



Thomas Riedl
Schlesier Straße 11 • D-35606 Solms

☎ +49 6442 9545 342

mail@ecomicrowaves.com

www.ecomicrowaves.com

Instruction manual microwave device CSR-MU



Before using your microwave device, read the instructions carefully, only then you will be able to use your device safely and correctly.

The device may only be operated by users registered with us by name and in compliance with these operating instructions. Incorrect use / operation can cause damage and pose a risk to life.

Table of contents

Important safety instructions	3
Preparation for microwave use	4
Treatment of beams	7
Hazard and exposure areas	7
Setting up and connecting	8
The control panel	9
Hazardous area and metrological tour	11
Care and cleaning	12
Things to know about microwaves	12
Practice Tip	16
Fault table	17
Customer service	18
Technical data	18
Warranty	18
Environmentally sound disposal	18
Warning sign	19

Important Safety instructions

Please read these instructions carefully! Only then will you be able to operate your device safely and correctly. Keep the operating instructions for later use.

The device:

- check after unpacking. Do not connect in the event of transport damage
- is intended only for private household and domestic environment
- use only for pest control of wood destroying insects
- Use only in closed rooms.
- is ready to plug in and may only be connected to a protective contact socket installed in accordance with regulations. The fuse protection must be at least 10 amperes. The mains voltage must correspond to the voltage specified on the type plate.
- **During operation, be sure to supervise personally**

Do not use multiple plugs and power strips. There is a risk of fire if overloaded.

The device plug must always be accessible.

Keep children up to 14 years away from the device and the connecting cable

Fire hazard!

The device becomes very hot. The wood to be treated also becomes very hot. Observe the information on the minimum distance above and next to the unit in the chapter *Setting up and connecting the unit*.

Make sure that there is no residue, resin or similar on the polystyrene front panel or that it has formed. Scrape off such contamination with a sharp knife. Do not use solvents or cleaning agents containing solvents.

Using the device for purposes other than those for which it is intended is dangerous and may cause damage.

Risk of serious damage to health!

Never operate the unit without aligning it with the wood to be treated. In the case of very small slats, boards or beams, fill the marked treatment area with additional wood, if possible of the same material thickness. Otherwise, impermissibly high and dangerous microwave potentials may occur in the room. See also chapter Exposure areas.

Risk of electric shock!

Repairs may only be carried out by competent persons. Only a technician trained by us has the necessary expertise to perform to be able to carry out repairs. If you detect a defect in the device, pull out the power plug and put the device out of operation. Keep children away.

Risk of burns!

The device can become very hot, depending on the duration of treatment. The treated wood can also become very hot. Allow to cool after use. Keep children away.

Danger of scalding!

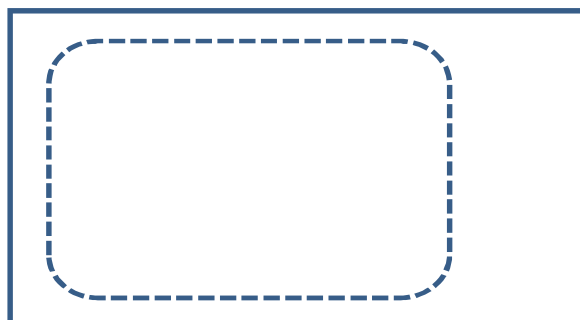
When the wood is heated, hot steam may be generated due to boiling distortion and steam bubbles may spray, even if the unit has already been switched off again. This also applies to any dissolved resin in the wood. Keep your distance. Keep children away.

Risk of injury!

Always place the unit on a suitable and solid surface so that it cannot fall over. If necessary, lash down with tension belts, but do not cover the marked treatment area.

Preparation for microwave use

On the unit is the treatment area, which is covered with a hard foam plate from which the microwaves emerge. The treatment area (dashed line) as seen from the front of the unit is approx. 20 x 32 cm:

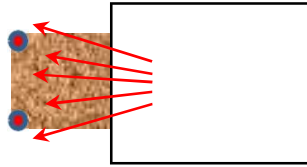


It is very dangerous to expose yourself or others to this range of microwaves!

