

Rittal
SK



**Luft/Wasser-
Wärmetauscher**

**Air/water
heat exchanger**

**Echangeur
thermique air/eau**

**Lucht/water-
warmtewisselaars**

**Luft/vatten
värmeväxlare**

**Scambiatore di calore
aria/acqua**

**Intercambiador
de calor aire/agua**

水冷ヒートエクスチェンジャー



SK 3212.xxx
SK 3214.100
SK 3215.100
SK 3216.xxx
SK 3217.100
SK 3218.100
SK 3218.104
SK 3219.100
SK 3249.100
SK 3249.104
SK 3247.000

Montageanleitung

Assembly instructions

Notice de montage

Montage-instructie

Montageanvisning

Istruzioni di montaggio

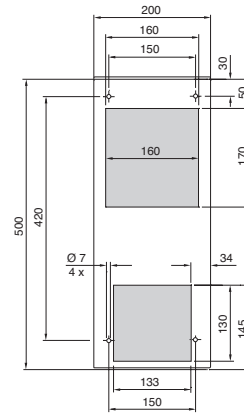
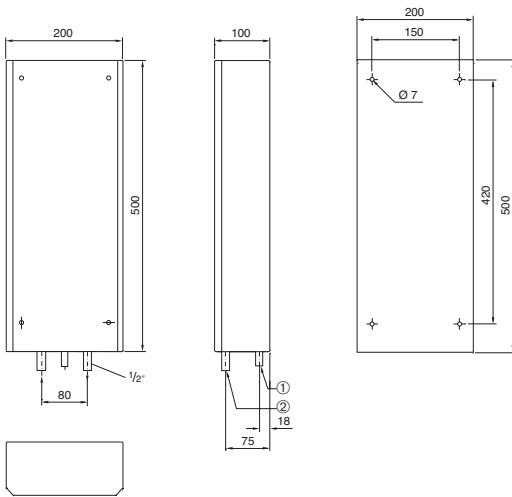
Instrucciones de montaje

取扱説明書

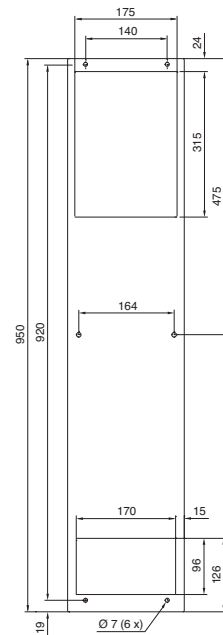
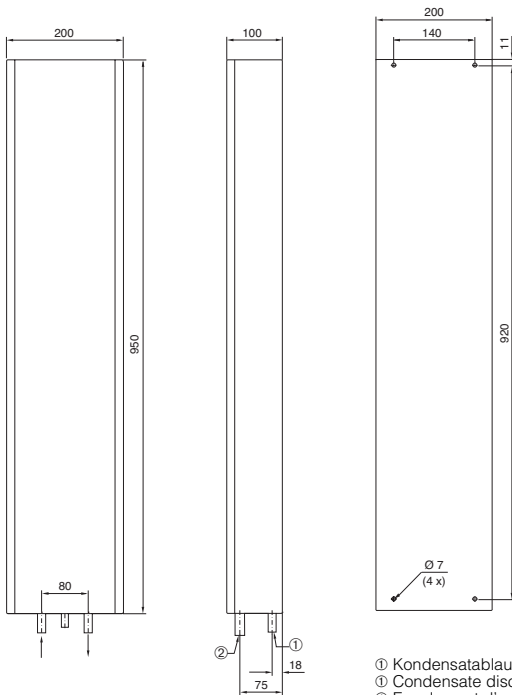
Befestigungsbohrungen Einbau
Fastening holes for internal mounting
Perçages pour montage encastré
Bevestigingsgaten voor inbouw
Montagehål bild, inbyggnad
Fori di fissaggio per installazione incassata
Taladros de fijación para montaje interior
取付穴 全埋め込み取付け

Montageausbruch Anbau
Mounting cut-out for external mounting
Découpe pour montage en saillie
Montage-uitsparingen, aanbouw
Montagehål bild, påbyggnad
Feritoia per installazione sporgente
Escotadura de montaje para montaje exterior
取付用カットアウト 表面取付け

SK 3214.100



SK 3215.100



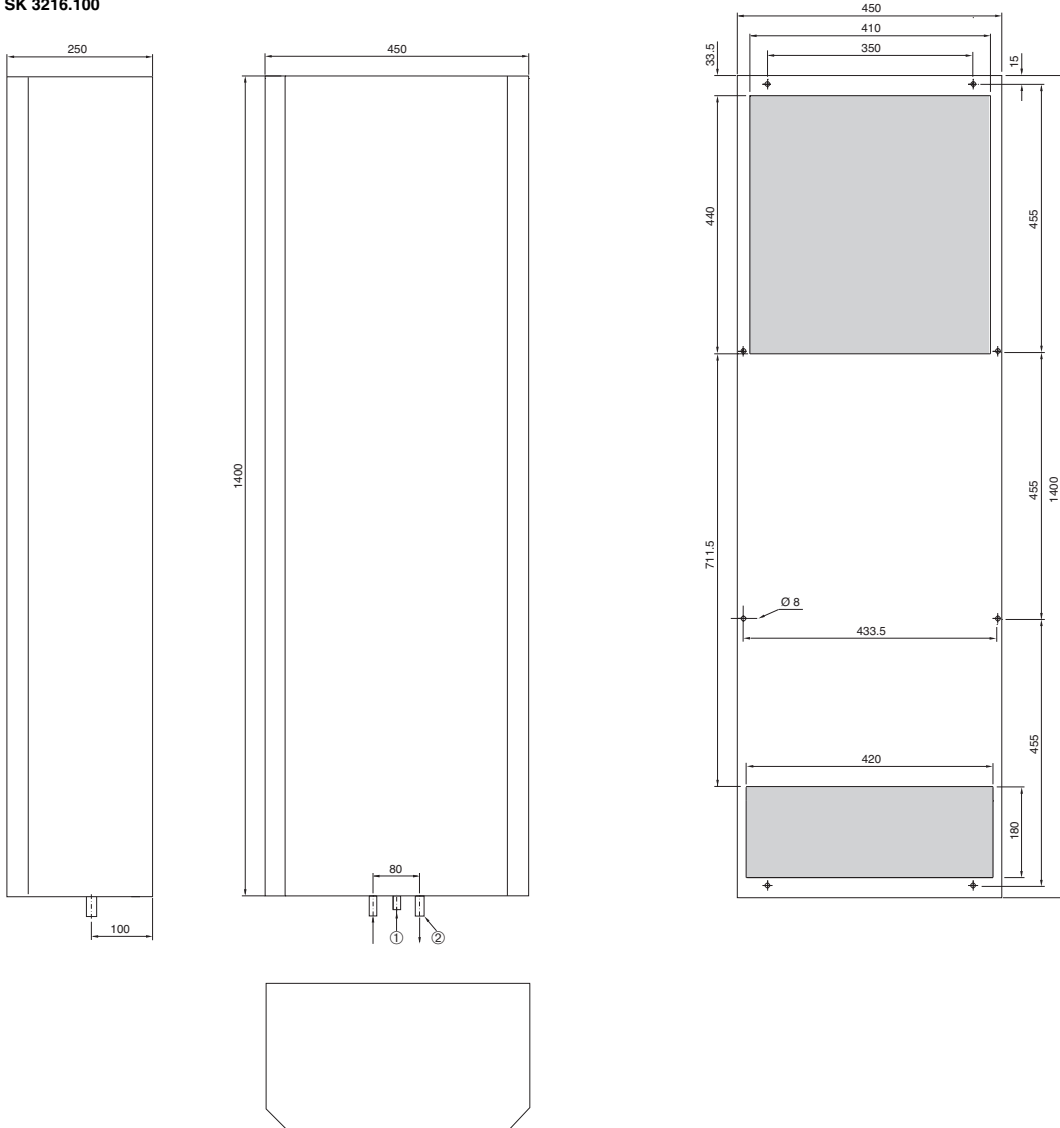
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- ① Condensate discharge
- ① Ecoulement d'eau de condensation
- ① Condensafvoer
- ① Kondensavlopp
- ① Dispositivo di scarico condensa
- ① Salida del agua de condensación
- ① 凝縮水排出器

- ② Kühlwasser-Anschluß 1/2"
- ② Cooling water connection 1/2"
- ② Branchement eau de refroidissement 1/2"
- ② Aansluiten koelwater 1/2"
- ② Kylvattenanslutning 1/2"
- ② Allacciamento liquido frigorifero 1/2"
- ② Acometida de 1/2" del agua de refrigeración
- ② 給水部 1/2 インチ

Befestigungsbohrungen Einbau
Fastening holes for internal mounting
Perçages pour montage encastré
Bevestigingsgaten voor inbouw
Montagehål bild, inbygggnad
Fori di fissaggio per installazione incassata
Taladros de fijación para montaje interior
取付穴 全埋め込み取付け

Montageausbruch Anbau
Mounting cut-out for external mounting
Découpe pour montage en saillie
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Escotadura de montaje para montaje exterior
取付用カットアウト 表面取付け

SK 3216.100

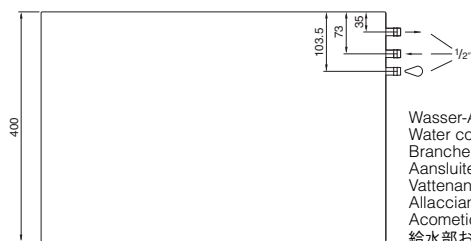
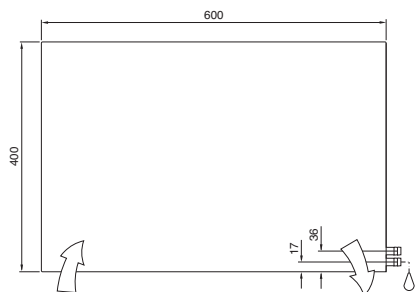
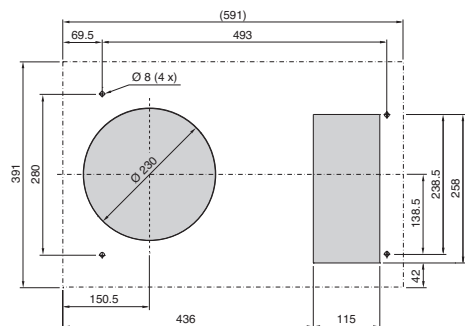


