

REPAIR INSTRUCTION

HB.. Ecolyse

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1 SAFETY

1.1 Troubleshooting



DANGER!

Do not replace components when the appliance is operating. When troubleshooting, proceed systematically as described in the troubleshooting steps.

1.2 The microwave oven – warnings



WARNING!

The microwave oven generates a very high voltage which may cause serious injuries or death – always follow the safety regulations specified in this repair manual.

- ▶ Before removing or installing components, always isolate the microwave oven from the mains power supply.
- ▶ Never attempt to measure voltages on the inverter, magnetron or high-voltage conducting wire. This high-voltage circuit generates voltages in excess of 4000 volts.
- ▶ Before measuring voltages inside the appliance, always connect the microwave oven to a residual current circuit breaker.
- ▶ Check that the oven's power requirements do not exceed the power rating of the mains power supply.

- ▶ Before removing or installing components, pull the plug out of the mains socket and discharge the high-voltage capacitors in the inverter circuit.
- ▶ Connect the microwave oven to a two-core extension cable. The microwave oven must be earthed – troubleshooting a microwave oven without an earth connection is extremely dangerous.
- ▶ On completion of the repair work, conduct a performance test.
- ▶ On completion of the repair work, test the microwave oven for leakage current.

1.3 Inverter circuit – warnings



CAUTION!

- ▶ The inverter circuit generates voltages in excess of 4000 volts – never attempt to measure voltages in this circuit.
- ▶ The aluminium cooling element on the inverter circuit becomes very hot – before removing the inverter circuit, allow the cooling element to cool down.
- ▶ Before removing the inverter circuit, pull the plug out of the mains socket and discharge the high-voltage capacitors in the inverter circuit.
- ▶ The inverter circuit must be earthed. After changing the inverter circuit, tighten the earth clamp and earthing contact conductor on the microwave oven's housing. An inverter circuit without an earth connection may become dangerous.

1.4 Leak test (leak measurement)

The leakage rate is the microwave energy escaping outside in spite of intact sealing systems. The leakage rate is measured with suitable measuring instruments as the energy density at a distance of 5cm. The unit of measurement is mW/cm^2 .

The limiting values for the permitted measurement values as well as the measurement conditions are specified in the VDE specifications 0700/Part 25 as follows:

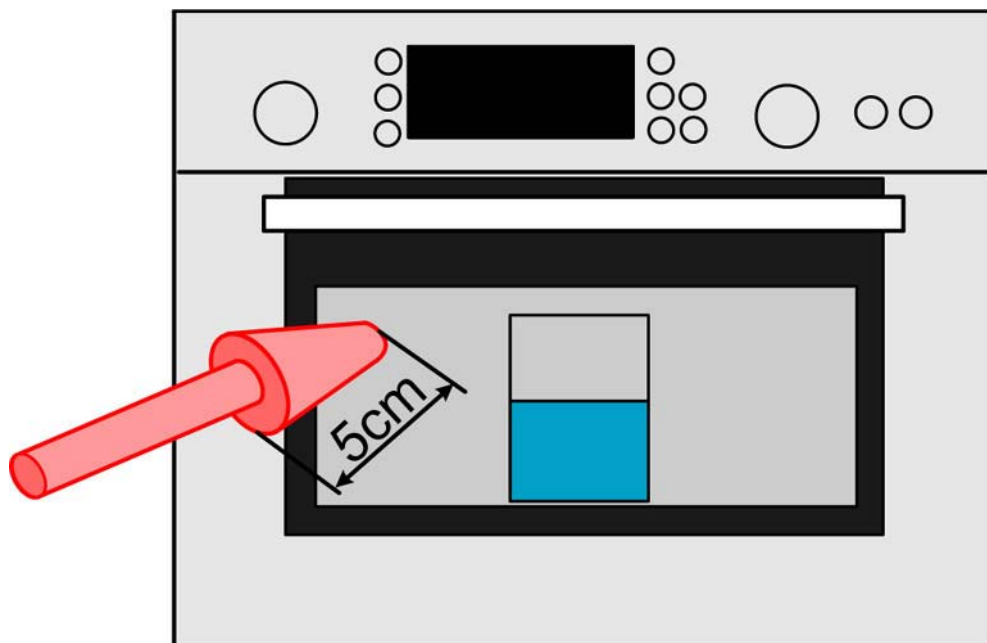
1.4.1 Normal operation under load

Setting: appliance at maximum power setting

Load: 275cm^3 water

Permitted limiting value: $3\text{mW}/\text{cm}^2$ ($5\text{mW}/\text{cm}^2$ VDE)

Distance: 5cm



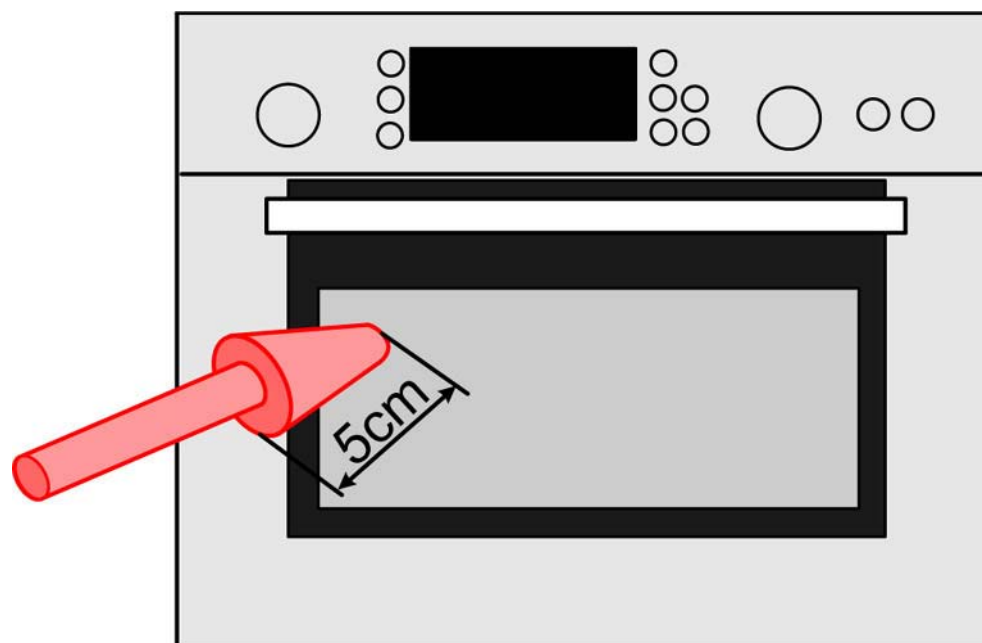
1.4.2 Abnormal operation (no-load operation)

