

Rittal  
**SK**



**Schaltschrank-  
Kühlgerät**

**Cooling Unit**

**Climatiseur**

**Koelaggregaat**

**Kylaggregat**

**Condizionatore  
per armadi**

**Refrigerador  
para armarios**

クーリングユニット



SK 3203100  
SK 3204100  
SK 3205100  
SK 3206100



**Montageanleitung**

**Assembly Instructions**

**Notice de montage**

**Montage-instructie**

**Montageanvisning**

**Istruzioni di montaggio**

**Instrucciones de montaje**

取扱説明書

**Umschalten auf Perfektion**  **RITTAL**

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3. Assembly
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6. Technical information
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## 1. Application

Enclosure cooling units are designed and built to dissipate heat from enclosures by cooling the air inside the enclosure and protecting temperature-sensitive components. Enclosure cooling units are particularly suitable for a temperature range of + 40 °C to + 50 °C.

## 2. Technical Data

(see table 2.1)

## 3. Mounting

The cooling unit can be mounted as standard either to the outer surface or inside the enclosure, as required.

Cutouts and fixing holes should be made on the mounting surface in accordance with fig. 3.1. Cut the enclosed seal to the required length and attach to the unit in accordance with fig. 3.2. Screw the set screws, item ①, into the blind nuts and fix them by means of a bracket, item ②, washers, item ③, and nuts, item ④, in accordance with fig. 3.2. Attach the condensate drain (see 6.3).

Prior to mounting, ensure that:

- the site for the enclosure, and hence the arrangement of the cooling unit, is selected so as to ensure good ventilation;
- the location is free from excessive dirt and moisture;
- the round cut-out for air extraction is located in the upper area of the enclosure;
- the mains connection ratings, as stated on the rating plate, are available;
- the ambient temperature is no higher than specified on the rating plate;
- the packaging shows no signs of damage;
- the enclosure is sealed on all sides. Condensation will occur if the enclosure is leaky;
- the separation of the units from one another and from the wall should not be less than 200 mm;
- air inlet and outlet are not obstructed on the inside of the enclosure;
- units are only fitted vertically in the specified position. Max. deviation from true vertical: 2°;
- condensate discharge must be made up by means of the material provided in the dispatch bag. The discharge tube must be free from kinks and must be arranged sloping away from the unit;
- electrical connection and repair are carried out only by authorized specialist personnel. Use only original replacement parts!
- To avoid an increase in condensation, a door operated switch (e.g. PS 4127) should be used which will switch the cooling unit off when the enclosure door is opened.

Tab. 2.1 Technical Data

	SK 3203100	SK 3205100	SK 3204100	SK 3206100
Operating voltage	230 V 50/60 Hz	115 V 50/60 Hz	230 V 50/60 Hz	115 V 50/60 Hz
Rated current	1.8 A/1.6 A	3.5 A/3.6 A	1.5 A/1.5 A	3.5 A/3.8 A
Starting current	2.7 A/2.8 A	4 A/4.5 A	1.9 A/2 A	4.2 A/4.5 A
Pre-fuse T	4 A/4 A	6 A/6 A	4 A/4 A	6 A/6 A
Duty cycle	100%		100%	
Power consumption L35 L35	275 W/280 W		285 W/290 W	
Useful cooling output DIN 3168/EN 814 L35 L35	350 W/360 W		320W/345 W	
Refrigerant	R134 a, 125 g		R134 a, 150 g	
Temperature range	+ 20 to + 50 °C		+ 20 to + 50 °C	
Noise level	62 dB (A)		62 dB (A)	
Protection category EN 60 529	IP 54 Internal circuit External circuit		IP 54 IP 34	
Dimensions (W x H x D) mm	270 x 520 x 120		490 x 300 x 120	
Weight	13 kg	15 kg	13 kg	15 kg
Colour	RAL 7032		RAL 7032	