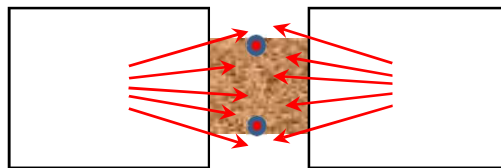
For safety, there are additional notes on the sides of the housing:



To ensure success, you must measure the temperature at the most unfavorable points. These are the circles marked in red for one-sided treatment:



For two-sided treatment, these are the areas:



Note that it does you no good if you "overheat" one area and do not heat the other area sufficiently. Furthermore, the buoyancy has a considerable influence, which means that you should rather position the device slightly below the center of the beam. Only when you reach the lethal temperature in the entire cross-section can you be sure that you have successfully combated the infestation.

During operation, the measured temperatures are not exact, as they are distorted by interference from the microwaves. Therefore, in order to measure accurately, you must turn off the device. However, the measurement error during operation is relatively the same, so you can also see during operation whether the device is optimally positioned, i.e. the critical temperatures are uniform.

Therefore, drill 4 holes, straight or angled, in the most unfavorable areas and slide in temperature sensors. The depth of the holes depends on the accessibility from the outside. If there is free access, 1 - 2 cm is sufficient. Make sure that the measuring tip is also in safe contact with the wood. Fix the sensors in place,

z. e.g. with suitable wooden dowels (not included in delivery). If you want to use unshielded sensors, holes with 2 - 3 mm diameter are sufficient, shielded cable sensors require 6 - 8 mm diameter. Note, however, that the measuring devices offered for this purpose only measure reliably when no microwaves are in operation and when measuring with microwave operation, the interference error of unshielded sensors is still considerably greater than shielded versions.

If you are treating thick beams (> 18 cm thick), it is possible that temperatures > 100 °C occur at the treatment front, i.e. that the wood may expand at

temperatures $> 120\text{ }^{\circ}\text{C}$ discolored and changed in its structure. It then makes sense to also place temperature sensors on the front, which you can attach with a U-shaped (office) clamp. It may then be necessary for you to interrupt microwave operation for a few minutes until the front temperature has dropped below $100\text{ }^{\circ}\text{C}$ again, and then possibly reheat in a pulsating manner until you reach the lethal temperature at the most unfavorable points

In the case of even thicker beams, we come up against the limits of use of the device, so we recommend for dimensions over 20 cm of oak or 23 - 25 cm of coniferous wood to arrange 2 devices opposite each other, as can be seen from the sketch on the previous pages, because due to the limited power of the device(s), the beam can no longer be warmed through in its entire cross-section with economic effort. At 30 cm or even more, even more devices may be required, but these can no longer be assigned to household-like use and must therefore be left to professional pest controllers.

According to DIN 68800, the safe lethal temperature for all insects is 55°C for one hour. However, these treatment parameters are based on earlier hot air treatments, where the temperature could only be supplied slowly from outside via heat conduction. In fact, these functional parameters depend on temperature and time. For example, one can also be successful with 60°C and 30 minutes holding time, or 65°C and 10 minutes, or 70°C and two minutes. However, we recommend following the recognized rule of technology according to DIN68800 (55°C 1 hour). To ensure this with microwave technology, it is sufficient to heat the thermally insulated beam to about $65 - 68\text{ }^{\circ}\text{C}$. Then the beam cools down to approx. 55°C within one hour with the insulation left in place, and there have been no complaints with this procedure so far.

But no rule without an exception: In our experience, the sapwood beetle (*Lyctus*) does not follow DIN. Since this beetle originally comes from the tropics, its lethal temperature is 66°C . We therefore recommend to control this beetle with 70°C .

If the two sensors for the lethal temperature differ significantly ($> 5^{\circ}\text{C}$), the device can be better positioned and thus the treatment time reduced. For documentation purposes, we recommend making a measurement log.