Microwave power: max 1000W

Load: none (no-load operation)

Max permitted value: **$5\text{mW}/\text{cm}^2$ ($10\text{mW}/\text{cm}^2$ VDE)**

Measuring distance: 5cm



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2 INSTALLATION

3 OPERATION

5 FUNCTIONS

5.1 Demo mode circuit

5.1.1 Activating demo mode

1. Press the Memory button for approx. 4 seconds.
On the display: →Select language
←→Deutsch
2. Press the Clock button for approx. 4 seconds.
A “D” appears at the bottom right of the display.

- ### 5.1.2 Deactivating demo mode

- Press the Stop button for 4 seconds.
- The **"D"** disappears on the display: the appliance is again fully functional.

Note: Demo mode remains active even during a prolonged interruption to the power supply.

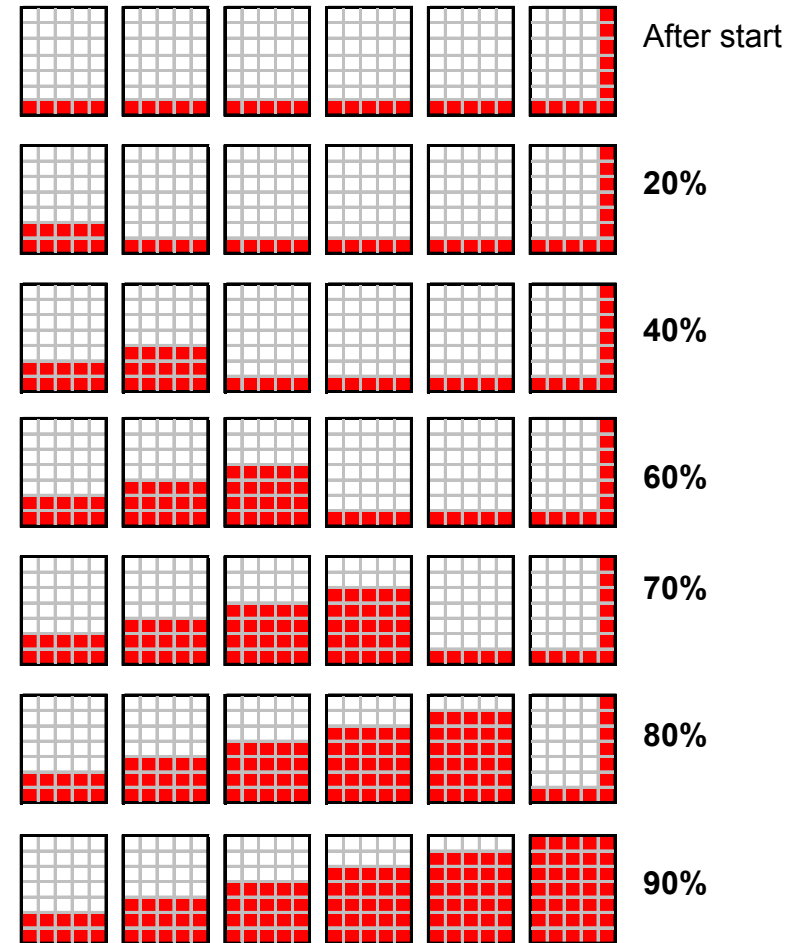
5.2 Temperature monitor

The temperature monitor indicates when the appliance has reached the set temperature.

However the display refers to 90% of the set temperature.

The following shows two examples of different temperature settings.

Line		Set temperature	
		120°C	250°C
7	90%	110°C	227°C
6	80%	100°C	204°C
5	70%	90°C	181°C
4	60%	80°C	158°C
3	40%	60°C	112°C
2	20%	40°C	66°C
1	Room temperature	20°C	20°C



5.3 Oven auto shut-off

The set temperature determines when the auto shut-off activates.

30–100°C	24 hours
100–195°C	6 hours
200–245°C	3 hours
250–300°C	2 hours
Grill setting	2 hours

Note: The auto shut-off delay is restarted each time a button or knob on the appliance is pressed.

5.4 Cooling fan over-travel time

The cooling fan over-travel time results from a combination of: the temperature of the control circuit board, the temperature in the oven, and the minimum runtime depending on the microwave runtime. The longest over-travel time therefore arises by combining microwave with conventional heating.

A resulting over-travel time of up to 55 minutes is normal!

To slightly reduce the noise nuisance, the circuit technology was changed in March 2007. Since then the magnetron fan and the cooling fan get switched off separately, i.e. a fan is switched off earlier but the total over-travel time resulting from the 3 mentioned parameters has not changed.

5.5 Childproof lock

5.5.1 Activating the childproof lock

► Press Stop for 4 seconds.

“Childproof lock” appears on the clock display.

5.5.2 Deactivating the childproof lock

► Press Stop for 4 seconds.

The lock is deactivated.

6 REPAIR

6.1 Checking the magnetron

1. Remove the high-voltage conductors from both magnetrons.
2. Measure the resistance via the terminals.
A good magnetron has a filament resistance of less than 1Ω .
3. Measure the resistance between each terminal and the magnetron housing.
A good magnetron has an infinite resistance between each terminal and the housing.

Measuring point	Normal	Fault
between the terminals	$< 1\Omega$	∞
between terminal and housing	∞	low Ω value

Note:

Not all magnetron faults can be identified on the basis of measured resistance values.

An internal flashover (short circuit) between the anode and cathode is difficult to ascertain.

