Repairing Manual

Fridge-freezer with electronic temperature control

KE315-4-2T

Küppersbusch

THE HEART OF A GOOD KITCHEN

GB

Service Manual: H8-420-02-04

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1. Safety Notices

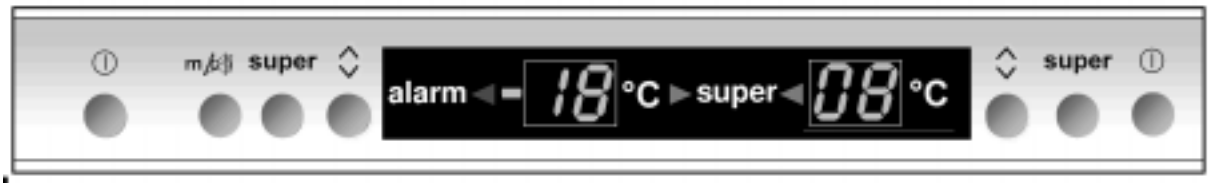
DANGER!

Cabinet and frame are live in case of fault!
Dangerous voltages exist inside these units!

To avoid electric shock be sure to heed the following safety information

- Always unplug the unit from mains before starting with the repair!
- Always use a fault current breaker when 'live' testing with components under a high potential!
- Always ensure a correct protective conductor connection! It is of decisive importance for the safety of persons and the function of the equipment.
- On completion of the repair work, carry out a test according to VDE 0701 as well as a functional and leakage test.
- Do not touch any components in the unit; also the modules carry mains voltage.
- Heed EGB instructions! (Instructions concerning electrostatic danger)

2. Control Panel



2.1 Temperature setting buttons for fridge and freezer compartments

When actuating the temperature setting button, the temperature display switches from actual to desired temperature indication. With each pressing of the button, the desired temperature is changed by 1K. At the end of the setting range, the display switches back to the initial value. Steady pressing of the button changes the value in 1s steps. If button 5 s is not pressed, the actual temperature is displayed again.

2.2 Fridge compartment ON/OFF button

With this button the fridge compartment can be switched off separately.

2.3 Fridge compartment SUPER button

This button is for starting the Super cooling programme. Pressing it a second time stops the programme.

2.4 Freezer compartment SUPER button

This button activates the freezing programme. Pressing it a second time stops the programme.

2.5 ALARM/OFF button

By pressing this button, the acoustic alarm is switched off, with the memory temperature displayed simultaneously. This clears the memory storage.

2.6 Start-up Programme

The start-up programme becomes active if at the moment of start-up all existing temperature sensors are measuring a warmer value than 12 °C.

Programme Sequence:

- 5 s - the solenoid valve is triggered
- 5 s - the light is triggered
- Triggering of the compressor
- 8 min - triggering of fridge compartment
- 10 min - triggering of freezer compartment
- Switch to normal operation