Fig. 3.1 Mounting Cutout

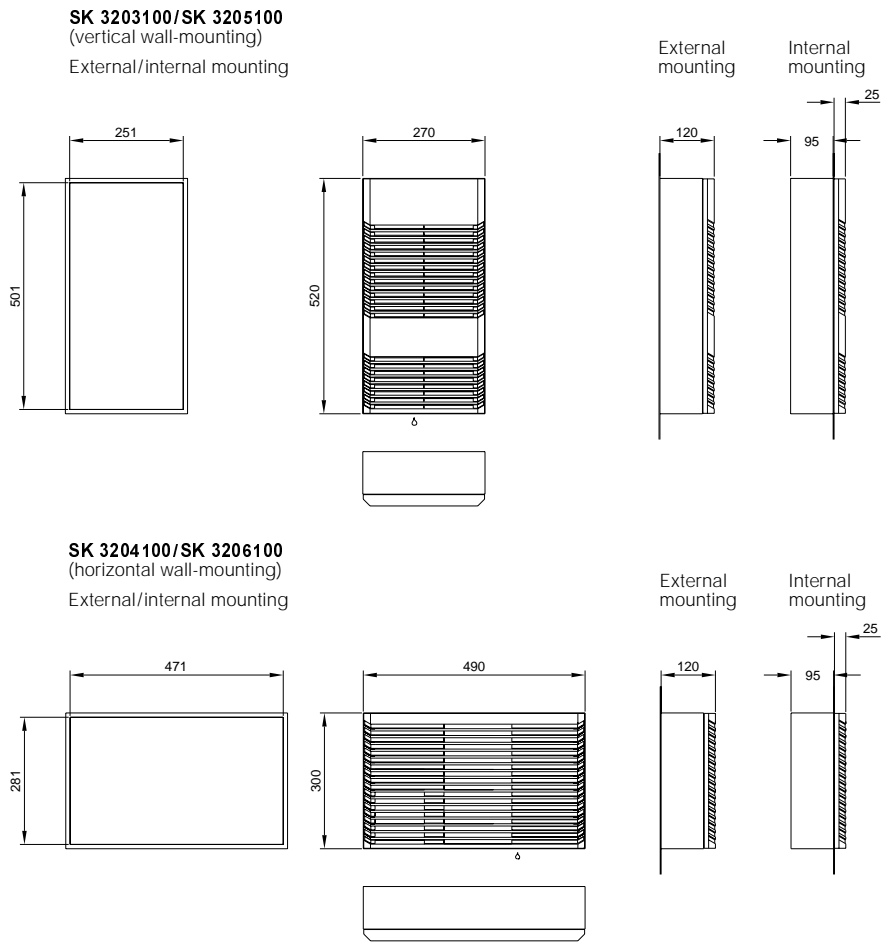
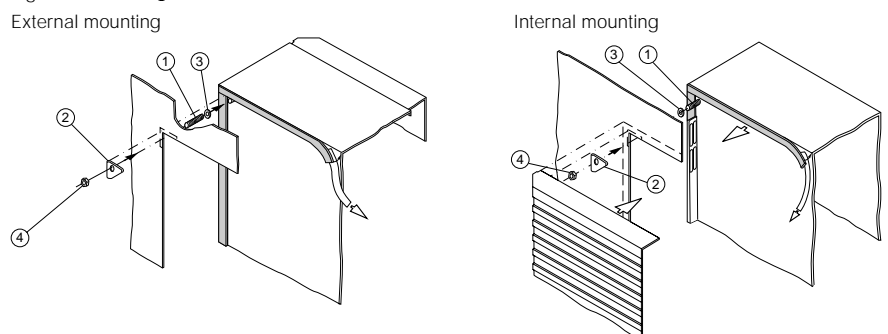


Fig. 3.2 Mounting



## 4. Electrical Connection

The connected voltage and frequency must correspond to the values stated on the rating plate. The cooling unit must be connected to the mains via an isolating device, which ensures at least 3 mm contact opening when switched off. The unit must not have any additional temperature control connected before it. Line protection should be provided by means of the pre-fuse specified on the rating plate. Observe the relevant regulations during installation!

Connect the mains connection to the plug-in terminal strip X10, see wiring diagram on page 17 (terminal L1, N, PE)

- **Note!** The cooling unit must only be connected via a suitable transformer to the rated voltage specified on the rating plate (see wiring diagram on page 19).
- Collective fault signal connection (terminal 3, 4, 5), see 5.1.2.
- Note the designations on the terminal strip (see wiring diagram).
- The unit must be disconnected prior to checking the protective earth conductor, high voltage and the insulation in the enclosure.

## 5. Microcontroller Adjustment

Following the completion of mounting and a waiting period of approximately 30 minutes (to allow oil to collect in the compressor in order to ensure lubrication and cooling) electrical connection can be made.