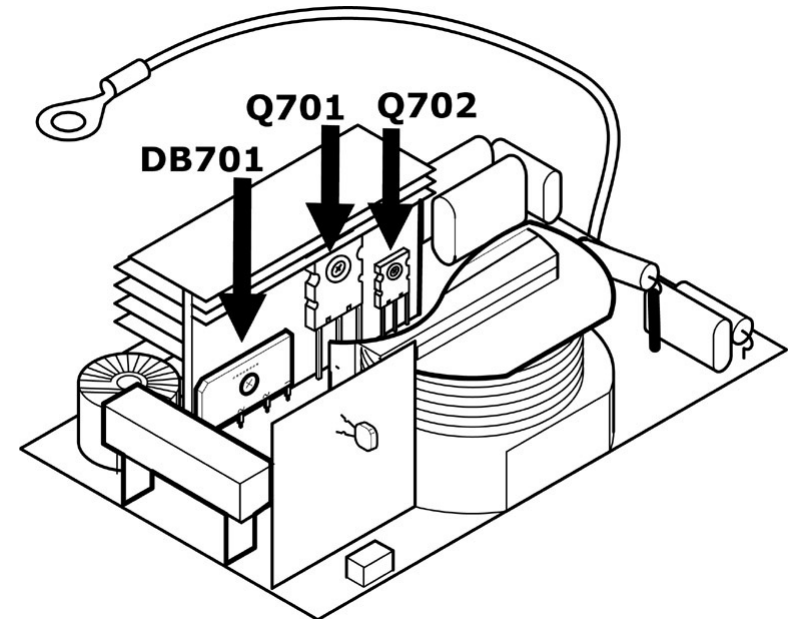
When inspecting the magnetron, check for scorch marks around the antenna and for cracked magnets and check the connections.

6.2 Testing the inverter circuit

Testing the inverter for a short-circuit

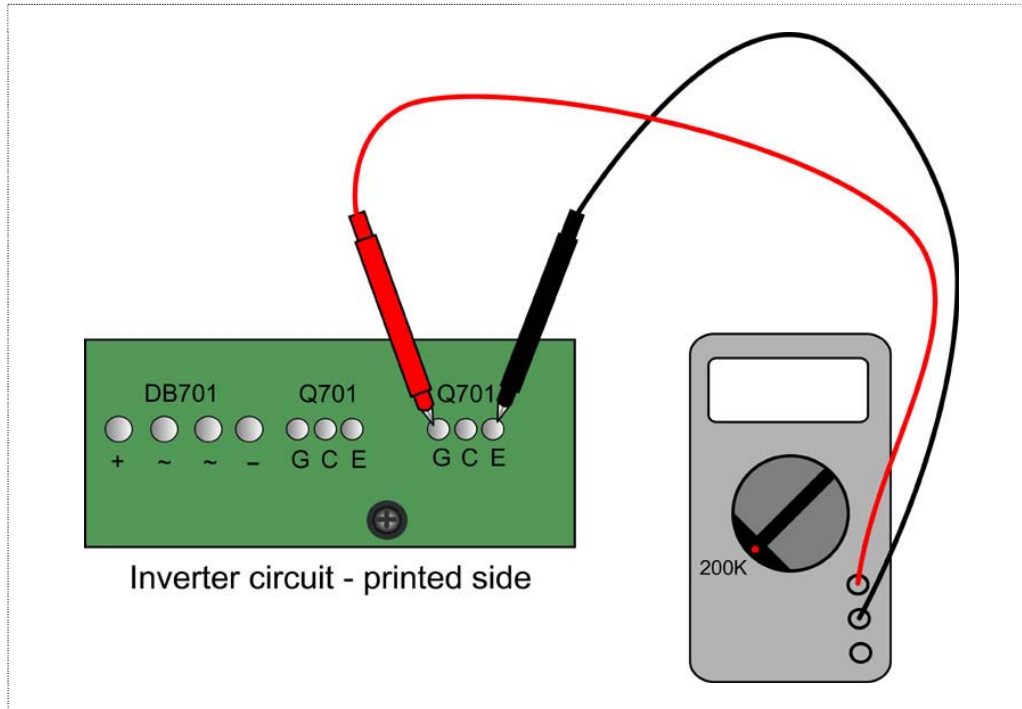
If the 10A fuse (ex factory 8A) in the microwave oven trips, the inverter circuit has probably short-circuited.

1. Remove all conductors from the inverter.
2. Remove the inverter.
3. Test the 3 components in the drawing by measuring the circuit resistance. Defective components usually have a very low resistance (almost 0Ω).



6.2.1 If the inverter fails due to a short-circuit, check the following points

- ▶ Is the cooling fan working properly?
- ▶ Has the microwave oven been installed according to the installation instructions?
There must be an air duct behind the furniture in accordance with the fitting instructions!
- ▶ Are the ventilation slots and air inlets free?



Q701 / Q702 (with 9V meter set to resistance)

	Normal		Fault	
	Forward	Backward	Forward	Backward
E-C	> 1k Ω	> 1k Ω	almost 0 Ω	fast 0 Ω
E-G	> 1k Ω	> 1k Ω	almost 0 Ω	fast 0 Ω
G-C	> 1k Ω	> 1k Ω	almost 0 Ω	fast 0 Ω

DB701 (with 9V meter set to diode)

	Forward	Backward
+ -	Value	∞
~ ~	∞	∞

6.3 Safety switches

6.3.1 Testing the safety switches

The safety switches are intended to prevent the generation of microwaves when the door is open.

Main switch – this interrupts the 230Va.c. supply to the inverter circuit.

Short-circuit switch – If the main switch fails in the closed state (short-circuit) and the user opens the door, the monitoring switch generates a short-circuit via the 230V power supply unit. The short circuit trips the 10A fuse (ex factory 8A), fusing the short-circuited switching contacts.

Signal switch – This relays the door position (open/closed) to the control module.

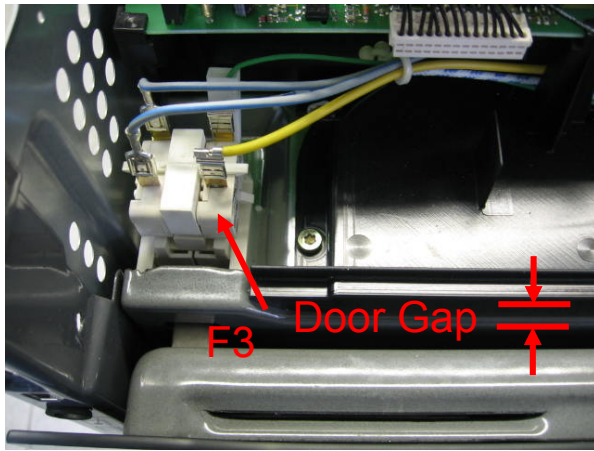
Testing the switches

1. Remove all wires from the 3 switches.
2. Test the travel of each switch when the door is open and closed.

	Door open	Door closed
Main switch	$\infty \Omega$	0 Ω
Signal switch	$\infty \Omega$	0 Ω
Short circuit switch	$\infty \Omega$	$\infty \Omega$

6.3.2 Adjusting the safety switches

The left, outermost micro switch (F3) and the right micro switch (F5) must be adjusted as follows:



Use a gauge to set a top door gap of 6mm (between the oven flange and the door base).