2.7 Demo programme (sales room circuit)

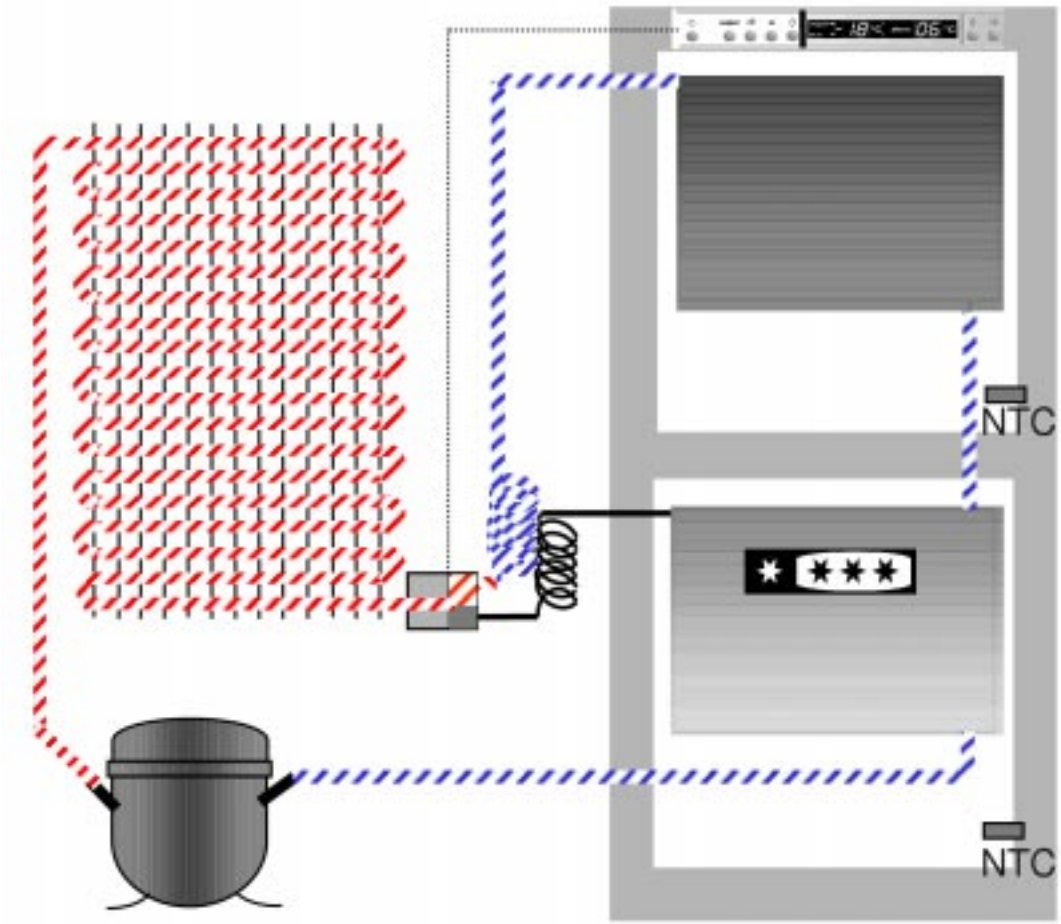
- Depress and keep depressed freezer compartment SUPER button
- Switch unit on
- After approx. 2 s the SUPER LED button illuminates
- Release SUPER button

While all control functions and displays are active, no load components are triggered. The demo programme is ended by switching the unit off.

3. Functional Description

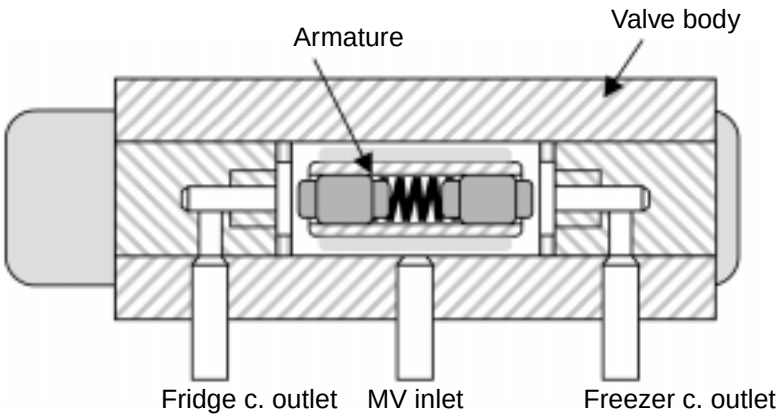
3.1 Refrigeration System

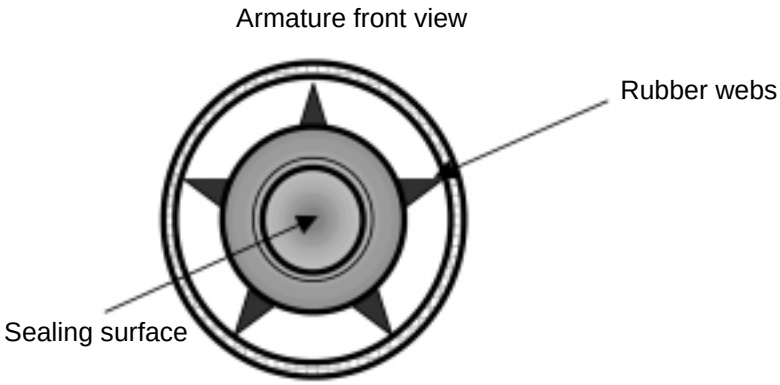
Supply of the two temperature zones is achieved by a dual-circuit refrigeration system using a solenoid valve. Triggering of the solenoid valve is by positive or negative half waves from the electronics. During simultaneous request from both temperature zones, the fridge compartment takes priority. If, via the solenoid valve, the fridge compartment evaporator is supplied first, the freezer compartment evaporator is connected in series with the fridge compartment evaporator. Excess refrigerant from the fridge compartment evaporator can evaporate in the freezer compartment evaporator. This way, the freezer compartment is supplied at the same time.

