



FOOD DIVISION

- **DRYERS**
- **DEFROSTERS**
- **PASTEURIZERS**



*Technology
and innovation
made easy*

COMPANY AND TECHNOLOGY	4
DRYERS	6
DEFROSTERS	10
PASTEURIZERS	14
LAB AND SPECIAL EQUIPMENT	18



COMPANY AND TECHNOLOGY

RF Systems designs and manufactures Radio Frequency machines for the food industry, that speed up and improve the efficiency of drying and thermal processes, cutting energy consumption and operating costs.

Founded in 1990, RF Systems manufactures dryers, defrosters and pasteurizers based on the Radio Frequency technology.

Driven by customers' challenges, RF Systems aims at enhancing industrial drying and thermal processes through state-of-the-art RF machines. More than 1000 machines have been installed worldwide and many processes and devices have been patented during its 30 years' activity.

High-performing, energy-saving and cost-efficient, RF Systems machines allow food processors to make the most of the advantages of RF technology with the best cost / benefit ratio.

Dynamic and forward-thinking, RF Systems strives also in delivering pilot and tailor-made equipment for special applications according to the customers' needs.

RF SYSTEMS supplies the exclusive SmarTouch PLC system for the machine management and control: equipped with a remote access facility, it allows the operator to monitor and modify as far as required every machine parameter and setting in order to guarantee the best operation and efficiency in all circumstances.

THE RADIO FREQUENCY TECHNOLOGY

The Radio Frequency technology is based on electromagnetic fields, specifically at 27.12 MHz, to heat water contained in food substrates.

While exposed to radio frequencies, the water molecules undergo vibration and rotation at a frequency of over 27 million times per second, generating heat and, if necessary, raising the water temperature to evaporation. The heat transfer is endogenous and instantaneous in the

entire product mass, making the whole process significantly faster than conventional drying and thermal methods.

The thermal effect is only due by to the molecules' rotation and not to the electromagnetic radiation itself (that is, in fact, non-ionizing), preserving at best the biological, chemical, sensorial and nutritional properties of the products, in compliance with food safety regulations.

The process is safe and can be controlled accurately. The Radio Frequency technology has been successfully used in the food industry since the '80s, with excellent results both in terms of energy efficiency and product quality.





ARIES

Radio Frequency drying of raw, intermediate and finished products

RF drying ensures fast and efficient moisture removal and levelling, increasing shelf-life and cutting processing costs.



The drying process plays a decisive role in creating high-quality products. Radio Frequency dryers have been developed on purpose to remove the excess moisture content from many substrates in minutes, replacing slow and expensive conventional drying systems.

The RF technology is particularly suitable for the post-baking drying of baked products (biscuits, crackers, crispbread, etc.). Indeed, final moisture reduction and levelling is a difficult task to achieve in baking ovens: due to the crust formation during baking,

moisture evaporation takes about 60% of the energy of the entire process and about 30% of the overall oven length.

Differently, Radio Frequency is selective towards water and ensures drying in minutes with no surface over-baking or excessive coloring.

Hundreds of RF post-baking dryers have been installed in industrial bakeries in the last 40 years, making it the most popular RF drying application in the food sector.



> **HIGHER PRODUCT QUALITY**

RF drying reduces checking problems, eliminates surface browning, enhances crispness and flavor, prolongs the shelf-life, reduces Acrylamide formation.

> **BOOST PRODUCTION, SAVE MONEY**

The desired final moisture content is achieved uniformly in a few minutes or even seconds, allowing at the same time a 20-30% increase in production capacity and huge savings in operating costs. The process is not affected by external ambient conditions.

> **EASY INTEGRATION IN ANY PRODUCTION LINE**

The reduced footprint of post-baking RF dryers guarantees a smooth and easy installation even in small production facilities. The modular design allows to increase the production capacity at a later stage. The PLC software ensures an easy and seamless integration into fully automated production lines.