- Both switches must then be just in the closed state (electrical continuity).

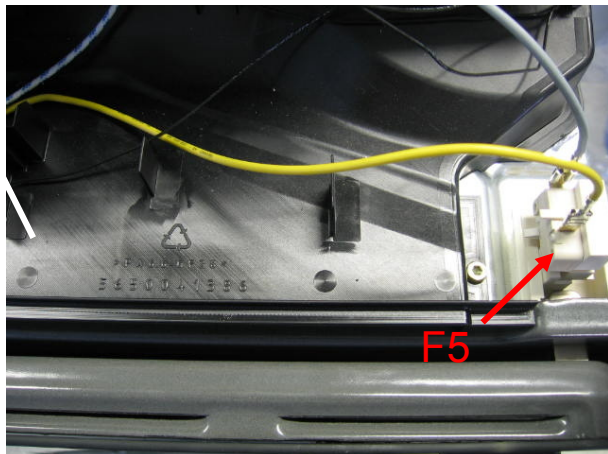
Afterwards use the gauge to set a door gap of 7mm.

- Both switches must then be open (no discontinuity).

The short-circuit safety switch F4 is automatically set correctly by an offset valve.



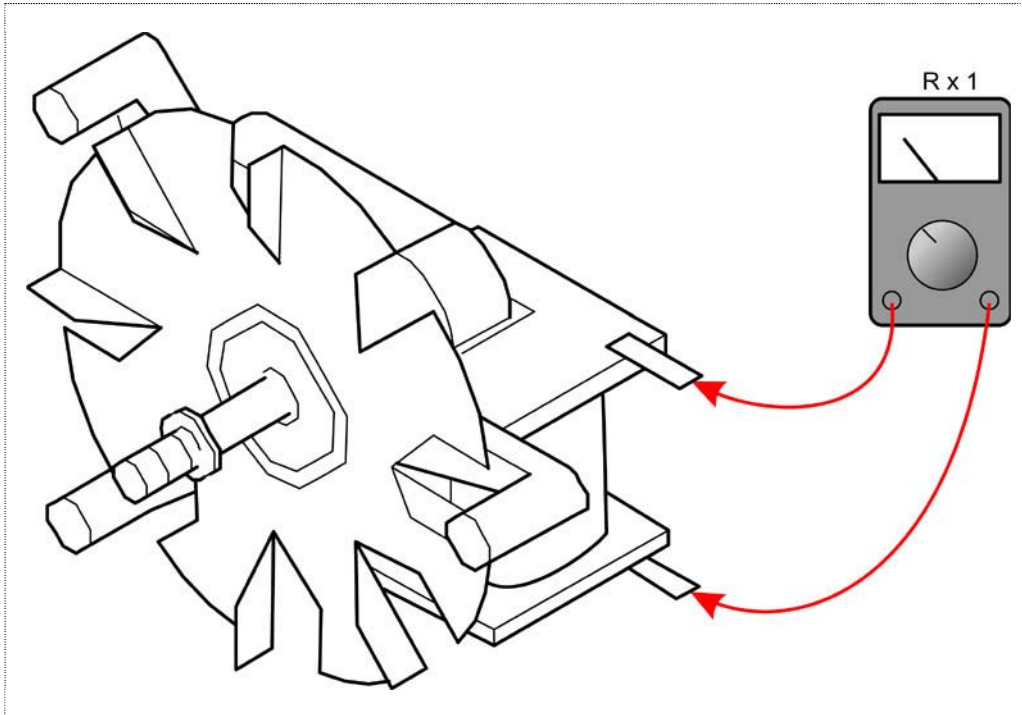
These components must be readjusted after every replacement of a door or door base!