### 5.1.1 Control Behaviour

The cooling unit operates automatically, i. e. after electrical connection, the evaporator fan will run continuously to circulate the air inside the enclosure. This results in a uniform temperature distribution in the enclosure. The temperature setting is made on the potentiometer on the control board. The potentiometer becomes accessible after removal of the grille (without tools) and can be set within a range of + 20°C to + 55°C (factory setting + 35°C). For economic reasons (energy saving) the set-point value of the enclosure's internal temperature should be selected as low as possible. The microcontroller provides automatic control switch-off of the condenser and the liquefier fan about the set value of the fixed switching difference of 5 K. The minimum switch-off time of both condenser and liquefier fan is 3 minutes.

### 5.1.2 Collective Fault Message

The microcontroller monitors the following faults:

- Enclosure internal temperature too high.
- Sensor break.

If the internal temperature of the enclosure exceeds the set-point value by 10 K (switching hysteresis 2 K), the red LED will flash for about 100 seconds. If the high internal temperature continues beyond 100 seconds, the red LED will give a permanent light, the fault signalling relay will drop out.

The limits of the input temperature values are monitored via the microcontroller. In the event of a sensor break, the red LED will illuminate, the fault signalling relay will drop out, and the cooling unit will cool in continuous operation.

### 5.1.3 Fault Signal Contact (K1, potential-free)

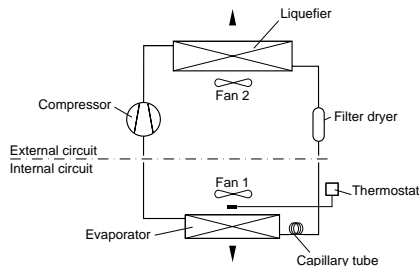
The fault signal relay is pulled in at normal condition. Any failure of the control voltage will also lead to drop-out of the relay and can thus be registered. The connection is made on the terminal strip X10. For contact data and assignment, see wiring diagram.

## 6. Technical Information

The cooling unit (compression refrigeration unit) consists of four main components: the coolant compressor, evaporator, condenser, and the choke, which are connected by suitable pipe-work. This circuit is filled with a readily boiling substance, the coolant. The R134 a ( $\text{CH}_2\text{FCF}_3$ ) coolant is free from chlorine. It has an ozone destroying potential (ODP) of 0 and is therefore environmentally friendly. A filter dryer which is integrated in the hermetically sealed cooling circuit, provides effective protection against moisture, acid, dirt particles, and foreign bodies within the cooling circuit.

### 6.1 Operation of the Cooling Unit

Fig. 6.1 Cooling Circuit



The compressor takes the gaseous coolant from the evaporator and compresses it to a higher pressure in the condenser. During this process the temperature of the coolant rises above the ambient temperature and heat can be dissipated to the environment via the surface of the condenser. Then the coolant is liquefied and, by means of a thermostatically controlled expansion valve, returned to the evaporator, where it evaporates at low pressure. The heat required for complete evaporation is drawn from the enclosure interior causing it to cool down.

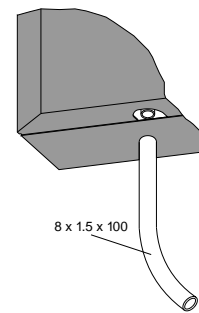
### 6.2 Safety Equipment

The cooling circuit of the cooling unit is intrinsically safe in accordance with DIN 8975. The coolant condenser and the fans are protected from excess current and excess temperature by thermal winding protection switches.

### 6.3 Condensate Drain

A drain pipe fitted to the evaporator divider panel ensures that any condensate which may form on the evaporator (at high air humidity, low temperatures inside the enclosure) is drained away from the bottom of the unit. For this purpose, a length of hose should be fitted to the condensate pipe connection piece (see fig. 6.2, if appropriate, remove the grille). The condensate must be able to run off freely.

Fig. 6.2 Condensate Discharge



### 6.4 General

**Storage temperature:** The cooling units must not be subjected to temperatures above + 70 °C during storage.

**Transport attitude:** The cooling units must always be transported upright.

**Waste disposal:** The closed cooling circuit contains coolant and oil which must be correctly disposed of for the protection of the environment. The disposal can be carried out at Rittal-Werk.

Technical modifications reserved.

## 7. Maintenance

As a maintenance-free, hermetically sealed system, the cooling circuit has been filled in the factory with the required amount of coolant, and tested for leaks and subjected to a function trial run. The installed maintenance-free fans use ball bearings, they are protected against moisture and dust, and are 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 that the components of the external air circuit are cleaned by compressed air. The use of a filter mat is recommended only if large particles of lint are present in the air, so that blockage of the condenser is prevented.

