KÜPPERSBUSCH
AFTER- SALES SERVICE

Technical Manual
Fridge-freezer combination
KE 320-4-2T

GB

VKS-H	Technical Manual KE 320-4-2T	H8-420-02-01

Responsible: K.H. Hiby	Phone: (0209) 401-732	Fax: (0209) 401-743	Date: 28.01.1998

Contents

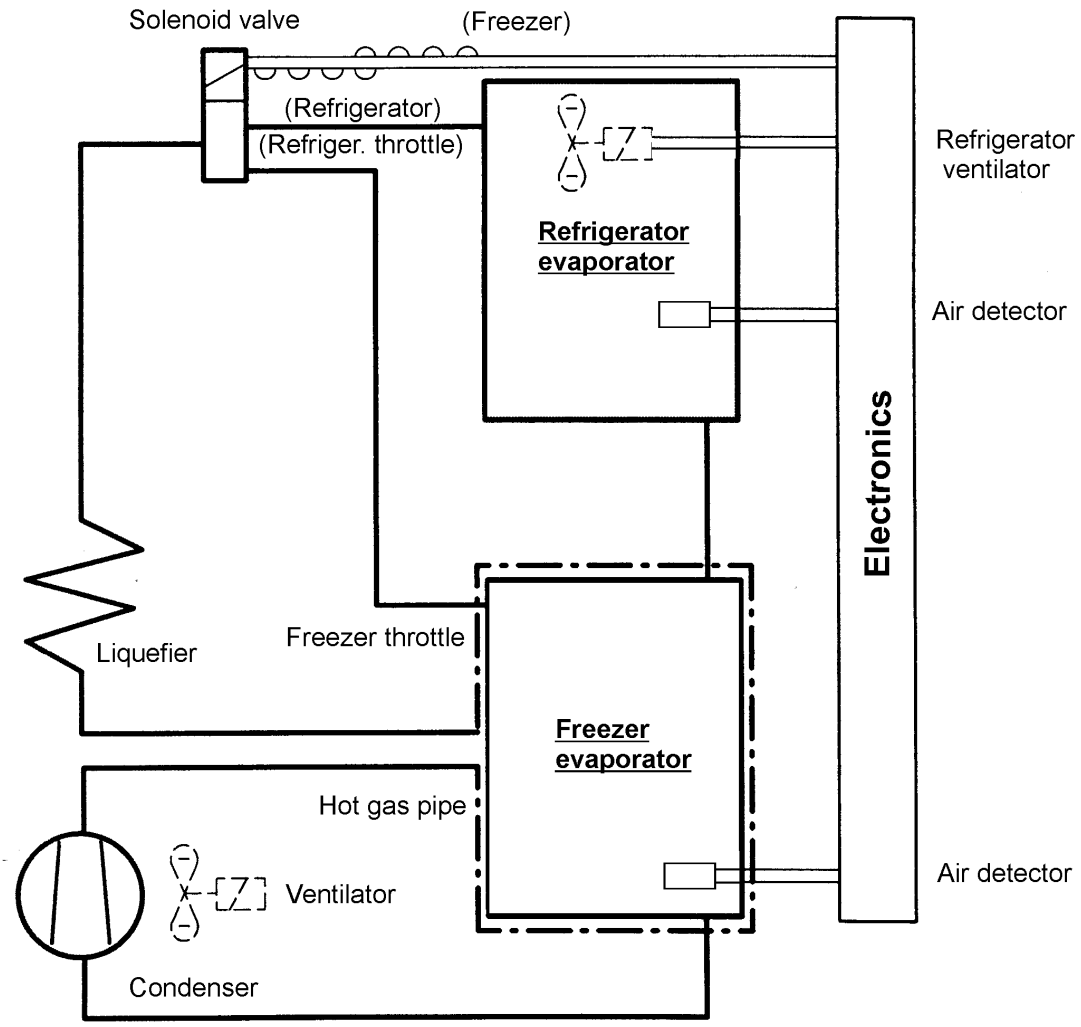
Küppersbusch

THE HEART OF A GOOD KITCHEN

1. General

- Electronic fridge-freezer
- Extra high insulation, energy efficiency class A
- Standard energy consumption 314 kWh in 365 days (DIN EN 153)
  room temperature 25 °C / not opened for 24 hours
- Climatic group SN +10 to +32 degrees Celsius
- gross capacity 280 litres; 190 litres refrigerator section; 90 litres freezer compartment
- Start from about July 1997
- Full stainless steel design brushed in longitudinal direction
- Plastic parts chrome finished, operation panel with **Küppersbusch** logo
- Control and operating electronics located behind operation panel and equipped with plastic protection device for high ESD safety
- All NTC temperature detectors can be replaced.
- Packaged transformer substation for all components in the area of the bottom trough
- Refrigeration circuit with 2 evaporators, 1 solenoid valve and 1 condenser
- Refrigerator compartment (RC) can be switched off independent of the freezer compartment (FC).