6.4 Testing the hot-air fan motor

1. Remove the connecting cables from the motor.
2. Measure the resistance of the motor winding in the cold state.

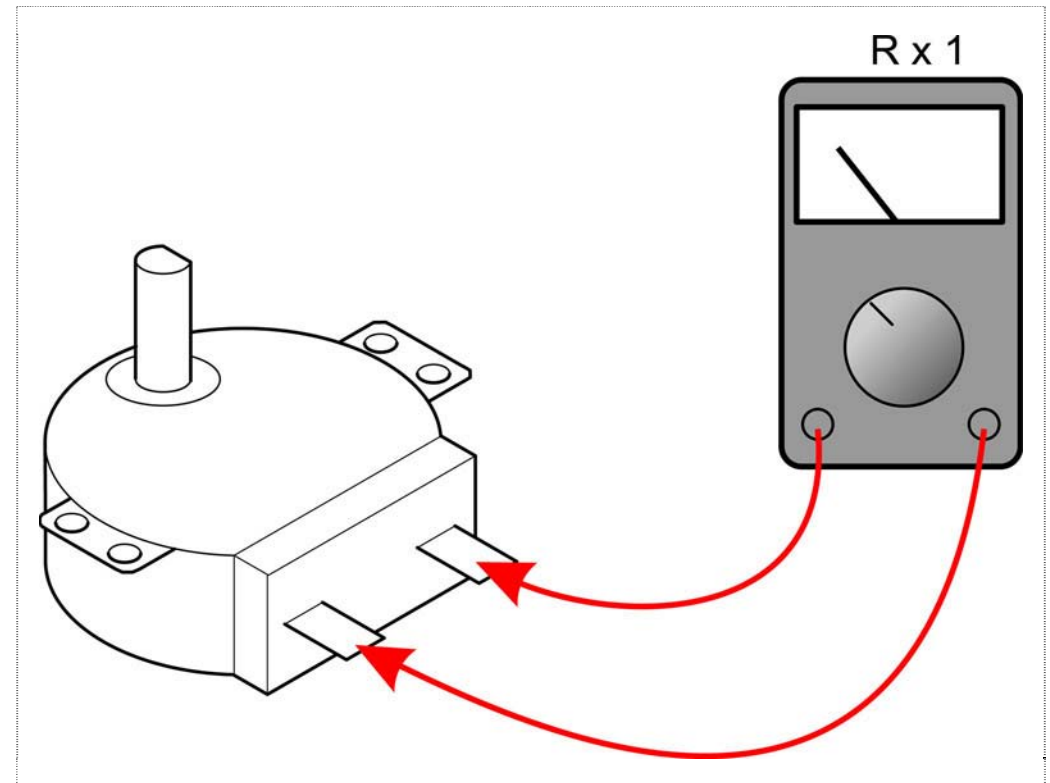
Power (W)	Resistance (Ω)
30	100



6.5 Testing the antenna motor

1. Remove the connecting cables from the motor.
2. Measure the resistance of the motor winding in the cold state.

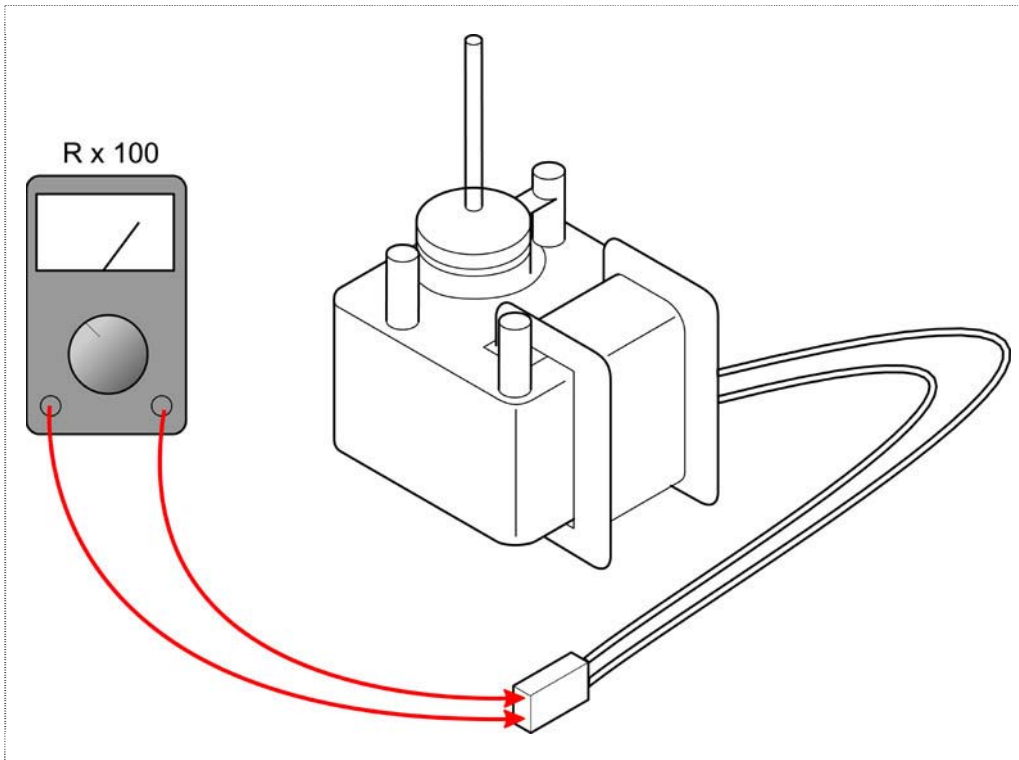
Power (W)	Resistance (Ω)
3	15300



If the antenna does not rotate despite correct resistance values, remove the motor and check that the driving key is still in place.

6.6 Testing the magnetron fan, radial flow fan and ventilator fan

1. Remove the connecting cables from the motor.
2. Measure the resistance of the motor winding in the cold state.



6.6.1 Magnetron fan

Power (W)	Resistance (Ω)
11	212

6.6.2 Radial flow fan

Power (W)	Resistance (Ω)	
12	236	not SR (Ebm)
15	260	not SR (Imper)
44	113 / 62	SR

6.6.3 Ventilator fan

Power (W)	Resistance (Ω)
14	385 / 300

6.7 Testing the mains connection

When the mains plug or the power supply cords are connected, it must be possible to measure e.g. the following voltages at the connections.

400V mains. 3-phase (widespread in Germany and Europe)

Terminals	Measured value		
X19 / X20	203V~ or. 240V~		
X19 / X18	approx. 0V	or	230V~ or.240V~
X20 / X18	230V~ or. 240V~	or	approx. 0V

230V mains. 3-phase (still occurs in places in Europe. e.g. France and Belgium)

Terminals	Measured value
X19 / X 20	230V~
X19 / X18	133V~
X20 / X18	133V~

230V mains. 2-phase. symmetrical voltage sharing (still occurs in places and rarely in Europe. e.g. France and Belgium)

Terminals	Measured value
X19 / X 20	230V~
X19 / X18	115V~
X20 / X18	115V~

In this power supply grid the appliance functions to a limited extent only: the clock strays by minutes per day because the time standard cannot be extracted from the mains frequency. The time standard is then the internal processor cycle.

Note:

The F901 10A fuse (ex factory 8A) is not a component of the power supply unit. This fuse has been installed in the microwave power supply circuit.

