



Refrigerator
IKEF 248-7
IKEF 249-6
IKEF 249-7

Service Manual: H8-71-07

Responsible: U. Laarmann
E-mail: uwe.laarmann@kueppersbusch.de
Phone: (0209) 401-732
Fax: (0209) 401-743
Date: 08.12.2008

KÜPPERSBUSCH HAUSGERÄTE AG

Kundendienst
Postfach 100 132
45801 Gelsenkirchen

Contents

1. Safety instructions	4
2. Repair instructions	5
3. Operation	6
3.1 Panel	6
3.2 Main switch	6
3.3 Refrigerator section temperature adjuster	6
3.4 Temperature setting range	6
3.5 Keep-fresh cooling section temperature setting range	6
3.6 Refrigerator section Super button	7
4. Components	8
4.1 Electronic controls	8
4.2 Keep-fresh cooling section fan	8
4.3 Heating the refrigerator section	8
4.4 Solenoid valve	8
5. Functions	9
5.1 Cooling circuit	9
5.2 Start-up program	10
5.3 Demonstration program (sales room switching)	10
5.4 Defrosting	10
5.5 Refrigerator section Super program	11
5.6 Test program	11
5.7 Solenoid valve safety function	11
6. Repairs	12
6.1 Capillary tube	12
7. Trouble shooting	13
7.1 NTC fault	13
7.2 Error message LO	13
8. Technical data	14
8.1 Sensor readings	14
8.2 Electrical data	14

1. Safety instructions



Danger!

***Repairs may only be carried out by a qualified electrician!
Improper repairs can be extremely dangerous for the user.***

It is essential that you observe the following instructions in order to prevent electric shocks:

- The casing and the frame may be live in the event of faults!
- Touching live components inside the appliance may cause dangerous currents to flow through your body!
- Disconnect the appliance from the mains prior to carrying out any repair work!
- When inspecting live parts, a residual current circuit breaker must always be used!
- Always ensure that an earthed conductor is properly connected! The ground wire resistance must not exceed that specified in the standard! It is of vital importance for ensuring the safety of people and the functioning of the appliance.
- On completion of repairs, an inspection must be carried out in accordance with VDE 0701 [Association of German Electrical Engineers] or the corresponding regulations for your country!
- Do not touch any of the components in the appliance. The modules are also live!
- Observe instructions on electrostatic hazards!
- Wear safety goggles and protective gloves when handling refrigerants. Rinse your eyes with a lot of water if refrigerant splashes into them.



Attention!

Make sure you observe the following instructions:

- The appliances must be disconnected from the mains prior to all repairs. If inspections must be carried out on live appliances, make sure you use a residual current operated device.



Sharp edges: Use protective gloves.



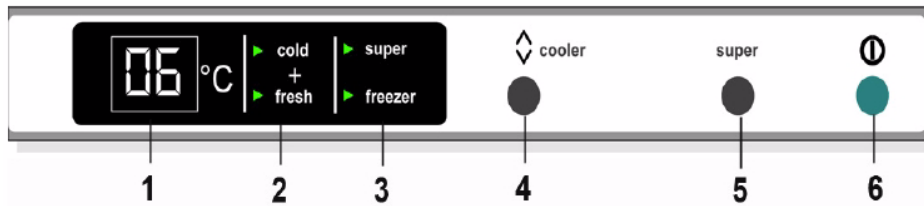
Components may be electrostatic!
Observe handling precautions!

2. Repair instructions

- Never attempt to carry out repairs by “randomly replacing” components!
- Always proceed systematically and observe the technical documentation that goes with the appliance!
- Electronic circuit boards are generally not repaired; instead they are completely replaced with original spare parts. Exceptions are documented separately.
- Pipe connections in cooling circuits are not to be soldered. Lokring connections are to be used.
- Carry out a leak test and a functional test on the cooling circuit.
- The dehumidifier is to be replaced before evacuation and filling during any intervention in the cooling circuit.
- It is essential to replace the compressor and the dehumidifier when repair work resulting from suction leaks in the cooling circuit is carried out. Humidity which gets into the cooling circuit will cause irreparable damage to the oil in the compressor.

