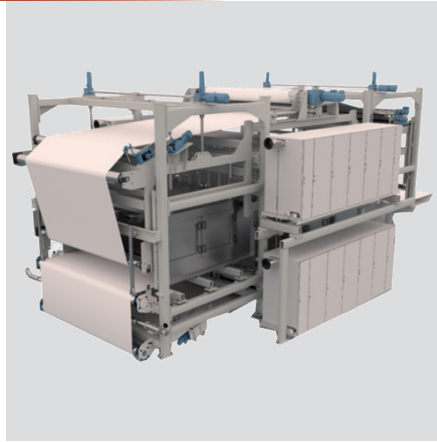


Fricke und Mallah Microwave Technology GmbH Product Catalog

Tunnel Ovens



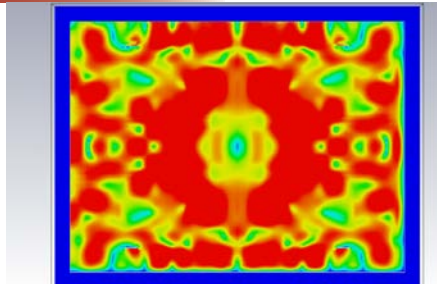
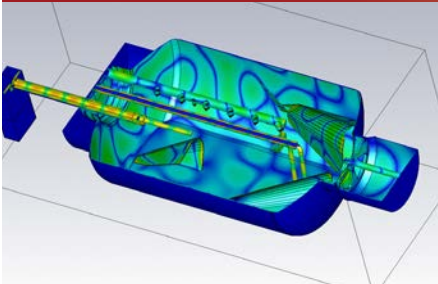
Chamber Ovens



Microwave Generators



Laboratory Ovens and Simulation



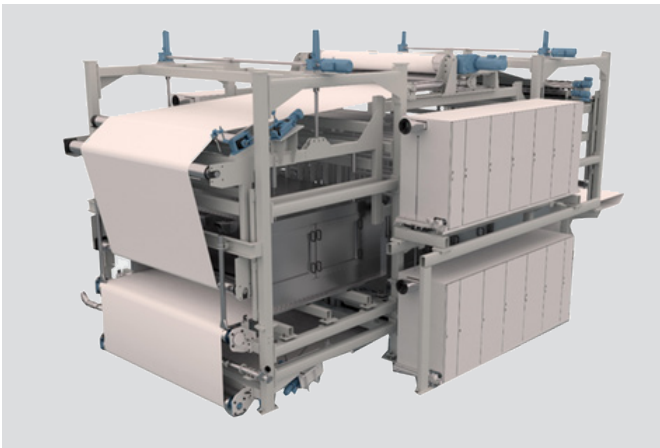
Microwave Tunnel Ovens

Tunnel Dryer for Selective and Fast Drying of Plant Pet Food



- Application: Drying of plant pet food
- Hygienic design
- Microwave power: 24 kW
- Usable length: 4770 mm
- Usable width: 290 mm
- Usable height 290 mm
- Total length: 11131 mm
- Total width: 1606 mm
- Total height: 2391 mm

Tunnel Heating Plant for Homogeneous Preheating of Wood Materials



- Application: Preheating of wood fibre (MDF)
- Microwave power: 720 kW
- Useful length: 4400 mm
- Useful width (belt width): 2600 mm
- Useful height (from upper edge of forming belt): 530 mm
- Total length: approx. 11000 mm
- Total height: approx. 7000 mm
- Total width: approx. 7200 mm

Hybrid Tunnel Dryer for Fast and Homogeneous Drying of Technical Ceramics



- Application: Honeycomb ceramics
- Microwave power: 32 kW
- Hot air: 72 kW / max. 80°C
- Usable length: 4660 mm
- Usable width: 500 mm
- Usable height 50 mm
- Overall length: 8500 mm
- Total width: 3000 mm