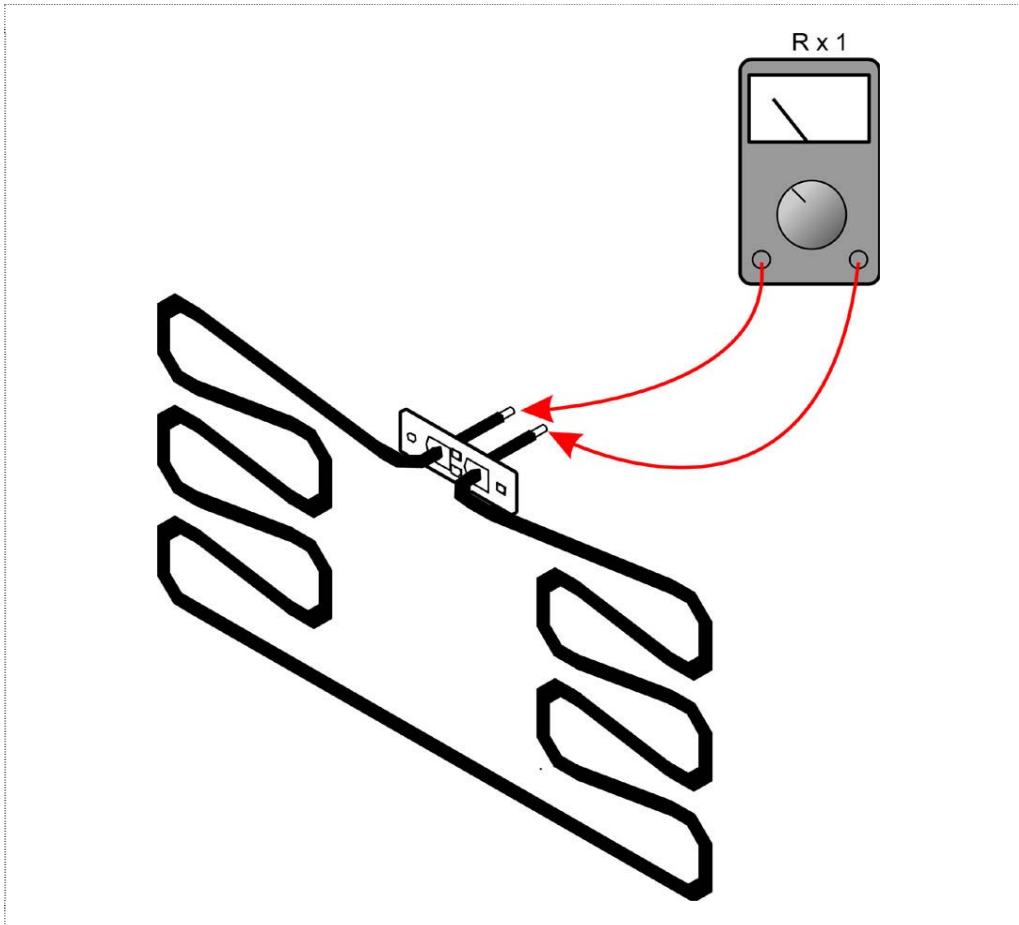
If the fuse trips, it is not usually necessary to replace the electronics module (relay board). The microwave components must be subjected to troubleshooting.

Exception: a short circuit has damaged the tracks (visual inspection).

6.8 Testing the ring heating element

1. Remove the connecting cables from the heating element.
2. Measure the resistance of the heating element in the cold state.

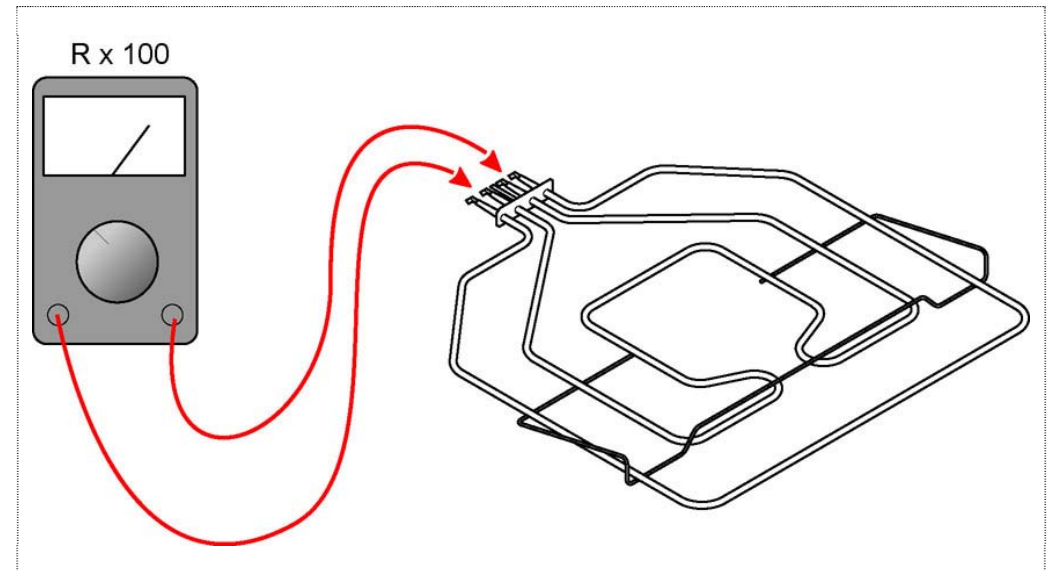
Power (W)	Resistance (Ω)
600	88.2



6.9 Testing the grill heating element

1. Remove the connecting cables from the heating element.
2. Measure the resistance of the heating element in the cold state.

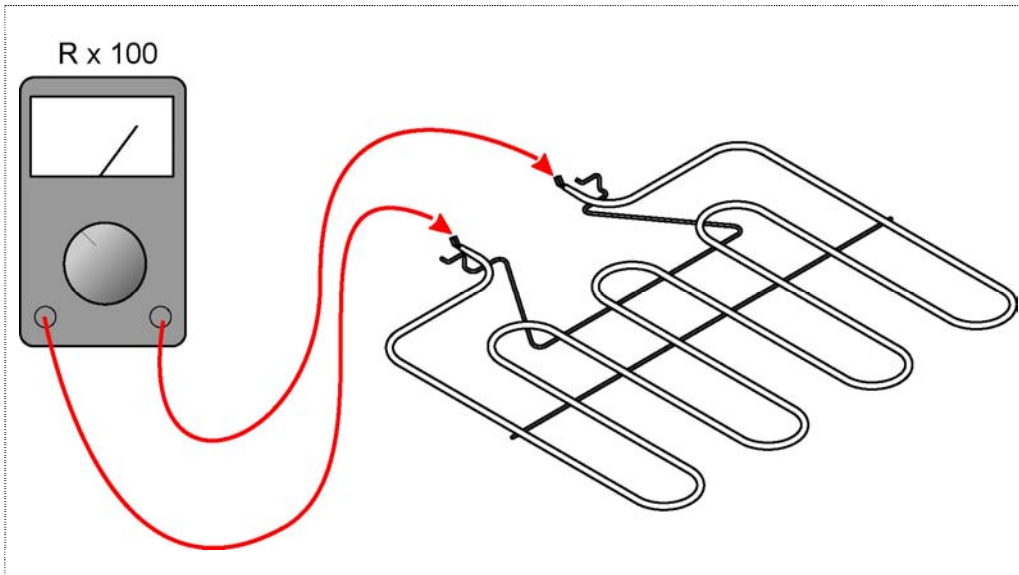
	Power (W)	Resistance (Ω)
Inside	1400	37.8
Outside	1100	48.1



6.10 Testing bottom heating

1. Remove the connecting cables from the heating element.
2. Measure the resistance of the heating element in the cold state.