- ① Kondensatablauf
- ① Condensate discharge
- ① Ecoulement d'eau de condensation
- ① Condensafvoer
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- ② Kühlwasser-Anschluß 1/2"
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- ② Kylvattenanslutning 1/2"
- ② Allacciamento liquido refrigerano 1/2"
- ② Acometida de 1/2" del agua de refrigeración
- ② 給水部 1/2 インチ

Montageausschnitt Dachaufbau
Mounting cut-out for roof mounting
Découpe pour montage sur toit
Montage-uitsparingen voor dakopbouw
Hål för takmontage
Feritoia per struttura tetto
Escotadura de montaje para montaje en el techo
取付用カットアウト ルーフ型

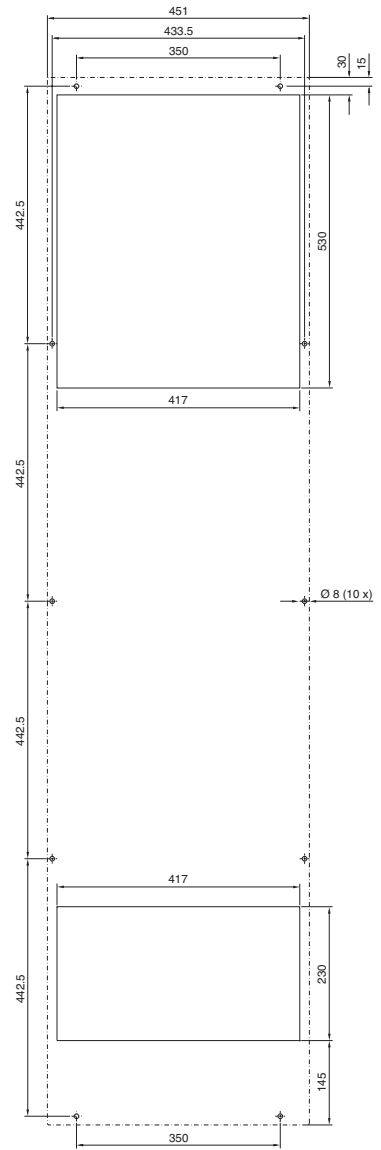
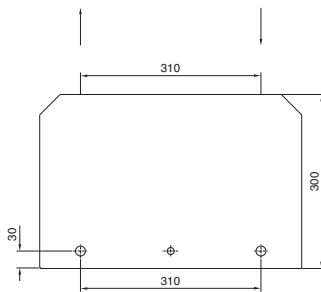
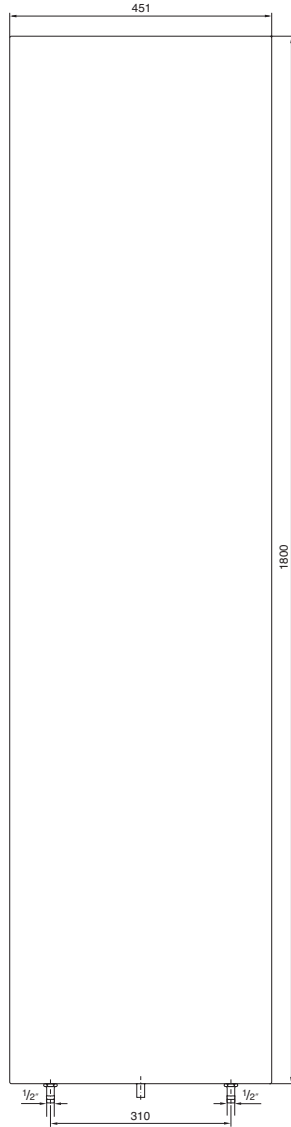
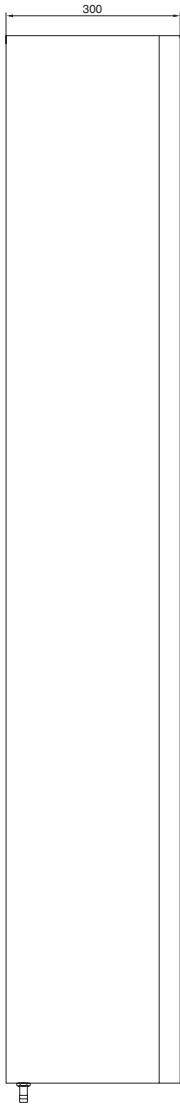
SK 3219.100



Wasser-Anschluß und Kondensatablauf 1/2"
 Water connection and condensate discharge 1/2"
 Branchement d'eau et écoulement de condensat 1/2"
 Aansluiten water- en condensafvoer 1/2"
 Vattenanslutning och kondensavlopp 1/2"
 Allacciamento idrico e scarico condensa 1/2"
 Acometida del agua y salida del agua de condensación 1/2"
 給水部および凝縮水排出器 1/2 インチ

Montageausbruch Anbau
Mounting cut-out for external mounting
Découpe pour montage en saillie
Montage-uitsparingen, aanbouw
Montagehålbid, påbyggnad
Feritoia per installazione sporgente
Escotadura de montaje para montaje exterior
取付用カットアウト 表面取付け

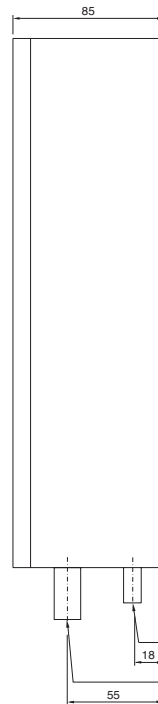
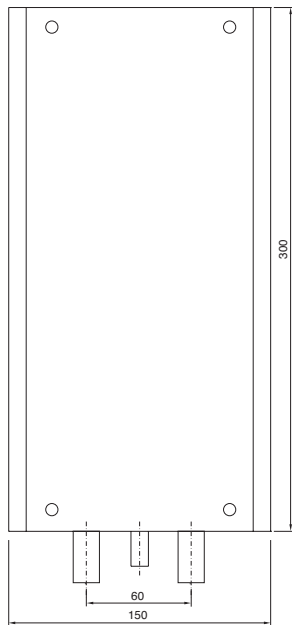
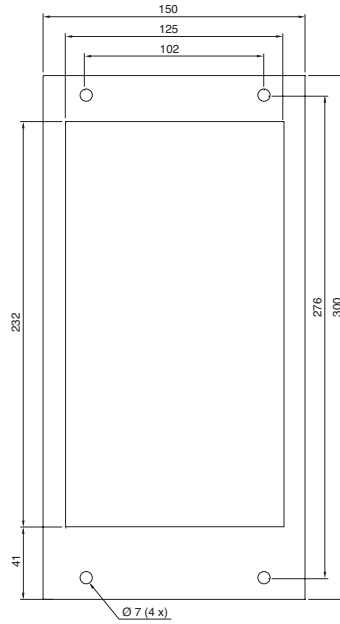
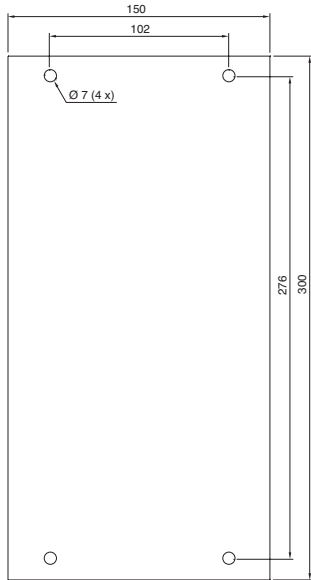
SK 3216.480



Befestigungsbohrungen Einbau
Fastening holes for internal mounting
Perçages pour montage encastré
Bevestigingsgaten voor inbouw
Montagehål bild, inbyggnad
Fori di fissaggio per installazione incassata
Taladros de fijación para montaje interior
取付穴 全埋め込み取付け

Montageausbruch Anbau
Mounting cut-out for external mounting
Découpe pour montage en saillie
Montage-uitsparingen, aanbouw
Montagehål bild, påbyggnad
Feritoia per installazione sporgente
Escotadura de montaje para montaje exterior
取付用カットアウト 表面取付け

SK 3212.xxx



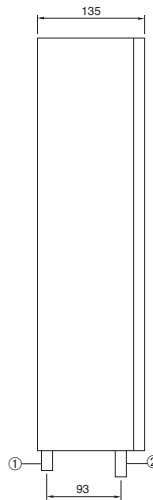
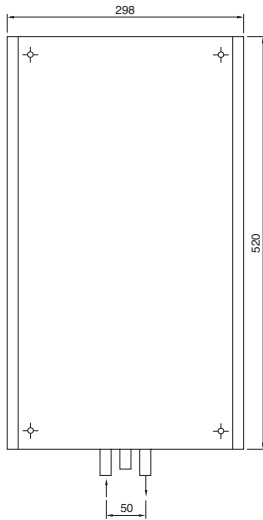
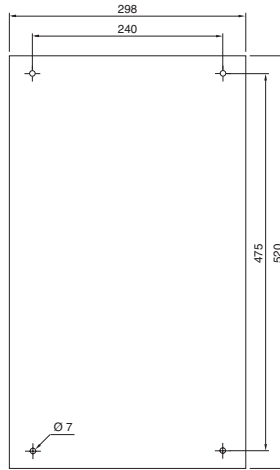
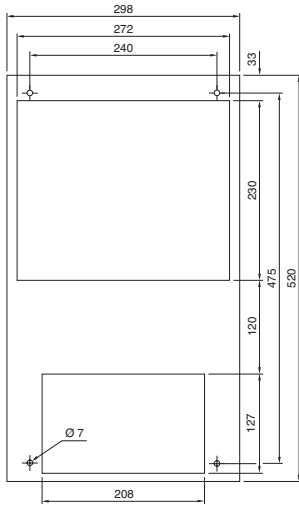
- ① Kondensatablauf
- ① Condensate discharge
- ① Ecoulement d'eau de condensation
- ① Condensafvoer
- ① Kondensavlopp
- ① Dispositivo di scarico condensa
- ① Salida del agua de codensación
- ① 凝縮水排出器