Microwave Pasteurizing Tunnel for Heat Treatment of Meal Trays



- Application: Modular Microwave Pasteurizing Tunnel for homogeneous, selective and gentle heat treatment of ready meal trays to increase minimum shelf time up to 25 days
- Hygienic Design
- Microwave Power: 108 kW
- Usable length: 9000 mm
- Usable width: 1400 mm
- Usable height: up to 50 mm
- Total length: 14000 mm
- Total width: 2350 mm
- Total height: 4400 mm

Modular Tunnel for Homogeneous Pasteurization of Packaged Mussels



- Application: Pasteurisation of packaged mussels
- Hygienic design
- Microwave power: 180 kW
- Usable length: 6000 mm
- Usable width: 1200 mm
- Usable height 100 mm
- Total length: 13000 mm
- Total width: 3000 mm
- Total height: 2800 mm

Modular Tunnel for Homogeneous Pasteurization of Packaged Meat Products



- Application: Pasteurisation of packaged meat products
- Hygienic design
- Extreme field homogeneity through professional field simulation
- PLC Siemens Simatic S7
- Microwave power: 110 kW
- Usable length: 9280 mm
- Usable width: 1200 mm
- Usable height 130 mm
- Total length: 15000 mm
- Total width: 3000 mm
- Total height: 2310 mm

Chamber Ovens for Industrial Applications

Microwave Chamber Dryer 36 kW / 2445...2475 MHz & 10 kW / 910...920 MHz



- Application: Microwave chamber dryer for homogeneous drying of various refractory
- Microwave power 36 kW / 2445...2475 MHz & 10 kW / 910...920 MHz
- Chamber dimensions(WxDxH):
- 1200 x 1200 x 900 mm
- Overall dimensions (WxDxH):
- 2200 x 3700 x 3600 mm
- Movable frequency controlled roller conveyor, usable dimensions 1500x2000 mm, loads up to 2000 kg
- Heating up to 400 °C over 3 hours
- Humidity measurement up to 250° C

Chamber Oven 10 kW / 900..930 MHz, Solid State Microwave Technology



- Application: Heating of various food
- Solid State Generators 10 kW / 900...930 MHz, stepless adjustable power and frequency
- Chamber dimensions(WxDxH):
- 620 x 1680 x 420 mm
- Overall dimensions (WxDxH):
- 2000 x 2200 x 2500 mm

Microwave chamber oven 24 kW / 2440...2470 MHz



- Application: Research microwave oven for homogeneous drying of various products with minimal pressure losses across the microwave chamber. The device is suitable for all drying and heating processes under different atmospheres.
- Microwave power 24 kW / 2440...2470 MHz
- Chamber dimensions (WxHxD):
- 800 x 800 x 1000 mm
- Overall dimensions (WxHxD):
- 2020 x 2885 x 3180 mm
- Various optional configurations possible, such as additional frequencies, sophisticated measurement technology, etc.

Microwave Chamber Dryer 6 kW / 2.45 GHz



- Application: Heating of mineral fibers
- Microwave power: 6 kW, 2.45 GHz
- Chamber size (WxDxH): 416 x 300 x 168 mm
- Outside dimensions (WxDxH): 1555 x 890 x 1761 mm
- Microwave power control according to temperature or/and weight
- Exhaust system
- PLC control with Touch Panel

Laboratory Oven 2 kW / 2.45 GHz, Solid State Microwave Technology



- Application: Drying/heat treatment of granulates
- Microwave power: Semiconductor-based generators 2 kW / 2.45 GHz, stepless power setting
- Chamber size (WxDxH): 535 x 330 x 250 mm
- External dimensions (WxDxH): 810 x 1425 x 1790 mm
- Side IR camera to monitor product temperature
- Chamber lighting
- Exhaust ventilator
- Air filter in the front side
- Microwave Lab Oven with PLC Control

Chamber Oven 2 kW / 2.45 GHz, Solid State Microwave Technology



- Application: Oven for bread
- Microwave power: 2 kW, 2.45 GHz, semiconductor-based microwave technology
- External dimensions (WxDxH): 1100 x 860 x 1765 mm
- Chamber lighting
- Humidity sensor
- Hot air ventilation setting - 8 positions, closed circuit