Treatment of beams

As an insulating material is suitable primarily rigid foam (Styrofoam), which is practically no resistance to microwave. In the case of misshapen beams, rock wool has also proven its worth because it is more flexible. Even small slits in the insulation of 1 - 2 mm cause considerable heat loss and should be avoided.

Silicone or PU foam is suitable for closing such slots. However, please avoid direct contact with the beam. Insulate the beam to be treated with approx. 3 cm thick rigid foam boards. You can also easily fix the boards with nails. However, avoid nails in the direct treatment area. You do not need to insulate in the treatment area, as the unit front panel provides insulation at the same time. For round beams, we recommend rock wool mats. If the beam is located between a wall, the wall can also serve as insulation. Align the unit with the front directly on the beam to be treated. If necessary, position the unit securely (e.g. on boards, planks or a tripod) and fix it with tension belts if necessary. The front panel must remain free.

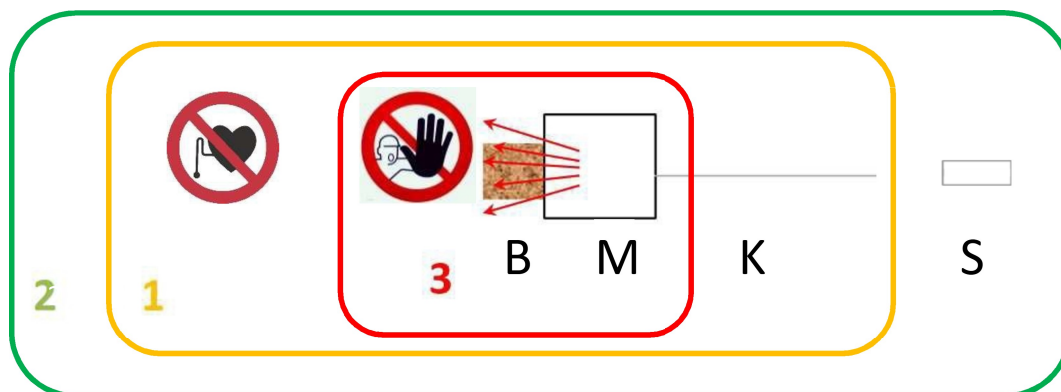
But before we start treatment, we need to address risks, namely the hazard and exposure areas explained below.

Hazard and Exposure areas

The Employer's Liability Insurance Association has issued the regulation and guideline 'Electromagnetic Fields' (BGR B11 and BGI B11). Even if you, as a private user, have nothing to do with the Employer's Liability Insurance Association, we adopt this regulation because it serves your safety. We have compiled the relevant values for you from these documents:

According to this, **the permissible limit value** as permanent exposure in the area of increased exposure and exposure area 1: 5 mW/m^2 is 50 W/m^2 .

in exposure area 2: $1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$ Definition of the areas:



Exposure area 2 is practically everywhere, except the yellow and red area, with max. $1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$.

Exposure area 1, permanent with max. $5 \text{ mW/cm}^2 = 50 \text{ W/m}^2$ No access for people with pacemakers



Exposure area 3 Hazardous area Access prohibited



Explanation of symbols

- B => Bar
- M => Microwave oven
- K => Control cable 5m
- S => Control unit

To give you a feeling for the microwave residual potential some comparative data: If you make a phone call with your cell phone, the 5 mW/cm^2 directly at the ear is usually exceeded.

A long-term study (> 10 years) in radiofrequency laboratories in the USA has found that continuous exposures of 100 mW/cm^2 lead to no detectable damage or changes in humans and animals.

In medical microwave applications, e.g. for muscle relaxation, people are treated with $500 - 1,000 \text{ mW/cm}^2$.