1.1 Refrigeration circuit



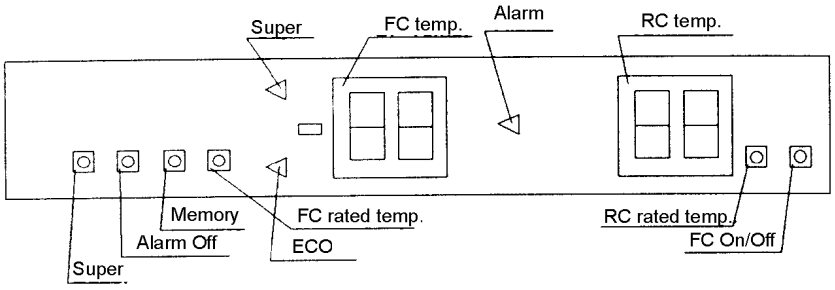
1.2 Structure of electronics

Software:

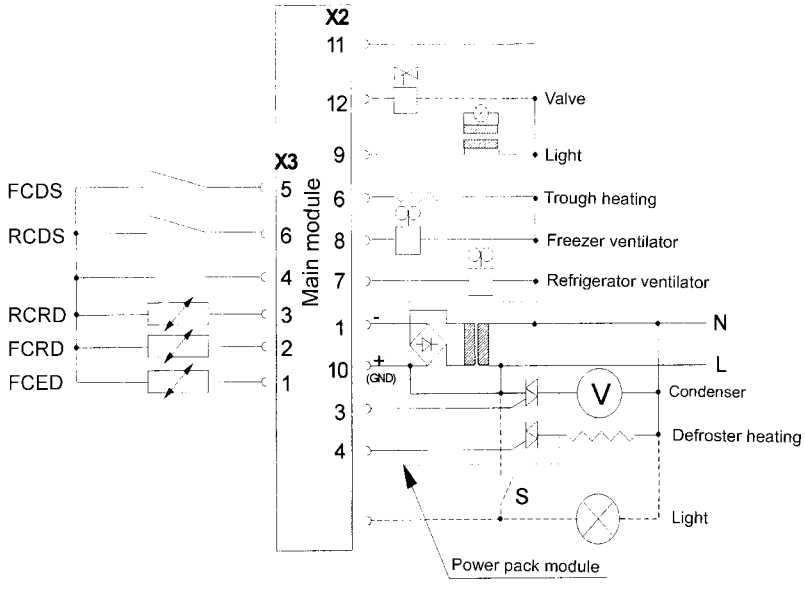
The MC68HC05B6 (6 kbyte ROM, 255 byte EEPROM) of Motorola is used as µC. In order to maintain the flexibility of the electronics changeable parameters (e.g. type of electronics, switching temperatures, etc.) are stored in the EEPROM of the µC.

1.3 Characteristics

Control type:	µC control
Condenser:	single-phase asynchronous motor
Solenoid valve:	bistable
Refrigerator compartment light:	halogen transformer with light



1.4 Electrical circuit diagram



2. Function requests

2.1 Operating functions

2.1.1 Super button and operation of the freezing programme

After pressing the Super button, the freezing programme will be initiated.

This means that:

- the Super LED lights.
- the ECO LED goes off.
- the condenser switches to continuous operation.
- the refrigerator compartment priority circuit is continually valid.
- the "Alarm On temperature" is changed to 4 degrees (standard setting: -13 degrees).

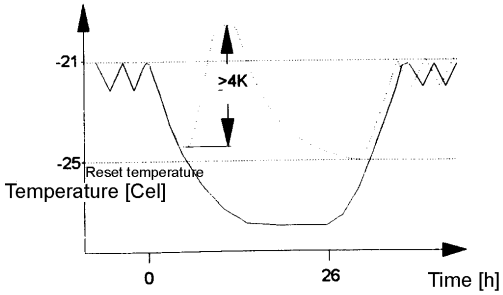
The appliance is reset to standard control operation, if:

- the Super button is pressed again.
- no goods have been put into the freezer within the "max. pre-running time" of 26 hours.
- the "freezer reset temperature" of -25 °C or
  the "freezing time" of 28 hours has been reached after putting goods into the freezer.