Switch Mode Power Supplies

Low Ripple Switch Mode Power Supply for Magnetrons



- Low Ripple Switch Mode Power Supply (LRSMPs) for Magnetrons 2, 3, 5 or 6 kW
- 19" Rack
- Air- or watercooled
- Low Ripple Current $\leq 2\%$, ideally for plasma applications and other most applications
- Microcontroller based Monitoring and Controlling of all important Magnetron Operating Parameters like High Voltage and Current. The LRSMPs ensures that the Magnetron is always operating in the ideal Operating Point (longer Magnetron lifespan)
- Low electromagnetic interference, improved fail-safe design against electromagnetic interference's
- No electromagnetic interference, much more fail safe against electromagnetic interference's
- Personal protection against accidental contact with the high voltage
- Improved alarm visualization, all alarms are described and displayed in plain text
- Two different control options to suit most application requirements (e.g. PLC control or fieldbus control capabilities)
- Profinet-Interface



Switch Mode Power Supplies

	Watercooled	Aircooled	
2 kW / 2.45 GHz	 PS2kW400-W	 PS2kW400-A	 PS2kW400-A-VG
3 kW / 2.45 GHz	 PS3kW400-W	 PS3kW400-A	 PS3kW400-A-VG
6 kW / 2.45 GHz		 PS6kW400-A	
5 kW / 915 MHz		 PS5kW400-A	

Components for Magnetron Applications

RF Power Measurement System



The Waveguide based RF Power Measurement System FM-DCR26PD1CH provides the user a precision stand-alone concept to monitor and document the forward and reverse RF power in the frequency range from 2400 MHz up to 2500 MHz.

To separate the forward and reverse RF power the directional coupler WR340/N(f) is used. The two power detectors FM-PD1CH2450N can be directly connected to the directional coupler. With a customer specific calibration is a precision RF power measurement in a power range from 10 Watt up to 10000 Watt possible.

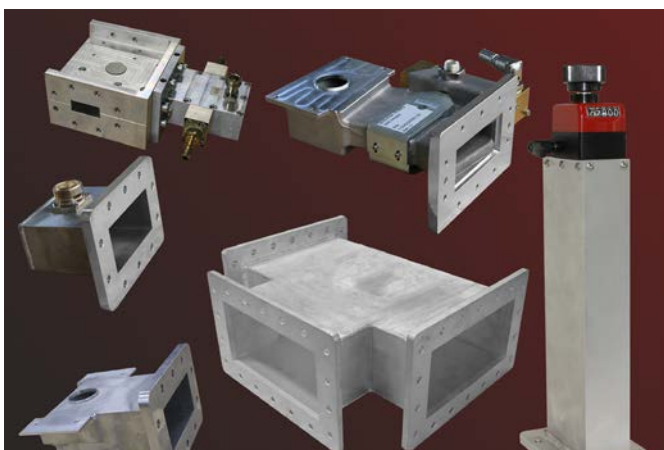
Directional Coupler FM - WR340/N(f)



The directional coupler FM - WR340/N(f) allow monitoring forward and reflected power in a waveguide transmission system.

Both versions (20 dB and 60 dB Coupling) are equipped with standard N(f) connectors at the sidearm. Allowing the connection of standard power meters or spectrum analyzers.

Microwave Components



Microwave components like Waveguides with rectangular and circular cross section, Isolator and Adjustable Shorts. Made of aluminium, brass or stainless steel.

Components for Magnetron Applications

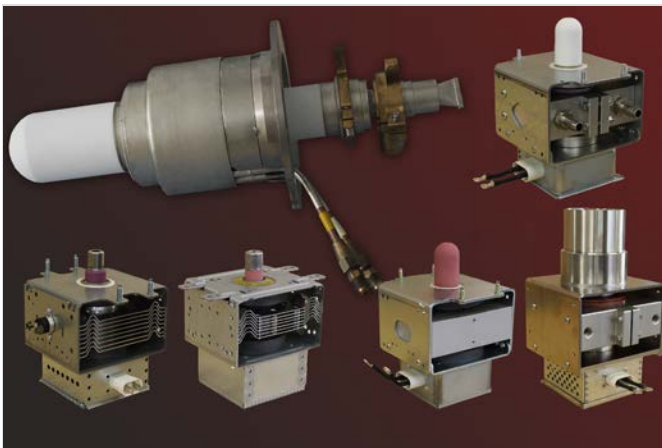
Tuning components: Manual, Motorized and Automatic Version