Set up and Connect

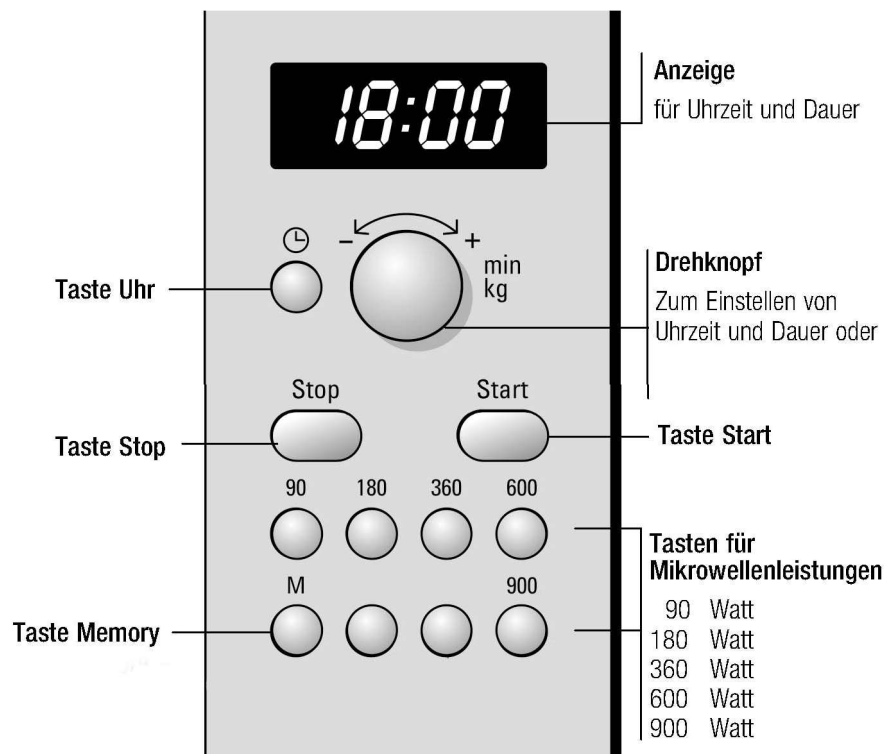
The device is intended for private household and household-like use only.

Place the unit on a firm, level surface and **align it directly in front of the wood to be treated. Never operate the unit empty without wood or wall in front of it!!!** The ventilation slots on the back, top and bottom must always remain free.

If temperature differences are involved, then buoyancy must also be taken into account. In fact, this is noticeable. When heating from above, you need considerably longer than when heating from below. When heating from the side, we still have differences of 10 - 20 %. Consequence: beams are treated more efficiently from below. When heating from the side, it is better to position the device axis about 10-20 % below the center of the beam.

The control panel

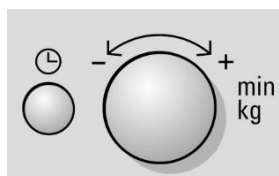
You can use the rotary knob to change all default and setting values. The rotary knob is retractable. Press the rotary knob to engage and disengage.



Set time

When the device has been connected or after a power failure, three zeros light up in the display field.

- 1 Press the *Clock* key. 12:00 appears in the display
- 2 Set the time with the *rotary knob*
- 3 Press the *Clock* key again and the selected time is set.



Hide the time

Press the *Clock* key and then press the *Stop* key. The display is dark. Press the *Clock* key again to show the display again

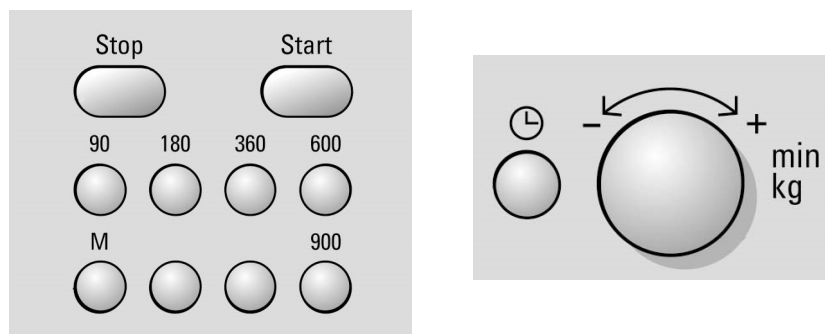
Microwaves performances

90W	slow thawing of frozen wood 180W Defrosting frozen wood
360W	Heating of smaller construction timber, e.g. roof battens 600W Heating of small beams
900W	Heating from medium to large beams

Set microwave

Example microwave power 600 W

- Press the desired microwave power, the display shows the set power and the duration of 1:00 minute.
- Set the desired duration with the *rotary knob*
- Press the *Start* key and the set time runs down visibly
- As soon as the duration has expired, a signal sounds. After pressing the key *Stop*, the time appears again
- The treatment duration can also be changed during operation. Use the *rotary knob* to set the desired duration. This is adopted immediately.