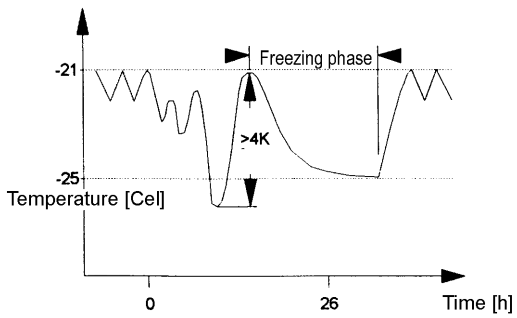
Definition of putting in of goods:

Goods have been put in, if the FC room detector has warmed up by at least the "FC temperature increase" of 4 K and the "maximum FC temperature" of -24 degrees has been exceeded.

Example 1



Example 2



Küppersbusch
THE HEART OF A GOOD KITCHEN

2.1.2 Alarm Off button and Alarm function

If the temperature of the FC room detector is higher or equal **-9 °C** the alarm LED and the accoustic signal transmitter will be activated.

The accoustic signal transmitter can be switched oof by pressing the alarm off button; the alarm LED is still on. Accoustic signal and alarm LED are extinguished, if the temperature is colder than -14 °C again.

2.1.3 Memory button and Memory function

If the preset rated temperature is reached again after an alarm signal, the temperature indicator continues to flash until the Memory button is pressed. By pressing the Memory button, the highest freezer temperature is displayed for 5 sec. before the indicator is reset to the actual temperature.

2.1.4 FC temperature selector and FC temperature indicator

The FC temperature indicator shows the rated temperature. If the FC temperature selector button is pressed, the actual rated value is indicated for 5 sec. The possible temperature setting range is between -18 °C and -26 °C. Setting is performed in increments of 1 degree. Each depression of the button reduces the temperature by 1 K. If the button is continually pressed, the rated temperature is continually changed in a 1 second-cycle.

The display may only be changed in increments of 1 K in order to prevent it from flickering. The entire display range is between +39 °C and -39 °C. The FC display shows a corrected measured FC room detector temperature.

2.1.5 RC temperature selector and RC temperature indicator

The RC temperature indicator shows the actual temperature. If the refrigerator temperature selector button is pressed, the actual rated value is displayed for 5 sec. The possible temperature setting range is between 2 °C and 11 °C. Setting is performed in increments of 1 degree. Each depression of the button reduces the temperature by 1 K.

The display may only be changed in steps of 1 K in order to prevent it from flickering. The matching speed amounts to max. 1 K per 10 min. up to 16 °C. In case of higher temperatures, the matching speed amounts to 1 K per 4 min. The entire display range is between 0 °C and 39 °C. The RC display shows a corrected measured RC room detector temperature.

2.1.6 RC On/Off button

By means of the RC On/Off button, the refrigerator compartment and the associated control and display functions are switched on/off. The refrigerator compartment interior light is switched off.

2.2 Control functions

2.2.1 Standard control

During standard control operation the following components are activated:

RC control (refrigeration request):
- condensor "on"
- valve to position "1" (neg. half-waves)

FC control (refrigeration request):
- condenser "on"
- valve to position "0" (pos. half-waves)

In case of simultaneous control of refrigerator compartment and freezer compartment, the refrigerator compartment has priority.

After the condenser has been switched off, a reclosing lockout of 10 min. has to be provided.

2.2.2 Defrosting function

The refrigerator compartment is defrosted after a RC appliance running time of 8 hours. The refrigerator compartment is not operated for the RC minimum defrosting time of 15 min. Then the appliance waits for the RC room detector to reach the RC defrosting reset temperature of +8 °C and the RC switching on value or until the RC defrosting safety time of 140 min. has been reached. Afterwards the refrigerator compartment will switch over to standard control operation again.

If the temperature of the RC room detector is lower than +8 °C during the commissioning, a defrosting of the refrigerator compartment is initiated after the first refrigerator compartment defrosting time of 3 hours.

During the defrosting phase of the refrigerator compartment, the refrigerator compartment cooling is switched off. Control of the freezer compartment is continued in standard mode.

2.3 Safety functions

2.3.1 Power failure protection

In case of a power failure, the following data are stored in the EEPROM:

- RC status: On/Off
- RC rated temperature
- FC status: standard control operation, super freeze operation
- FC rated temperature
- Memory temperature

2.3.2 Detector breakage/short-circuit

In case of a breakage or short-circuit of the detector, the following functions are triggered.

The function of the other detector is maintained.

Detector	Temperature	Status of the appliance
- RCRD	$\geq$ 45 °C, $\leq$ -7 °C	- RC display flashes **"E1"** - RC control: 10 min. - On 10 min. - Off
- FCRD	$\geq$ 45 °C, $\leq$ -44 °C	- FC display flashes **"E2"** - Continuous operation of the condenser

2.3.3 Solenoid valve safety function

If the temperature of the FCRD leaves the capture range in the direction cold during the withstand time, the valve will be switched over for a short time. Then the FCRD is checked every 30 min. to see whether the temperature increases again. If not, the valve is activated again. This procedure is repeated until the RCRD has returned to the capture range again.