We supply the appropriate accessories for our microwave generators. Our product range includes waveguide components made of aluminium, brass or stainless steel, magic tees, tuning elements such as manual and motorized 3-stub tuners and isolators.

Furthermore, we offer coaxial components such as filters, isolators and circulators in different versions and performance classes.

Magnetrons



Fricke und Mallah supplies numerous versions of top-class magnetrons for high frequency applications. These play a central role in the generation of electromagnetic energy. We supply them in the frequency ranges 915, 2450 and 5800 MHz. The output power, depending on the design and frequency range, is available from 300 W to 100 kW.

Magnetronheads, Water Cooled



- 2kW; 3kW or 6kW HF-Power output
- Frequency 2450 \pm 10 MHz
- Integrated filament transformer
- Integrated magnetron, water cooled
- Integrated temperature switch
- Integrated isolauncher
- Interlock: Arc detection and Magnetron over-temperature
- Fully enclosed and in a compact housing
- Optionally with power detector

Solid State Microwave Generator 500 W 2400..2500 MHz in a 19" rack



- Designed for industry heating, drying and plasma processes
- Frequency band 2400 MHz – 2500 MHz.
- Maximum 500 W output power.
- 20 W – 500 W setting range in 1 W steps.
- Flexible signal generator with CW or Pulse.
- Protected against total mismatch (isolator)
- High efficiency water cooling
- Interlock (one or two channel)
- Knob switch to turn on the generator
- Local or remote operation
- Measuring of forward and reverse power
- All connectors on the back side

Power Control Unit for Solid State Microwave Generators 2000 W 2450 MHz



With the Power Control Unit (PCU) four solid-state microwave generators (2450 MHz) with 500 W output power each can be easily connected to applicators. The control unit enables an automatic search for the lowest reverse reflection and would follow it within the frequency band of 2400..2500 MHz. In combination with isolators and power detectors the system is 100% tolerant against mismatch. The PCU can be easily connected to a PLC via Profinet, so that an easy integration into existing systems is possible. This product group is perfectly suited to generate a homogeneous microwave field in the applicator.

Solid State Microwave Generators



- Output power adjustable from 0 W to max. power in 1.0 W steps
- Output frequency adjustable in steps of 1 MHz
- Real time measurement of reflected power and frequency
- High temperature stability through efficient water cooling
- VSWR protection mechanisms
- Communication Interface with industrial bus standards

Solid State Generators are available in the following versions:

2400..2500 MHz

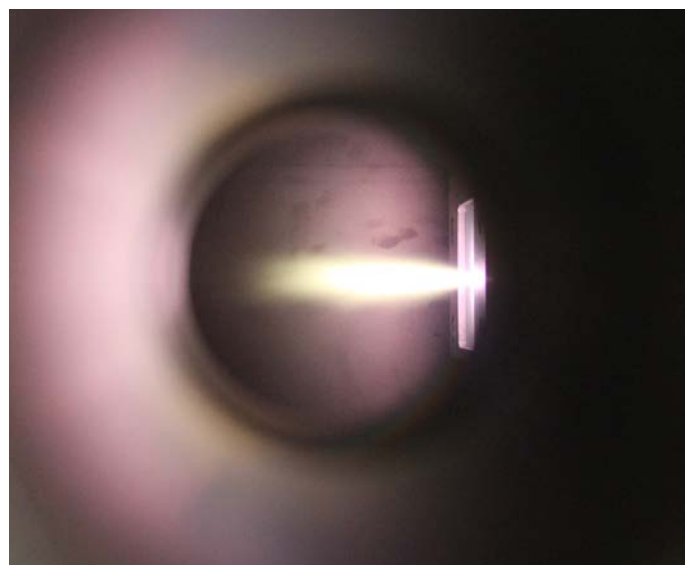
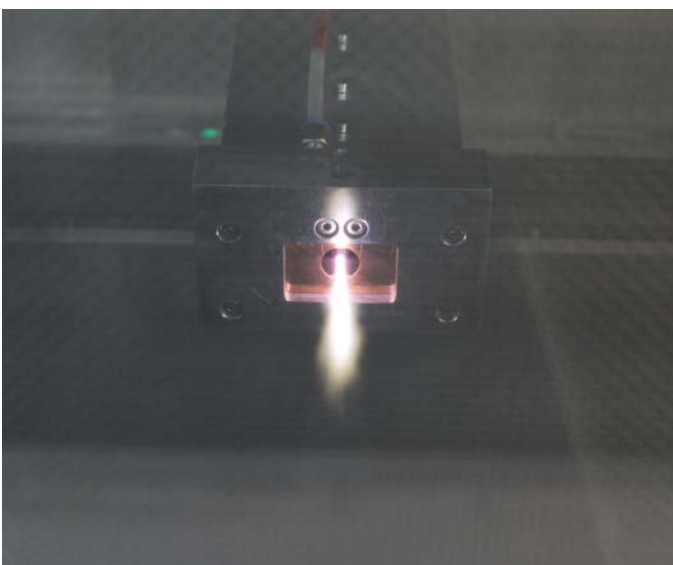
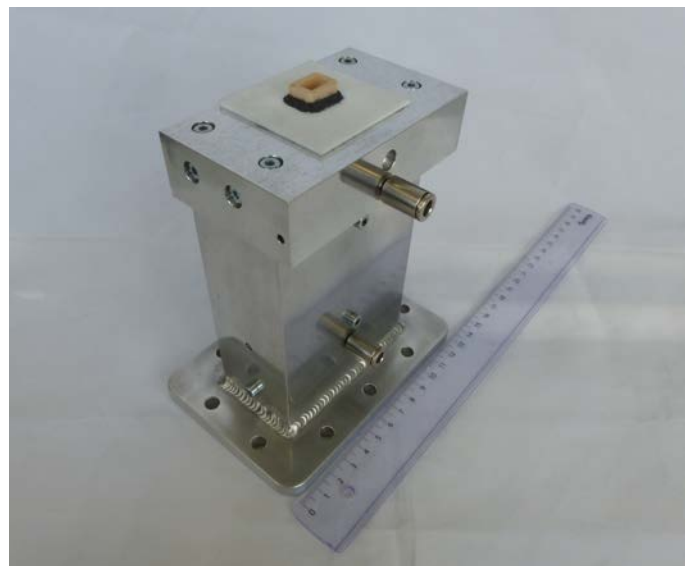
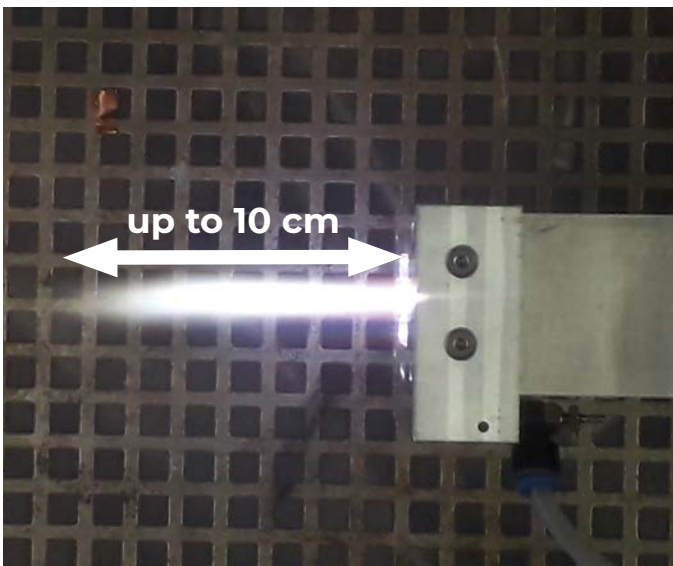
- 250 W
- 300 W
- 500 W
- 1 kW
- 6 kW