Pause / Cancel operation

Operation can be interrupted by pressing the *Stop* key once. To continue, press the *Start* key.

Pressing the *Stop* key twice cancels the operation and the time appears.

The M (Memory) key

Press the *M* key to save a setting temporarily. If the mains voltage is lost, this setting is lost.

Example

600 W 18 minutes

- Press the *M* key (M appears in the display)
- Select the desired power, key *600 W*
- Use the *rotary knob* to set the desired duration, 18 minutes
- Press the *M* key again to save the setting.
- Press the *M* key the stored setting appears in the display
- Press *Start* key and the treatment starts

Hazardous area and metrological tour

In the appendix you will find a warning sign, print it out and stick it on a suitable surface (e.g. cardboard, wood, etc.). Place the warning sign in a clearly visible position to mark the danger area. When you have secured the room, move to exposure area 2 with the control panel and press the start button. Then start the metrological tour.

After commissioning, move out of the safe exposure area 2 towards the microwave device and measure until you reach the limit value of 1 mW/cm^2 . Move the meter up and down with the front facing the microwave device so that you can also detect any hot spots. In this way, delimit exposure area 1 around the entire area behind and to the side of the microwave device.

Then go to the front side at a safe distance and measure the limit value of exposure area 2 there as well. This may also be necessary in the neighboring apartment, if there are areas that exceed the limit value, there is nothing else to do than to close off this area safely or to go out of service again until you have found another solution.

Furthermore, with the extended limits $< 5 \text{ mW/cm}^2 = 50 \text{ W/m}^2$ and

$< 6 \text{ min}$ in exposure area 1 and $< 30 \text{ mW/cm}^2 = 300 \text{ W/m}^2 < 6 \text{ min}$ in the area of increased exposure harmless limit values for your metrological tour, where for a short time our desired exposure area 2 can also become exposure area 1 if you detect areas of increased exposure. Short-term excessive measured values are not to be classified as dangerous!

Care and Cleaning

With careful care and cleaning, your microwave oven will stay beautiful and intact for a long time. How to properly care for and clean your appliance, we explain here.

Possible stains on the front panel made of hard foam are due to manufacturing and do not mean any impairment.

Danger of short circuit!

Never use high-pressure or

Use a steam cleaner for cleaning

Risk of burns!

Never clean the unit immediately after switching it off. Allow the device to cool down.

Risk of electric shock!

Never immerse the device in water or clean it under a water jet.

Use:

- Wash new sponge cloths thoroughly before use
- Clean the device with a damp cloth and mild detergents and dry with a clean cloth
- No sharp and abrasive cleaning agents, however, should such an agent get onto the front panel (hard foam), wipe it off immediately with water
- No glass or metal scrapers
- No hard scouring pads and/or cleaning sponges
- No cleaning agents containing alcohol

Caution Pull out the mains plug before cleaning!

Things to know about Microwaves

Microwaves convert their energy directly in matter, in wood exclusively into heat. This is the great advantage of microwaves. Therefore, the temperature inside the wood is higher than outside. As soon as the energy supply of the microwave is interrupted, heat is also no longer generated. It is like the light switch, switch off => light off.

Theoretically, the final ring depth is infinite. In practice, however, approx. 50% of the power is absorbed at each wavelength (12 cm). For this reason, we recommend single-sided treatments up to a maximum of 18 cm. For a larger cross-section, it is advisable to treat from two sides at the same time.

If you can position the device under a beam, you will use the buoyancy and thus work efficiently.