3. Shop circuit state

The shop circuit state is obtained by **pressing** the **"Super" button** with the appliance disconnected from the supply and **switching on the appliance**. The button must be pressed, until the **yellow super LED is lit (2 sec.)**. The shop circuit is terminated, when the supply voltage is disconnected (switching off of the appliance, interruption of power supply).

The shop circuit state includes the following functions:

- Refrigerator compartment indicator = 6 °C
- Freezer compartment indicator = -18 °C
- Refrigerator compartment interior light depending on the refrigerator compartment door position
- No RC/FC control (no control of load components, except refrigerator compartment interior light)
  All buttons can be operated, however, buttons "Memory" and "Alarm Off" have no function.

4. Special pogrammes

4.1 Starting programme

The starting programme is active,if

- the FCRD > -5 °C,
- the RCRD > 12 °C

during the commissioning of the appliance.

After termination of the starting programme, the appliance switches over to the standard control operation. All indicators and push-buttons operate like during the standard control operation.

Programme cycle:

- The valve is activated for 5 sec. (bistable: half-wave control)
- The halogen light is activated for 5 sec.
- The freezer compartment ventilator is activated for 5 sec.
- 8 min. operation of the refrigerator compartment (valve is immediately switched in)
- 10 min. operation of the freezer compartment
- standard control operation

4.2 Test programmes

The test programmes can be activated by **pressing** the **"Super" button** with the appliance disconnected from the supply and **switching on the appliance**. Keep the button pressed, until the yellow Super LED is extinguished after lighting (longer than 5 sec.). **"P0"** is indicated in the display. Release the button again. The specific test programme can be set via the **"FC rated temperature button".** For this purpose, the counter is increased by one each time. Pressing the button "FC On/Off" or "Alarm Off" reverses the direction of counting. If the **"Super"** button is pressed now, the function will be performed until the "Super" button is released again. In case no setting is changed for 10 min. the appliance returns to the standard control operation.

The test programme is terminated, if the supply voltage is switched off (switching off of the appliance, interruption of the power supply).

Display	Function Button SUPER
P0	Initiation of a RC defrosting phase
P1	Valve is activated (bistable: continuous half-waves)
P2	Not used at the moment
P3	Not used at the moment
P4	Not used at the moment
P5	Not used at the moment
P6	Buzzer is activated
P7	Halogen transformer is activated
P8	Condenser is activated
P9	RCRD and FCRD temperature is displayed, true value (permanent display of the measured value in °C). The RC display uses the alarm LED as negative sign, in order to indicate the RCRD temperature.
"PB"	Status display of the RC door switch in the RC display (permanent display) C = Refrigerator compartment door closed O = Refrigerator compartment door opened
"PC"	Switch over to standard control operation.

5. Switching values and NTC detector values

Rated temperature	ON	Value in OHM	OFF	Value in Ohm
Freezer compartment (Freezer NTC)				
-18 °C	-12.5 °C	4500	-14 °C	4889
-22 °C	-16.5 °C	5500	-18 °C	5972
-26 °C	-20.5 °C	7000	-22 °C	7317
Refrigerator compartment (Refrigerator NTC)				
+11 °C	14.3 °C	approx. 1330	13.9 °C	approx. 1358
+6 °C	9.1 °C	approx. 1681	8.8 °C	approx. 1651
+2 °C	5.2 °C	approx. 2020	4.9 °C	approx. 1980

