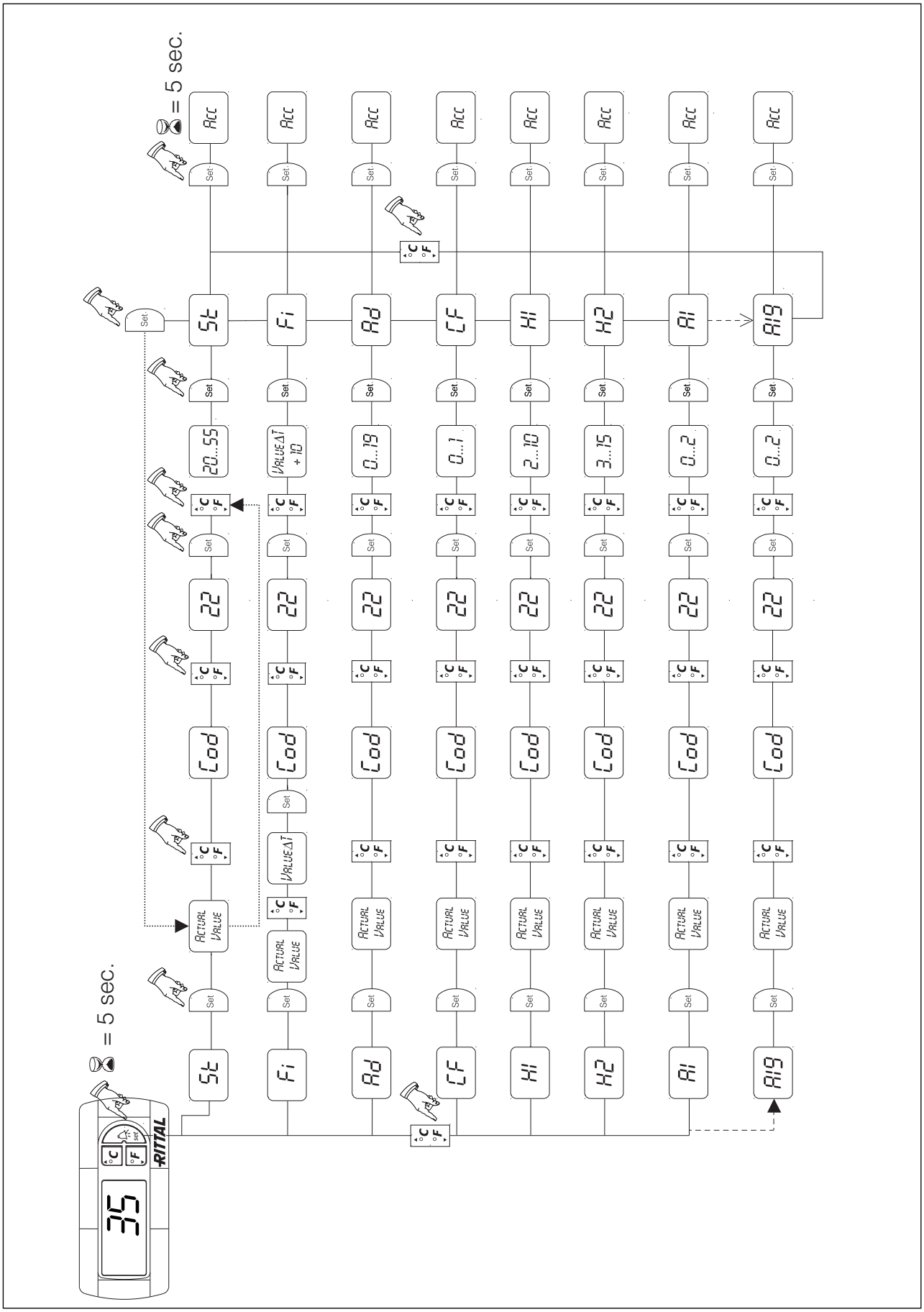


Fig. 37: Programming overview

6.2.6 Defining system messages for evaluation

System messages are shown on the display of the Comfort controller via the displays A1 to A20 and E0.
A more detailed explanation of the system messages may be found in section “6.2.8 Evaluating system messages”, page 29.
See also Fig. 37 on page 27.

Progr. level	Display screen	Min. value	Max. value	Factory setting	Type or location of fault
7	A1	0	2	0	Enclosure door open
8	A2	0	2	0	Internal temperature of enclosure too high
9	A3	0	2	0	Filter monitoring
10	A4	0	2	0	Ambient temperature too high/too low
11	A5	0	2	0	Icing hazard
12	A6	0	2	1	PSA^{H} pressure-operated switch
13	A7	0	2	2	Evaporator coil
14	A8	0	2	1	Condensate warning
15	A9	0	2	1	Condenser fan blocked or defective
16	A10	0	2	1	Evaporator fan blocked or defective
17	A11	0	2	2	Compressor
18	A12	0	2	1	Condenser
19	A13	0	2	1	Ambient temperature sensor
20	A14	0	2	1	Icing temperature sensor
21	A15	0	2	1	Condensate warning temperature sensor
22	A16	0	2	1	Internal temperature sensor
23	A17	0	2	1	Phase monitoring
24	A18	0	2	0	EPROM
25	A19	0	2	0	LAN/Master-Slave

Tab. 5: System messages evaluable via relay

The system messages A1 – A19 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 changeover and normally open contact: see connection diagrams under “4.6.2 Installing the power supply”, page 14:
– Terminal 3: NC (normally closed)
– Terminal 4: C (connection of the supply voltage to the system message relay)
– Terminal 5: NO (normally opened)

The definitions NC and NO refer to the de-energised state. As soon as power is applied to the cooling unit, the system message relay picks up, so that the relay contacts change status (contact 3 – 4 open; contact 4 – 5 closed). This is the normal operating state of the cooling unit. As soon as a system message occurs or the power supply is interrupted, the relay drops out.

Program system messages with the value
0: System message is not sent to the system message relay, but merely appears in the display
1: System messages is evaluated by relay 1
2: System messages is evaluated by relay 2

6.2.7 Setting the master/slave identifier

When several cooling units are linked together (up to a maximum of 10), one of the cooling units must be defined as the “master” and the others as “slaves”. To this end, assign a corresponding identifier (address) to each cooling unit which will enable the cooling unit to be identified in the network.

If one of the slave units reaches the set temperature or in the case of the door limit switch function, the affected slave unit will report to the master unit, which will then switch off all the other cooling units.

Notes:

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

On the **master cooling unit** (00 = factory setting), set the number of slave units contained in the network:

01: Master with 1 slave cooling unit
02: Master with 2 slave cooling units
03: Master with 3 slave cooling units
04: Master with 4 slave cooling units
05: Master with 5 slave cooling units
06: Master with 6 slave cooling units
07: Master with 7 slave cooling units
08: Master with 8 slave cooling units
09: Master with 9 slave cooling units

On the **slave cooling unit** (00 = factory setting), set its own address:

11: Slave cooling unit no. 1
12: Slave cooling unit no. 2
13: Slave cooling unit no. 3
14: Slave cooling unit no. 4
15: Slave cooling unit no. 5
16: Slave cooling unit no. 6
17: Slave cooling unit no. 7
18: Slave cooling unit no. 8
19: Slave cooling unit no. 9

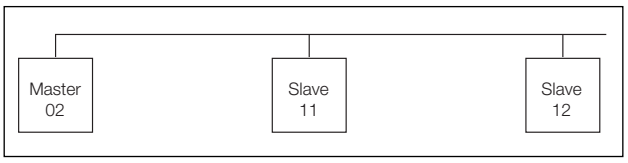


Fig. 38: Master/slave connection (example)

For further connection examples, see “4.6.1 Bus connection (only in conjunction with several units with a Comfort controller)”, page 13.

For details of how to set the identifier, see “6.2.4 Variable parameters”, page 26 or “6.2.5 Programming overview”, page 27, parameter “Ad”.

6.2.8 Evaluating system messages

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

Following the appearance of messages A03, A06 and A07 and after rectifying their cause, you will need to reset the Comfort controller (see “6.2.9 Resetting the Comfort controller”, page 31).

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	Enclosure interior temperature too high	Cooling capacity too low/ unit underdimensioned. Error as a consequence of messages A03 to A17.	Check cooling capacity
A03	Filter monitoring	Filter mat soiled	Clean or exchange; reset the Comfort controller
A04	Ambient temperature too high/too low	Ambient temperature outside of admissible operating range (+10°C to +60°C)	Increase or lower the ambient temperature (e.g. heat or ventilate room)
A05	Icing hazard	Operational display in case of icing hazard. Evaporator fan may be mechanically blocked or defective.	Set the enclosure interior temperature higher. Check the evaporator fan; release or exchange if necessary.
A06	PSA^{H} pressure-operated switch	Ambient temperature too high	Lower the ambient temperature; reset the Comfort controller
		Condenser soiled	Clean the condenser; reset the Comfort controller
		Filter mat soiled	Clean or exchange; reset the Comfort controller
		Condenser fan defective	Replace; reset the Comfort controller
		E-valve defective	Repair by refrigeration engineer; reset the Comfort controller
		PSA^{H} pressure-operated switch defective	Exchange by refrigeration engineer; reset the Comfort controller
A07	Evaporator coil	Lack of coolant; sensor in front of or behind condenser defective.	Repair by refrigeration engineer; reset the Comfort controller
A08	Condensate warning	Condensate discharge kinked or blocked	Check condensate discharge; remove any kinks or blockages in the hose
		Only in units with optional condensate evaporation	Check the evaporation unit, exchange if necessary
A09	Condenser fan	Blocked or defective	Clear the blockage; exchange if necessary
A10	Evaporator fan	Blocked or defective	Clear the blockage; exchange if necessary
A11	Compressor	Compressor overloaded (inner winding protection)	No action required; unit switches on again independently.
		Defective (check by measuring the winding resistance)	Exchange by refrigeration engineer
A12	Condenser temperature sensor	Open or short circuit	Replace
A13	Ambient temperature sensor	Open or short circuit	Replace
A14	Temperature sensor Icing	Open or short circuit	Replace
A15	Temperature sensor Condensate warning	Open or short circuit	Replace
A16	Temperature sensor Internal temperature	Open or short circuit	Replace
A17	Phase monitoring	For three-phase devices only: Incorrect rotary field/phase absent	Exchange two phases
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. Then disconnect the unit from the mains and re-connect.
A19	LAN/Master-Slave	Master and slave not linked	Check setting and/or cable
A20	Voltage drop	Error display not shown	Result is stored in the log file
E0	Display message	Connection problem between display and controller board	Reset: Switch power supply off, then switch on again after approx. 2 sec.
		Cable defective; connection loose	Exchange the boards

Tab. 6: Troubleshooting with the Comfort controller

6.2.9 Resetting the Comfort controller

After the occurrence of faults A03, A06 and A07, you will need to reset the Comfort controller.

- Press buttons 1 (▲) and 3 (▼) (Fig. 36) simultaneously for 5 seconds.

The system messages will disappear and the temperature display will be shown.

7 Inspection and servicing

Risk of electric shock!
The unit is live.
Switch off the power supply before opening, and take suitable precautions to prevent it being switched back on accidentally.

7.1 General

The cooling circuit is designed in the form of a maintenance-free, hermetically sealed system. The cooling unit is filled with the required quantity of coolant at the factory, checked for leaks, and subjected to a functional test run.

The installed maintenance-free fans are 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 cooling unit is thus largely maintenance-free. All that may be required from time to time is to clean the components of the external air circuit using a vacuum cleaner or compressed air if they become visibly dirty. Any stubborn, oily stains may be removed using a non-flammable detergent, such as degreaser.