- ② Kühlwasser-Anschluß 3/8"
- ② Cooling water connection 3/8"
- ② Branchement eau de refroidissement 3/8"
- ② Aansluiten koelwater 3/8"
- ② Kylvattenanslutning 3/8"
- ② Allacciamento liquido frigorifero 3/8"
- ② Acometida de 3/8" del agua de refrigeración
- ② 給水部 3/8 インチ

Montageausbruch Anbau
Mounting cut-out for external mounting
Découpe pour montage en saillie
Montage-uitsparingen, aanbouw
Montagehål bild, påbyggnad
Feritoia per installazione sporgente
Escotadura de montaje para montaje exterior
取付用カットアウト 表面取付け

Befestigungsbohrungen Einbau
Fastening holes for internal mounting
Perçages pour montage encastré
Bevestigingsgaten voor inbouw
Montagehål bild, inbyggnad
Fori di fissaggio per installazione incassata
Taladros de fijación para montaje interior
取付穴 全埋め込み取付け

SK 3217.100



- ① Kondensatablauf
- ① Condensate discharge
- ① Ecoulement d'eau de condensation
- ① Condensafvoer
- ① Kondensavlopp
- ① Dispositivo di scarico condensa
- ① Salida del agua de condensación
- ① 凝縮水排出器

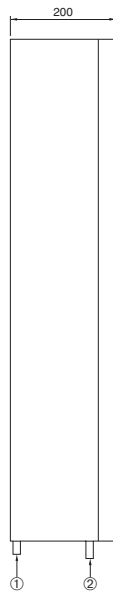
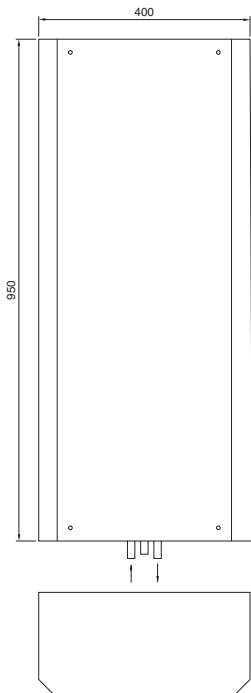
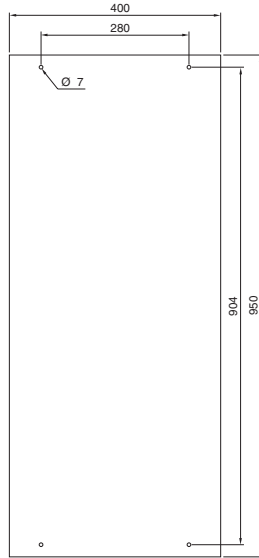
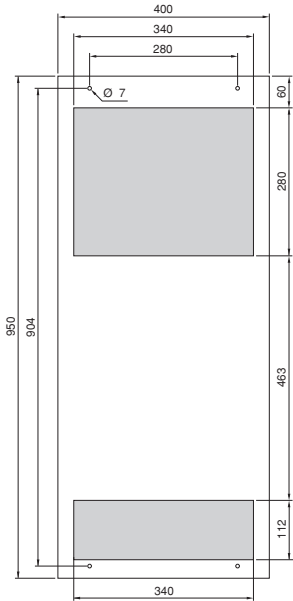
- ② Kühlwasser-Anschluß 1/2"
- ② Cooling water connection 1/2"
- ② Branchement eau de refroidissement 1/2"
- ② Aansluiten koelwater 1/2"
- ② Kylvattenanslutning 1/2"
- ② Allacciamento liquido frigorifero 1/2"
- ② Acometida de 1/2" del agua de refrigeración
- ② 給水部 1/2 インチ



Montageausbruch Anbau
Mounting cut-out for external mounting
Découpe pour montage en saillie
Montage-uitsparingen, aanbouw
Montagehål bild, påbyggnad
Feritoia per installazione sporgente
Escotadura de montaje para montaje exterior
取付用カットアウト 表面取付け

Befestigungsbohrungen Einbau
Fastening holes for internal mounting
Perçages pour montage encastré
Bevestigingsgaten voor inbouw
Montagehål bild, inbyggnad
Fori di fissaggio per installazione incassata
Taladros de fijación para montaje interior
取付穴 全埋め込み取付け

SK 3218.xxx



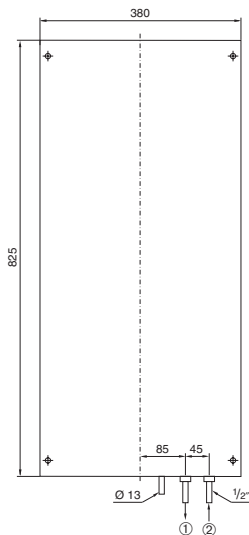
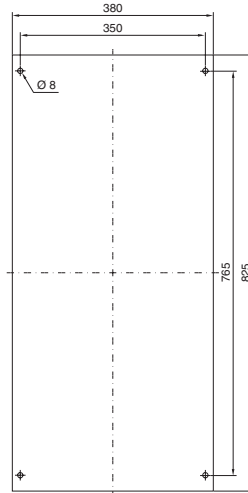
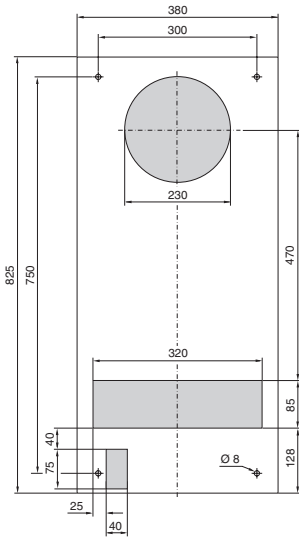
- ① Kondensatablauf
- ① Condensate discharge
- ① Ecoulement d'eau de condensation
- ① Condensafvoer
- ① Kondensavlopp
- ① Dispositivo di scarico condensa
- ① Salida del agua de codensación
- ① 凝縮水排出器

- ② Kühlwasser-Anschluß 1/2"
- ② Cooling water connection 1/2"
- ② Branchement eau de refroidissement 1/2"
- ② Aansluiten koelwater 1/2"
- ② Kylvattenanslutning 1/2"
- ② Allacciamento liquido frigorifero 1/2"
- ② Acometida de 1/2" del agua de refrigeración
- ② 給水部 1/2 インチ

Montageausbruch Anbau
Mounting cut-out for external mounting
Découpe pour montage en saillie
Montage-uitsparingen, aanbouw
Montagehål bild, påbyggnad
Feritoia per installazione sporgente
Escotadura de montaje para montaje exterior
取付用カットアウト 表面取付け

Befestigungsbohrungen Einbau
Fastening holes for internal mounting
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Taladros de fijación para montaje interior
取付穴 全埋め込み取付け

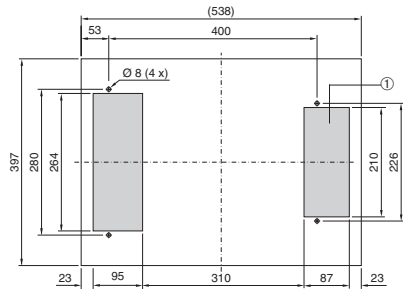
SK 3247.000



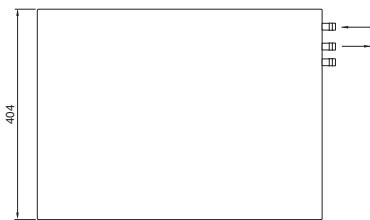
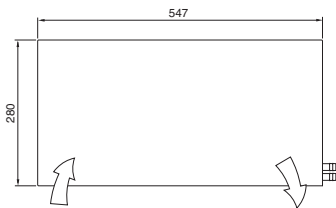
- | | |
|-------------------|--------------------|
| ① Wasseraustritt | ② Wassereintritt |
| ① Water outlet | ② Water inlet |
| ① Départ d'eau | ② Arrivée d'eau |
| ① Wateruitrede | ② Waterintrede |
| ① Vattenutgång | ② Vatteningång |
| ① Uscita acqua | ② Entrata acqua |
| ① Salida del agua | ② Entrada del agua |
| ① 放水口 | ② 吸水口 |

Montageausbruch Anbau
Mounting cut-out for external mounting
Découpe pour montage en saillie
Montage-uitsparingen, aanbouw
Montagehålbild, påbyggnad
Feritoia per installazione sporgente
Escotadura de montaje para montaje exterior
取付用カットアウト 表面取付け Anbau

SK 3249. xxx



- ① Luftaustritt
- ① Air outlet
- ① Départ d'air
- ① Inblaaslucht
- ① Luftutlopp
- ① Uscita aria
- ① Salida del aire
- ① 空気吹出口



Tab. 2.1 Technische Daten
 Tab. 2.1 Technical data
 Tab. 2.1 Données techniques
 Tab. 2.1 Technische gegevens
 Tab. 2.1 Tekniska data
 Tab. 2.1 Caratteristiche tecniche
 Tab. 2.1 Datos técnicos
 図 2.1 仕様