**Caution:** Prior to any maintenance work, the power to the cooling unit must be disconnected.

## 8. Scope of Supply and Guarantee

- 1 cooling unit, ready for connection
- 4 set screws M6 x 25
- 4 nuts M6
- 4 washers A 6.4
- 1 set of assembly and operating instructions
- 1 drilling template
- 1 sealing tape 10 x 5
- 4 clamps
- 1 transparent hose 8 x 1.5 x 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 cooling 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.

## 9. Fault Message and Fault Analysis

Fault message	Cause	Remedy
Red LED illuminates Fault signalling relay drops out	Ambient temperature too high	Temperature limit has been exceeded
	Internal air circuit too fast	Air inlets and outlets must not be obstructed
	External air circuit contaminated	Clean the heat exchanger module with compressed air
	Defective fan	Replace
	Defective condenser	Repair by refrig. expert (Rittal Service-Center)
	Lack of coolant	Repair by refrig. expert (Rittal Service-Center)
	Defective temperature sensor	Replace

## **D** Anschlußschema Microcontroller

- A1 = Leistungsplatine
- B1 = Temperaturfühler Innentemperatur
- C1-C2 = Betriebskondensatoren
- D1 = Störmelde-LED rot
- D2 = Betriebs-LED grün
- 1F1 = Thermischer Wicklungsschutz
- K1 = Störmelderelais
- M1 = Verdichter
- M2 = Verflüssigerventilator
- M4 = Verdampferventilator
- P1 = Sollwertpotentiometer

### Kundenseitiger Anschluß:

- X3 = Anschluß Temperaturfühler
- X10 = Anschlußklemmleiste
- X10 = L1, L2/N, PE = Netzanschluß  
braun = L1 (Phase)  
blau = L2/N (Neutral)  
grün/gelb = PE (Erdung)
- X10 = 3, 4, 5 = Sammelstörmeldung

## **NL** Aansluitschema microcontroller

- A1 = Hoofdstroomprint
- B1 = Temperatuursensor interne temp.
- C1-C2 = Motorcondensator
- D1 = Storings-LED rood
- D2 = Storings-LED groen
- 1F1 = Thermische beveiliging van de wikkeling
- K1 = Storingsrelais
- M1 = Compressor
- M2 = Condensorventilator
- M4 = Verdamperventilator
- P1 = Temperatuurinstellingspotentiometer

### Elektrische aansluiting door klant:

- X3 = Aansluitingstemperatuurvoeler
- X10 = Klemmenstrook
- X10 = L1, L2/N, PE = netaansluiting  
bruin = L1 (Fase)  
blauw = L2/N (Nul)  
groen/geel = PE (Aarde)
- X10 = 3, 4, 5 = algemene storingsindicatie

## **E** Esquema de conexiones del microprocesador

- A1 = Pletina de potencia
- B1 = Sonda térmica de la temp. en el interior del armario
- C1-C2 = Condensador electrolítico de servicio
- D1 = Indicador rojo de avería
- D2 = Indicador verde de funcionamiento
- 1F1 = Protección térmica del devanado
- K1 = Relé de fallo
- M1 = Compresor
- M2 = Ventilador del condensador
- M4 = Ventilador del evaporador
- P1 = Potenciómetro de ajuste

### Connexión por parte del cliente:

- X3 = Conexión de la sonda térmica
- X10 = Regleta de bornes
- X10 = L1, L2/N, PE = Conexión de red
- X10 = 3, 4, 5 = Bornes de conexión (señal avería)

## **GB** Wiring Diagram Microcontroller

- A1 = Power PCB
- B1 = Temperature sensor, internal temp.
- C1-C2 = Operating capacitors
- D1 = Fault signalling LED red
- D2 = Operation LED green
- 1F1 = Thermal winding protection
- K1 = Fault signalling relay
- M1 = Compressor fan
- M2 = Condenser fan
- M4 = Evaporator fan
- P1 = Set-point potentiometer

### Electrical Connection by Customer:

- X3 = Temperature sensor connection
- X10 = Terminal strip
- X10 = L1, L2/N, PE = Mains connection  
brown = L1 (phase)  
blue = L2/N (neutral)  
green/yellow = PE (ground)
- X10 = 3, 4, 5 = Collective fault message

## **S** Anslutningschema microcontroller

- A1 = Drivkort
- B1 = Temperaturgivare innertemperatur
- C1-C2 = Startkondensator
- D1 = Störsignal-LED röd
- D2 = Drift-LED grön
- 1F1 = Termiskt lindningsskydd
- K1 = Samlingsrelä felsignaler
- M1 = Kompressor
- M2 = Kondensorfläkt
- M4 = Förångarfläkt
- P1 = Börvärdepotentiometer