Maintenance interval: 2000 operating hours. Depending on the level of contamination in the ambient air, the maintenance interval may be reduced to suit the air pollution intensity.

Caution!
Risk of fire!
Never use flammable liquids for cleaning.

Sequence of maintenance measures:

– Check the level of dirt.
– Filter soiling? Replace the filter if necessary.
– Cooling membranes soiled? Clean if necessary.
– Activate test mode; cooling function OK?
– Check the noise generation of the compressor and fans.

7.1.1 Compressed air cleaning SK 3304.xxx/SK 3305.xxx

Fig. 39: Disconnect the power cord

Fig. 40: Remove the upper louvred grille

Fig. 41: Remove the lower louvred grille

Fig. 42: Remove the infill panel

Fig. 43: Disconnect the connector from the display (1)

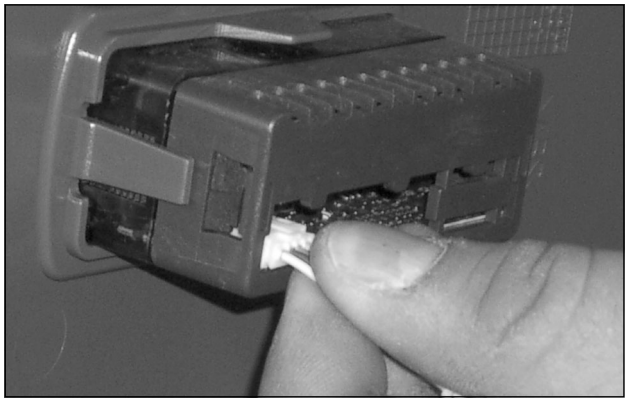


Fig. 44: Disconnect the connector from the display (2)

Fig. 45: Cooling unit without grille

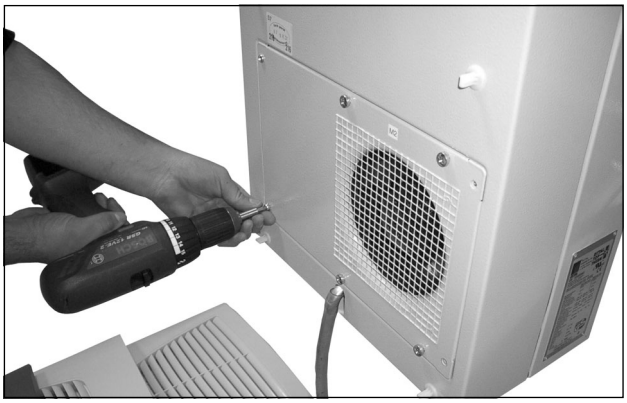


Fig. 46: Remove the external circuit fan (loosen the four screws)

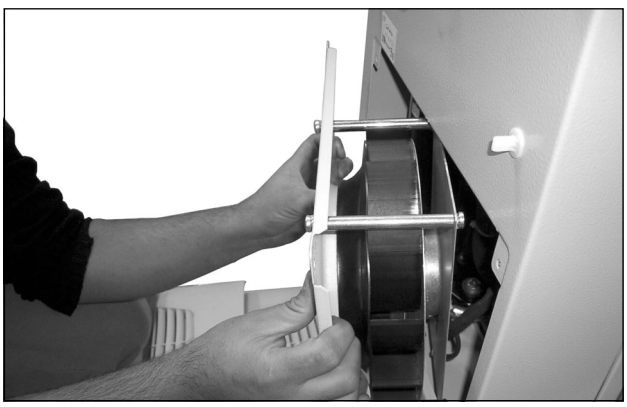


Fig. 47: Remove the fan

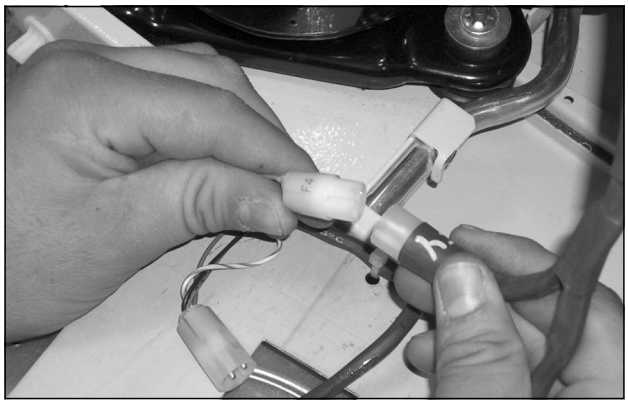


Fig. 48: Disconnect the fan connectors

Fig. 49: Remove the cover (loosen the four screws)

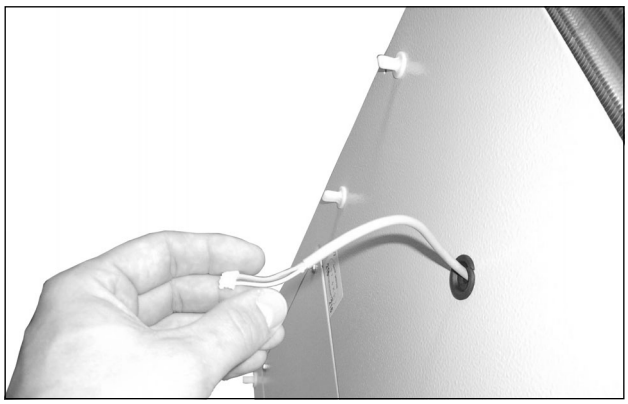


Fig. 50: Push back the display cable

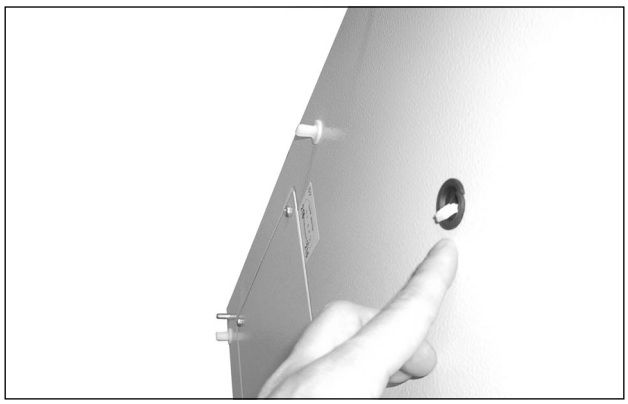


Fig. 51: Push the display cable through the cable gland

Fig. 52: Remove the cover (1)

Fig. 53: Remove the cover (2)

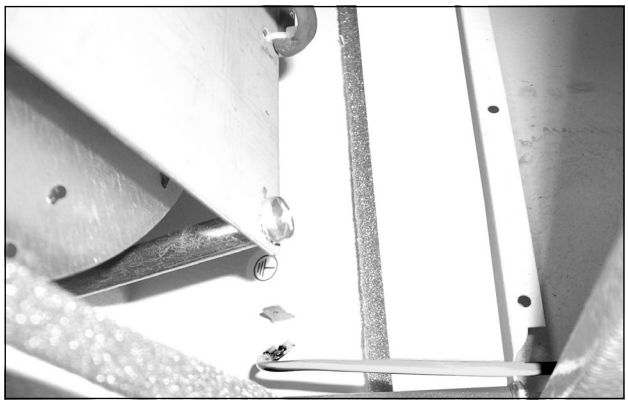


Fig. 54: Loosen the earthing cable between the cover and the chassis (1)

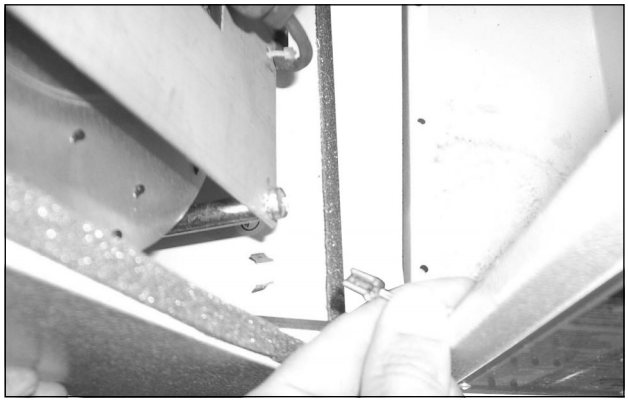


Fig. 55: Loosen the earthing cable between the cover and the chassis (2)

Fig. 56: Clean out the heat exchanger coil and compressor chamber using compressed air (1)

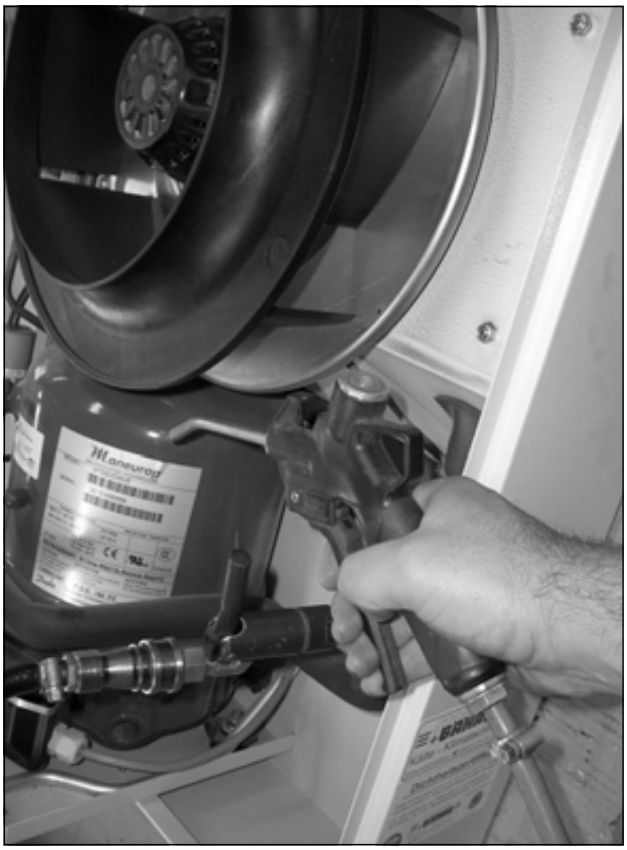


Fig. 57: Clean out the heat exchanger coil and compressor chamber using compressed air (2)

7.1.2 Compressed air cleaning SK 3328.xxx, SK 3329.xxx, SK 3332.xxx

Fig. 58: Disconnect the power cord

Fig. 59: Remove the upper louvred grille (1)

Fig. 60: Remove the upper louvred grille (2)

Fig. 61: Remove the upper louvred grille (3)

Fig. 62: Remove the lower louvred grille (1)

Fig. 63: Remove the lower louvred grille (2)