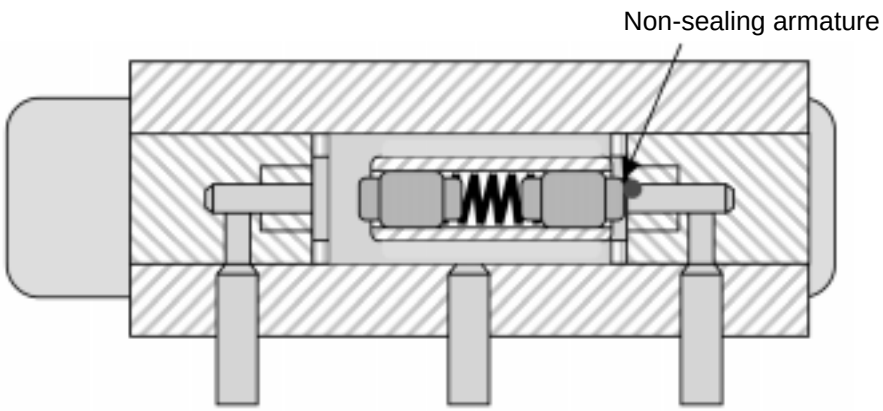


3.2 Solenoid Valve

A bistable solenoid valve is used. Such type solenoid valve has no defined idle position. Each switching position is achieved by triggering from positive and negative half waves of the mains voltage. The movable armature is in the magnetic field of a permanent magnet and moved by the triggering into its end position. In this position, the outlet not being used is closed by the armature. To ensure that the armature remains in this position the triggering is repeated every 60 s.







Should the armature be prevented from sealing the outlet completely, e.g. by mechanical action or a foreign body, there is injection into both outlets (cross injection). This results in an uncontrolled supply to the compartments and hence considerable temperature fluctuations.

3.3 Electronic Control

The electronic control consists of two modules. The control and display module is housed in the fascia recess. In this module are the inputs of the NTC-sensor and of the door contact. The power supply unit is under a cover panel in the machine compartment. It triggers all load components and supplies the controls module with power.

3.4 Temperature Indication

The temperature indications are corrected temperature measurement values. Changes in the temperature indication are shown in 1 K steps. The speed of the indication change is a function of the temperature inside the compartments. For the fridge compartment, it is 2 min per 1K at inside temperatures of over 16 °C, thereunder, every 10 min 1 K. In the freezer compartment, the indication is changed by 1K per 2min up to 0 °C, thereunder, by 1K in 10 min. Temperatures above 19 °C are represented as "—".

3.5 Alarm Function

If the temperature in the freezer compartment rises above -13 °C, the acoustic alarm is triggered. The display for the freezer compartment begins to flash, with the alarm buzzer sounding alternately. The Alarm-off temperature lies at -18 °C. The highest temperature reached in the freezer compartment is recorded in the memory storage. By pressing the Alarm-off/Memory button, the stored temperature is displayed for 5 s and the alarm buzzer switched off. The memory is erased by the call-up. During operation of the Super programme, the Alarm-on temperature is raised to -4 °C.

3.6 Fridge Compartment Defrost

On commissioning of the unit, a defrost phase is initiated after 3 h 20 min. After that, defrosting is every 8hrs. Should at this point the compressor be supplying the fridge compartment, the defrost phase is delayed by a max. of 56 min. At first the fridge compartment is not supplied for 16 min, then there is a delay until the sensor for this space records 8 °C or 135 min have passed. During the defrost phase, and for 100 min ± 20 min thereafter, the last-indicated value is held in the temperature display. During the fridge compartment defrost, the freezer compartment continues to be regulated.