### Ansluts av kund:

- X3 = Anslutning temperaturgivare
- X10 = kopplingsplint
- X10 = L1, L2/N, PE = nätanslutning  
brun = L1 (Fas)  
blå = L2/N (Nolla)  
grön/gul = PE (Jord)
- X10 = 3, 4, 5 = samlingsstörningsanslutning

## **J**

## **F** Schéma électrique Microprocesseur

- A1 = Platine de puissance
- B1 = Sonde de température, température intérieure
- C1-C2 = Condensateur de régime
- D1 = Diode d'indication de défauts, rouge
- D2 = Diode de fonctionnement, verte
- 1F1 = Protection de bobinage thermique
- K1 = Relais pour l'indication des défauts
- M1 = Compresseur
- M2 = Ventilateur du condenseur
- M4 = Ventilateur de l'évaporateur
- P1 = Potentiomètre de la valeur de consigne

### Electrical Connection by Customer:

- X3 = Raccordement de la sonde de température
- X10 = Borne plate de raccordement
- X10 = L1, L2/N, PE = Raccordement au réseau  
brun = L1 (phase)  
bleu = L2/N (neutre)  
vert/jaune = PE (mise à la terre)
- X10 = 3, 4, 5 = Connexion de la signalisation de défaut

## **I** Schema allacciamenti microcontrollore

- A1 = Scheda di potenza
- B1 = Sonda temperatura interna
- C1-C2 = Condensatore d'esercizio
- D1 = Segnalazioni guasti LED rosso
- D2 = Funzionamento LED verde
- 1F1 = Protezione termica avvolgimento
- K1 = Relè segnalatore guasti
- M1 = Compressore
- M2 = Ventilatore del condensatore
- M4 = Ventilatore dell'evaporatore
- P1 = Valore nominale del potenziometro

### Connessioni elettriche a cure del cliente:

- X3 = Allacciamento sonda termosensibile
- X10 = Morsetteria d'allacciamento
- X10 = L1, L2/N, PE = Allacciamento rete  
marrone = L1 (fase)  
azzurro = L2/N (neutro)  
verde/giallo = PE (terra)
- X10 = 3, 4, 5 = Segnalatore comune disturbi

**Anschlußschema**

**Wiring Diagram**

**Schéma électrique**

**Aansluitschema**

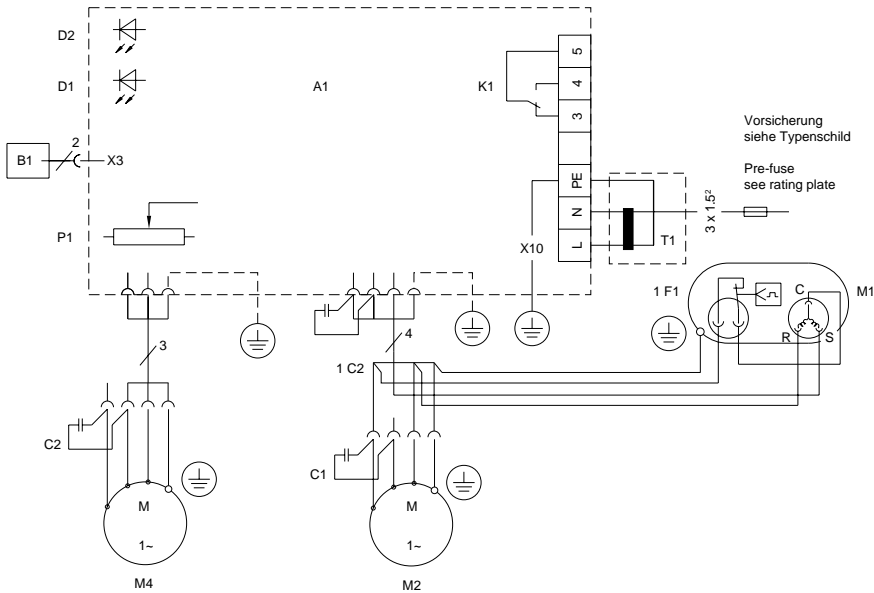
**Anslutningschema**

**Schema allacciamenti**

**Esquema de conexiones**

**接続図面**

SK 3203100  
SK 3204100  
SK 3205100  
SK 3206100



**Kontaktdata K1**  
**Contact Data K1**  
**Caracteristiques des contacts K1**  
**Contactgegevens K1**  
**Kontaktdata K1**  
**Caratteristiche dei contatti K1**  
**Características del contacto K1**  
**接続データ K1**