Fig. 64: Remove the infill panel

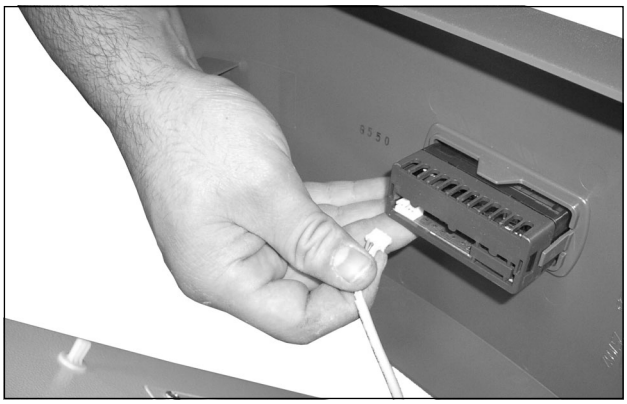


Fig. 65: Disconnect the display cable

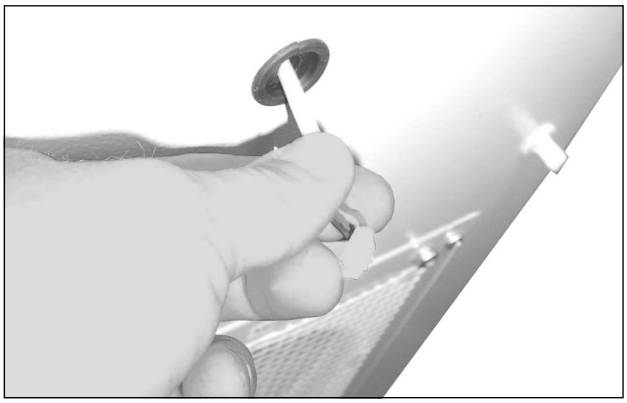


Fig. 66: Push back the display cable and press it through the cable gland (1)

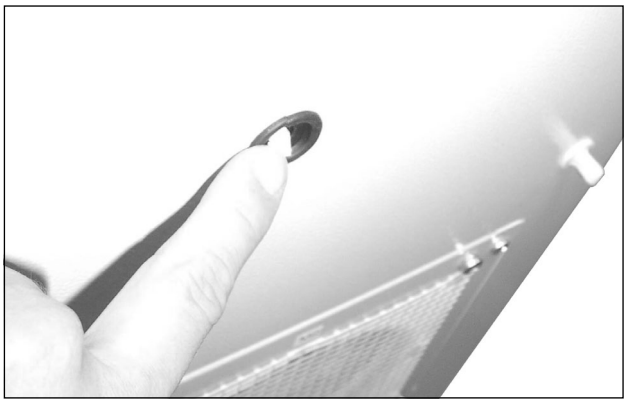


Fig. 67: Push back the display cable and press it through the cable gland (2)

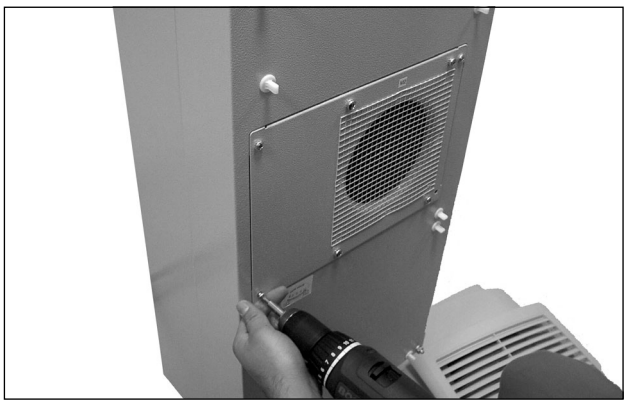


Fig. 68: Loosen the four screws of the external circuit fan

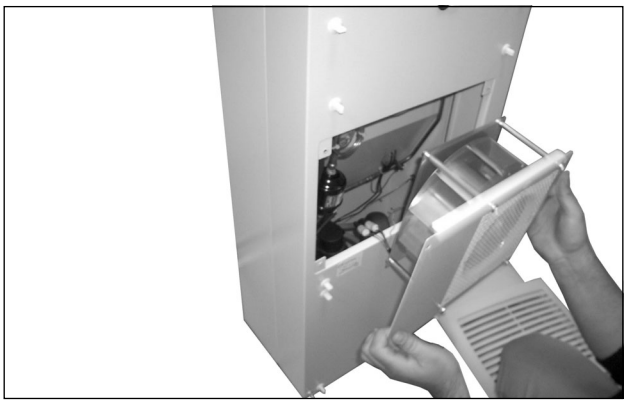


Fig. 69: Remove the external circuit fan

Fig. 70: Disconnect the fan connectors (1)

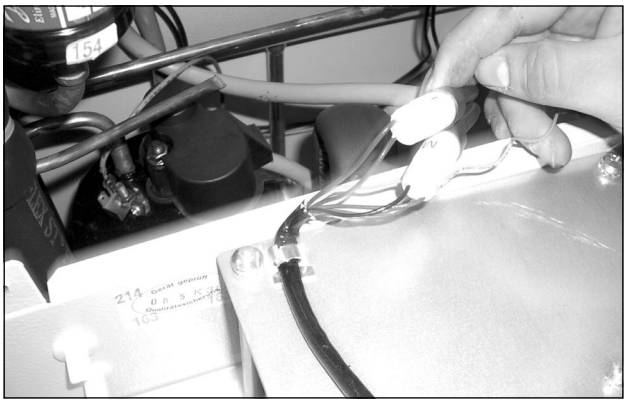


Fig. 71: Disconnect the fan connectors (2)

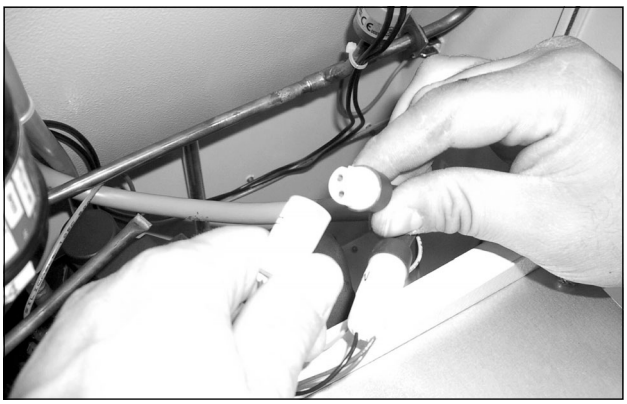


Fig. 72: Disconnect the fan connectors (3)

Fig. 73: Disconnect the fan earthing cable (1)

Fig. 74: Disconnect the fan earthing cable (2)

Fig. 75: Loosen the four screws of the cover

Fig. 76: Remove the cover

Fig. 77: Disconnect the earthing cable (1)

Fig. 78: Disconnect the earthing cable (2)

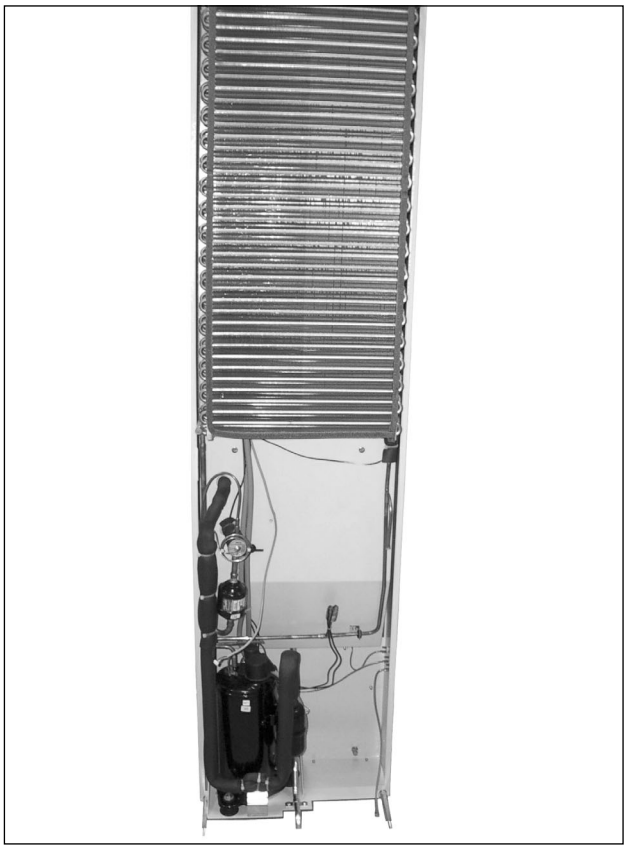


Fig. 79: Clean out the heat exchanger coil and compressor chamber using compressed air (1)

Fig. 80: Clean out the heat exchanger coil and compressor chamber using compressed air (2)

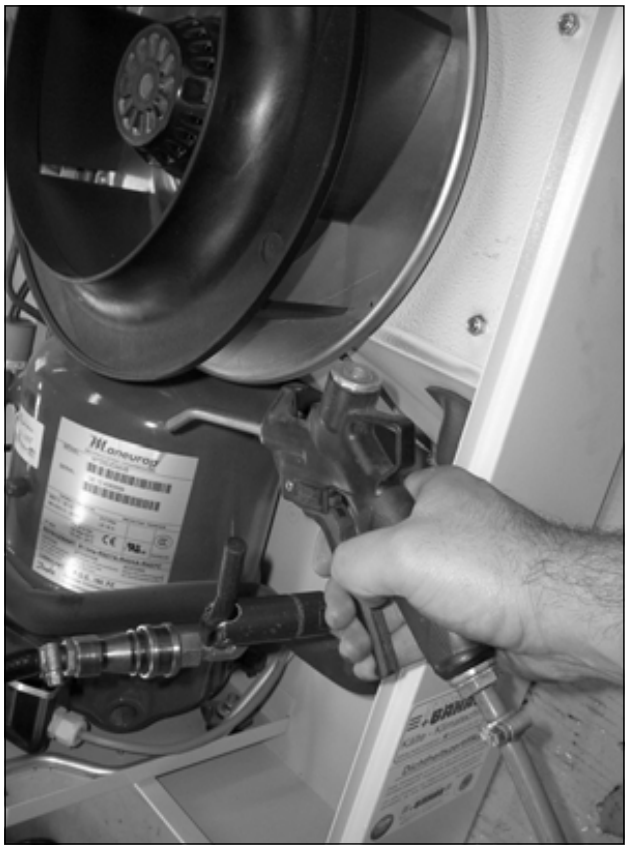


Fig. 81: Clean out the heat exchanger coil and compressor chamber using compressed air (3)

GB

8 Storage and disposal

Caution! Risk of damage!
The cooling unit must not be exposed to temperatures above +70°C during storage.

During storage, the cooling unit must stand upright.
The closed cooling circuit contains refrigerant and oil which must be properly disposed of for the sake of the environment. Disposal can be carried out at the Rittal plant.
Please contact us for advice.

