

## Atlas Pilot Freeze Drying Plant - RAY1



The RAY1 pilot plant is used in the food and beverage industries for small-scale production of market samples and for pilot testing of new products prior to full-scale production.

RAY1 is also used in bacterial and pharmaceutical applications.

The RAY1 plant is operated via a computer. Parameters are monitored and stored during the freeze drying process, to provide full documentation of the process. This makes it possible to repeat the test with the same freeze drying characteristics.

Test runs with the RAY1 provide excellent data for scaling-up to industrial production, either in one of the Atlas RAY batch freeze dryers or in a CONRAD continuous freeze drying plant.

### Design

The Atlas RAY1 is designed for a hygienic process and features easy cleaning and maintenance.

RAY1 can operate at a pressure as low as 0.2 mbar. The design principle of the pilot plant is illustrated in the figure. The RAY1 freeze drying plant consists of:

### The tray system

- Four trays.
- Rack for trays suspended in weighing cell.

### The Cabinet

- Circular drying chamber.
- Doors on three sides for easy access.
- All in stainless steel.

### The heating system

- Electrical heating of plates.
- Waterproof heating plates.
- A built-in temperature sensor in all heating plates.

### The vacuum system

- Two-stage rotary vane vacuum pump.
- Absolute pressure transmitter for registration and control of vacuum during freeze drying.

### The condenser system

- Refrigerating unit.
- Stainless steel condenser coil.
- Electrical heating for de-icing.

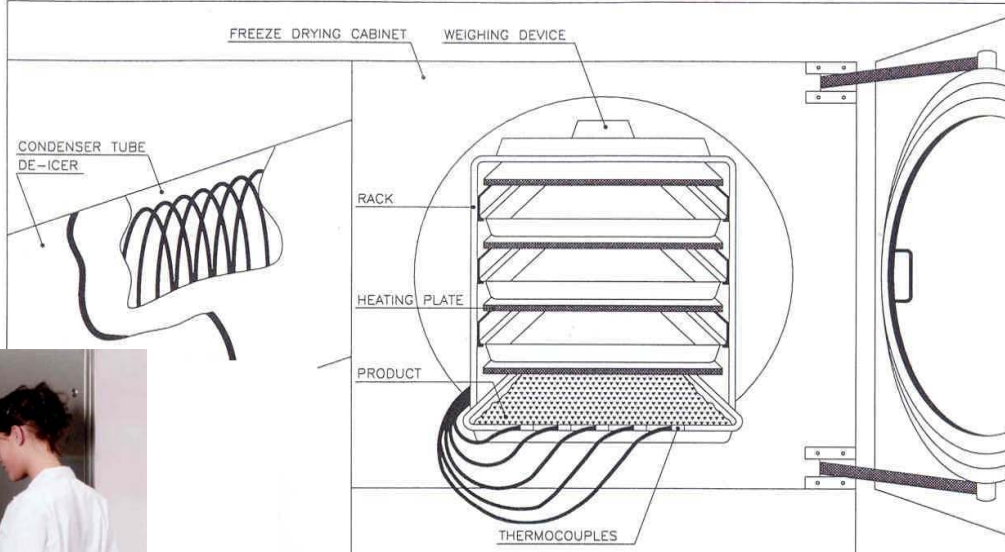
### The control and registration system

- Automatic temperature control of each heating plate.
- Computer with keyboard.
- Colour screen.
- Colour printer.
- Modem as option.

### Operation

- Thermocouples are placed in the product.
- Trays with frozen products are loaded into the cabinet.
- The door is closed.
- Start-up via the computer.
- The vacuum pump evacuates the cabinet to operational vacuum. The operational vacuum is controlled automatically during operation. If required, the operational vacuum can be change during operation.
- Freeze drying is performed according to given parameters for vacuum, maximum product temperature and maximum heating plate temperature. Or it can performed according to a given drying profile.
- Vapour sublimated from the frozen product condenses on the condenser coil. The condenser operates with an average temperature of  $-40^{\circ}\text{C}$ .





The registered coil temperature is stored in the computer and can be printed as part of the documentation.

- When the process is completed the heating plates are shut off automatically. However, it is possible to keep the vacuum automatically and break it manually.
- When atmospheric pressure is re-established the dried product can be unloaded.

### Data storage

- The different sensors in the cabinet continuously monitor drying parameters such as heating plate temperature, refrigeration temperature, vacuum, product weight and product temperatures. These data are transferred to the computer and stored.
- During the process all parameters can be displayed on the screen or transcribed on the printer. The process can be illustrated either in figures or in a variety of coloured graphics.



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Typical capacities				
Product type		Boiled beef	Shrimps	Vegetables
Dry matter	%	35.0	22.0	10.0
Load	kg/batch	7.8	6.6	6.0
Batch time	h	6.0	8.0	8.0
Sublimation	kg H <sub>2</sub> O/batch	5.0	5.1	5.4
Production	kg/batch	2.8	1.5	0.6

(Capacity and freeze drying time depend on e.g. product type, bulk density, product layer thickness and heat sensitivity.)

- Data storage ensures that the process can be repeated with identical parameters.

### Technical data trays

4 trays made of anodised aluminium  
500 x 400 x 30 mm  
Total area: 0.8m<sup>2</sup>

### Utilities

3 x 400 V, 50 Hz  
(or to specification)  
7.3 kWh/h  
250 l/h water

### Auxiliary equipment

The following can be supplied with the RAY 1 pilot freeze-drying plant:

- Laboratory freezer
- Pilot granulator
- Foaming and pre-freezing for extract coffee/tea eq.

### Dimensions and shipping data cabinet

#### Dimensions

- 1850 mm high
- 1600 mm wide
- 700 mm deep

#### Shipping data, approx.

- 820 kg gross weight
- 700 kg net weight
- 3 m<sup>3</sup> volume

### Control board

#### Dimensions

- 800 mm high
- 1450 mm wide
- 500 mm deep

#### Shipping data, approx

- 450 gross weight
- 300 kg net weight
- 3 m<sup>3</sup> volume