Power (W)	Resistance (Ω)
1500	35.3



6.11 Possible customer complaint concerning the temperature monitor

If the food is very wet or water is used as the cooking medium (baking tray filled with water for boiling down) or if there is a large load (baking on several levels), the last segment of the temperature monitor may not switch on.

The temperature control in the oven is nevertheless functioning without restrictions. The baking or cooking result is not impaired.

Any complaint is unwarranted.

7 FAULT DIAGNOSTICS

7.1 Test programme

7.1.1 Activating the test programme

The test programme can be run only after a mains reset. (Max time after reset 5 minutes.)

The following steps activate the test programme.

1. Press the Clock button
2. Press 90 W
3. Press the Clock button
4. Press 900 W
5. Press the Start button

In acknowledgement all segments light up on the clear text display and a buzzer sounds.

Acknowledge programme start by door open/closed or only door closed.

On the LED display “Test” appears in line 1 and the software version of the electronics module in line 2.

If the door is opened again, “Close door” appears in line 2 on the display.

7.1.2 Deactivating the test programme

- ▶ Interrupt the mains voltage.
- ▶ Press the Stop button for 6 seconds.
- ▶ Do not press any buttons for 10 minutes.

When the test programme has been activated, the following tests can be run.

Individual consumer test as under [chapter 7.2](#)

Control test as under [chapter 7.3](#)

Inverter test as under [chapter 7.4](#)

Debug mode as under [chapter 7.5](#)

7.2 Individual consumer test

Start test programme as described under [Section 7.1.1](#).

Actuation	Displayed symbols	Clock display	Clear text display	Consumers
Rotate temperature selector to right (one notch)	None		Test output	
Rotate programme selector to right (one notch each time)		A1:A6		Grill, inner + oven light
		A2:A6		Grill, outer + oven light
		A3:A6		Ring heating element + oven light
		A4:A6		Bottom heating + oven light
		A6		All-pole disconnection + oven light
		A7		Magnetron fan + cooling fan
		A8		Ventilator fan, slow
		A9		Ventilator fan, quick
		A11		Antenna motor + inverter + oven light
		A12		Circulating-air motor

7.3 Control test

Start test programme as described under [Section 7.1.1](#).

Actuation	Displayed symbols	Clock display	Clear text display
Rotate programme selector to right (two notches)	None		Test input
Door contact open	None	00:	
Door contact closed	None	:00	
Microwave power button 90 W	LED_MW1	11:11	
Microwave power button 180 W	LED_MW2	22:22	
Microwave power button 360 W	LED_MW3	33:33	
Microwave power button 600 W	LED_MW4	44:44	
Microwave power button 900 W	LED_MW5	55:55	
 Button for changing the line on the clear text display	None	. kg	
Rapid heating up button	LED_Rapid heating		
Memory button	LED_Memory	1 2 3 4 5 6	
Clock button	LED_Clock	→	
Timer button	LED_Timer	h min	
Start button	None	0S:00	
Stop button	None	0S:01 ⁺ and fault signal (without time limit)	

7.4 Inverter test

Start test programme as described under [Section 7.1.1.](#)

1. Rotate temperature selector to right (three notches).

Display: **Test Inverter**

Water Load

2. Press the Start button

Test is run at 900W and for 2 minutes.

Run the test only when the door is closed!

At the end of the test, a corresponding error message appears on the clock display.

[The possible error messages are listed under Section 7.6.](#)

7.5 Debug mode

Start test programme as described under [Section 7.1.1](#).

Actuation	Displayed symbols	Clock display	Clear text display	Designation
Rotate temperature selector to right (fourth notch)	None	None	Test Debug mode	
Start button			Oven temperature	Start debug mode
Any operation				– Time lapse 10x faster – Temperature value in line 2 of the clear text display
Fault occurred		Fault		– Fault appears on the clock display