AC cosφ = 1	DV L/R = 40 ms
I max. = 5 A U max. = 230 V	I min. = 10 mA U max. = 100 V ! I max. = 200 mA U max. = 20 V ! I max. = 5 A

**Montage von externem Transformator**

**Fixing the external transformer**

**Montage du transformateur extérieur**

**Montage van externe transformator**

**Montage av extern transformator**

**Montaggio del trasformatore esterno**

**Montaje de un transformador externo**

SK 3205100  
SK 3206100

Montage Geräterückwand

Mounting the rear panel

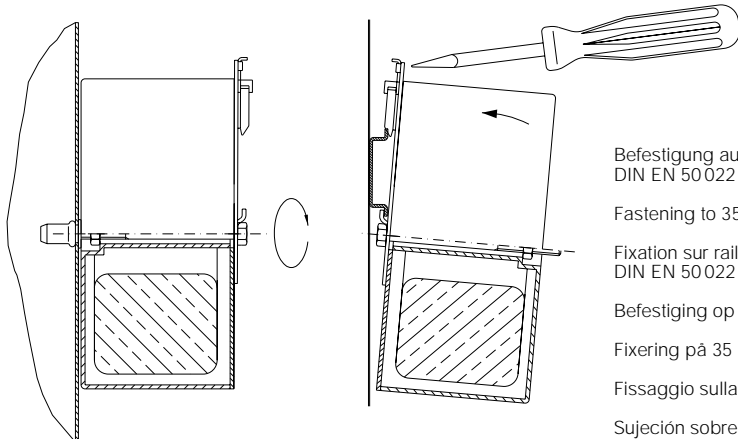
Montage du panneau arrière

Montage achterwand van het aggregaat

Montage aggregatsbakstycke

Montaggio sulla parete posteriore

Montaje en el dorsal



Befestigung auf 35 mm Tragschiene  
DIN EN 50 022

Fastening to 35 mm support rail  
DIN EN 50 022

Fixation sur rail de support de 35 mm  
DIN EN 50 022

Befestiging op 35 mm DIN EN 50 022 draagprofiel

Fixering på 35 mm profilskena  
DIN EN 50 022

Fissaggio sulla guida 35 mm  
DIN EN 50 022

Sujeción sobre guías de 35 mm  
DIN EN 50 022

**D**

**10. Ersatzteilliste**

Bezeichnung
15 Versandbeutel
45 Lamellengitter
40 Microcontroller
70 Temperaturfühler
5/10 Ventilator
1 Verdichter
90 Verdampfer
100 Verflüssiger
25 Filtertrockner

**GB**

**10. Spares List**

Description
15 Dispatch bag
45 Louvre grille
40 Microcontroller
70 Temperature sensor
5/10 Fan
1 Compressor
90 Evaporator
100 Liquefier
25 Filter dryer

**F**

**10. Liste des pièces détachées**

Désignation
15 Pochette d'accessoires
45 Grille à lamelles
40 Microprocesseur
70 Sonde de température
5/10 Ventilateur
1 Compresseur
90 Evaporateur
100 Condenseur
25 Assècheur de filtre

**NL**

**10. Onderdelenlijst**

Omschrijving
15 Toebehorenzakje
45 Ventilatiooster
40 Microcontroller
70 Temperatuurvoeler
5/10 Ventilator
1 Compressor
90 Verdampfer
100 Condensor
25 Filterdroger

**S**

**10. Reservdelista**

Beteckning
15 Tillbehörspåse
45 Lamellgitter
40 Mikrokontroll
70 Temperaturgivare
5/10 Flakt
1 Kompressor
90 Förångare
100 Kondensör
25 Torkfilter

**I**

**10. Lista parti di ricambio**

Descrizione
15 Sacchetto accessori
45 Griglia a lamelle
40 Microcontrollore
70 Sonda termosensibile
5/10 Ventilatore
1 Compressore
90 Evaporatore
100 Condensatore
25 Filtro essiccatore