GB

9 Technical specifications

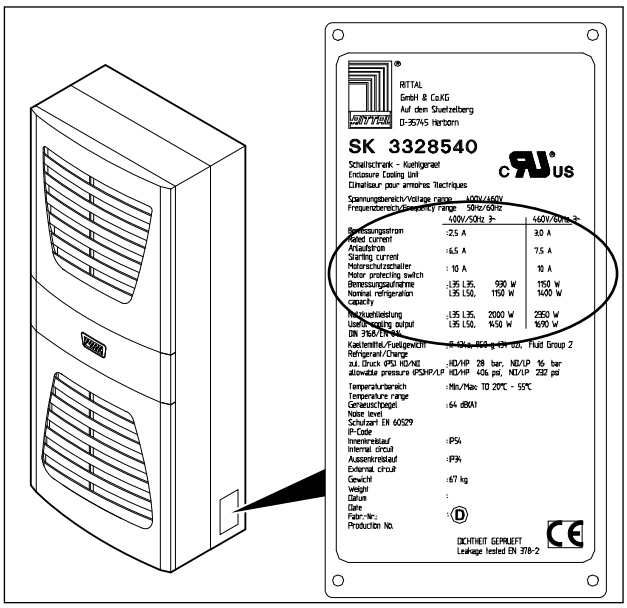


Fig. 82: Rating plate (technical specifications)

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

	Unit	Model No. SK							
Basic controller, RAL 7035	–	**3302.100**	**3302.110**	**3302.300**	**3302.310**	**3303.100**	**3303.110**	**3304.100**	**3304.110**
Comfort controller, RAL 7035	–	**–**	**–**	**–**	**–**	**3303.500**	**3303.510**	**3304.500**	**3304.510**
Basic controller, stainless steel cover	–	**3302.200**	**3302.210**	**–**	**–**	**3303.200**	**3303.210**	**3304.200**	**3304.210**
Comfort controller, stainless steel cover	–	**–**	**–**	**–**	**–**	**3303.600**	**3303.610**	**3304.600**	**3304.610**
Rated voltage	V Hz	230, 1~, 50/60	115, 1~, 60	230, 1~, 50/60	115, 1~, 60	230, 1~, 50/60	115, 1~, 60	230, 1~, 50/60	115, 1~, 50/60
Rated current	A	1.6/1.7	3.3	1.6/1.7	4.0	2.6/2.6	5.7	5.4/5.0	10.6/11.1
Start-up current	A	3.0/3.4	8.0	4.3/5.3	12.0	5.1/6.4	11.5	12.0/14.0	26.0/28.0
Pre-fuse T	A	10.0	10.0	10.0	10.0	10.0	10.0	10.0	16.0
Motor circuit breaker	–	–	–	–	–	–	–	–	–
Transformer circuit-breaker	–	–	–	–	–	–	–	–	–
Miniature circuit-breaker/ Fuse	–	■	■	■	■	■	■	■	■
Useful cooling output $\dot{Q}_k$ L 35 L 35 to DIN 3168 L 35 L 50	W W	300/320 150/170	300 150	300/320 150/160	300 150	500/610 280/350	500 280	1000/1060 790/840	1000/1060 790/840
Power consumption P_{el} L 35 L 35 to DIN 3168 L 35 L 50	W W	245/255 255/275	290 340	285/300 320/340	290 340	360/380 420/390	470 500	825/775 875/835	850/800 900/875
Refrigeration factor $\varepsilon = \dot{Q}_k/P_{el}$		1.2	1.2	1.1	1.1	1.4	1.4	1.2	1.2
Refrigerant – Type – Filling	– g	R134a 100			R134a 95	R134a 170	R134a 170	R134a 325	R134a 325
Admissible pressure	bar	25	25	25	25	28	28	25	25
Temperature setting range	°C	+20 to +55							
Noise level	dB (A)	< 61	< 61	< 61	< 61	< 61	< 61	< 61	< 64
Protection category to EN 60 529/10.91 – Internal circuit – External circuit	 – –	 IP 54 IP 34							
Dimensions (W x H x D)	mm	280 x 550 x 140		525 x 340 x 153		280 x 550 x 200	400 x 950 x 260		
Weight	kg	13	13	13	17	17	17	39	44

9 Technical specifications

GB

	Unit	Model No. SK							
Basic controller, RAL 7035	–	**3304.140 3304.142**	**3305.100**	**3305.110**	**3305.140 3305.142**	**3328.100**	**3328.110**	**3328.140**	**3329.100**
Comfort controller, RAL 7035	–	**3304.540 3304.542**	**3305.500**	**3305.510**	**3305.540 3305.542**	**3328.500**	**3328.510**	**3328.540**	**3329.500**
Basic controller, stainless steel cover	–	**3304.240**	**3305.200**	**3305.210**	**3305.240**	**3328.200**	**3328.210**	**3328.240**	**3329.200**
Comfort controller, stainless steel cover	–	**3304.640**	**3305.600**	**3305.610**	**3350.640**	**3328.600**	**3328.610**	**3328.640**	**3329.600**
Rated voltage	V, Hz	400, 3~, 50/ 460, 3~, 60	230, 1~, 50/60	115, 1~, 50/60	400, 3~, 50/ 460, 3~, 60	230, 1~, 50/60	115, 1~, 50/60	400, 3~, 50/ 460, 3~, 60	230, 1~, 50/60
Rated current	A	2.8/2.9	6.0/6.5	12.1/13.6	2.6/2.9	7.5/9.1	14.7/17.3	2.8/3.3	8.6/10.6
Start-up current	A	11.5/12.7	22.0/24.0	42.0/46.0	12.2/11.3	22.0/26.0	36.0/39.0	6.8/7.8	21.0/21.0
Pre-fuse T	A	6.3 – 10.0	16.0	20.0	6.3 – 10.0	16.0	25.0	6.3 – 10.0	16.0
Motor circuit breaker	–	■	–	–	■	–	–	■	–
Transformer circuit-breaker	–	–	–	–	–	–	–	–	–
Miniature circuit-breaker/ Fuse	–	–	■	■	–	■	■	–	■
Useful cooling output $\dot{Q}_k$ L 35 L 35 to DIN 3168 L 35 L 50	W W	1000/1060 790/840	1500/1510 1230/1250	1500/1510 1230/1250	1500/1510 1230/1250	2000/2350 1450/1690	2000/2350 1450/1690	2000/2350 1450/1690	2500/2750 1600/1750
Power consumption P_{el} L 35 L 35 to DIN 3168 L 35 L 50	W W	700/675 785/800	975/1125 1125/1285	1000/1175 1165/1325	925/1100 1085/1275	1025/1200 1250/1350	1085/1250 1300/1410	1050/1275 1275/1525	1450/1675 1625/2000
Refrigeration factor $\varepsilon = \dot{Q}_k/P_{el}$		1.4	1.5	1.5	1.6	2.0	1.8	1.9	1.7
Refrigerant – Type – Filling	 – g	 R134a 500	 R134a 600	 R134a 600	 R134a 600	 R134a 950	 R134a 950	 R134a 950	 R134a 950
Admissible pressure	bar	25	25	25	25	28	28	28	28
Temperature setting range	°C	+20 to +55							
Noise level	dB (A)	< 64	< 64	< 64	< 64	< 64	< 64	< 64	< 64
Protection category to EN 60 529/10.91 – Internal circuit – External circuit	 – –	 IP 54 IP 34							
Dimensions (W x H x D)	mm	400 x 950 x 260				400 x 1580 x 290			
Weight	kg	40	41	46	42	66	73	67	69

	Unit	Model No. SK					
Basic controller, RAL 7035	–	**3329.110**	**3329.140**	**3332.140**	**3361.100**	**3361.110**	**3361.140**
Comfort controller, RAL 7035	–	**3329.510**	**3329.540**	**3332.540**	**3361.500**	**3361.510**	**3361.540**
Basic controller, stainless steel cover	–	**3329.210**	**3329.240**	**3332.240**	**3361.200**	**3361.210**	**3361.240**
Comfort controller, stainless steel cover	–	**3329.610**	**3329.640**	**3332.640**	**3361.600**	**3361.610**	**3361.640**
Rated voltage	V, Hz	115, 1~, 50/60	400, 3~, 50/ 460, 3~, 60	400, 3~, 50/ 460, 3~, 60	230, 1~, 50/60	115, 1~, 60	400, 2~, 50/60
Rated current	A	17.0/22.0	3.7/3.8	4.2/4.8	2.3/2.4	5.3	1.2/1.4
Start-up current	A	44.0/42.0	6.8/7.6	9.2/11.0	5.6/5.6	12.0	3.1/3.3
Pre-fuse T	A	25.0	6.3 – 10.0	6.3 – 10.0	10.0	10.0	6.3 – 10.0
Motor circuit breaker	–	–	■	■	–	–	–
Transformer circuit-breaker	–	–	–	–	–	–	■
Miniature circuit-breaker/Fuse	–	■	–	–	■	■	–
Useful cooling output $\dot{Q}_k$ L 35 L 35 to DIN 3168 L 35 L 50	W W	2500/2750 1600/1750	2500/2700 1900/1950	4000/4400 3070/3570	750/780 510/540	750 500	750/780 510/540
Power consumption P_{el} L 35 L 35 to DIN 3168 L 35 L 50	W W	1500/1725 1675/2065	1425/1625 1675/1975	1850/2250 2120/2590	480/550 530/640	570 670	480/550 530/640
Refrigeration factor $\varepsilon = \dot{Q}_k/P_{el}$		1.7	1.8	2.1	1.5	1.5	1.5
Refrigerant – Type – Filling	 – g	 R134a 950	 R134a 950	 R134a 3000	 R134a 280	 R134a 260	 R134a 280
Admissible pressure	bar	28	28	28	28	28	28
Temperature setting range	°C	+20 to +55				+20 to +52	+20 to +55
Noise level	dB (A)	< 64	< 64	< 64	< 64	< 64	< 64
Protection category to EN 60 529/10.91 – Internal circuit – External circuit	 – –	 IP 54 IP 34					
Dimensions (W x H x D)	mm	400 x 1580 x 290		500 x 1580 x 340	280 x 550 x 280		
Weight	kg	76	70	91	22	22	22

	Unit	Model No. SK					
Basic controller, RAL 7035	–	**3366.100**	**3366.110**	**3366.140**	**3377.100**	**3377.110**	**3377.140**
Comfort controller, RAL 7035	–	**3366.500**	**3366.510**	**3366.540**	**3377.500**	**3377.510**	**3377.540**
Basic controller, stainless steel cover	–	**3366.200**	**3366.210**	**3366.240**	**3377.200**	**3377.210**	**3377.240**
Comfort controller, stainless steel cover	–	**3366.600**	**3366.610**	**3366.640**	**3377.600**	**3377.610**	**3377.640**
Rated voltage	V, Hz	230, 1~, 50/60	115, 1~, 50/60	400, 3~, 50/ 460, 3~, 60	230, 1~, 50/60	115, 1~, 50/60	400, 3~, 50/ 460, 3~, 60
Rated current	A	7.1/7.3	14.3/14.7	3.0/3.1	7.1/7.3	14.3/14.7	3.3/3.4
Start-up current	A	22.0/24.0	43.0/47.0	8.0/8.8	22.0/24.0	43.0/47.0	8.0/8.8
Pre-fuse T	A	10.0	20.0	6.3 – 10.0	10.0	20.0	6.3 – 10.0
Motor circuit breaker	–	–	–	■	–	–	■
Transformer circuit-breaker	–	–	–	–	–	–	–
Miniature circuit-breaker/Fuse	–	■	■	–	■	■	–
Useful cooling output $\dot{Q}_k$ L 35 L 35 to DIN 3168 L 35 L 50	W W	1500/1500 1050/1100	1500/1500 1050/1100	1500/1500 1050/1100	1500/1500 1050/1100	1500/1500 1050/1100	1500/1500 1050/1100
Power consumption P_{el} L 35 L 35 to DIN 3168 L 35 L 50	W W	1045/1175 1220/1335	1075/1200 1265/1375	1090/1240 1260/1430	1045/1175 1220/1335	1075/1200 1265/1375	1090/1240 1260/1430
Refrigeration factor $\varepsilon = \dot{Q}_k/P_{el}$		1.4	1.4	1.3	1.4	1.4	1.3
Refrigerant – Type – Filling	 – g	 R134a 700	 R134a 700	 R134a 700	 R134a 700	 R134a 700	 R134a 700
Admissible pressure	bar	28	28	28	28	28	28
Temperature setting range	°C	+20 to +55					
Noise level	dB (A)	< 64	< 64	< 64	< 64	< 64	< 64
Protection category to EN 60 529/10.91 – Internal circuit – External circuit	 – –	 IP 54 IP 34					
Dimensions (W x H x D)	mm	450 x 1590 x 195			450 x 1590 x 165		
Weight	kg	45	50	46	45	50	46