D	Bemessungsbetriebsspannung	Bemessungsstrom	Vorsicherung T	Einschalt-dauer	Nutzkühlleistung	Kühlmedium: Wasser (s. Spezifikation)	Wasservorlauf-temperatur	Umgebungs-temperaturbereich	Betriebsdruck	Geräuschpegel	Schutzart Innenkreislauf Außenkreislauf	Abmessungen (B x H x T) mm	Gewicht	Farbton
GB	Operating voltage	Rated current	Pre-fuse T	Duty cycle	Useful cooling output	Refrigerant: Water (see specification)	Water inlet temperature	Ambient temperature	Operating pressure	Noise level	Protection categ. Internal circuit External circuit	Dimensions (W x H x D) mm	Weight	Colour
F	Tension nominale	Courant nominal	Dispositif de sécurité T	Durée de mise en circuit	Puissance frigorifique en régime permanent	Fluide frigorigène: de l'eau (voir les spécifications)	Température de l'eau à l'entrée	Température ambiante	Pression de régime	Niveau sonore	Ind. de protect. Circuit intérieur Circuit extérieur	Dimensions (L x H x P) mm	Poids	Teinte
NL	Bedrijfs-spanning	Nominale stroom	Voor-zekering, traag T	Inschakel-duur	Nuttig koelvermogen	Koelmedium: Water (zie specificatie)	Waterinlaat-temperatuur	Omgevings-temperatuurbereik	Bedrijfs-druk	Geluidsnivo	Beschermklasse Inwendig circuit Uitwend. circuit	Afmetingen (B x H x D) mm	Gewicht	Kleur
S	Märkspänning	Märkström	Försäkring T	Inkopplings-tid	Effektiv kyl-effekt	Kylmedel: Vatten (se specifikation)	Tillvattens-temperatur	Omgivningst-temperatur	Vattentryck	Ljudnivå	Kapslingsklass Inre kretslopp Yttre kretslopp	Mått (B x H x D) mm	Vikt	Färgton
I	Tensione nominale	Corrente nominale	Fusibile ritardato T	Intermittenza	Potenza frigorifera utile	Mezzo frigorifero: Acqua (vedi specifica)	Temperatura di ingresso dell'acqua	Campo di temperatura d'impiego	Pressione di esercizio	Livello di rumorosità	Grado di protez. Circuito interno Circuito esterno	Dimensioni (L x A x P) mm	Peso	Colore
E	Tensión de servicio	Intensidad nominal	Fusible T	Duración de conexión	Potencia frigorífica útil	Agente refrigerante: Agua (ver especificación)	Temperatura del agua de entrada	Campo de temperatura ambiente	Presión máxima admisible	Nivel de ruido	Protección Circuito interior Circuito exterior	Dimensiones (anch. x alt. x prof.) mm	Peso	Color
J	定格電圧	定格電流	バックアップヒューズ	デューティサイクル	有効冷却能力	冷却材：水 (冷却材仕様参照)	注入時水温	外部温度範囲	動作圧	騒音レベル	保護等級内部回路外部回路	外形寸法 (幅 x 高さ x 奥行) mm	質量	カラー
					L35 W10, 200 l/h L35 W10, 400 l/h						EN 60 529			
SK 3212.230	230 V, 50/60 Hz	0.11 A / 0.13 A	4.0 A / 4.0 A	100%	300 W (200 l/h)		> +1°C – +30°C	+1°C – +70°C	1 – 10 bar	42 dB (A)	IP 55	150 x 300 x 80	3 kg	RAL 7035
SK 3214.100	230 V, 50/60 Hz	0.17 A / 0.18 A	2.0 A / 2.0 A	100%	600 W (200 l/h) 650 W (400 l/h)		> +1°C – +30°C	+1°C – +70°C	1 – 10 bar	42 dB (A)	IP 55	200 x 500 x 100	7 kg	RAL 7035
SK 3217.100	230 V, 50/60 Hz	0.60 A / 0.55 A	4.0 A / 4.0 A	100%	1000 W (200 l/h) 1100 W (400 l/h)		> +1°C – +30°C	+1°C – +70°C	1 – 10 bar	44 dB (A)	IP 55	298 x 520 x 135	9.5 kg	RAL 7035
SK 3215.100	230 V, 50/60 Hz	0.38 A / 4.0 A	4.0 A / 4.0 A	100%	1250 W (200 l/h) 1300 W (400 l/h)		> +1°C – +30°C	+1°C – +70°C	1 – 10 bar	53 dB (A)	IP 55	200 x 950 x 100	13 kg	RAL 7035
SK 3247.000	230 V, 50/60 Hz	0.43 A / 0.50 A	4.0 A / 4.0 A	100%	1540 W (200 l/h) 1700 W (400 l/h)		> +1°C – +30°C	+1°C – +70°C	1 – 10 bar	51 dB (A)	IP 55	380 x 825 x 105	17 kg	RAL 7035
SK 3218.104	230 V, 50/60 Hz	0.42 A / 0.48 A	4.0 A / 4.0 A	100%	2250 W (200 l/h) 2650 W (400 l/h)		> +1°C – +30°C	+1°C – +70°C	1 – 10 bar	42 dB (A)	IP 55	400 x 950 x 200	19 kg	RAL 7035
SK 3218.100	230 V, 50/60 Hz	0.42 A / 0.48 A	4.0 A / 4.0 A	100%	3000 W (200 l/h) 3500 W (400 l/h)		> +1°C – +30°C	+1°C – +70°C	1 – 10 bar	42 dB (A)	IP 55	400 x 950 x 200	21 kg	RAL 7035
SK 3216.100	230 V, 50/60 Hz	0.98 A / 1.10 A	4.0 A / 4.0 A	100%	5000 W (400 l/h)		> +1°C – +30°C	+1°C – +70°C	1 – 10 bar	61 dB (A)	IP 55	450 x 1400 x 250	56 kg	RAL 7035
SK 3216.480	400 V, 3-, 50/60 Hz 480 V, 3-, 60 Hz	1.4 A / 1.6 A 1.2 A	4.0 A / 4.0 A	100%	7000 W (500 l/h)		> +1°C – +30°C	+1°C – +70°C	1 – 10 bar	70 dB (A)	IP 55	450 x 1800 x 300	79 kg	RAL 7035
SK 3249.104	230 V, 50/60 Hz	0.91 A / 0.94 A	4.0 A / 4.0 A	100%	1700 W (200 l/h) 1900 W (400 l/h)		> +1°C – +30°C	+1°C – +70°C	1 – 10 bar	47 dB (A)	IP 55	547 x 280 x 404	19 kg	RAL 7035
SK 3249.100	230 V, 50/60 Hz	0.91 A / 0.94 A	4.0 A / 4.0 A	100%	2250 W (200 l/h) 2500 W (400 l/h)		> +1°C – +30°C	+1°C – +70°C	1 – 10 bar	47 dB (A)	IP 55	547 x 280 x 404	21 kg	RAL 7035
SK 3219.100	230 V, 50/60 Hz	1.2 A / 1.8 A	4.0 A / 4.0 A	100%	3330 W (200 l/h) 4000 W (400 l/h)		> +1°C – +30°C	+1°C – +70°C	1 – 10 bar	56 dB (A)	IP 55	600 x 400 x 400	38 kg	RAL 7035

Contents

1. Application
2. Technical data
3. Assembly
4. Electrical connection
5. Cooling water connection
6. Refrigeration and control behaviour
7. Leaks and temperature monitoring
8. Maintenance
9. Scope of supply and warranty
10. Notes on discharge of condensate
11. Safety instructions
12. Notes on water quality
13. Spares list

1. Application

Air/water heat exchangers are designed and built to dissipate heat from enclosures, by cooling the air inside the enclosure and protecting temperature sensitive components. Air/water heat exchangers are particularly suitable for the temperature range of +40°C to +70°C, where for system related reasons, comparable units such as air/air heat exchangers, enclosure cooling units or fan units with filters cannot be used to dissipate heat effectively and economically.

2. Technical data

(see table 2.1).

3. Assembly

Please use the enclosed drilling template to cut out the component apertures.

3.1 SK 3247.000

- The unit can be mounted
- a) on the enclosure
see fig. on page 30
 - b) inside the enclosure
see fig. on page 30

Cut the enclosed seal to length and stick to the appliance as shown in fig. 3.2, page 31.

3.2 SK 3219.100 / SK 3249.xxx

The unit should be mounted on the top cover of the enclosure in accordance with fig. on page 31.

3.3 SK 3212.230 / SK 3214.100 / SK 3215.100 / SK 3216.xxx / SK 3217.100 / SK 3218.xxx

External installation of the unit (Fig. page 30):
Screw the four fastening bolts ①, together with the washer ② and nut ③, to the mounting level ④ of the enclosure. Push the heat exchanger ⑤ into position and secure with four screws ⑥.

Internal installation of the unit (Fig. page 30):

Insert four fastening bolts ① into the appliance from behind. Slide the fixing ring ⑦ onto the fastening bolts as a mounting aid. Screw the appliance, together with the washer ② and nut ③, to the mounting level of the enclosure from the outside. Push the protective cap ⑧ onto the nut.

4. Electrical connection

The connection voltage and frequency must correspond to the rated values quoted on the data plate. The unit must be connected to the mains via a disconnection device which ensures at least 3 mm contact opening in the deactivated state. No additional temperature control must be connected to the supply side of the unit. Line protection should be provided by means of the pre-fuse specified on the name plate. Please observe the relevant regulations when installing!
The mains connection is made at the connection terminal (see fig. on page 32).

5. Cooling water connection

The cooling water connection must be made with pressure resistant flexible hoses which should be secured with clips.

(Note the direction of flow and check for absence of leaks!)

The units have no separate air-bleed. With pressure-sealed systems, corresponding air-bleed facilities are to be installed on the water side.

Protect the water circuit from contamination and excess pressure (10 bar max.).

Please observe the relevant regulations when installing!

6. Refrigeration and control behaviour

The fan of the air circuit operates continuously, thus ensuring an even temperature distribution within the enclosure. A solenoid valve controls the cooling water flow in accordance with the preset temperature. Setting range +20°C to +60°C. Presetting of the enclosure temperature is made,

- 6.1 for **SK 3214.100 / SK 3215.100 / SK 3216.xxx / SK 3217.100 / SK 3218.xxx** via the **thermostat** on the rear of the unit.
- 6.2 for **SK 3247.000** at the **setting knob** of the built-in thermostat. To do this, remove the hood of the unit.
- 6.3 for **SK 3219.100 / SK 3249.xxx** at the **potentiometer P1** of the control board. To do this, remove the hood of the unit and the board cover.
- 6.4 **SK 3212.xxx** has no control unit.

7. Leaks and temperature monitoring

7.1 Temperature monitoring

Should the temperature inside the enclosure rise by more than

10 K in the models **SK 3247.000 / SK 3214.100 / SK 3215.100 / SK 3216.xxx / SK 3217.100 / SK 3218.xxx**

7 K in the models **SK 3219.100 / SK 3249.xxx** above the set-point value, then the potential-free changeover contact will switch. This contact is routed to the outside via a separate cable for model **SK 3247.000**, via a separate plug for model **SK 3219.100 / SK 3249.xxx**.

For **SK 3214.100 / SK 3215.100 / SK 3216.xxx / SK 3217.100 / SK 3218.xxx** the connection of the potential-free contact is made via the plug-in terminal strip on the rear of the unit.

