

RAY® Pilot Plant Freeze Dryer

For superior quality freeze-dried products
and process optimization



Safe and gentle product handling.

In the food and beverage sector, we have a long history of designing and building freeze dryers that meet increasingly stringent regulations and standards and, at the same time, enable you to meet growing consumer demand for fresh and tasty foodstuffs.

Created to process a wide range of products — from instant coffee, fruit, vegetables, herbs, meat, seafood and pet food to sensitive ingredients such as lactic acid bacteria, enzymes and lactoferrin — GEA freeze dryers enable suppliers to preserve properties including color and consistency — as well as constituents such as proteins and vitamins — and remove inherent solvents as vapor.

Offering a wide range of benefits, GEA's high quality RAY® Pilot Plant (RAY® PP) is a batch-based freeze dryer that has been specifically designed for new product development. Enabling users to test and optimize important process parameters prior to full-scale manufacture, it's also suitable for small-scale production. The equipment provides fully scalable data that can be utilized to expedite time-to-market.



Key Features

Easy to clean and maintain and operated via a touchscreen, the RAY® PP is perfect for hygienic processing applications. And, although designed to operate at 1 mbar, the RAY® PP can work at pressures as low as 0.1 mbar.

Once the frozen product has been placed in the chamber, the process runs fully automatically and all vital parameters — product temperature, heating profile, loss of weight, etc. — are monitored and stored to provide full documentation and ensure repeatability. In addition, the RAY® PP is able to generate drying profiles and, based on maximum product temperature and/or factors such as constant weight, temperature and vacuum difference, determine the end point of the process.

RAY® PP		RAY® 1	RAY® 2
Drying surface (m²)		0.7	1.5
Load (kg/day)		20	38
Dry matter (%)		20.0	20.0
Expected batch time (h)		8.0	8.0
Sublimation (kg H ₂ O/day)		15.3	30
Production (kg/day)		4.0	8.0
Installed power (kW)		12	25
Average consumption (kWh/h)		7	12
Water consumption (L/h)		50	75
Dimensions	Length	2.2m	2.2m
	Width	1.0m	2.4m
	Height	1.9m	1.9m

Key Benefits

As one of the most experienced designers and manufacturers of freeze drying plants in the world, GEA combines unique technology with reliable plant operation to provide the superior product quality you need to stay ahead of your competitors.

- The RAY® Pilot Plant offers the following economic and technical advantages:
- Full scalability to industrial systems
- Preservation of product structure and size, as well as key attributes such as color and nutrients
- Uniform drying delivering stable products with a long shelf-life
- Flexible operation with variable parameters for condenser temperature, vacuum and heat input
- Online monitoring of weight loss and product temperature
- Integrated batch reporting and recipe system
- High throughput and large capacity condenser
- Automatic generation of freeze drying profile.



**RAY® Pilot Plant**

Whatever your application — from traditional food and beverage products through to active ingredients such as probiotics, enzymes and other functional ingredients for health products — our single focus during the entire process is product safety and hygiene.

In addition, the RAY® concept ensures short downtimes between batches based on rapid evacuation times and effective deicing.

With no contact between the product and the freeze drying chamber, combined with gentle and controlled heat input and the optimized control of residual moisture, safe product handling is ensured.

Furthermore, the RAY® PP chamber can easily be washed and cleaned from the large front door and all components are readily accessible for inspection and maintenance.

RAY® PP at a Glance

- Stainless steel cabinet and condenser
- Plug 'n' Play unit that only requires water and power
- High-capacity vapor trap able to handle sublimation of 2.5 kg H₂O /m²/h
- Water-based heating system.
- Controlled heating and cooling from 20–140°C
- Radiation heating for even heat input.
- Evacuation to 1 mbar in less than 8 min
- Accurate vacuum regulation from 0.1–5 mbar for controlled drying
- Condenser temperature and pressure monitoring and logging
- Touchscreen computer-based HMI
- Product weighing system

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