GB

10 List of spare parts

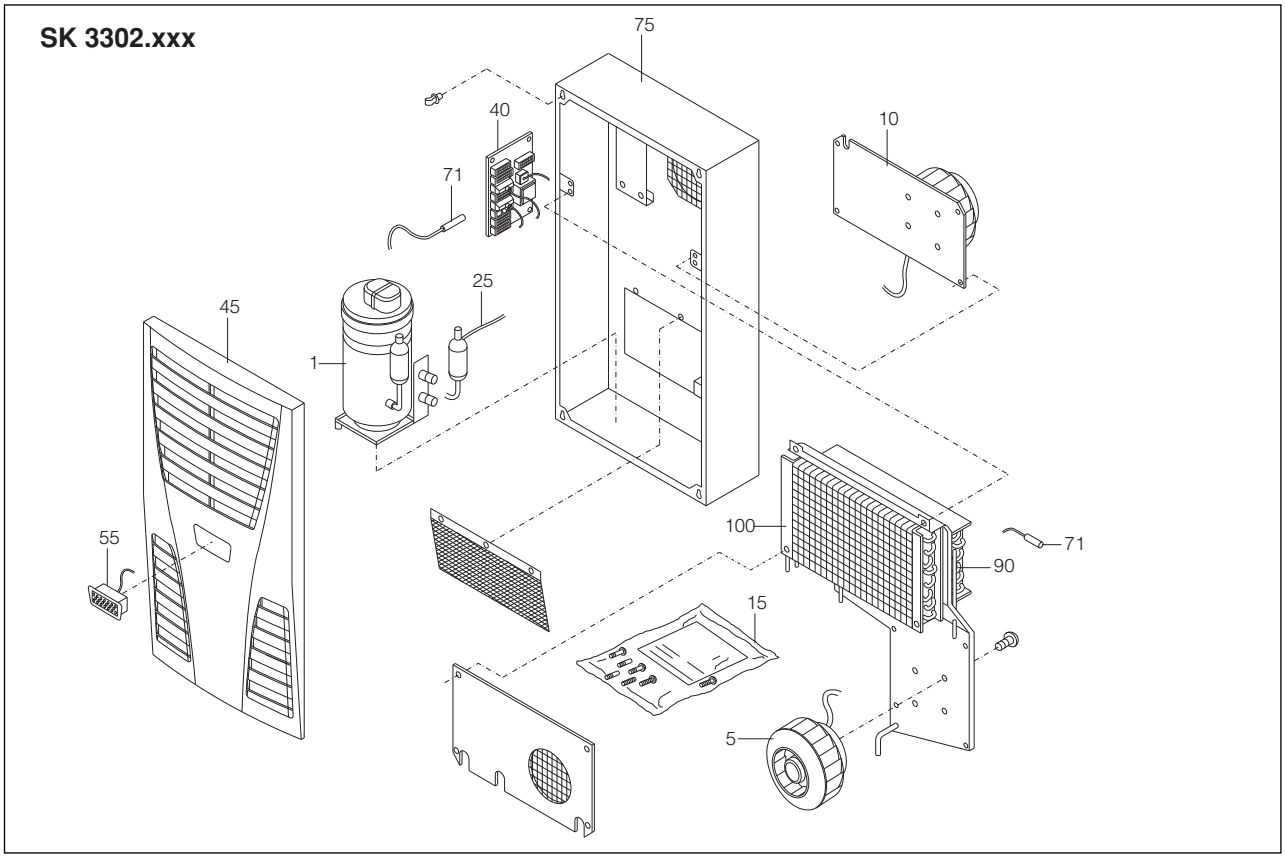
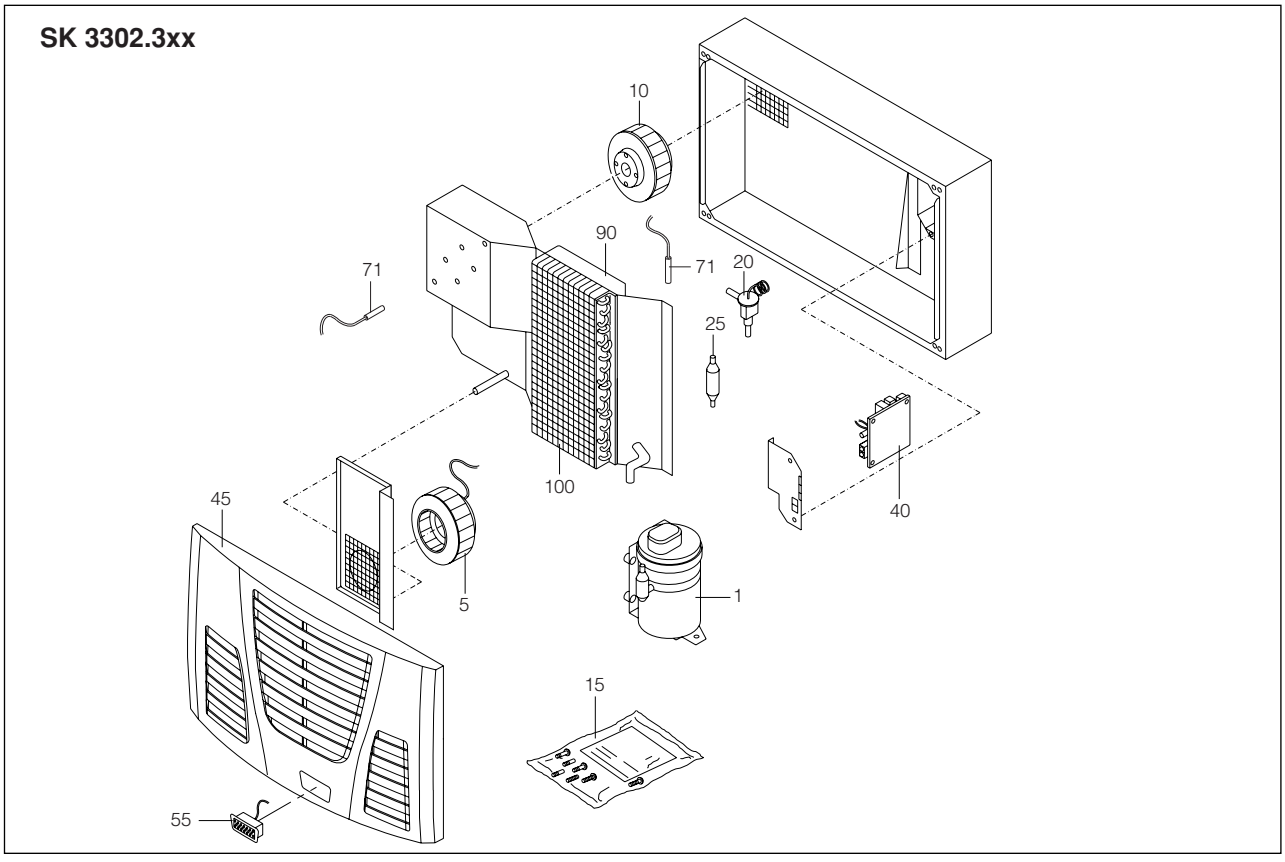
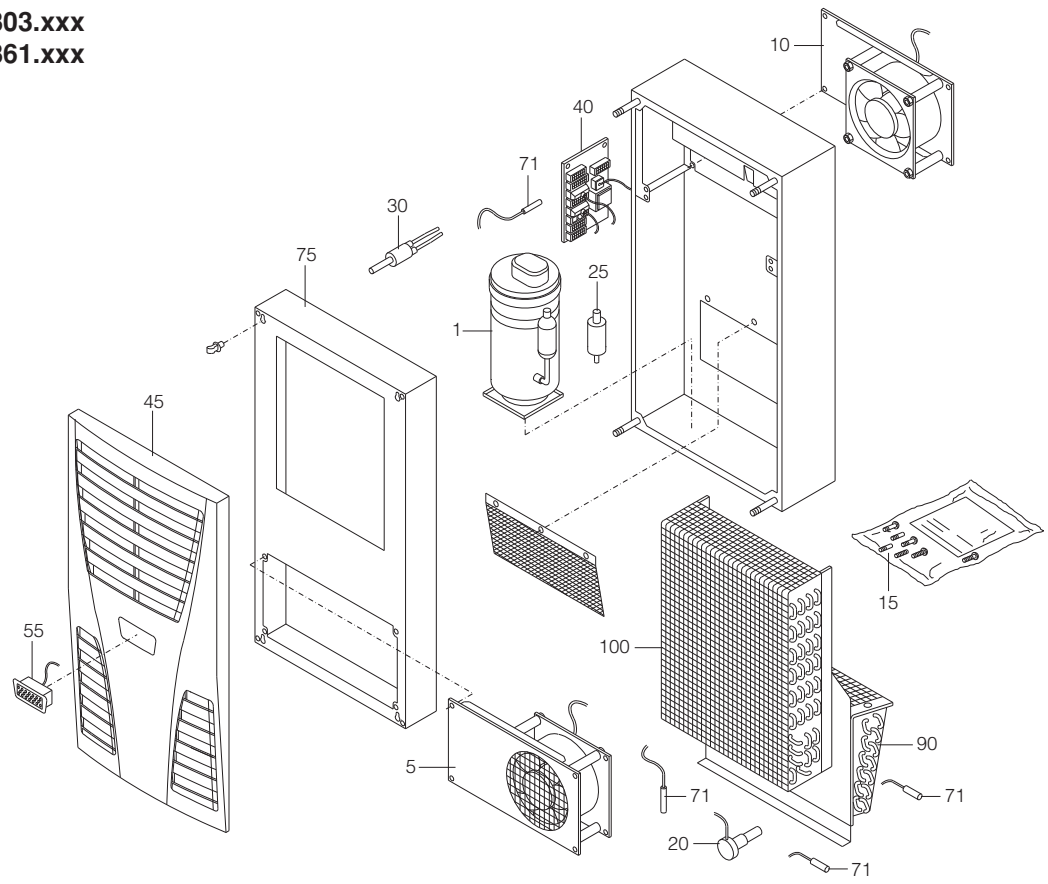