3. Operation

3.1 Panel



1. Temperature display (only lights up when the outer door is open)
2. Keep-fresh cooling section operation display (only lights up when the outer door is open)
3. Super mode / freezer section operation display (only lights up when the outer door is open)
4. Temperature adjuster
5. Super button
6. Main switch

3.2 Main switch

The main switch is used for switching the refrigerator on and off.

3.3 Refrigerator section temperature adjuster

The temperature display is switched from the actual to the target temperature display when the temperature adjuster is pressed. Each time the button is pressed the target temperature is changed by 1 K. At the end of the adjustment range the temperature is switched back to the original setting. Pressing the button constantly will change the temperature every second. If the button is not pressed for 5 s, the actual temperature will be shown again.

3.4 Temperature setting range

The setting range is from 3°C to 8°C. The basic setting is 6°C.

3.5 Keep-fresh cooling section temperature setting range

- Press the temperature adjuster and keep it pressed.
- Switch on the refrigerator at the main switch.
- Keep pressed for 3 s until 88 lights up and then goes off again.
- Release the temperature adjuster.
- The refrigerator section display shows the sensor setting (basic setting = 2)
- The keep-fresh cooling section temperature is adjusted in 1 K steps with the temperature adjuster. Settings can be made from 6 (warm) to 0 (cold).

The display returns to the standard status when the temperature adjuster is not activated for 1 min.

The new setting is assumed after the display has returned to the standard status.



The refrigerator section display has no minus sign. There is a risk of the temperature falling below 0°C (a 0 setting does not mean 0°C).

3.6 Refrigerator section Super button

This button is used to start the Super program for the refrigerator section. Pressing this button again will discontinue the program.

4. Components

4.1 Electronic controls

The control system comprises two modules. The control and display module is located in the control panel. The input ports for the NTC sensor and the door contact are located on this module. The power supply module is located under a cover in the power room. This is where the loaded components are all activated and the control module is supplied with power.

4.2 Keep-fresh cooling section fan

- The fan is switched off when the outer door is open.
- The fan is always switched on when the appliance is being defrosted.
- The fan is switched on for 30s when the outer door is closed.
- The fan will operate when the keep-fresh cooling section indicates that cooling is required.
- The fan will be switched on for 12min after standing still for 4min.

4.3 Heating the refrigerator section

The refrigerator section is heated, since it becomes too cold when the room temperature is low. The refrigerator section heater is located on the evaporator. The heater is placed in foam and cannot be replaced.

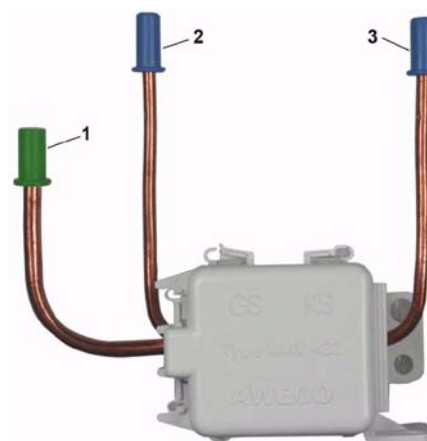
Heater output = 10W.

The refrigerator section heater is regulated by the room temperature:

Room temperature	Action
21°C	Heater is on when the compressor is off
15°C	Heater operating continuously

4.4 Solenoid valve

The solenoid valve has no defined resting position. Each switching position is reached by activating positive and negative control voltage half waves. The flexible armature of the valve is located in the magnetic field of a permanent magnet and activation brings it into its end position. In this position the output port to which refrigerant is currently not to be applied is closed by the armature. Triggering is repeated every 60s in order to ensure that the armature remains in this position. The permanent magnet (in the housing) generates an armature lock in the required position.