> **ACCURATE PROCESS CONTROL**

The RF power delivered by the machine can be easily adjusted and automatically controlled based on the specific needs of each particular product, thus ensuring an accurate moisture removal and the best quality results, minimizing at the same time human errors.



> **Drying of crackers**
600 Kg/h throughput



> **Drying of candied fruit citrus**
1000 Kg/h throughput



> **Drying of cookies**
1350 Kg/h throughput

TECHNICAL FEATURES

RF Power (kW)	Standard Dimensions LxWxH (mm)	Max. Belt Width (mm)	RF Generator Cooling System	Nominal Evaporation Capacity (l/h)
5	1350x900x2200	Batch Unit	Air	/
5	2500x1700x2300	750	Air	2.5-5
20	7000x1500x3400	1100	Air	10-20
40	7600x2124x3400	1750	Air	20-40
60	9600x2124x3400	1750	Air or water	30-60
85	9600x2124x3400	1750	Air or water	40-80

Note: Production rate depends on product type, size, shape etc. The equipment can be customized to accomplish any production requirement.



THERIO

Radio Frequency defrosting of meat, fish and vegetables

RF defrosters ensure a rapid and uniform defrosting process, eliminating the need for large thawing rooms and minimizing the drip loss.

Conventional defrosting systems (still air thawing, forced air/blast thawing, water sprinkling, water immersion systems, etc..) are slow and often generate product waste due to the poor process control.

Differently, RF defrosting is an endogenous and instantaneous method that delivers the product ready for the next step in a few minutes: the product to be defrosted, either in blocks or IQF, is placed on the conveyor belt of the RF machine and is

submitted to rapid dielectric heating that brings its temperature just below the melting point of water, with no drip loss or bacterial deterioration.

In this way, other than saving time and preserving quality, last-minute orders can be easily managed and product waste is completely avoided.

Furthermore, being a continuous and in-line process, multiple handling is eliminated, with huge savings in labor cost.



➤ **UNIFORM DEFROSTING**

Meat, fish, vegetables, fruit etc. either in blocks or IQF can be defrosted in a few minutes up to -1/-3°, with no drip loss. The process is uniform throughout the whole mass of the product, regardless of its size, weight and shape.

➤ **NO BACTERIAL DEGRADATION OR CONTAMINATION**

Either loose or packaged products can be RF defrosted with no bacterial degradation thanks to the fast process. Bacterial cross-contamination among different product pieces is eliminated in packaged product. The RF defrosters are also equipped with an efficient CIP system for the sanitization of the conveyor belt carrying the product.

➤ **IN-LINE PRODUCTION**

The process is carried out in-line, ensuring handling efficiency, labor savings and operational flexibility.

➤ **ACCURATE PROCESS CONTROL**

The RF power delivered by the machine can be easily adjusted and automatically controlled based on the specific needs of each particular product, thus ensuring a defrosting process up to the desired temperature range and the best quality results, minimizing human errors and eliminating product waste at the same time.

➤ **LARGE PRODUCTION CAPACITY IN A SMALL SPACE**

The reduced footprint of RF defrosters enables food companies to reduce drastically the area dedicated to the thawing process. The modular design allows to increase the production capacity at a later stage. The PLC ensures an easy and seamless integration into fully automated production lines.



➤ **Defrosting of IQF strawberries**
1000 Kg/h throughput

➤ **Defrosting of packaged shrimps**
1500 Kg/h throughput

➤ **Defrosting of meat blocks**
1000 Kg/h throughput

TECHNICAL FEATURES

RF Power (kW)	Standard Dimensions LxWxH (mm)	Max. Belt Width (mm)	RF Generator Cooling System	Nominal Throughput (-20°C to -4/-2°C) (kg/h)
5	1350x900x2200	Batch Unit	Air	/
5	2500x1700x2300	750	Air	100
20	7000x1500x3400	1100	Air	400
40	7600x2124x3400	1750	Air	800
60	9600x2124x3400	1750	Air or water	1200
85	9600x2124x3400	1750	Air or water	1600

Note: Production rate depends on product type, size, shape etc. The equipment can be customized to accomplish any production requirement.