Fig. 83: Spare parts for SK 3302.xxx



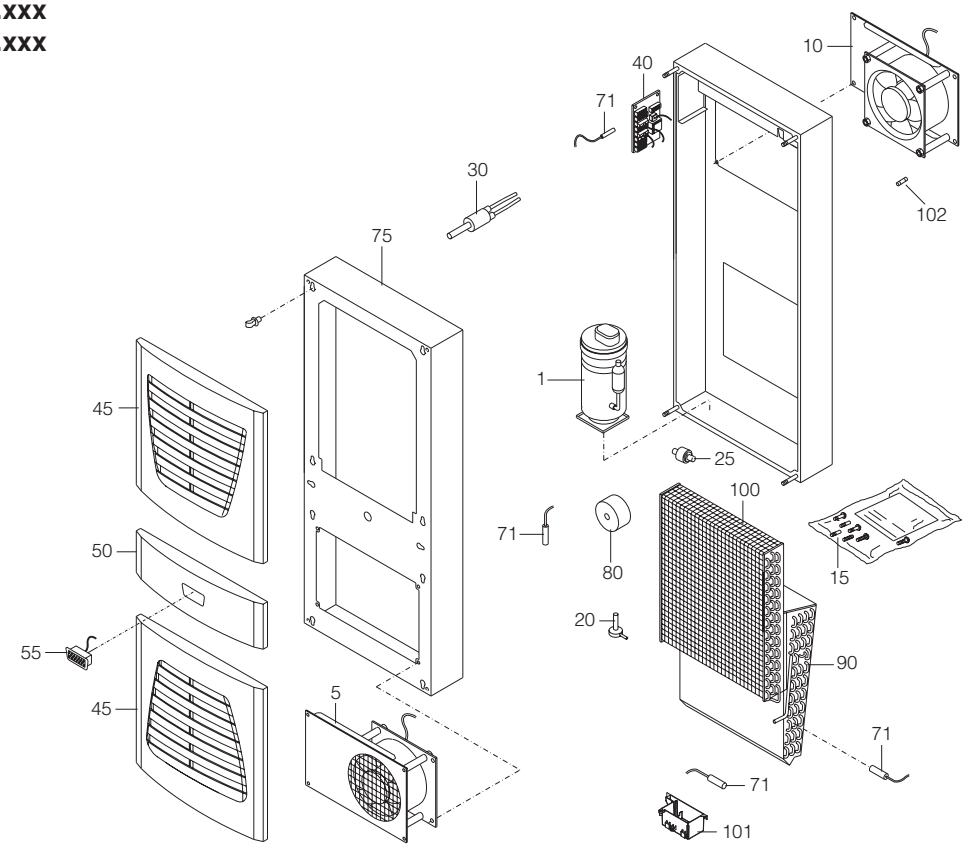
Spare parts for SK 3302.3xx

SK 3303.xxx
SK 3361.xxx



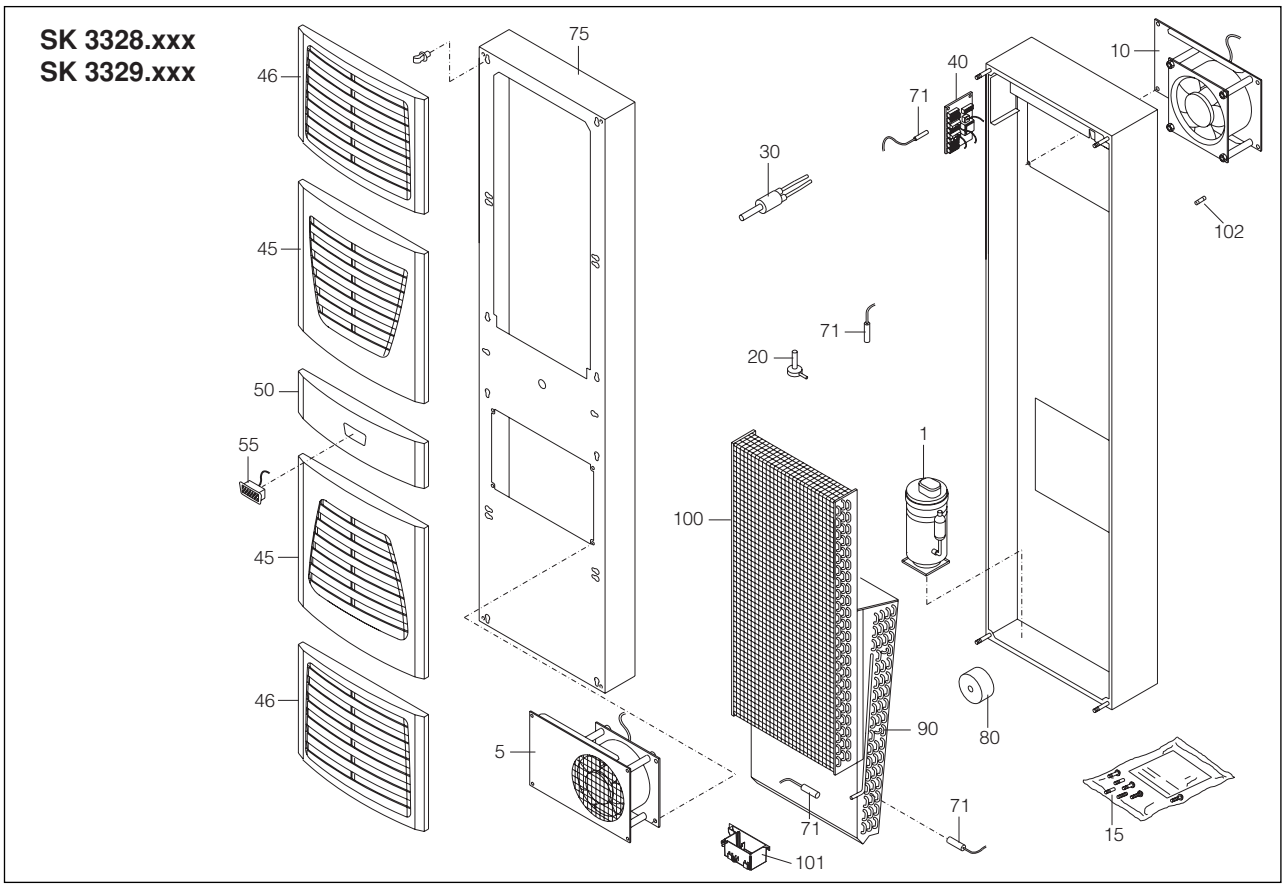
Spare parts for SK 3303.xxx, SK 3361.xxx

SK 3304.xxx
SK 3305.xxx



Spare parts for SK 3304.xxx, SK 3305.xxx

GB



Spare parts for SK 3328.xxx, SK 3329.xxx

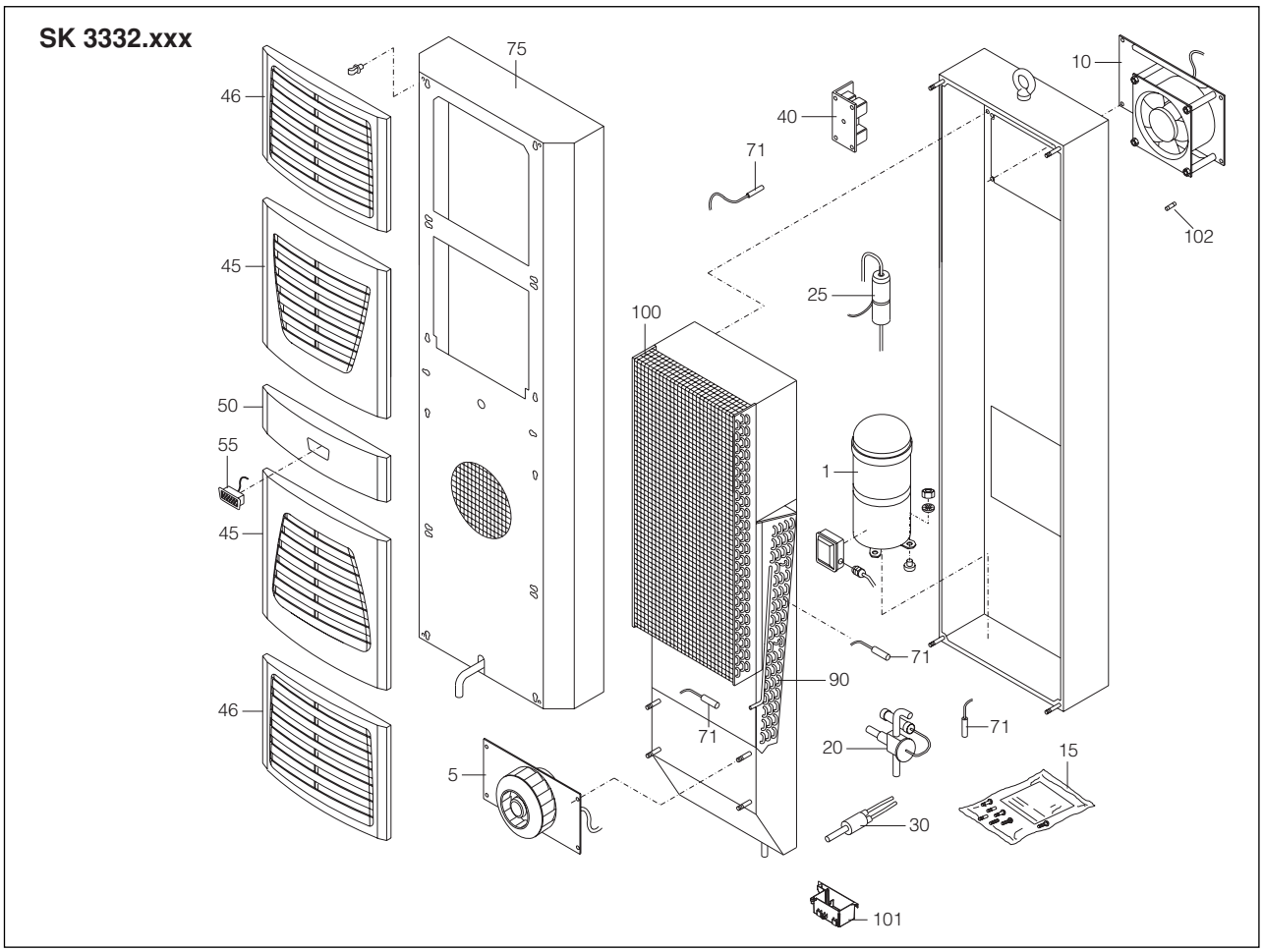
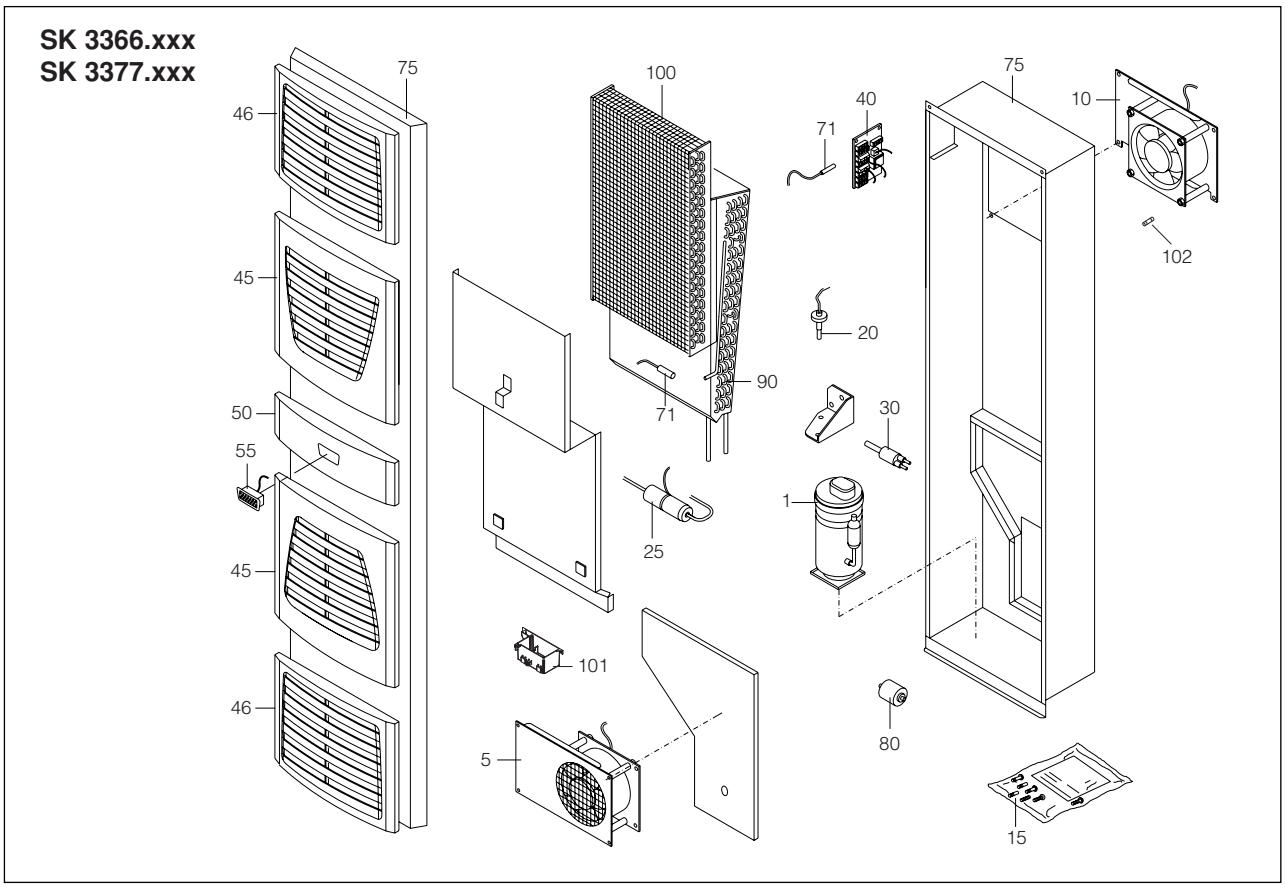


Fig. 84: Spare parts for SK 3332.xxx



Spare parts for SK 3366.xxx, SK 3377.xxx

Key

1 Compressor
5 Condenser fan
10 Evaporator fan
15 Dispatch bag
20 Expansion valve
25 Filter dryer
30 PSA^H pressure-operated switch
40 Controller box
45 Louvred grille 1
46 Louvred grille 2
50 Infill panel
55 Controller
71 Temperature sensor
75 Enclosure tray
80 Transformer
90 Evaporator coil
100 Condenser
101 Condensate evaporator
102 Miniature fuse, condensate evaporator

Note:
In addition to the spare part number, when ordering spares please always give the following:
– Unit model
– Fabrication number
– Date of manufacture
This information may be found on the rating plate.