If vapors form inside the wood and then condense again in colder areas, behind or next to the main panel, thermal stresses and cracking may occur. To avoid this, do **not exceed 100°C**. Note that even embedded resin can become liquid at these temperatures and then concentrate primarily at knots.

If the wood is rotten or already predominantly eaten away on the inside, heating is even faster because the density/mass is considerably lower. If there is then (only) "loose" grit or drill dust inside the beam, the ignition temperature may be exceeded. A **smoldering fire may result**.

Therefore, avoid temperatures above 100 °C.

Furthermore, at temperatures close to and above 100 °C, the hard foam front panel of the device deforms. However, this is not a functional fault, but only a cosmetically unattractive side effect with no impairment of safety.

Simply take breaks of a few minutes. Then the heat is dissipated further back from the areas near the surface and you can then reheat when the critical (near-surface) areas are again below the level you want. This increases the treatment time, but you can also use it to achieve lower temperatures, e.g.

80° C must be maintained. Even if only 60 °C is permissible for sensitive inks, this can be ensured with pulsed operation.

You can check the surface temperatures with an infrared thermometer when the device is switched off. Never measure with these devices when the microwave oven is operating.

Microwaves penetrate glass, porcelain, paper, ceramics, air without significant resistance (attenuation). On metal surfaces, no matter how thick or how the surface is, i.e. blank, polished or painted, also no matter whether copper, brass, aluminum, steel, stainless steel, galvanized, the microwaves are reflected.

Here, too, the following applies: No rule without exception. If a thin and long metal rod is exposed to microwaves, it can become a rod (dipole) antenna.

Then it no longer reflects the microwaves, but absorbs them and converts

the energy into heat. It therefore becomes hot. This depends on the diameter, the length of the rod and the wavelength. It can affect nails or screws that are in the wood or protrude. In practice, however, this has so far only occurred with headless steel nails, which are usually used to fasten skirting boards. These nails are usually 3 cm long ($\lambda/4$) and smaller than 1 mm in diameter. In this case, pay special attention to possible overheating. All other commercial dimensions of nails and screws are too thick in relation to the length to assume this phenomenon and can therefore not cause problems

Hot spots are non-reproducible, regional concentrations of microwaves and cannot be avoided. They depend on many parameters, which we cannot measure in practice. However, due to natural heat conduction, the temperatures balance themselves out with their surroundings, so that in practice there are often hardly any measurable differences and therefore these 'hot spots' are often not even noticed. Nevertheless, in individual cases, the treatment area can be restricted and or shifted as a result.

Like all electromagnetic waves, microwaves affect other similarly powered devices. These include electronic or magnetic devices

z. e.g. radios, televisions, PCs incl. their remote controls and connecting cables, loudspeakers, radios, cell phones, magnetic memory cards, e.g. check or credit cards. Such items are to be removed from the rooms to be treated. Any claims based on alleged or actual defects in these devices are fundamentally excluded! It is therefore essential to observe the relevant safety instructions for these devices.

People with pacemakers are not allowed to enter the exposure area 1. Since it cannot be ruled out that you may carelessly enter the exposure area for a short time, the device must not be operated by people with pacemakers.

However, before you put the microwave unit into operation, make sure once again that you have made all preparations. This includes, in particular, estimating the expected exposure area 1 if the area behind the beam or parquet to be treated is not open or visible. Make sure you know what is behind it. For example, if it is another apartment, inform the neighbors and close off that room to make sure that a baby, for example, cannot be in there during your microwave treatment. If necessary, you must refrain from treatment or take shielding measures if you cannot clarify this before commissioning.

Mark the corresponding areas, e.g. with warning tape and warning signs, or place the control unit clearly visible in front of the access point, as microwave operation is also indicated on it. Through your personal permanent control, you also ensure that no unauthorized persons (e.g. with pacemakers) have access to exposure area 1. You then document your measurements and measures in the measurement log

Wood moisture

The influence of wood moisture is relatively small. Although we need a certain minimum moisture content (> approx. 1 - 2 %) for microwaves to be absorbed at all, this moisture content is practically always present. However, the thermal conductivity of moist wood (> 20 - 30 %) is better. In the process, more heat then also flows away into colder regions, but this is only relevant during the first heating section and does not mean any additional losses in total.