3.7 Super Programme, Freezer Compartment

The freezing programme is started with the freezer compartment SUPER button. The SUPER LED illuminates, with the compressor going into continuous mode; the fridge compartment priority circuit remains active nevertheless. The Alarm-on temperature is raised to -4 °C. If the SUPER button is pressed again or no articles were added within 26 hrs, the unit goes into normal duty. If, after adding articles, 25 °C is reached, but after 26 hrs at the latest, there is switch-back to normal duty. The electronics recognises the adding of articles from a temperature rise of 4 K and a warming to above -24 °C.

3.8 Super Programme, Fridge Compartment

Supercooling is started with the fridge compartment SUPER button. The SUPER-LED illuminates and the fridge compartment is operated with the coldest setting (2 °C). After 6 hrs or when the SUPER-button is pressed again, there is switch-back to normal duty.

3.9 NTC Sensor

The unit is equipped with two NTC sensors. Each is mounted in a sensor housing in the fridge or freezer compartment.

4. Specifications

4.1 Fault Indications

Fault	Sensor	Temperature	Behaviour of Unit
E 1	Fridge c. sensor	≥ 45 °C, ≤ -44 °C	Fridge regulation: 12 min on and 12 min off
		≥ 169 kΩ, ≤ 2,6 kΩ	
E 2	Freezer c. sensor	≥ 45 °C, ≤ -44 °C	Freezer regulation: cont. duty
		≥ 169 kW, ≤ 2,6 kΩ	

4.2 NTC Sensor Values

Temp. °C	R kOhm	Temp. °C	R kOhm	Temp. °C	R kOhm	Temp. °C	R kOhm
-40	169.1	-19	45.87	2	14.75	23	5.46
-39	158.19	-18	43.31	3	14.03	24	5.22
-38	148.06	-17	40.92	4	13.35	25	4.99
-37	138.66	-16	38.67	5	12.69	26	4.78
-36	129.93	-15	36.49	6	12.07	27	4.58
-35	121.75	-14	34.51	7	11.49	28	4.38
-34	114.12	-13	32.65	8	10.94	29	4.20
-33	107.03	-12	31.00	9	10.42	30	4.02
-32	100.43	-11	29.38	10	9.94	31	3.85
-31	94.28	-10	27.67	11	9.48	32	3.69
-30	88.73	-9	26.19	12	9.04	33	3.54
-29	83.42	-8	24.81	13	8.62	34	3.39
-28	78.47	-7	23.50	14	8.23	35	3.26
-27	73.84	-6	22.28	15	7.85	36	3.13
-26	69.52	-5	21.16	16	7.49	37	3.01
-25	65.31	-4	20.07	17	7.15	38	2.89
-24	61.52	-3	19.04	18	6.82	39	2.77
-23	57.98	-2	18.08	19	6.52	40	2.66
-22	54.67	-1	17.17	20	6.24		
-21	51.57	0	16.32	21	5.97		
-20	48.59	1	15.51	22	5.71		

4.3 Service Test Programme

- Depress and keep depressed Freezer-SUPER button
- Switch power on
- After a approx. 5s SUPER LED goes out
- Release SUPER button
- The display shows P0

Pressing the fridge temperature setting button moves the test programme forward, pressing the Alarm-off button moves it backward. The freezer SUPER button activates the test step. If the button is actuated longer than 12s, the test is terminated by consumers. If for 5min no button is actuated, the unit returns to normal duty. The test programme is also terminated by switching the unit off.

Programme	Function
P0	Triggering of compressor. The compressor is triggered directly and with automatic re-start.
P1	Light triggered.
P2	Solenoid valve triggered. Alternate positive and negative half wave triggering in 2s steps.
P3	Display of the sensor measurement value of the freezer compartment sensor (neg. temp. flashing). Indicated is the actual sensor measurement value without offset temperatures and adjustment speed.
P4	Display of the sensor measurement value of the fridge compartment sensor (neg. temp. flashing). Indicated is the actual sensor measurement value without offset temperatures and adjustment speed.
P5	Buzzer triggered.
P6	Indication and programming of door contact.
P7	Start of a fridge compartment defrost phase and change to normal duty.

P6 - Programming and status of door contact

Programming	Status	Function
1	0	Door shut, door contact active
1	1	Door open, door contact active
0	0	Door shut, door contact inactive
0	1	Door open, door contact inactive

5. Repair

5.1 Intervention in the Refrigeration Cycle

With every intervention in the refrigeration cycle, renew drier before evacuation and refilling.