GB

11 Appendix: Cut-out and hole sizes

11.1 Dimensions for external mounting

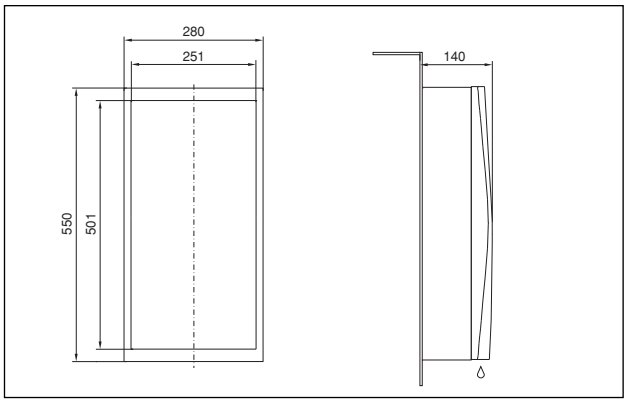


Fig. 85: SK 3302.xxx external mounting (except SK 3302.3xx)

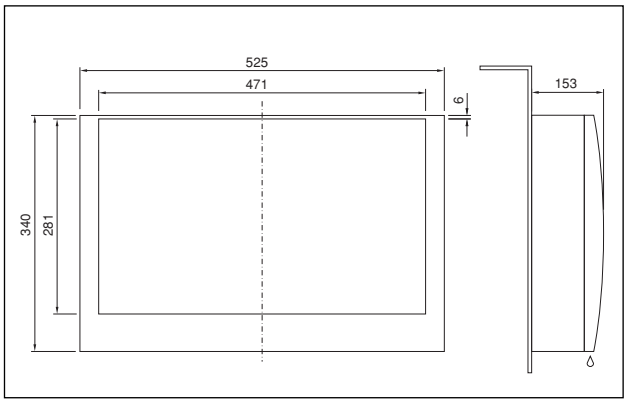


Fig. 86: SK 3302.3xx external mounting

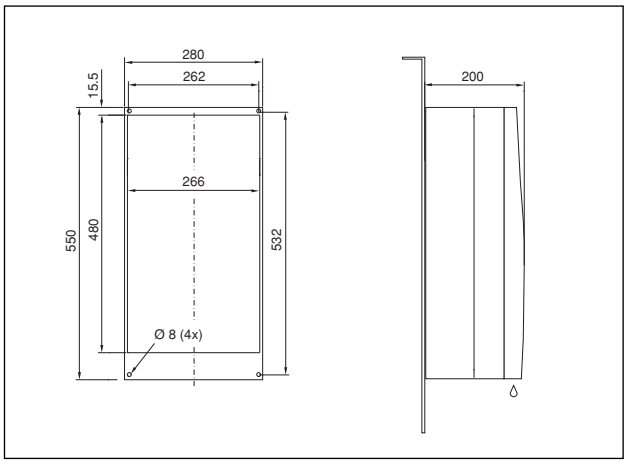


Fig. 87: SK 3303.xxx/SK 3361.xxx external mounting

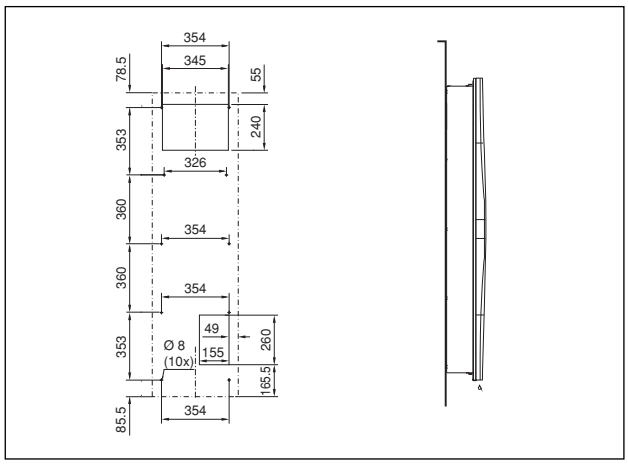


Fig. 88: SK 3366.xxx/SK 3377.xxx external mounting

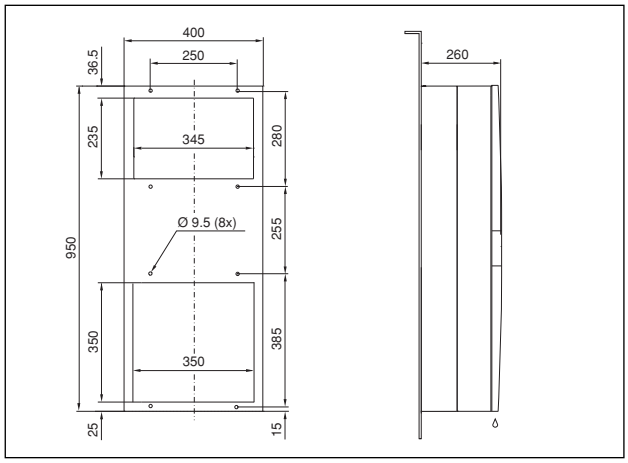


Fig. 89: SK 3304.xxx/SK 3305.xxx external mounting

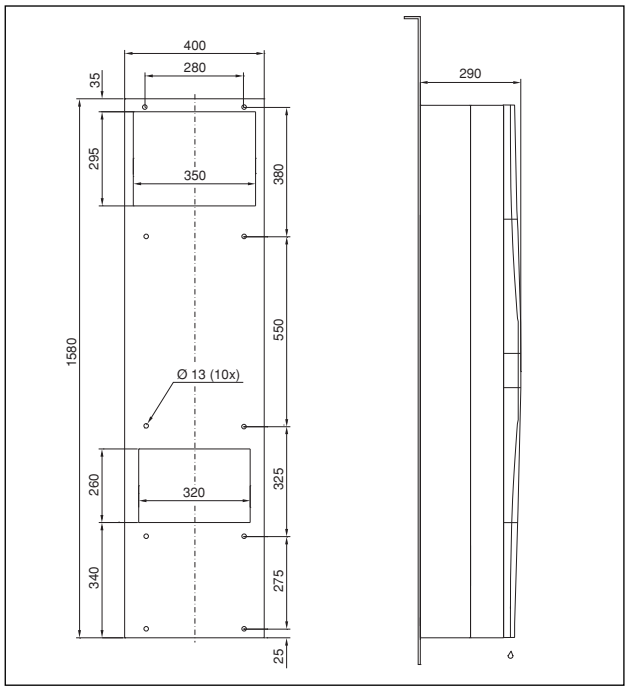


Fig. 90: SK 3328.xxx/SK 3329.xxx external mounting

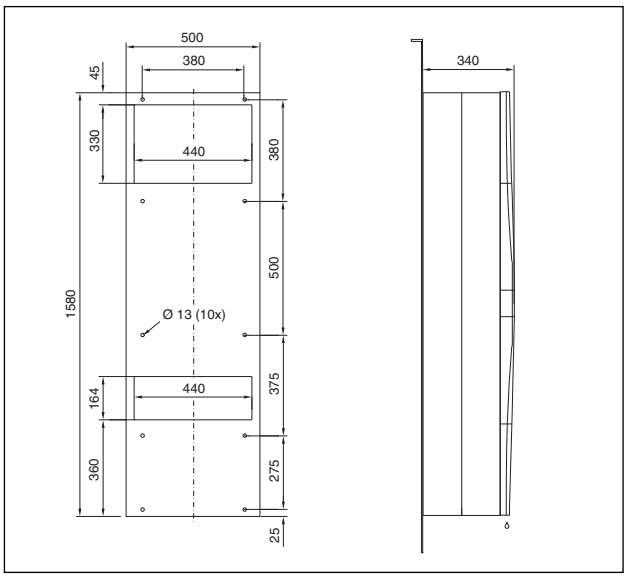


Fig. 91: SK 3332.xxx external mounting

11.2 Dimensions for partial internal mounting

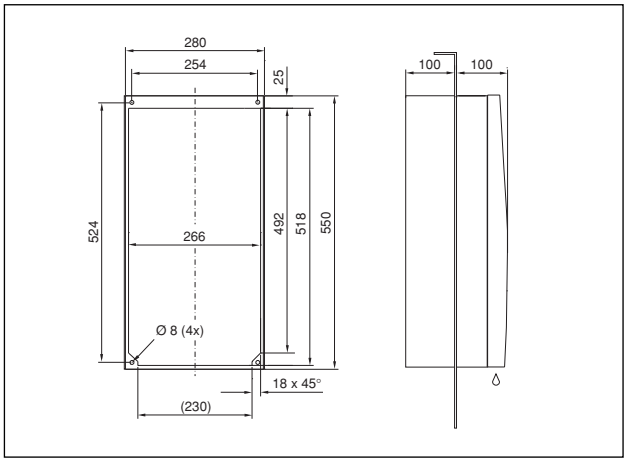


Fig. 92: SK 3303.xxx partial internal mounting

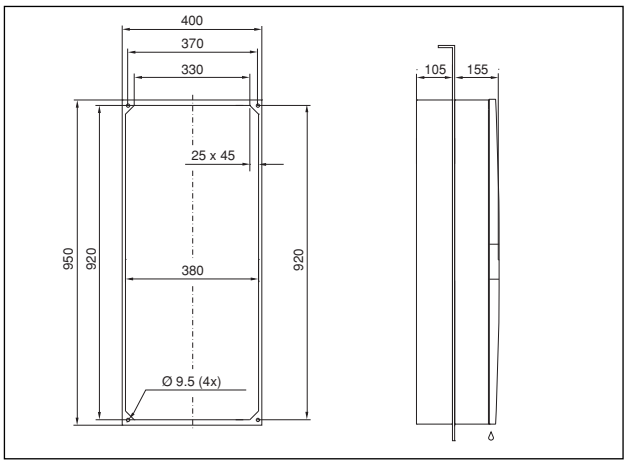


Fig. 93: SK 3304.xxx/SK 3305.xxx partial internal mounting

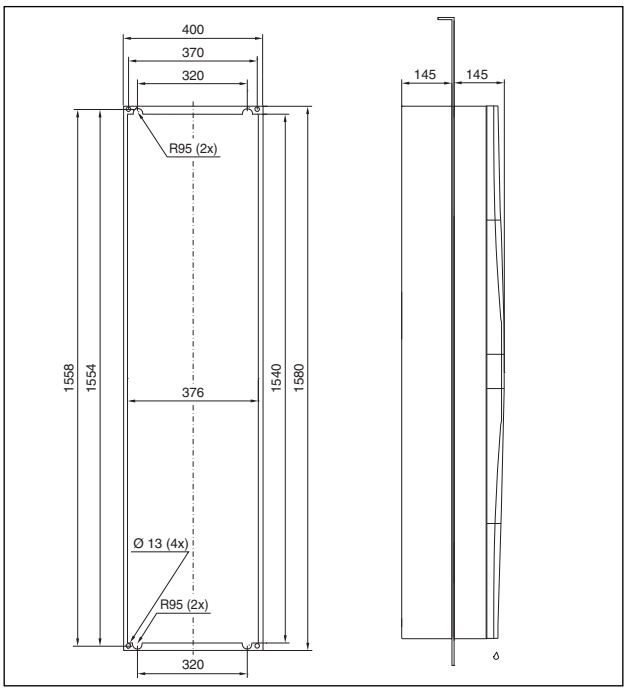


Fig. 94: SK 3328.xxx partial internal mounting

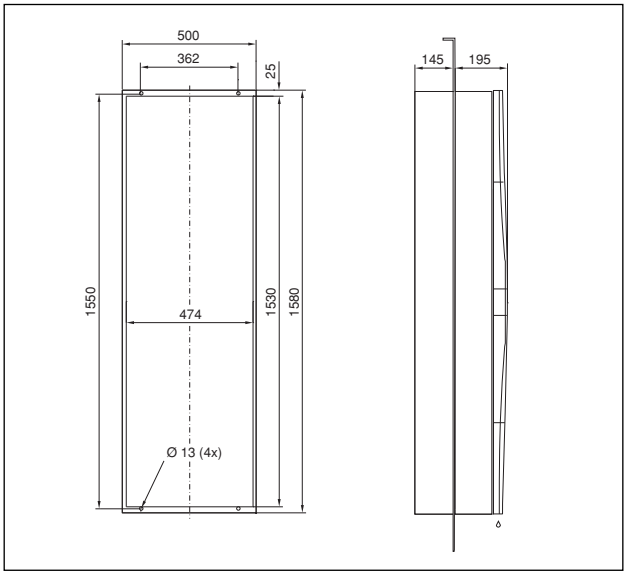


Fig. 95: SK 3332.xxx partial internal mounting

11 Appendix: Cut-out and hole sizes

11.3 Dimensions for full internal mounting

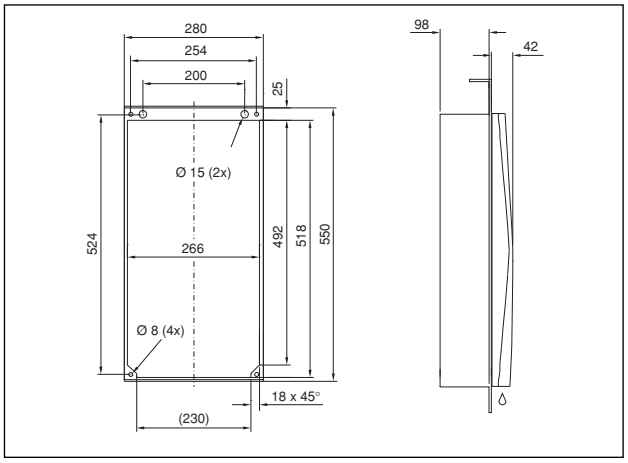


Fig. 96: SK 3302.1xx full internal mounting

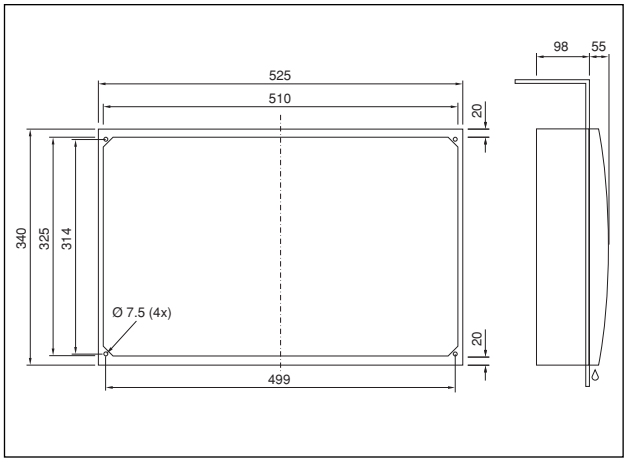


Fig. 97: SK 3302.3xx full internal mounting

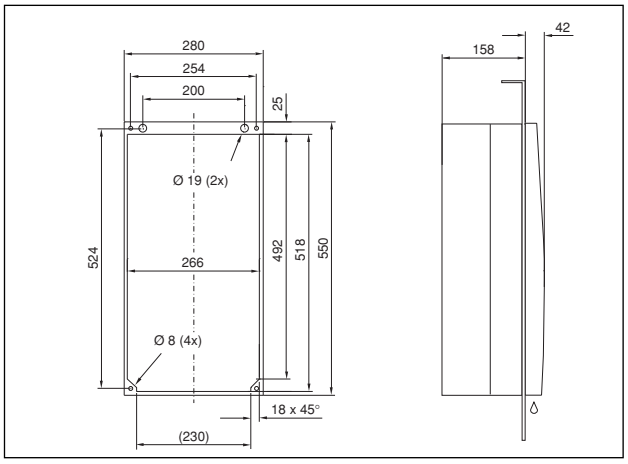


Fig. 98: SK 3303.xxx/SK 3361.xxx full internal mounting