The moisture loss during microwave treatment is also relatively low, averaging around 2 - 3 % for dry beams (< approx. 10 - 12 % wood moisture content) if optimally treated. However, with quite thick (> 18 cm) and new beams (wood moisture at approx. 30 %), which can only be treated on one side and thus the treatment can sometimes take several hours, the evaporation is also greater. After treatment, we have measured wood moisture contents that are 5-10% lower than before treatment.

Colors and paints

According to previous experience, no changes / discolorations could be detected in the paints encountered. In the case of unknown paints, however, we recommend that you obtain information from the manufacturer about the temperature resistance, and if necessary test the temperature resistance on a sample or on an area that is as marginal as possible.

Practice Tip

- For example, for a beam with a cross-section of 15 x 15 cm, set the maximum power of 900 W and measure the temperatures as already described. Switch on the device for 5 min. and measure the temperatures again. Now form the quotient of temperature increase and switch-on time, e.g. $14^{\circ}\text{C} / 5\text{ min.} = 2.8^{\circ}\text{C}/\text{min.}$
So, if you started at 20°C and reached 34°C after 5 min, to reach 68°C , for example, you still need to treat $(68 - 34)/2.8 = 12\text{ min}$ at the same power to reach 68°C .
- For rafters and beams, you can improve the performance of the microwave, use a rigid foam board for this purpose. Stick this with aluminum foil. Attach the side without aluminum foil to the back of the beam, e.g. with clamps. The microwaves emitted are reflected by the aluminum foil and heat the wood once again.

Fault table

If a malfunction occurs, it is often only due to a minor issue. With the help of the table, you can fix minor faults yourself.

Error message	Possible cause	Remedy / Note
The device does not work	Plug was not inserted	Plug in connector
	Power outage	Use another device to check whether the socket is live
	Fuse defective	Check the fuse box to see if the fuse for the device is OK
	Incorrect operation	Switch off the fuse in the fuse box and switch it on again after approx. 10 seconds.
The microwave does not work	You have not pressed the Start button	Press the Start button
3 zeros light up in the display	Power outage	Reset the time
The device is not in operation. The display shows a duration	The rotary control was operated by mistake	Press the Start key or delete the setting with the Stop key
Microwave operation is aborted for no apparent reason	The microwave has a malfunction	If this error occurs repeatedly, call customer service

⚠ Risk of electric shock! Improper repairs are dangerous. Only a technician trained by us may carry out repairs

Customer service

If your device needs repair, our service is there for you. We always find a suitable solution, also to avoid unnecessary repairs.

This device complies with the EN 55011 or CISPR 11 standard. It is a Group 2, Class B product. Group 2 means that microwaves are generated for the purpose of heating, class B means that the device is suitable for private household environment.

Technical Data

Power supply	220 - 230 V, 50 Hz
Power consumption	1450
W Maximum output power	900 W
Dimensions	approx. H 31 x W 51 x D
41 cm Effective treatment area	approx. 20 x 32 cm
Weight	approx. 15 Kg
Ambient conditions	-1035° C, max. 95 % r.H.
CE mark	yes

Dispose of in an environmentally friendly manner

This device is marked in accordance with the European Directive 2012/19/EU on waste electrical and electronic equipment. The directive provides the framework for the EU-wide take-back and recycling of waste equipment.

Warranty

We grant a manufacturer's warranty of two years from the date of purchase. During this period, we will remedy free of charge all defects that are demonstrably due to material or manufacturing defects and that significantly impair the function. Further claims are excluded. Excluded from the warranty are damages which are due to non-observance of the operating instructions or improper handling.

Dispose of in an environmentally friendly manner

Dispose of the packaging in an environmentally friendly manner.

This device is in accordance with the European Directive 2002/96/EC on waste electrical and electronic equipment. The Directive provides the framework for the EU-wide take-back and recovery of waste equipment.

Do not enter!
Behind this barrier
Danger due to microwaves!