7.2 Leak monitoring

(only in the case of SK 3219.100 / SK 3249.xxx)

In the event of a leakage developing in the **SK 3219.100 / SK 3249.xxx**, or a pipe fracture occurring in the water circuit

- a) the cooling water supply will be cut off immediately,
- b) the potential-free changeover contact will be switched, and
- c) the fan will be switched off.

8. Maintenance

The air/water heat exchangers require no maintenance (see point 12.).
Check the function of the condensate draining facility regularly.

9. Scope of supply and warranty

9.1 SK 3247.000 / SK 3212.xxx / SK 3214.100 / SK 3215.100 / SK 3216.xxx / SK 3217.100 / SK 3218.xxx

- 1 air/water heat exchanger, ready for connection
- 1 sealing tape
- 4 fastening bolts
(internal installation of unit 3247.000)
- 4 threaded pins M6 x 30
(internal installation of unit)
- 4 flat-headed screws M6*
- 4 fixing rings*
- 4 nuts M6
- 4 washers A 6.4
- 4 protective caps
- 1 set of assembly and operating instructions
- 1 drilling template
- * Only for SK 3214.100 / SK 3215.100 / SK 3216.xxx / SK 3217.100 / SK 3218.xxx instead of the threaded pins.

9.2 SK 3219.100 / SK 3249.xxx

- 1 air/water heat exchanger, ready for connection
- 1 sealing plate
- 4 double-ended threaded bolts
- 4 nuts M6
- 4 serrated washers J 6.4
- 1 set of assembly and operating instructions
- 1 drilling template
- 1 angled hose fitting
- 1 threaded bush
- 2 connectors
- 1 eyebolt (SK 3219.100)

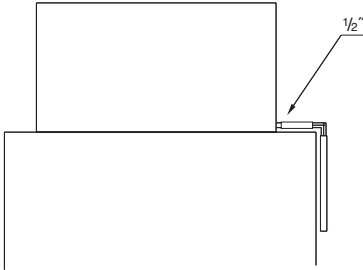
Guarantee:

This unit is covered by a 1-year guarantee from the date of supply, subject to correct usage. Within this period, the returned unit will be repaired in the factory or replaced free of charge. The unit is to be used for the cooling of enclosures only. If it is connected or handled improperly the manufacturer's guarantee does not apply and in this case we are not liable for any damage caused.

10. Notes on discharge of condensate

A drain hose must be fitted to the 1/2" flanged socket protruding from the unit, to discharge any condensate water accumulating. For **SK 3219.100 / SK 3249.xxx** connect drain hoses with elbow sockets (do not kink!) and direct immediately downwards to avoid reflux and overflow of the condensate into the inside of the unit.

Fig. 10.1 **Condensate discharge SK 3219.100 / SK 3249.xxx**



In order to ensure the safe discharge of condensate, the following points must be observed:

- Discharge hose must be routed free from kinks!
- Do not reduce the hose cross-section!
- Always install the drainage hose with a downward slope!

In order to prevent increased development of condensate and also in the interest of energy savings, the cooling water temperature should be matched to the required cooling output (see performance diagrams).

11. Safety instructions

- When installing the device, the condensate discharge must be routed out of the enclosure!
- In order to avoid frost damage, the minimum permissible water temperature of +1°C must not be undercut at any point in the water cycle!
- It is essential to obtain the manufacturer's permission before adding anti-freeze!
- During storage and transportation below freezing point, the water cycle should be drained completely using compressed air!
- Only set the thermostat as low as is strictly necessary, because of undercutting the dew point with a falling water inlet temperature (condensation)!
- It is very important that the enclosure is sealed on all sides (IP 54), particularly the cable entry (condensation)!

12. Notes on water quality

For safe operation of the equipment, it is essential to observe the VBG guidelines on cooling water (VGB R 455 P). Cooling water must not contain any limescale deposits or loose debris; in other words, it should have a low level of hardness, particularly a low level of carbon hardness. For recooling within the plant, the carbon hardness should not be too high. On the other hand, however, the water should not be so soft that it attacks the operating 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. For this reason, not only is it always necessary to add a corresponding quantity of fresh water, but also to remove part of the enriched water.

Gypsiferous water is unsuitable for cooling purposes because it has a tendency to form boiler scale, which is particularly difficult to remove. Furthermore, cooling water should be free from iron and manganese, because otherwise deposits may occur which settle in the pipes and block them. At best, organic substances should only be present in small quantities, because otherwise sludge deposits and microbiological contamination may occur.

12.1 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	Filtering of water via <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

In order to ensure correct operation of a recooling system which is operated with water on at least one side, the properties of the added or system

water used should not deviate substantially from the following list of hydrological data:

Hydrological data	SK 3212.xxx / SK 3247.000 / SK 3219.100 / SK 3249.100 / SK 3214.100 / SK 3215.100 / SK 3216.xxx / SK 3217.100 / SK 3218.100	SK 3218.104 ¹⁾ / SK 3249.104 ¹⁾
pH value	7 – 8.5	6 – 9
Carbonate hardness	> 3 < 8 °dH	1 – 12 °dH
Free carbon dioxide	8 – 15 mg/dm ³	1 – 100 mg/dm ³
Accompanying carbonic acid	8 – 15 mg/dm ³	free
Aggressive carbonic acid	0 mg/dm ³	0 – 400 mg/dm ³
Sulphides	free	free
Oxygen	< 10 mg/dm ³	< 10 mg/dm ³
Chloride ions	< 50 mg/dm ³	< 200 mg/dm ³
Sulphate ions	< 250 mg/dm ³	< 500 mg/dm ³
Nitrates and nitrites	< 10 mg/dm ³	< 100 mg/dm ³
COD	< 7 mg/dm ³	< 40 mg/dm ³
Ammonia	< 5 mg/dm ³	< 20 mg/dm ³
Iron	< 0.2 mg/dm ³	free
Manganese	< 0.2 mg/dm ³	free
Conductivity	< 2200 µS/cm	< 4000 µS/cm
Residue on evaporation	< 500 mg/dm ³	< 2000 mg/dm ³
Potassium permanganate consumption	< 25 mg/dm ³	< 40 mg/dm ³
Suspended matter	< 3 mg/dm ³	
	> 3 < 15 mg/dm ³ part current purification recommended	
	> 15 mg/dm ³ continuous purification recommended	

¹⁾ The complete absence of corrosion under experimental conditions suggests that solutions with a significantly higher salt content and greater corrosion potential (such as seawater) may still be tolerated.

13. Spares list

(see page 28)

Position Item Pos. Pos. Pos. Posición 項目	Ersatzteil- liste	Spare list	Liste de pièces détachées	Lijst reserve- delen	Reserv- delslista	Lista dei pezzi di ricambio	Lista de piezas de repuesto	スペア パーツ
	D	GB	F	NL	S	I	E	J
	Bezeichnung	Description	Signification	Benaming	Beteckning	Descrizione	Descripción	製品名
10	Ventilator, komplett	Fan, complete	Ventilateur, complète	Ventilator, kompleet	Fläkt, komplett	Ventilatore, completa	Ventilador, completo	ファン、 一式
15	Zubehörbeutel	Dispatch bag	Pochette d'accessoires	Zakje toebehoren	Tillbehörspåse	Sacchetto accessori	Bolsa de accesorios	アクセサリー バッグ
16	Abdichtplatte	Sealing plate	Plaque d'étanchéité	Afdichtplaat	Tätningsplatta	Piastra di tenuta	Placa de estanqueidad	密閉用プレート
32	Magnetventil, komplett	Solenoid valve, complete	Vanne électromag- nétique, complète	Magneetventiel, kompleet	Magnetventil, komplett	Valvola elettromag- netica, completa	Electroválvula, completa	マグネットバルブ、 一式
33	Rückschlagventil	Flap valve	Clapet antiretour	Terügstroomventiel	Backventil	Valvola di non ritorno	Válvula de retención	フラップバルブ
35	Zwei-Stufen- Thermostat	Two-stage thermostat	Thermostat à deux paliers	Tweestanden- thermostaat	Tvåstegs- termostat	Termostato a due stadi	Termostato de dos estados	二段階式 サーモスタット
40	Steuerplatine komplett	Control PCB complete	Platine de com- mande, complète	Stuurstrooprint, kompleet	Styrkort, komplett	Piastra circuito stampate, completa	Pletina de mando completa	コントロールPCB、 一式
48	Lufteintrittsgitter	Air inlet grille	Grille d'entrée d'air	Luchtinlaatrooster	Luftingångsgaller	Griglia d'entrata dell'aria	Rejilla de entrada de aire	吸気グリッド
71	Temperaturfühler	Temperature sensor	Sonde de température	Temperatuursensor	Temperaturgivare	Sonda di temperatura	Sonda térmica	温度センサー
73	Leckagesensor	Leakage sensor	Palpeur de fuite	Lekkagesensor	Läckagesensor	Rivelatore di perdite	Sensor de fugas de agua	漏水モニター
75	Haube, komplett	Cover, complete	Couvercle, complète	Afdekkap, kompleet	Huv, komplett	Calotta, completa	Cubierta completa	カバー、 一式
91	Wärmetauscher	Heat exchanger	Echangeur thermique	Warmtewisselaar	Värmeväxlare	Scambiatore di calore	Intercambiador de calor	ヒートエクスチェン ジャー
95	Bodenwanne, komplett	Base tray, complete	Bac de rétention, complète	Bodemplaat, kompleet	Bottenråg, komplett	Vaschetta di racc. cond., completa	Bandeja de base completa	ベーストレイ、 一式

Bei Bestellung unbedingt angeben

Typ:

Fabrikations-Nr.:

Herstelldatum:

Ersatzteil-Nr.:

Absolutely necessary in case of order

Type:

Fabrication no.:

Manufacturing date:

Spare part no.:

スペアパーツご発注時に必ずご記入下さい。

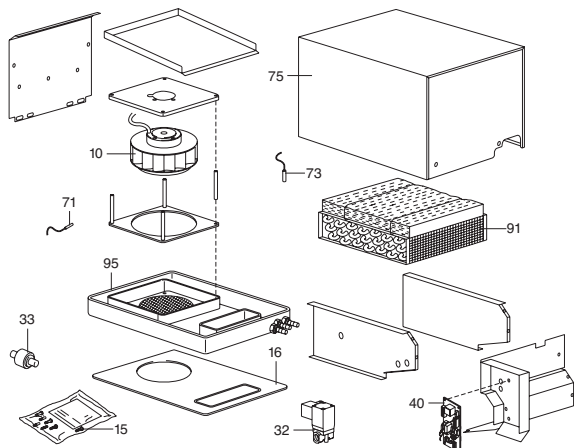
クーラー型式:

製造番号:

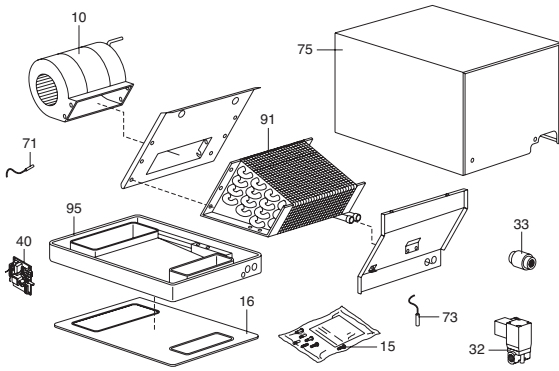
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スペアパーツ番号:

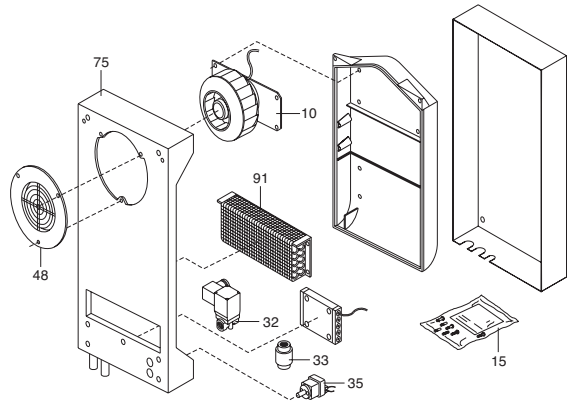
SK 3219.100



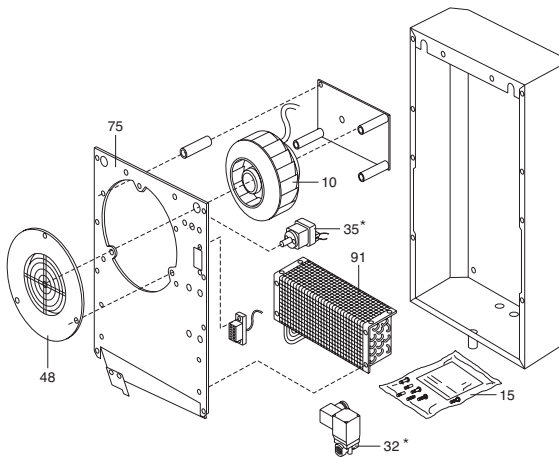
SK 3249.100 / SK 3249.104



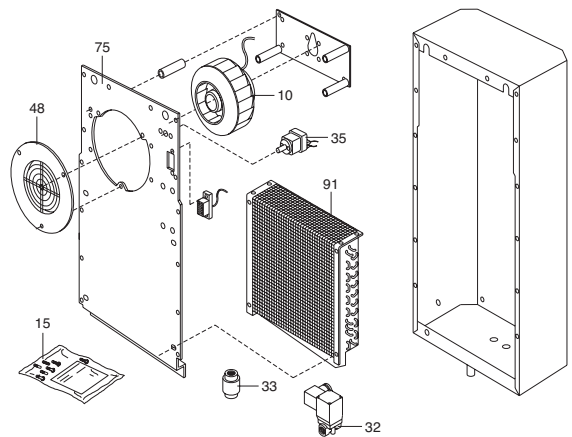
SK 3247.000



**SK 3212.230 / SK 3214.100 /
SK 3215.100 / SK 3217.100**



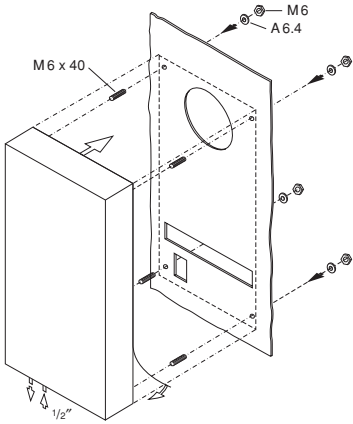
SK 3216.xxx / SK 3218.100 / SK 3218.104



* nicht bei SK 3212.xxx /
not installed in SK 3212.xxx

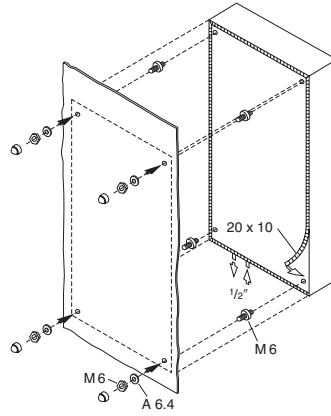
Geräteanbau
 External mounting
 Montage en saillie
 Apparaatopbouw
 Påbyggnad
 Montaggio sporgente
 Montaje exterior del aparato
 表面取付け

SK 3247.000

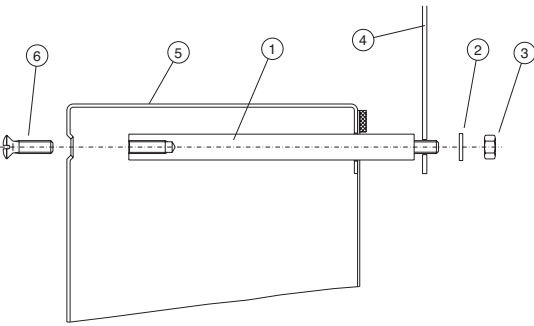


Geräteeinbau
 Internal mounting
 Montage encastré
 Apparaatinbouw
 Inbyggnad
 Montaggio incassato
 Montaje interior del aparato
 全埋め込み取付け

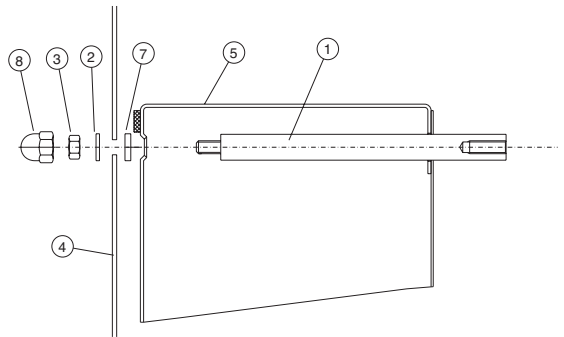
SK 3247.000



SK 3212.xxx / SK 3214.100 / SK 3215.100 / SK 3216.xxx / SK 3217.100 / SK 3218.xxx

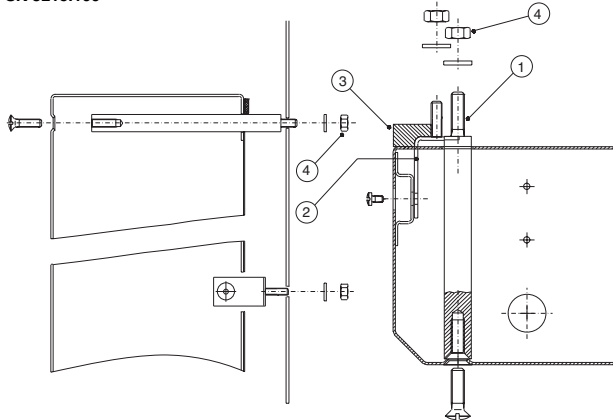


SK 3212.xxx / SK 3214.100 / SK 3215.100 / SK 3217.100 / SK 3218.xxx



Geräteanbau
 External mounting
 Montage en saillie
 Apparaatopbouw
 Påbyggnad
 Montaggio sporgente
 Montaje exterior del aparato
 表面取付け

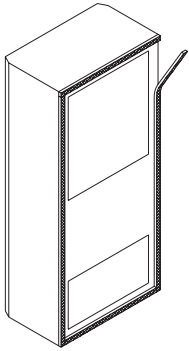
SK 3215.100



- Abb. 3.2 Anbringung der Dichtung
- Fig. 3.2 Attaching the seal
- Fig. 3.2 Mise en place du joint
- Afb. 3.2 Aanbrengen van de afdichting
- Bild 3.2 Montage av tätning
- Fig. 3.2 Applicazione della guarnizione
- Fig. 3.2 Colocación de la junta
- 図 3.2 パッキンの取付

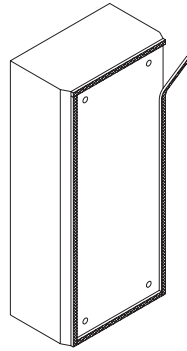
Geräteanbau
 External mounting
 Montage en saillie
 Apparaatopbouw
 Påbyggnad
 Montaggio sporgente
 Montaje exterior del aparato
 表面取付け

SK 3212.xxx / SK 3214.100 / SK 3215.100 /
 SK 3216.xxx / SK 3217.100 / SK 3218.xxx

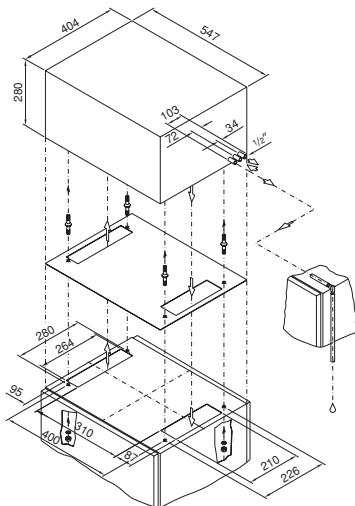


Geräteeinbau
 Internal mounting
 Montage encastré
 Apparaatinbouw
 Inbyggnad
 Montaggio incassato
 Montaje interior del aparato
 全埋め込み取付け