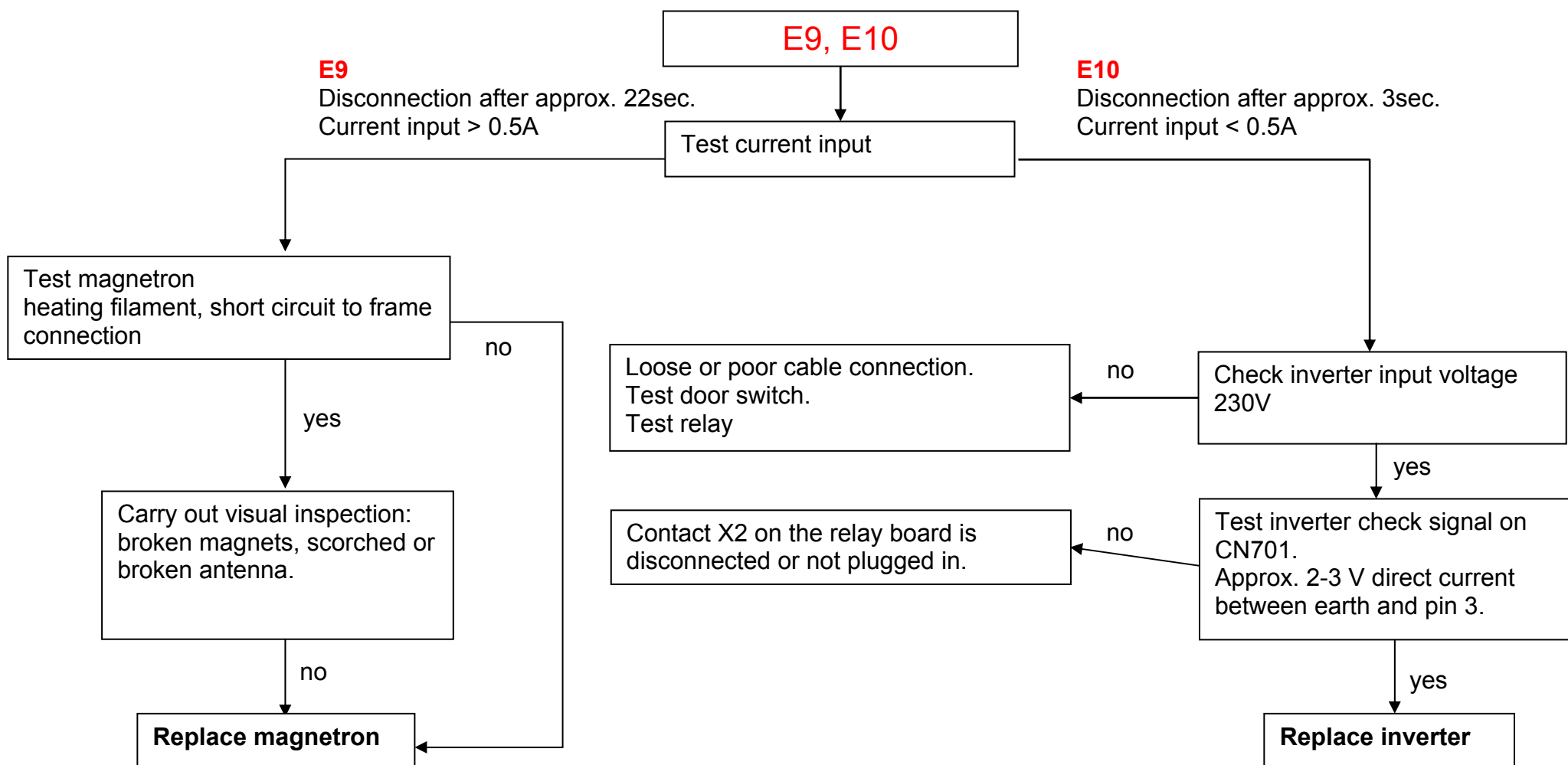
[The possible error messages are listed under Section 7.6.](#)

7.6 Error messages

Description of fault	Fault code	Possible causes of fault	Possible repair measure
Oven temperature sensor high resistance	E1	Oven temperature sensor defective	Replace oven temperature sensor
		Relay board defective	Replace relay board
	E1 unstable	Microwave leakage (leakage in the oven, etc.)	Replace appliance
Oven temperature sensor low resistance	E2	Oven temperature sensor defective	Replace oven temperature sensor
		Relay board defective	Replace relay board
	E2 unstable	Microwave leakage (leakage in the oven, etc.)	Replace appliance
Microwave mode, start sequence: magnetron oscillation does not build up	E9	see under Section 7.7	
Microwave mode, start sequence: Inverter does not respond to activation	E10		
Microwave mode, run mode: microwave defective during operation	E11	Inverter defective	Replace inverter
		Magnetron defective	Replace magnetron
ROM fault	E16	Relay board defective	Replace relay board
EEPROM fault	E17	Relay board defective	Replace relay board

7.7 In microwave mode appliance switches off after 3sec (E10) or 23sec (E9)

1. See under [Section 7.4](#) for inverter test programme
2. Troubleshooting tree



7.7.1 Determining the microwave output power

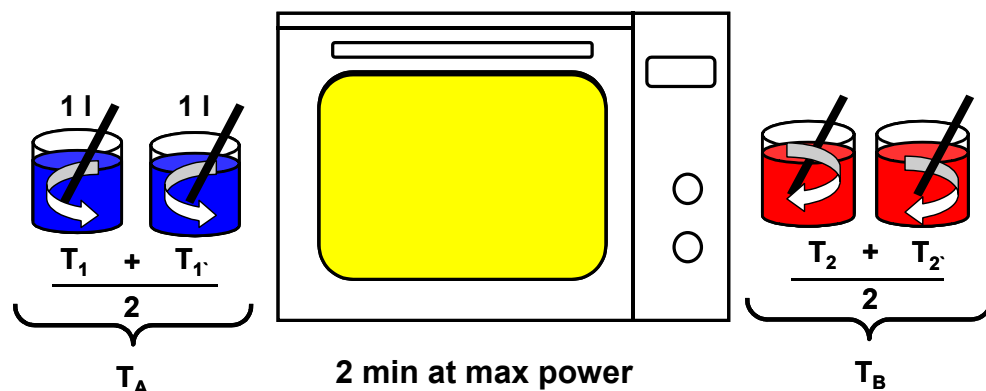
The output power P_{Ab} is determined from the heat generated in a specific amount of water (cold tap water).

Required accessories

- ▶ 2x 1-litre microwave-proof receptacles
- 1x thermometer with immersion sensor

Execution

1. Determine initial temperature (mean value)
2. 2 min. cooking time at max power
3. Determine final temperature (mean value)
4. Calculate temperature difference



$$(T_B - T_A) \times 70 + 100 = P_{Ab} \text{ [Watt]}$$

5. Calculate output power



Owing to the many tolerances deviations may be as high as 200W.



For example, this method may return only 800W for a 1000W appliance.

7.8 Monitoring the output power

As a measure to protect the inverter from overheating the output power is reduced as a function of time and the selected power setting.

Time*)		230V version		Explanation	
		PWM value	Approx. MW power output	Approx. MW power input	
in [s]	in [min/s]	in %	in W	in W	
0 ... 60	0:00 ... 1:00	86%	900	1800	900W button
60 ... 90	1:00 ... 1:30	73%	783	1566	1st UDT downgrade
90 ... 121	1:30 ... 2:01	68%	729	1458	2nd UDT downgrade
121 ... 181	2:01 ... 3:01	50%	567	1134	3rd UDT downgrade
181 ... 605	3:01 ... 10:05	50%	567	1134	4th UDT downgrade
605 ... 1816	10:05 ... 30:16	50%	567	1134	5th UDT downgrade
1816 ...	30:16 ...	48.5%	549	1098	6th UDT downgrade
		54%	603	1206	600W button
		28%	360	720	360W button
		28%	180	360	180W button
		28%	90	180	90W button
		38%	450	900	"600W" combined power

8 TECHNICAL SPECIFICATIONS