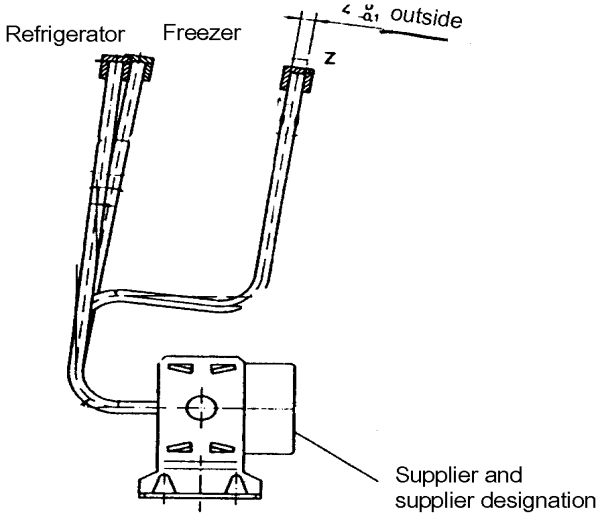
6. Solenoid valve

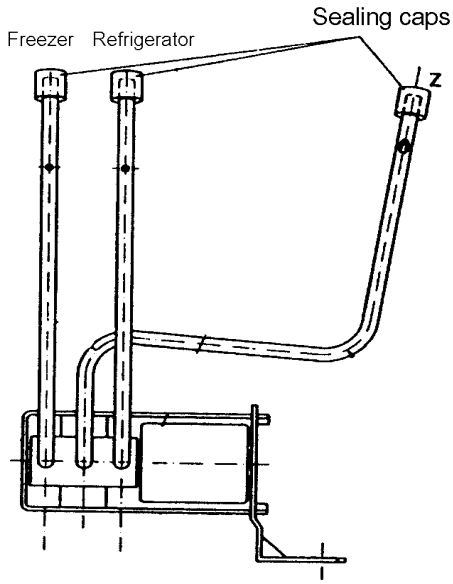
The bistabile solenoid valve is activated by the electronics. The switch over is triggered by four positive half-waves (freezer compartment) resp. negative half-waves (refrigerator compartment) in a 30-second-cyle. This refresh impulse is required to ensure the desired position in case of a possible uncontrolled triggering of the Triac.

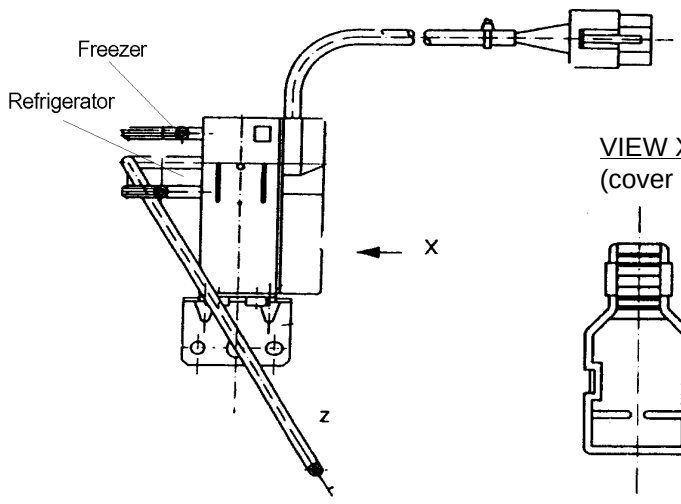
In case of an uncontrolled triggering the solenoid valve would switch over unintentionally and the desired evaporator would not be supplied.

The solenoid valve has a closing delay of approx. 1 minute in standard control operation.

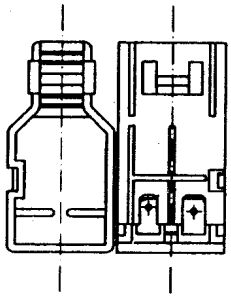
Coil resistance = 1650 Ohm (+/- 150 Ohm)







VIEW X
(cover open, drawn without cable)



Executed as flat connector acc. to DIN 46244 4.8x0.8

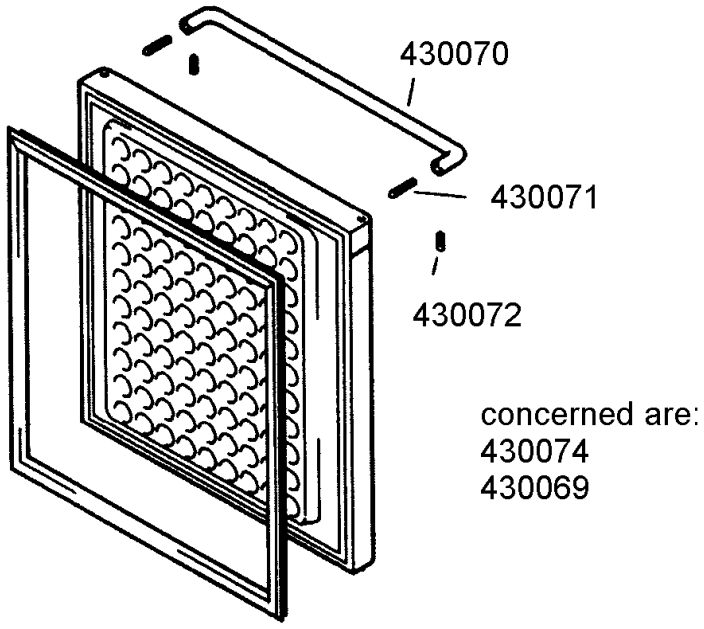
Executed as flat connector acc. to DIN 46244 6.3x0.8

7. Stainless steel doors

The doors of the fridge-freezer combinations are supplied without door handle and door sealing.