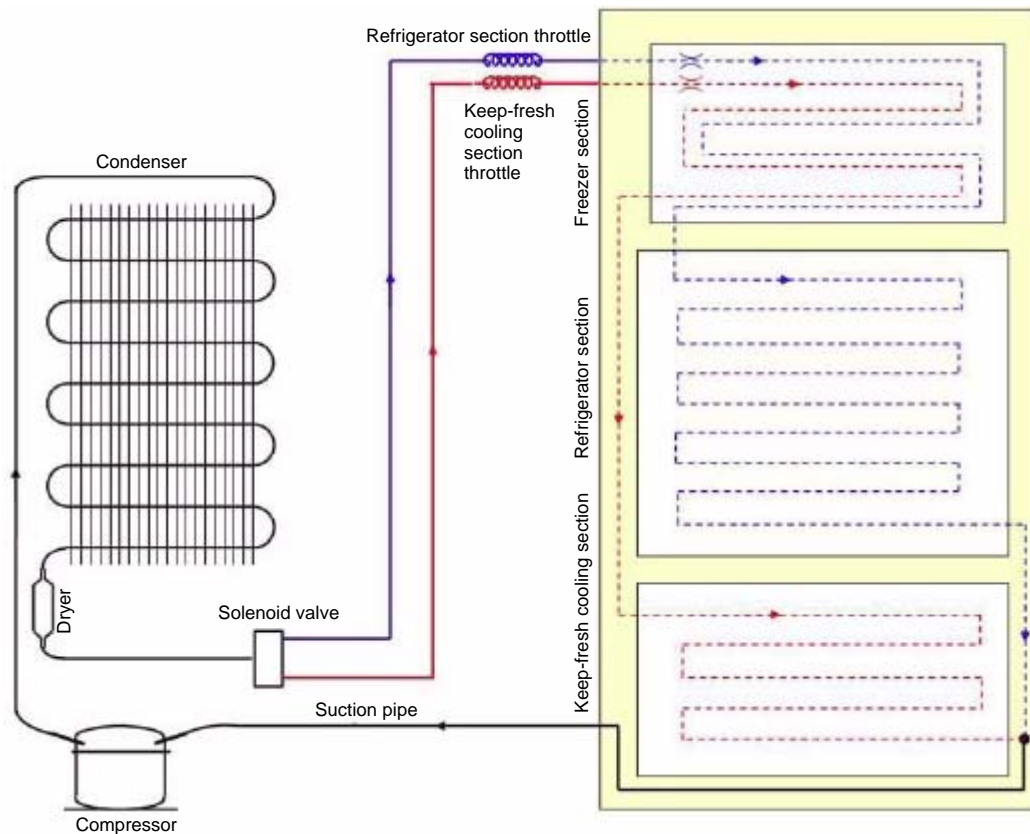


- 1 = input
2 = keep-fresh cooling section output
3 = refrigerator section output

5. Functions

5.1 Cooling circuit

The solenoid valve supplies the keep-fresh cooling section or the refrigerator section. The refrigerant is first of all lead through the freezer section and then into the keep-fresh cooling section or it is simultaneously injected into the refrigerator section through the freezer section. The freezer section is always supplied when the compressor is in operation. The freezer section does not have its own controls. The keep-fresh cooling section has priority.



5.2 Start-up program

The start-up program is activated when the sensor temperatures (except for the room sensor) are all in the range of 10°C to 45°C when the refrigerator is switched on. The room sensor may not fall below -20°C and not exceed +45°C.

Program sequence

- 5s no trigger
- 5s solenoid valve
- 5s refrigerator section heater
- 5s keep-fresh cooling section fan
- 39min keep-fresh cooling section supply
- 24min refrigerator section supply
- If the electronic system detects an error, the keep-fresh cooling section fan will be activated for 15min.
- Standard operating mode

5.3 Demonstration program (sales room switching)

- Switch the refrigerator off.
- Press the temperature adjuster and keep it pressed.
- Switch the refrigerator on.
- Keep the temperature adjuster pressed until LO appears.
- Release the temperature adjuster.

All the operation functions and displays are active but no load components are triggered.