900..930 MHz

- 1 kW
- 15 kW
- 30 kW

PlasGen PG-L 3000.1 - The Magnetron Plasma Jet System for Rapid Heating

Microwave plasma technology is a very demanding application used to activate surfaces in electrical engineering, automotive, textile and many other industries. Fricke and Mallah and Heuermann HF-Technik GmbH develop microwave plasma sources with an excellent heat coupling. The result is a particularly high plasma density and high temperature processes of up to 5,000 °C. This field is generated by our microwave generator with 2.45 GHz and 3 kW output power. The plasma jet reaches lengths of up to 10 cm. This is a unique result in this range.



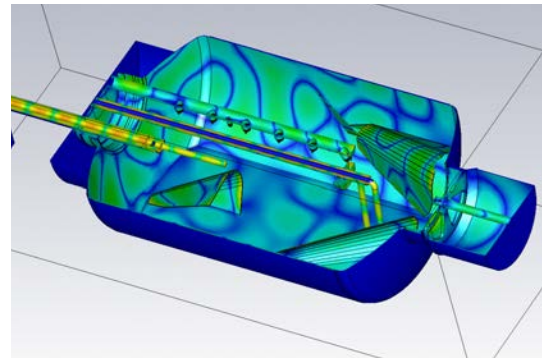


Fricke und Mallah Microwave Technology was founded in the year 1995 in Hanover, Germany. In the meantime, technologically and technically as well as in terms of personnel we have developed considerably in the recent years. At our location in Peine we employ currently 40 highly qualified and motivated engineers, technicians and production staff. At the end of 2016, we moved into our new building with more than 800 m² of office space and approximately 1300 m² of production space. So in combination with our old Building we have totally ca. 1200 m² office and at least 2000 m² production area. We have a professional department for deep modeling of electromagnetic and temperature fields using mainly the Software CST and occasionally COMSOL as well as very effective and innovative mechanical and electrical design department.

Meanwhile, we are one of the world's leading producers of microwave generators and systems (heating and plasma systems) based on Solid State Microwave Technology. At present, we produce and offer three microwave generators based on the Solid State Technology: 250 W, 300 W, 500 W, 1.0 kW and 6.0 kW at 2.45 GHz, 1.0 kW, 15 kW and 30 at 915 MHz. Our solid state based microwave generators are equipped with special technical intelligence for automatic and very fast power matching and homogeneous field distribution. These solid state based generators can be combined using compact HF-Combiners enabling the creation of higher microwave power at one single port. The solid state based microwave generators have an automatic electronic power matching (no need of mechanical 3-Stub-Tuners more!), which takes place in less than few milliseconds.

A very high field homogeneity can be achieved by the automatic frequency or phase change of the microwave fields. The combination of both frequencies 2.45 GHz and 915 MHz, which we have patented in the past, is also possible in order to be able to dry or heat large volume products homogeneously.

In the field of the Magnetron Technology, we developed by our electronic department in Peine new switch mode power supply for 1 kW, 1.5 kW, 2 kW, 3 kW, 6 kW, 10 kW, 15 kW and 20 kW magnetrons 2.45 GHz as well as 5 kW up to 100 kW 915 MHz. The switch mode power supply was originally developed for plasma applications and therefore has a very low ripple below 2% and pulsable. The 6 kW 2.45 GHz switch mode power supply a CSA certification.



Fricke und Mallah Microwave Technology GmbH is committed to healthy growth and, with a total of 40 employees, is one of the leading German suppliers of microwave ovens for industry and public research. We are currently involved in 10 national and 3 EU research projects.

We have already built high-quality microwave systems with a microwave power of up to 1 MW for the wood, ceramic, plastics and food industry. This also includes Microwave Heating Systems in which the microwave heating cavity can be electrically lifted up completely to allow 100% accessibility for cleaning and maintenance.



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