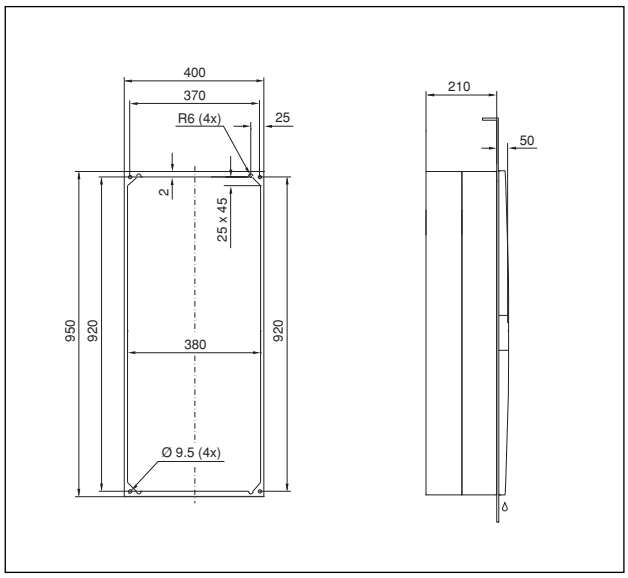


Fig. 99: SK 3304.xxx/SK 3305.xxx full internal mounting

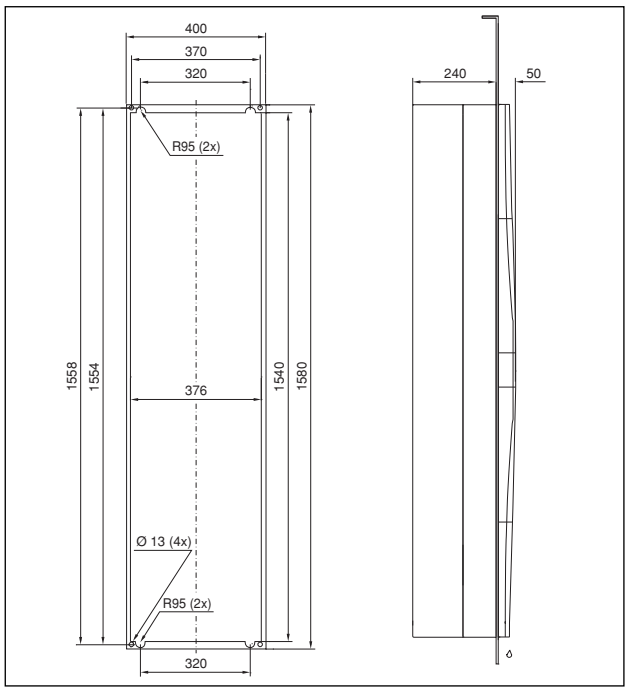


Fig. 100: SK 3328.xxx/SK 3329.xxx full internal mounting

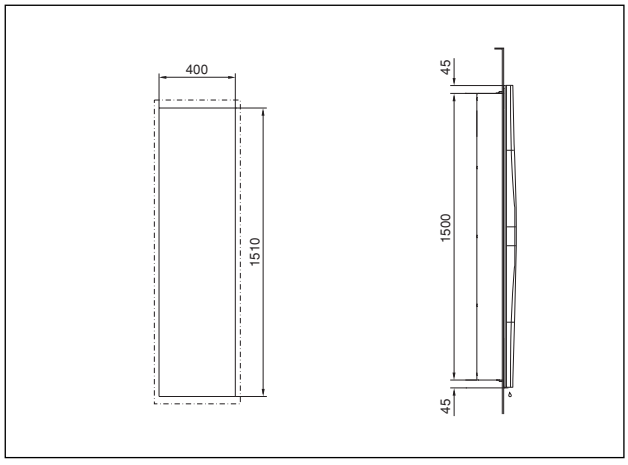
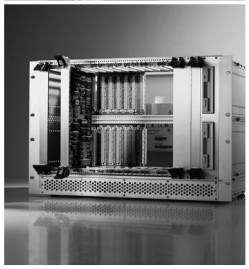


Fig. 101: SK 3366.xxx/SK 3377.xxx full internal mounting

Schaltschrank-Systeme
Industrial Enclosures
Coffrets et armoires électriques
Kastsystemen
Apparatskåpssystem
Armadi per quadri di comando
Sistemas de armarios
インダストリアル エンクロージャー

Stromverteilung
Power Distribution
Distribution de courant
Stroomverdeling
Strömfördelning
Distribuzione di corrente
Distribución de corriente
分電・配電システム



Elektronik-Aufbau-Systeme
Electronic Packaging
Electronique
Electronic Packaging Systems
Electronic Packaging
Contenitori per elettronica
Sistemas de montaje para la electrónica
エレクトロニクス パッケージシステム

System-Klimatisierung
System Climate Control
Climatisation
Systeemklimatisering
Systemklimatisering
Soluzioni di climatizzazione
Climatización de sistemas
温度管理システム

IT-Solutions
IT Solutions
Solutions IT
IT-Solutions
IT-lösningar
Soluzioni per IT
Soluciones TI
ITソリューション

Communication Systems
Communication Systems
Armoires outdoor
Outdoor-behuizingen
Communication Systems
Soluzioni outdoor
Sistemas de comunicación
コミュニケーションシステム

318 635

Rittal GmbH & Co. KG · Postfach 1662 · D-35726 Herborn
Telephone: +49(0)2772 505-0 · Telefax: +49(0)2772 505-2319 · eMail: info@rittal.de · www.rittal.com

Switch to perfection RITTAL

2nd edition 12/07 (04/07)