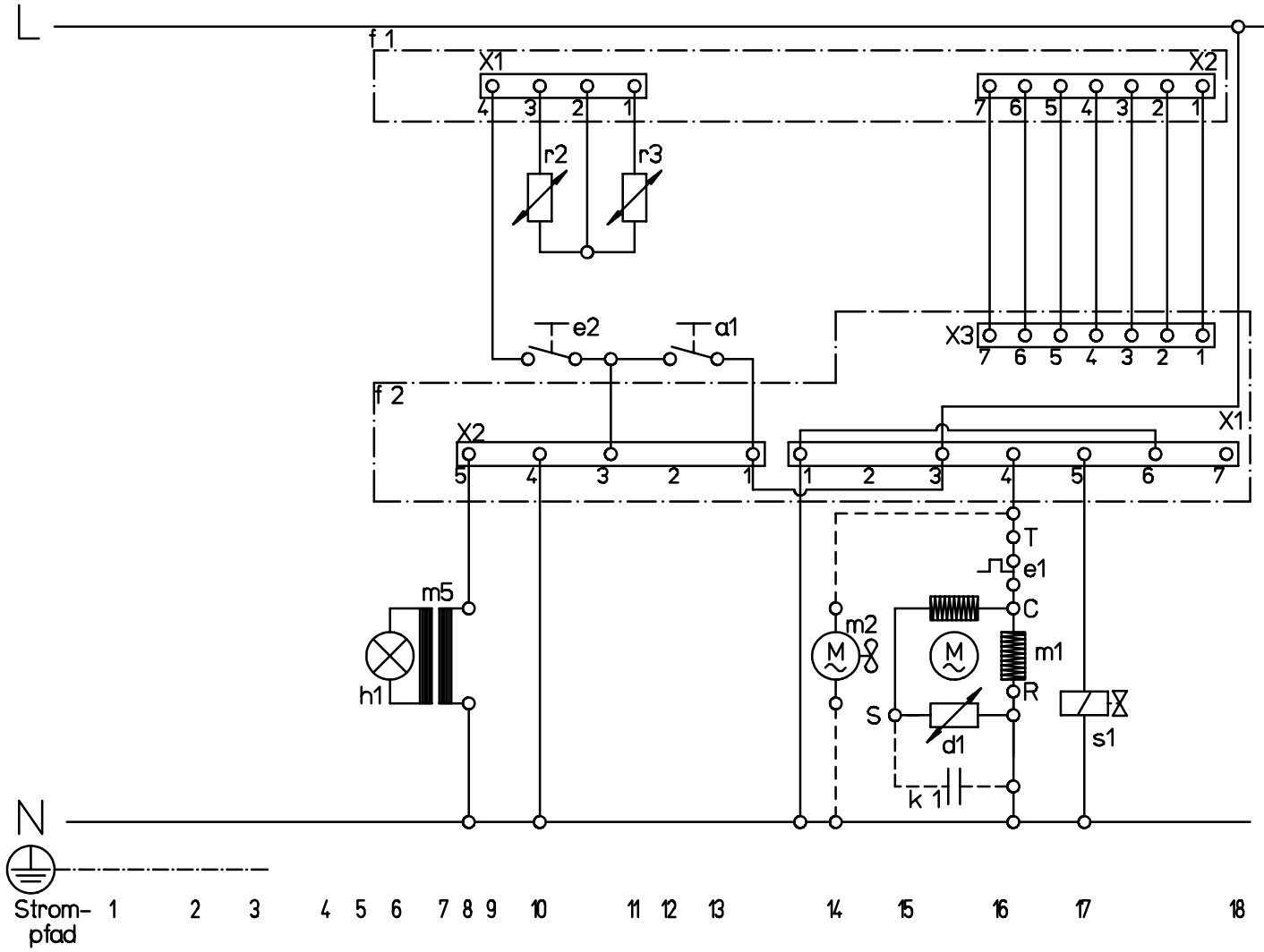
5.2 Suction-Side Leakage

With suction-side leakage of the refrigeration cycle and resulting repairs, be sure to renew the compressor and the drier.