**E**

**10. Lista de piezas de repuesto**

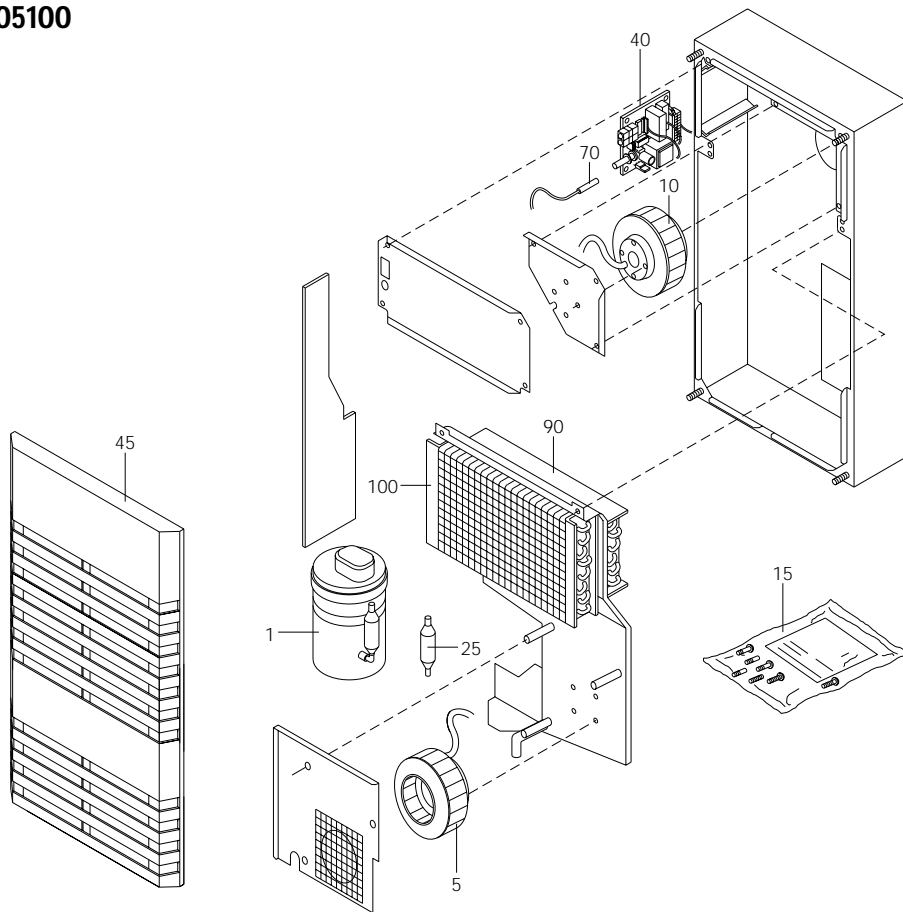
Descripción
15 Bolsa de accesorios
45 Rejilla
40 Microcontrolador
70 Sensor térmico
5/10 Ventilador
1 Compresor
90 Evaporador
100 Condensador
25 Secador del filtro