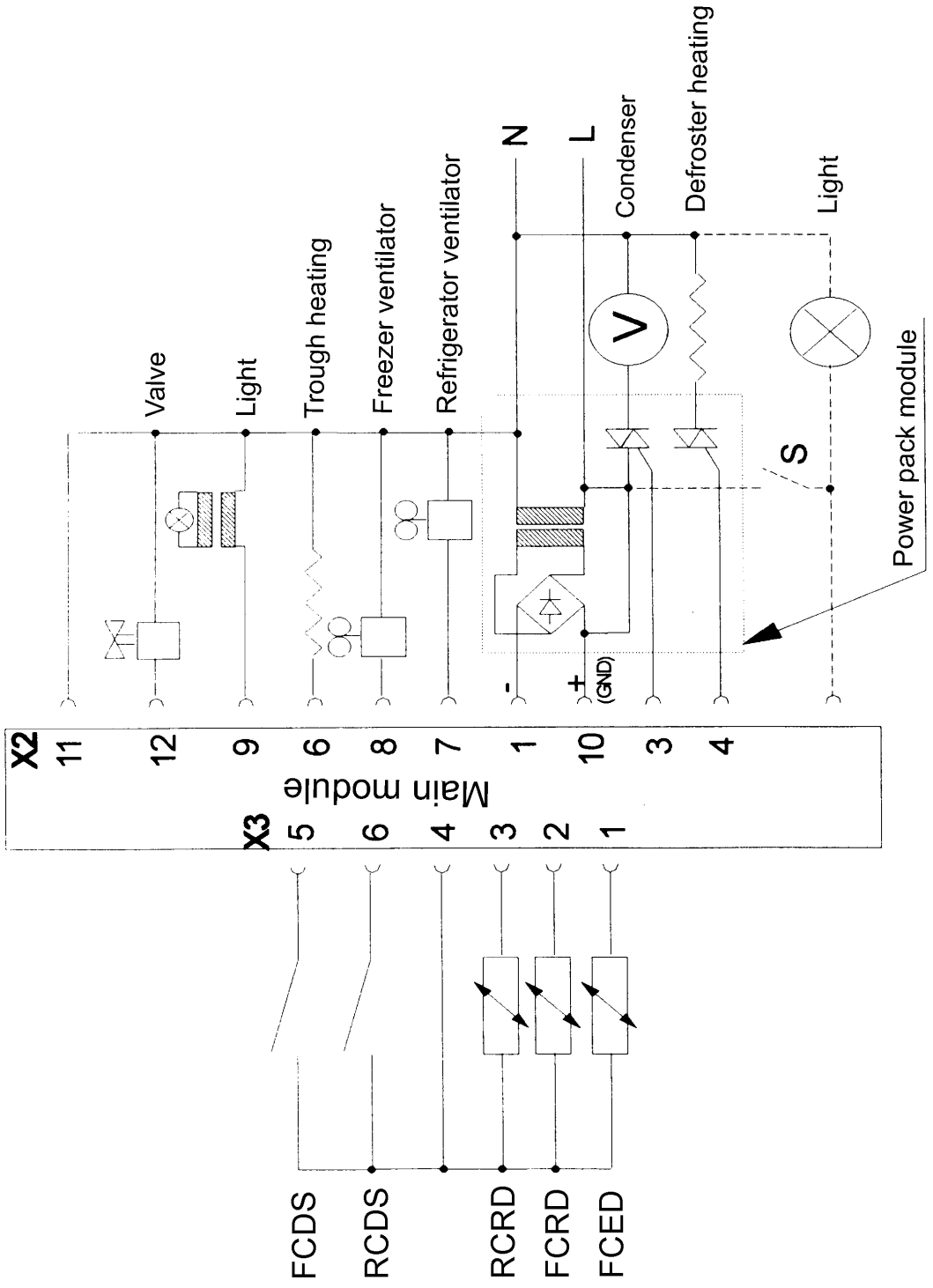
For an exchange of the door all attachment elements must be ordered separately or must be taken from the already existing door.

The door handle is fixed at the stay bolt with a grub screw. This grub screw has a hexagon bolt with a diameter of 1.5 mm.

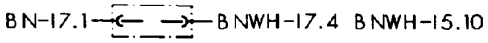


Küppersbusch
THE HEART OF A GOOD KITCHEN

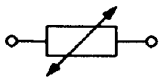
Responsible: K.H. Hiby	Phone: (0209) 401-732	Fax: (0209) 401-743	Date: 28.01.1998



a1 Main switch



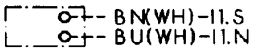
d1 PTC-unit



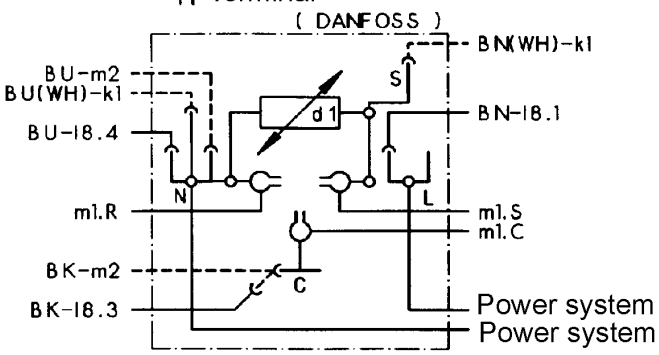
e1 Circuit-breaker

e2 Switch "Halogen Light"