Air moisture penetrating into the refrigeration cycle causes irreparable damage of the oil in the compressor.

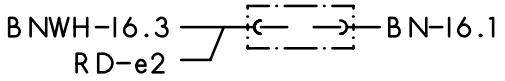
6. Wiring diagrams and legend

			Current circuit
a 1	=	Main switch	12/13
d 1	=	PTC unit	15/16
e 1	=	Circuit-breaker	16
e 2	=	Switch „Halogen light“	9/11
f 1	=	Control electronics	6/18
f 2	=	Power pack	6/18
h 1	=	Halogen light	6
K 1	=	Operating capacitor	15/16
l 1	=	Terminal	
l 2	=	Mounting rail	
l 3	=	Socket housing	
l 4	=	Socket housing	
l 5	=	Socket housing	
l 6	=	Socket housing	
l 7	=	Socket housing	
m 1	=	Condenser motor	15/16
m 2	=	Ventilator motor Machine room	14
m 5	=	Transformator	7
r 2	=	Air temperature detector Freezer Compartment	10
r 3	=	Air temperature detector Refrigerator Compartment	11
s 1	=	3-way valve	17

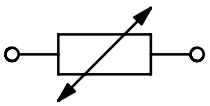


		Strom-pfad			Strom-pfad
a 1 =	Hauptschalter	12/13	m 1 =	Verdichter-Motor	15/16
d 1 =	PTC-Glied	15/16	m 2 =	Ventilator-Motor Maschinenraum	14
e 1 =	Schutzschalter	16	m 5 =	Trafo	7
e 2 =	Schalter "Halogenlampe"	9/11	r 2 =	Luft-Temperatur-Fuehler GS-Fach	10
f 1 =	Regelelektronik	6/18			
f 2 =	Netzteil	6/18	r 3 =	Luft-Temperatur-Fuehler KS-Fach	11
h 1 =	Halogenlampe	6			
k 1 =	Betriebskondensator	15/16	s 1 =	3-Wege-Ventil	17
l 1 =	Anschlussteil				
l 2 =	Tragschiene				
l 3 =	Buchsengehaeuse				
l 4 =	Buchsengehaeuse				
l 5 =	Buchsengehaeuse				
l 6 =	Buchsengehaeuse				
l 7 =	Buchsengehaeuse				

a1 Hauptschalter

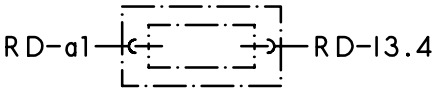


d1 PTC-Glied

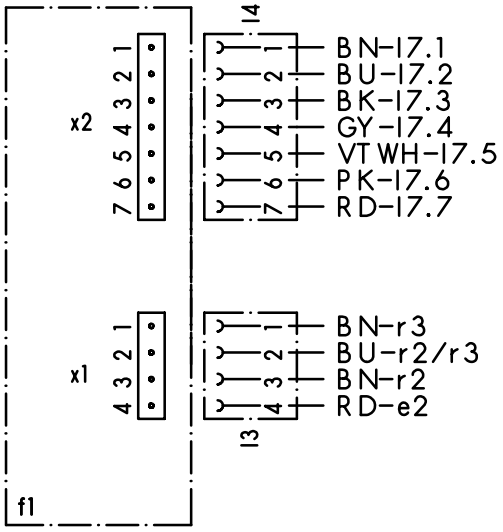


e1 Schutzschalter

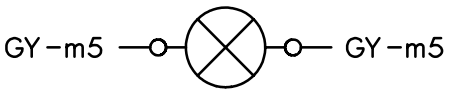
e2 Schalter "Halogenlampe"



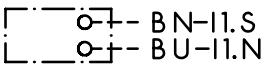
f1 Steuerelektronik
+ 13 Buchsengehaeuse
+ 14 Buchsengehaeuse