**J**

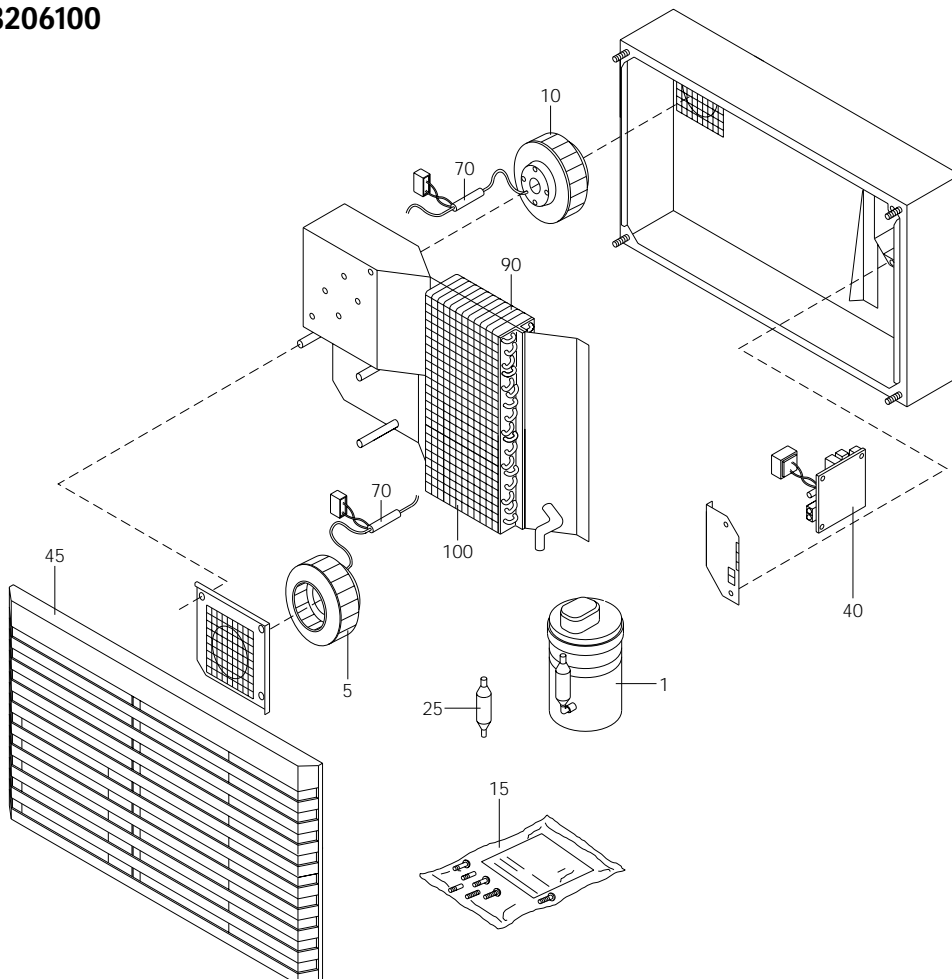
**10.**

15
45
40
70
5/10
1
90
100
25

SK 3203100/3205100



SK 3204100/3206100



## Kennlinienfeld (DIN 3168)

### Performance Diagram

### Diagramme des lignes caractéristiques

### Karakteristiek

### Karakteristik kurva

### Diagramma delle curve caratteristiche

### Diagrama de potencia

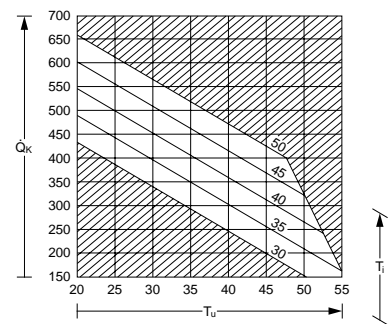
### 冷却能力線図

$Q_k$  = Dauer-Nutzkühlleistung (W)  
Cooling output  
Puissance frigorifique utilisée  
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 del armario de mando  
内部温度 (蒸発器入口温度)

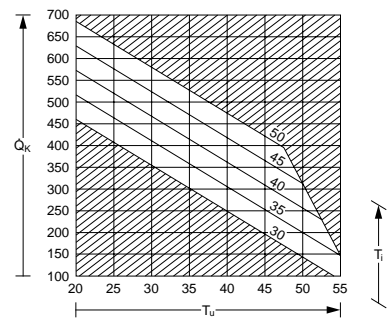
$T_u$  = Umgebungstemperatur (°C)  
Ambient temperature  
Température ambiante  
Omgevingstemperatuur  
Omgivningstemperatur  
Temperatura ambiente  
Temperatura ambiente  
外部温度 (凝縮器入口温度)

### Kennlinienfeld SK 3203100/3205100 (DIN 3168) (50 Hz)



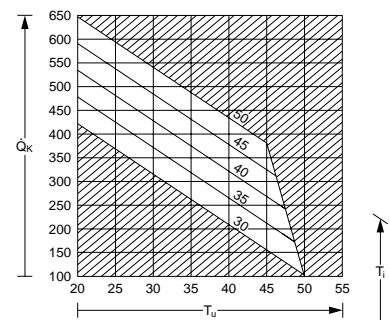
$T_u$  = Umgebungstemperatur (°C)  
 $Q_k$  = Dauer-Nutzkühlleistung (W)  
 $T_i$  = Schaltschrank-Innentemperatur (°C)

### Kennlinienfeld SK 3203100/3205100 (DIN 3168) (60 Hz)



$T_u$  = Umgebungstemperatur (°C)  
 $Q_k$  = Dauer-Nutzkühlleistung (W)  
 $T_i$  = Schaltschrank-Innentemperatur (°C)

### Kennlinienfeld SK 3204100/3206100 (DIN 3168) (50 Hz)



$T_u$  = Umgebungstemperatur (°C)  
 $Q_k$  = Dauer-Nutzkühlleistung (W)  
 $T_i$  = Schaltschrank-Innentemperatur (°C)

### Kennlinienfeld SK 3204100/3206100 (DIN 3168) (60 Hz)

$T_u$  = Umgebungstemperatur (°C)  
 $Q_k$  = Dauer-Nutzkühlleistung (W)  
 $T_i$  = Schaltschrank-Innentemperatur (°C)