SK 3212.xxx / SK 3214.100 / SK 3215.100 /
 SK 3217.100 / SK 3218.xxx

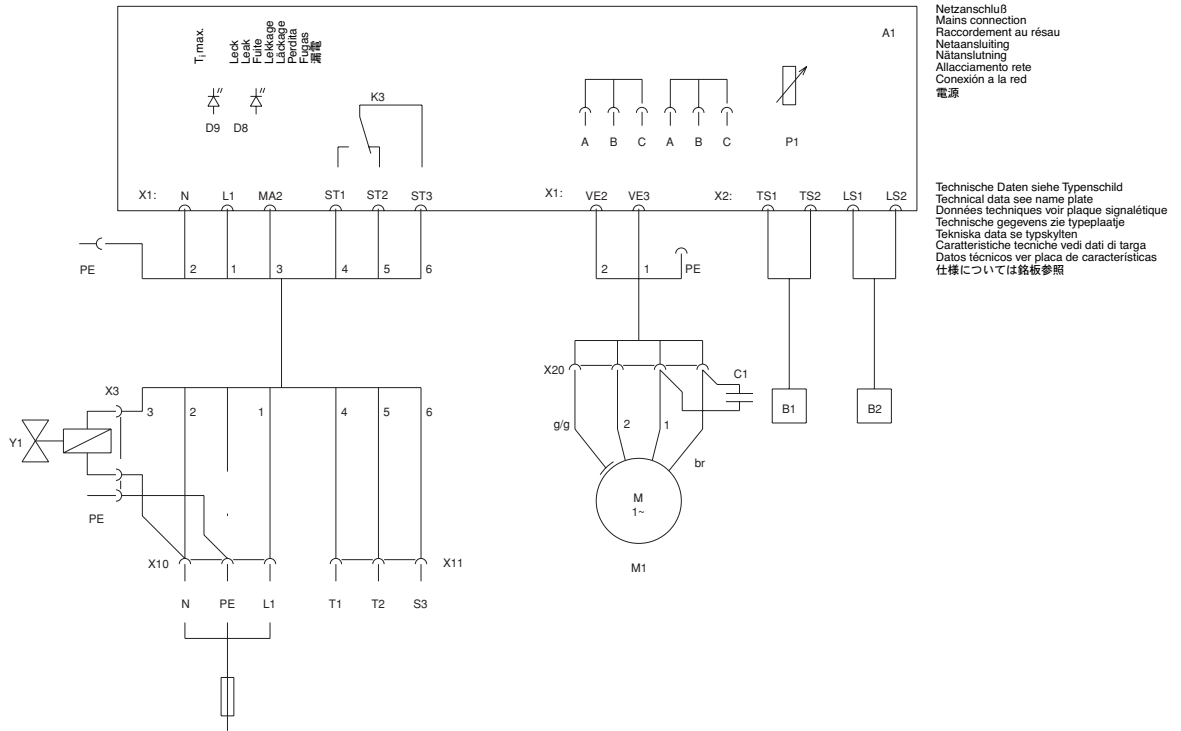


SK 3249.xxx



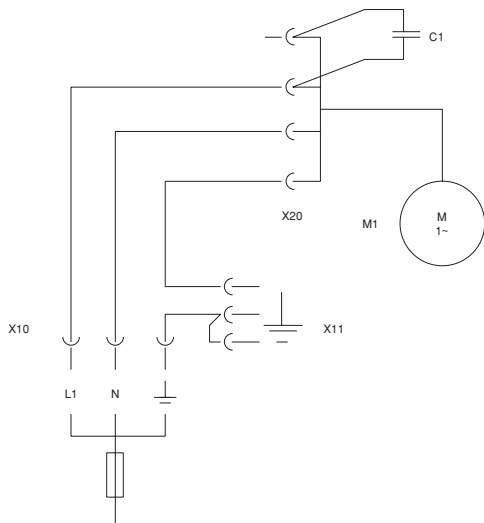
SK 3249.100 / SK 3249.104 / SK 3219.100

- _____ Anschlußplan
- _____ Wiring diagram
- _____ Schéma des connexions
- _____ Ansluitschema
- _____ Anslutningsdiagram
- _____ Schema di allacciamento
- _____ Esquema de conexiones
- _____ 配線図



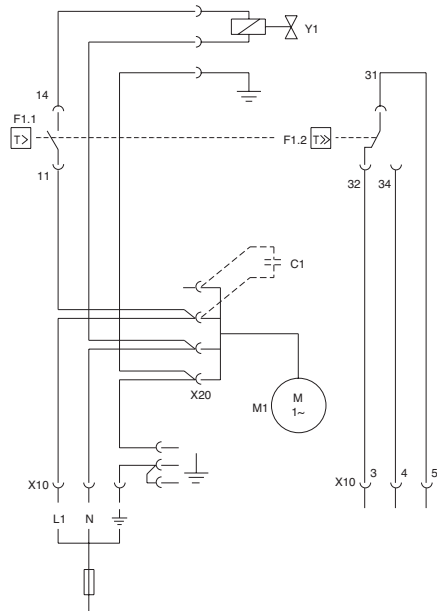
SK 3212.230

- _____ Anschlußplan
- _____ Wiring diagram
- _____ Schéma des connexions
- _____ Ansluitschema
- _____ Anslutningsdiagram
- _____ Schema di allacciamento
- _____ Esquema de conexiones
- _____ 配線図



SK 3214.100 / SK 3215.100 / SK 3216.100 / SK 3217.100 / SK 3218.100 / SK 3218.104

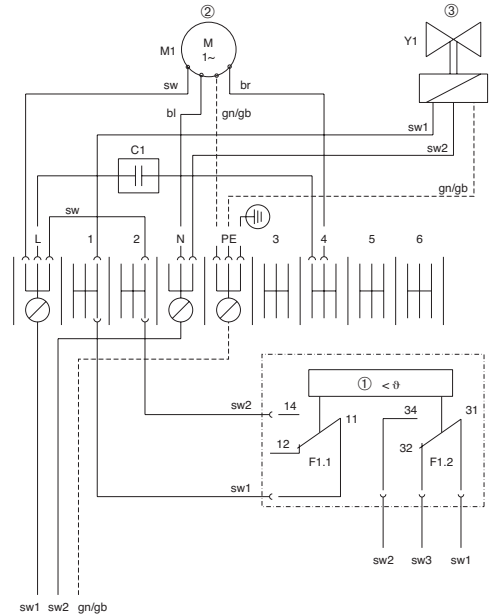
- _____ Anschlußplan
- _____ Wiring diagram
- _____ Schéma des connexions
- _____ Aansluitschema
- _____ Anslutningsdiagram
- _____ Schema di allacciamento
- _____ Esquema de conexiones
- _____ 配線図



Technische Daten siehe Typenschild
 Technical data see name plate
 Données techniques voir plaque signalétique
 Technische gegevens zie typeplaatje
 Tekniska data se typskylten
 Caratteristiche tecniche vedi dati di targa
 Datos técnicos ver placa de características
 仕様については銘板参照

SK 3247.000

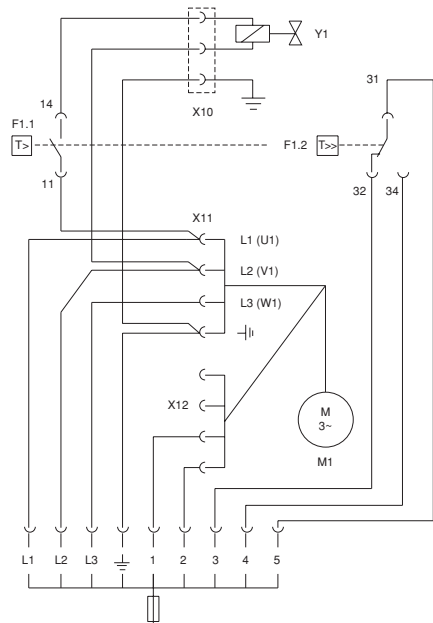
- _____ Wirkschaltplan
- _____ Detailed wiring diagram
- _____ Schéma des connexions détaillé
- _____ Vermogensdiagrammen
- _____ Effektdiagram
- _____ Schema di allacciamento
- _____ Esquema de conexiones
- _____ 詳細配線図



- ① Thermostat
Thermostat
Thermostat
Thermostat
Thermostat
Termostato
- ② Ventilator
Fan
Ventilateur
Ventilator
Fläkt
Ventilatore
Ventilador
サーモスタット
- ③ Magnetventil
Solenoid valve
Vanne électromagnétique
Magnventiel
Magnetventil
Valvola elettromagnetica
Valvula electromagnética
マグネットバルブ

SK 3216.480

- _____ Anschlußplan
- _____ Wiring diagram
- _____ Schéma des connexions
- _____ Aansluitschema
- _____ Anslutningsdiagram
- _____ Schema di allacciamento
- _____ Esquema de conexiones
- _____ 配線図



Technische Daten siehe Typenschild
 Technical data see name plate
 Données techniques voir plaque signalétique
 Technische gegevens zie typeplaatje
 Tekniska data se typskylten
 Caratteristiche tecniche vedi dati di targa
 Datos técnicos ver placa de características
 仕様については銘板参照

D Anschlußschema

A1	= Steuerplatine
B1	= Temperaturfühler
B2	= Leckagefühler
C1	= Betriebskondensator
F1	= Thermostat
F1.1	= Schaltkontakt
F1.2	= Störmeldekontakt
M1	= Ventilator
Y1	= Magnetventil
X1	= Klemmleiste
X10	= Stecker Netzanschluß (schwarz)
X11	= Stecker Sammelstörmeldung (braun)
X12	= Gerätesteckanschluß TW
X20	= Steckverbindung Ventilator
P1	= Sollwert-Potentiometer Schrankinnentemperatur
ABC	= Umschaltung der Betriebsart

GB Wiring diagram

A1	= Control PCB
B1	= Temperature sensor
B2	= Leak sensor
C1	= Operating capacitor
F1	= Thermostat
F1.1	= Switch contact
F1.2	= Fault signal contact
M1	= Fan
Y1	= Solenoid valve
X1	= Terminal strip
X10	= Mains plug connector (black)
X11	= Collective fault signal plug (brown)
X12	= Unit plug connector TW
X20	= Plug connection fan
P1	= Set-point setter, enclosure internal temperature
ABC	= Changeover of operating mode

F Schéma électrique

A1	= Platine de commande
B1	= Sonde de température
B2	= Sonde de niveau d'eau
C1	= Condensateur de régime
F1	= Thermostat
F1.1	= Contact de commutation
F1.2	= Contact de signalisation de défaut
M1	= Ventilateur
Y1	= Vanne électromagnétique
X1	= Bornier
X10	= Bornes de raccordement secteur (noir)
X11	= Bornes de raccordement des indications de défaut (brun)
X12	= Connecteur enfichable TW
X20	= Fiche du ventilateur
P1	= Potentiomètre de réglage de la température intérieure de l'armoire
ABC	= Commutation du mode de fonctionnement