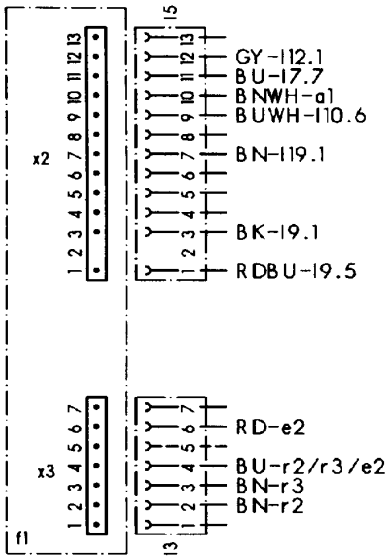
k1 Operating capacitor



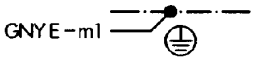
l1 Terminal



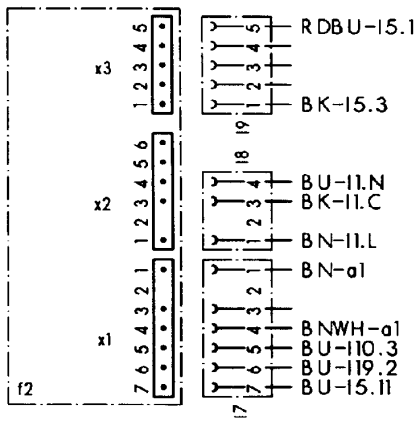
f1 Control electronics
+ 13 Socket housing
+ 15 Socket housing