IGOS

Radio Frequency pasteurization of loose and packaged products

The RF pasteurizers ensure a rapid and thorough microbial inactivation, preserving at best physical, sensorial and nutritional properties of food.



The outstanding benefits of the RF technology can also be achieved in the disinfestation, sanitization and pasteurization of various food commodities, intermediates or finished products, either in bulk or packaged.

Food processors often rely on steam or other conventional heating systems (mostly based on hot air circulation or surface heat exchangers) for the microbial inactivation/stabilization processes: the heat transfer is generally slow and uneven, severely damaging the physical, sensorial and nutritional properties of the product.

Differently, the ability to penetrate deep inside the product mass and generate heat evenly and instantly is, at the same time, the main characteristic and the main benefit of RF heating. Practically, in RF pasteurizers the product is submitted to a rapid and gentle dielectric heat treatment for a few minutes, that leads to live cell destabilization and microbial

inactivation. In this way, food substrates can be sanitized while preserving their physical, sensorial and nutritional properties.

RF machines are rather small in size and modular, so that additional production capacity can be easily added at any time. This makes convenient the integration of the RF technology into existing production lines.

Adjustable parameters in the PLC allows the operator to set the appropriate process recipe for each product.

Either batch or conveyORIZED model RF machines are available, depending on the product type and production capacity requirements. The machines and their ancillary equipment are designed and supplied according to the customers' specific requirements.



➤ **RAPID AND COST EFFICIENT**

Small footprint, fast process and low energy consumption make the RF pasteurizers a cost-efficient solution for microbial abatement.

➤ **ACCURATE PROCESS CONTROL**

The process parameters can be easily adjusted and automatically controlled based on the specific needs of each particular product, thus ensuring a gentle yet effective sanitization process, minimizing at the same time human errors.

➤ **SAFE AND RELIABLE**

Non-ionizing radio frequency energy waves are used to disinfest, sanitize or pasteurize products; all their physical, sensorial and nutritional properties are preserved at best.

➤ **VERSATILE TECHNOLOGY**

The RF technology can be used to stabilize a wide range of food commodities and products, either in bulk or packaged.

Suitable for:

- Nuts
- Cereals, pulses, grains
- Rice, corn
- Herbs, powders, flours
- Packaged fresh pasta, bread
- Liquids in the tube



➤ **Sanitization of corn**
1000 Kg/h throughput

➤ **Pasteurization of packaged croissants**
300 Kg/h throughput

➤ **Pasteurization of dried tomatoes**
800 Kg/h throughput

TECHNICAL FEATURES

RF Power (kW)	Standard Dimensions LxWxH (mm)	Max. Belt Width (mm)	RF Generator Cooling System	Nominal Throughput (kg/h)
5	1350x900x2200	Batch Unit	Air	/
5	2500x1700x2300	750	Air	50
20	7000x1500x3400	1100	Air	200
40	7600x2124x3400	1750	Air	400
60	9600x2124x3400	1750	Air or water	600
85	9600x2124x3400	1750	Air or water	800

Note: Production rate depends on product type, size, shape etc. The equipment can be customized to accomplish any production requirement.

LAB AND SPECIAL EQUIPMENT

Either you need to test new products or develop new processes, in small batches or in-line, RF Systems can supply lab equipment for custom-made applications. Small in size and easy to use, these machines are suitable for R&D projects for laboratories or small production lines.

rfsystems.it



 **RF equipment for pet food**
600 kg/h throughput

 **RF equipment for meringues**
500 kg/h throughput

 **RF drying of shrimps' shells**
600 kg/h throughput

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RF SYSTEMS S.r.l.

**Via Torre, 7
36020 Solagna (VI) IT
rfsystems@rfsystems.it
Phone +39 0424 558321
Fax +39 0424 559088
rfsystems.it**