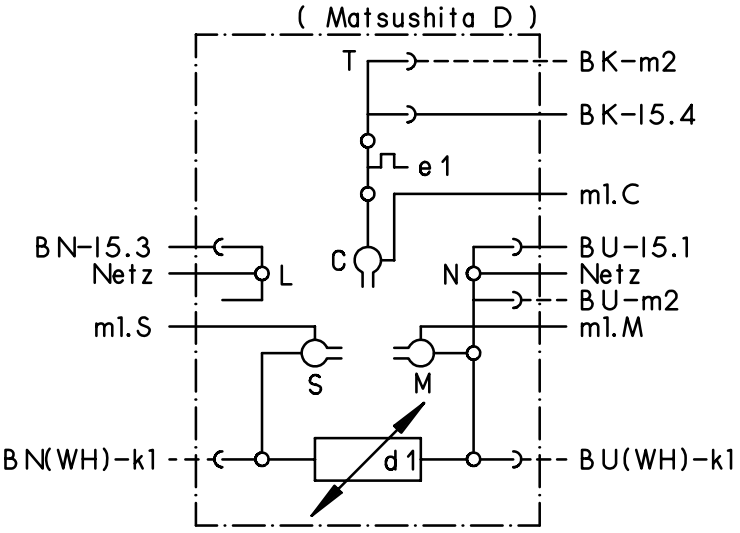
h1 Halogenlampe



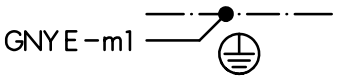
k1 Betriebskondensator



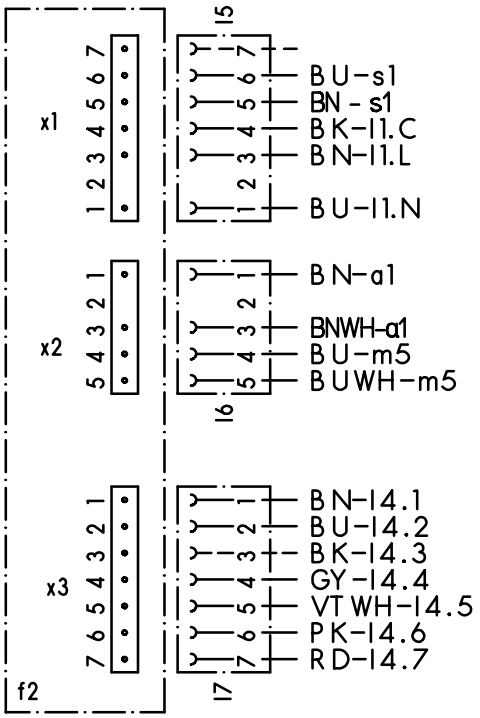
l1 Anschlussteil
(Matsushita D)



l2 Tragschiene



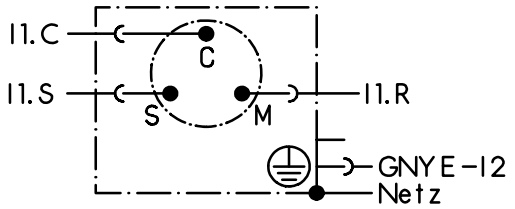
f2 Netzteil
+ 15 Buchsengehaeuse
+ 16 Buchsengehaeuse
+ 17 Buchsengehaeuse



Farbe	Kurzzeichen nach DIN/ IEC 757
schwarz	BK
braun	BN
rot	RD
orange	OG
gelb	YE
gruen	GN
blau	BU
violett	VT
grau	GY
weiss	WH
rosa	PK
gold	GD
tuerkis	TQ
silber	SR

D	1 709 911 661	05 / 99
		S0-50/0863

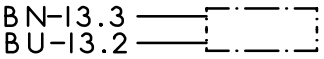
m1 Verdichter-Motor



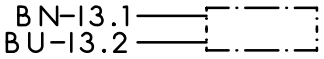
m2 Ventilator-Motor

m5 Trafo

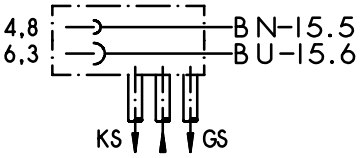
r2 Luft-Temperatur-Fuehler GS Fach



r3 Luft-Temperatur-Fuehler KS-Fach



s1 3-Wege Ventil



Farbe	Kurzzeichen nach DIN/ IEC 757
schwarz	BK
braun	BN
rot	RD
orange	OG
gelb	YE
gruen	GN
blau	BU
violett	VT
grau	GY
weiss	WH
rosa	PK
gold	GD
tuerkis	TQ
silber	SR