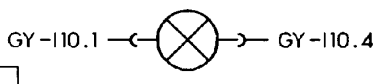
l2 Mounting rail



f2 Power pack
+ 17 Socket housing
+ 18 Socket housing
+ 19 Socket housing

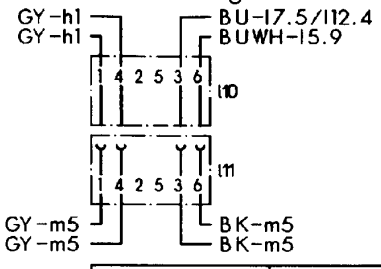


h1 Halogen light

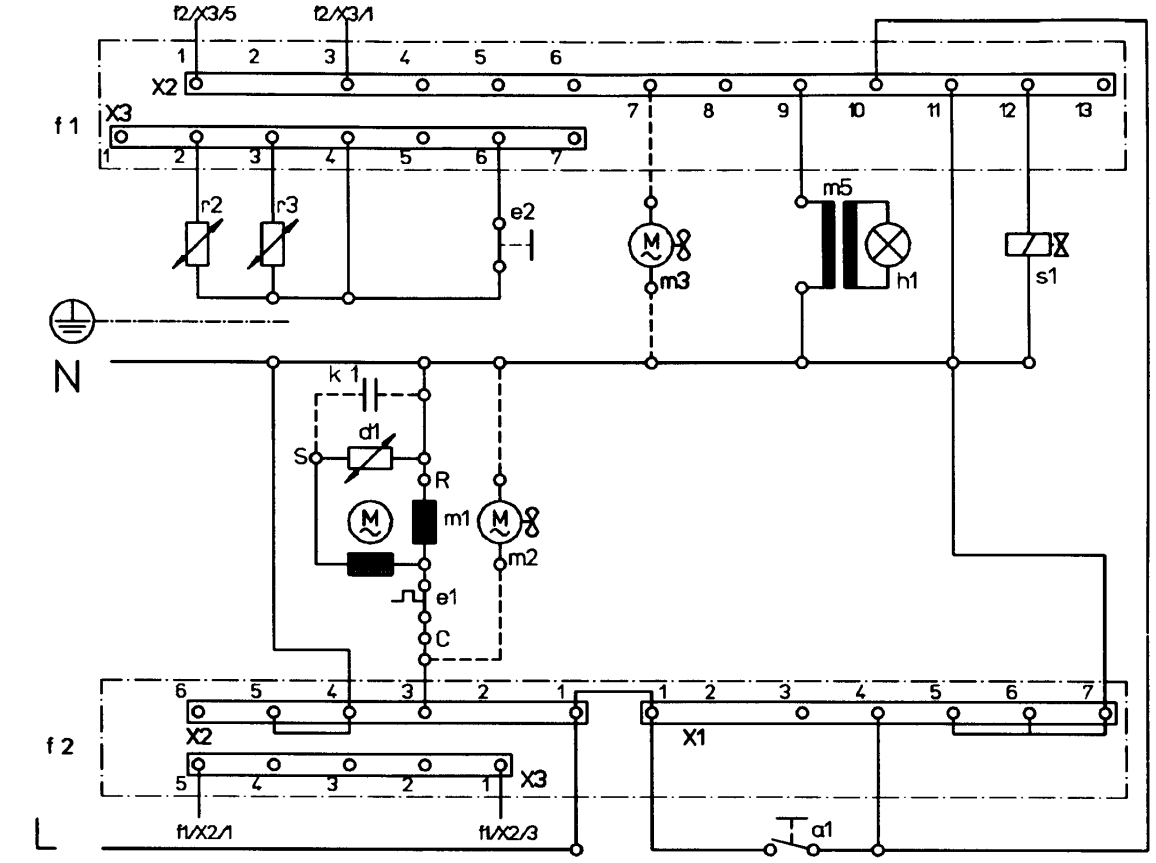


Colour	Abbrev. acc. to DIN/ IEC 757
black	BK
brown	BN
red	RD
orange	OG
yellow	YE
green	GN
blue	BU
violet	VT
grey	GY
white	WH
pink	PK
gold	GD
turquoise	TQ
silver	SR

l10 Pin housing
+ l11 Socket housing



1 709 911 618	03 / 97



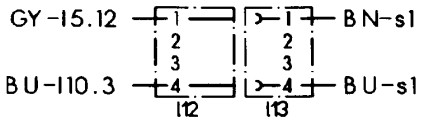
Current circuit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

		Current circuit
a 1 =	Main switch	12
d 1 =	PTC unit	4 / 6
e 1 =	Circuit-breaker	6
e 2 =	Switch "Halogen Light"	7
f 1 =	Control electronics	1 / 17
f 2 =	Power pack	1 / 17
h 1 =	Halogen light	14
k 1 =	Operating capacitor	4 / 6
l 1 =	Terminal	
l 2 =	Mounting rail	
l 3 =	Socket housing	
l 5 =	Socket housing	
l 7 =	Socket housing	
l 8 =	Socket housing	
l 9 =	Socket housing	
l 10 =	Pin housing	
l 11 =	Socket housing	
l 12 =	Pin housing	
l 13 =	Socket housing	
l 19 =	Socket housing	
l 20 =	Pin housing	

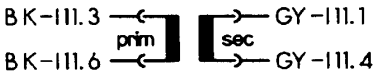
		Current circuit
m 1 =	Condenser motor	6
m 2 =	Ventilator motor Machine room	7
m 3 =	Recirculation ventilator	10
m 5 =	Transformer	13
r 2 =	Air temperature detector Freezer compartment	2
r 3 =	Air temperature detector Refrigerator compartment	3
s 1 =	3-way valve	16

1 709 911 618	03 / 97

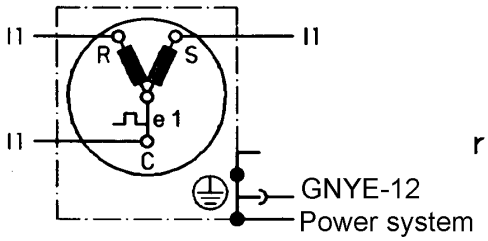
112 Pin housing
+ 113 Socket housing



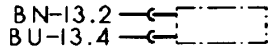
m5 Transformer



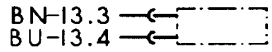
m1 Condenser motor



r2 Air temperature detector
Freezer compartment

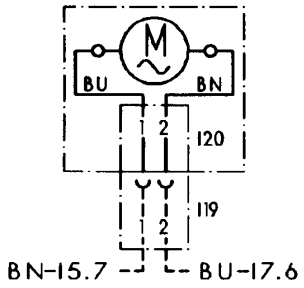


r3 Air temperature detector
Refrigerator compartment

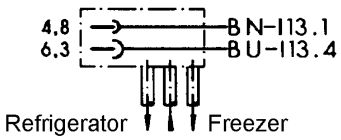


m2 Ventilator motor

m3 Recirculation ventilator
+ 119 Socket housing
+ 120 Pin housing



s1 3-way valve



Colour	Abbrev. acc. to DIN/ IEC 757
black	BK
brown	BN
red	RD
orange	OG
yellow	YE
green	GN
blue	BU
violet	VT
grey	GY
white	WH
pink	PK
gold	GD
turquoise	TQ
silver	SR

1 709 911 618	03 / 97