Exception: The fan continues to operate for 30s after the outer door has been closed.

The demonstration program ends when the appliance is switched off.

5.4 Defrosting

5.4.1 Refrigerator section

During initial operation of the refrigerator, the refrigerator section will begin to defrost after 10h. The refrigerator will always begin to defrost again after 23h 20min.

5.4.2 Keep-fresh cooling section

During initial operation of the refrigerator, the keep-fresh cooling section will begin to defrost after 10h. The keep-fresh cooling section will always begin to defrost again after 16h.

- The keep-fresh cooling section is not supplied with power for 60min.
- It is defrosted until the keep-fresh cooling section evaporator sensor reaches 4°C or after 100min.

During defrosting the keep-fresh cooling section fan remains switched on (only when the outer door closed).

5.5 Refrigerator section Super program

The Super cooling function is started with the Super button. The Super LED lights up and the refrigerator section is operated at a target temperature of 2°C. After 24h or when the temperature adjuster has been pressed again, the appliance will return to normal operation.

5.6 Test program

Calling the test program:

- Switch off the refrigerator.
- Press the Super button and keep it pressed.
- Switch on the refrigerator.
- Keep pressed for approx. 5s until LO appears.
- Release the Super button.
- P0 will appear in the display.

Pressing the temperature setting button will make the test program move forward. Pressing the Super button will activate the test step. If no button is pressed for 5min, the refrigerator will return to normal operation. Switching off the refrigerator will also exit the test program.

Program	Function
P0	The compressor is activated.
P1	The keep-fresh section fan is activated.
P2	The refrigerator section heater is activated.
P3	The solenoid valve is activated.
P4	Break (no consumer is activated).
P5	Room temperature sensor is shown.
P6	Refrigerator section sensor is shown.
P7	Keep-fresh cooling section sensor is shown.
P8	Keep-fresh cooling section evaporator sensor is shown.
P9	Status display of the door contact.
PA	Defrosting followed by transition to normal operation.

P9 - Status display of the door contact

Display	Function
1 0	Door closed
1 1	Door open

5.7 Solenoid valve safety function

If the electronic unit detects a drop in temperature in the refrigerator section during a refrigerator dwell time, the solenoid valve is switched in 30min cycles, until the temperature in the refrigerator section is in the normal range.

6. Repairs

6.1 Capillary tube

The capillary tube of the keep-fresh cooling section is marked yellow.



If a capillary tube has broken off direct at the point where it is lead into the suction pipe, it can be repaired with two NTR lokring connections (spare-part no. 066034).



7. Trouble shooting

7.1 NTC fault

The resistance readings of a sensor are converted into temperatures by the electronics unit.

A sensor is recognised as being defect by the sensor when the temperatures exceed specified temperature limits. Irrespective of the sensor function, the electronic unit puts the defect sensor into a certain operating status.

Display	Sensor	Temperature	Function
E1	Refrigerator section sensor	$\geq 45^{\circ}\text{C}, \leq -44^{\circ}\text{C}$	Refrigerator section controls: 20min ON and 28min OFF
E3	Keep-fresh cooling section sensor	$\geq 45^{\circ}\text{C}, \leq -44^{\circ}\text{C}$	Keep-fresh cooling section controls 20min ON and 28min OFF
	Keep-fresh cooling section evaporator sensor	$\geq 45^{\circ}\text{C}, \leq -44^{\circ}\text{C}$	Defrosting the keep-fresh cooling section sensor

7.2 Error message LO

An LO error message in the display means:

- The operating voltage is lower than 160V or higher than 264V.
- The operating frequency is lower than 45Hz or higher than 55Hz.

Cause of fault:

- An unstable mains power supply.
- A defect power supply module.

8. Technical data

8.1 Sensor readings

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	149.06	-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		

8.2 Electrical data

Operating voltage: The operating range of the appliance is between 160V and 264V.

Operating frequency: The operating frequency of the appliance is between 45 Hz and 55Hz.

Interior lighting 230V, 25W

Fan: 230V, 0.05A, 7W