NL Aansluitschema

A1	= Stuurstroombprint
B1	= Temperatuursensor
B2	= Lekkagesensor
C1	= Bedrijfskondensator
F1	= Thermostaat
F1.1	= Schakelaar
F1.2	= Storingmeldercontact
M1	= Ventilator
Y1	= Magneetventiel
X1	= Klemmenstrook
X10	= Stekker netaansluiting (zwart)
X11	= Stekker verzamelsfoormelding (bruin)
X12	= Connectoraansluiting TW
X20	= Connector voor ventilator
P1	= Temperatuur in kast
ABC	= Omschakeling van bedrijfsstand

S Anslutningsschema

A1	= Styrtkort
B1	= Temperaturavkännare
B2	= Läckageavkännare
C1	= Driktkondensator
F1	= Termostat
F1.1	= Omkopplare
F1.2	= Felmeddelande
M1	= Fläkt
Y1	= Magnetventil
X1	= Klämlist
X10	= Kontakt nätanslutning (svart)
X11	= Kontakt störsignaler (brun)
X12	= Aggregatuttag TW
X20	= Anslutning fläkt
P1	= Apparatskåpets innertemperatur
ABC	= Växling av funktion

I Schema allacciamenti

A1	= Piastra circuito stampate
B1	= Sonda di temperatura
B2	= Rivelatore (sonda) di predita
C1	= Condensatore d'esercizio
F1	= Termostato
F1.1	= Contatto degli interruttori di distribuzione
F1.2	= Contatto di segnalazione guasti
M1	= Ventilatore
Y1	= Valvola elettromagnetica
X1	= Morsettiera
X10	= Spina allacciamento rete (nero)
X11	= Spina circuito de segnalazione (marrone)
X12	= Allacciamento apparecchio TW
X20	= Connettore per ventilatore
P1	= Regolazione della temperatura interna
ABC	= Commutazione del tipo esercizio

E Esquema de conexiones

A1	= Pletina de mando
B1	= Sensor de temperatura
B2	= Sensor de fugas
C1	= Condensador de servicio
F1	= Termostato
F1.1	= Contacto de conexión
F1.2	= Contacto de aviso de avería
M1	= Ventilador
Y1	= Válvula electromagnética
X1	= Regleta de bornes
X10	= Enchufe alimentación de red (negro)
X11	= Enchufe aviso de avería colectiva (marrón)
X12	= Conexión de enchufe del aparato TW
X20	= Conexión ventilador
P1	= Valor teórico potenciómetro temperatura interior armario
ABC	= Conmutación de la clase de servicio

J 配線図

A1	= 制御PCB
B1	= 温度センサー
B2	= 漏水センサー
C1	= 操作用コンデンサー
F1	= サーモスタット
F1.1	= スイッチ接点
F1.2	= エラー信号接点
M1	= ファン
Y1	= マグネットバルブ
X1	= ターミナルストリップ
X10	= 電源プラグ (黒)
X11	= 集合故障信号プラグ (茶)
X12	= ユニットプラグコネクタ TW
X20	= プラグ接続式ファン
P1	= 設定値ポテンシャルメータ エンクロージャー内部温度用
ABC	= 運転モード切替

Kennlinienfeld (DIN 3168)

Performance diagram

Diagramme aéralique

Karakteristiek

Karakteristik kurva

Diagramma delle curve caratteristiche

Diagrama de potencia

動作性能表

\dot{Q}_K = Dauer-Nutzkühlleistung [W]

Continuous useful cooling output

Puissance frigo. en régime permanent

Nuttig koelvermogen

Kyleffekt

Potenza frigorifera utile

Potencia útil de refrigeración

冷却能力

T_i = Schaltschrank-Innentemperatur [°C]

Enclosure internal temperature

Température à l'intérieur de l'armoire

Temperatuur in de kast

Temperatur inne i skåpet

Temperatura interna dell'armadio

Temperatura interior armario

エンクロージャ内部温度

T_w = Wassereintrittstemperatur [°C]

Water inlet temperature

Température de l'eau à l'entrée

Waterinlaattemperatuur

Vattnets ingångstemperatur

Temperatura d'ingresso dell'acqua

Temperatura de entrada del agua

注入時水温

\dot{V} = Volumenstrom [l/h]

Volume flow

Débit d'air

Volumestrom

Volymström

Portata

Caudal volumétrico

水量

ΔP = Wasserwiderstand [m/bar]

Water resistance

Résistance hydraulique

Waterweerstand

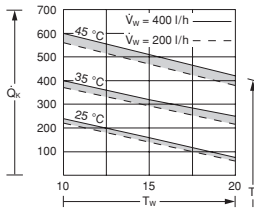
Vattenmotstånd

Resistenza dell'acqua

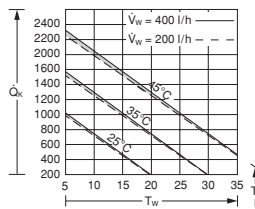
Resistencia del agua

耐水压

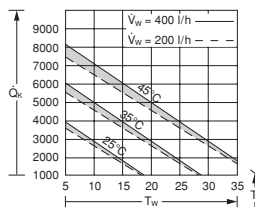
Kennlinienfeld SK 3212.230 (DIN 3168) (50/60 Hz)



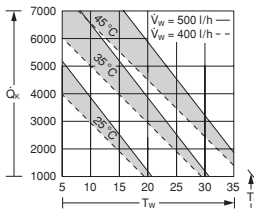
Kennlinienfeld SK 3215.100 (DIN 3168) (50/60 Hz)



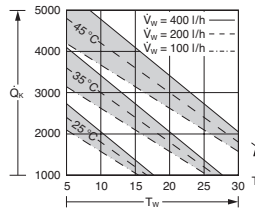
Kennlinienfeld SK 3216.100 (DIN 3168) (50/60 Hz)



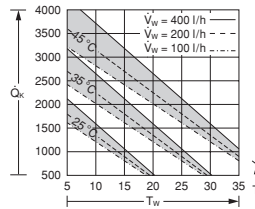
Kennlinienfeld SK 3218.100 (DIN 3168) (50/60 Hz)



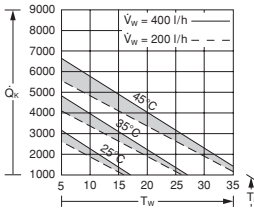
Kennlinienfeld SK 3218.100 (DIN 3168) (50/60 Hz)



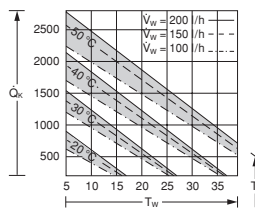
Kennlinienfeld SK 3218.104 (DIN 3168) (50/60 Hz)



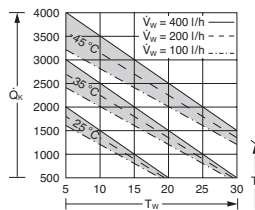
Kennlinienfeld SK 3219.100 (DIN 3168) (50/60 Hz)



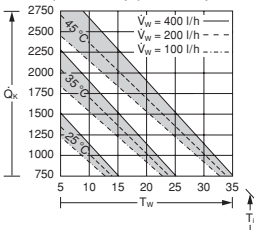
Kennlinienfeld SK 3247.000 (DIN 3168) (50/60 Hz)



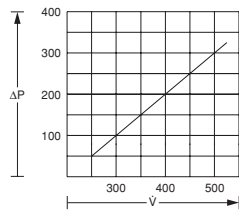
Kennlinienfeld SK 3249.100 (DIN 3168) (50/60 Hz)



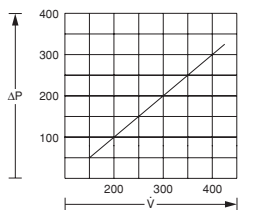
Kennlinienfeld SK 3249.104 (DIN 3168) (50/60 Hz)



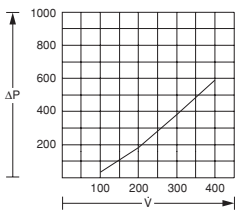
Wasserwiderstandskennlinie SK 3214.100



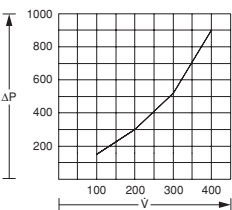
Wasserwiderstandskennlinie SK 3215.100



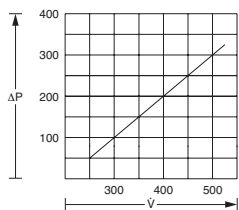
Wasserwiderstandskennlinie SK 3212.230



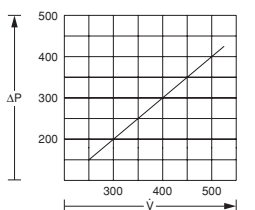
Wasserwiderstandskennlinie SK 3216.100



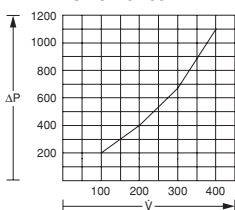
Wasserwiderstandskennlinie SK 3217.100



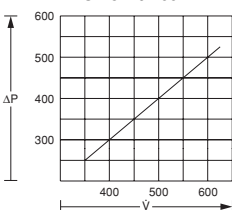
Wasserwiderstandskennlinie SK 3218.100



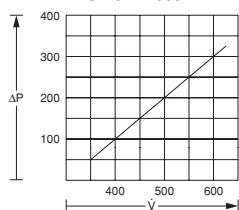
Wasserwiderstandskennlinie SK 3216.480



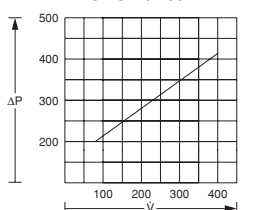
Wasserwiderstandskennlinie SK 3219.100



Wasserwiderstandskennlinie SK 3247.000



Wasserwiderstandskennlinie SK 3249.100

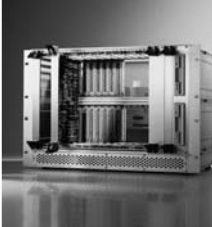




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