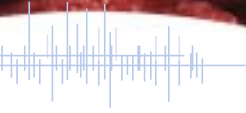
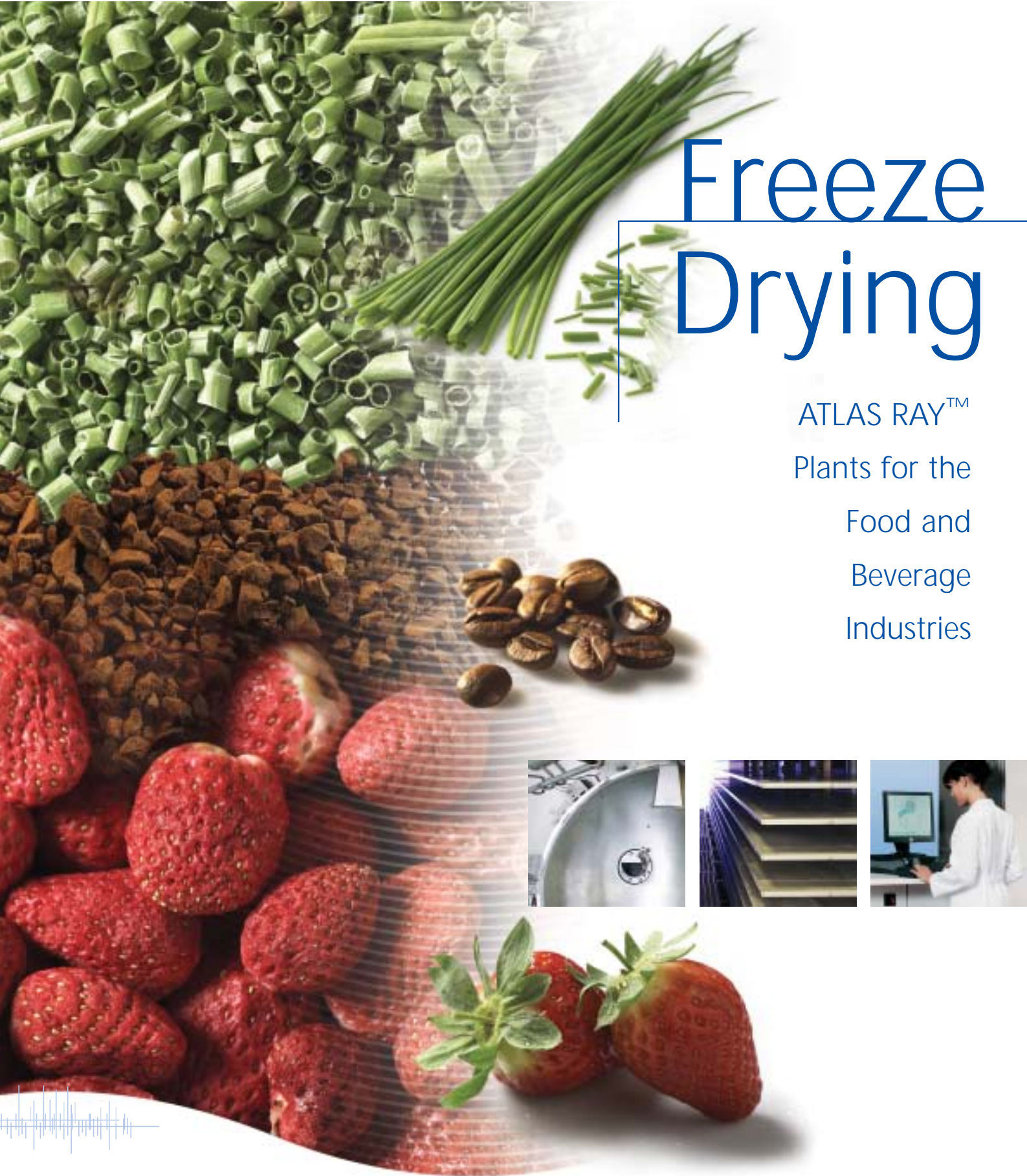


Freeze Drying

ATLAS RAY™

Plants for the
Food and
Beverage
Industries



Superior Quality

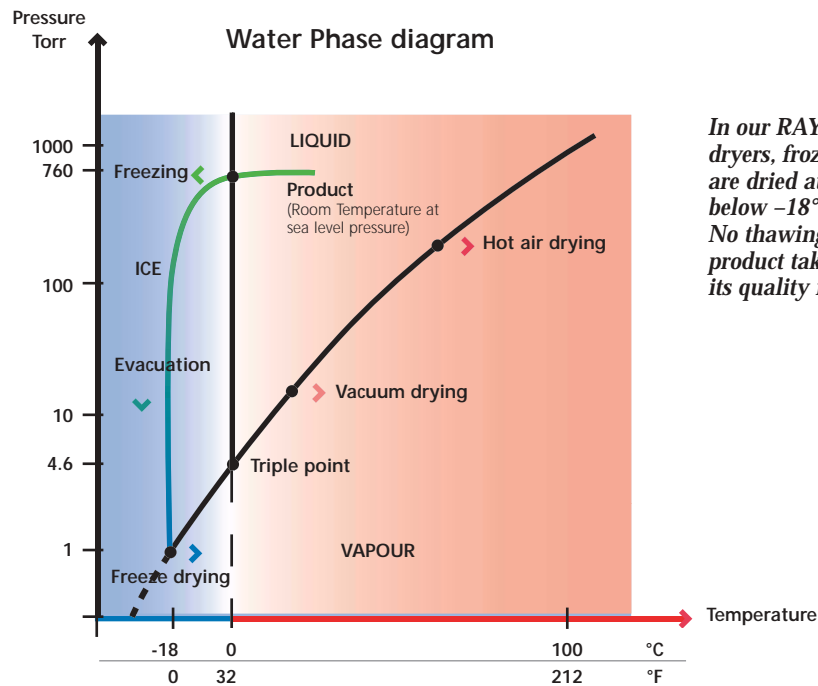
– *Unique Advantages...*

The ATLAS freeze drying plants from Niro offer substantial benefits to nearly every area of food processing, such as fish, fruits, coffee and herbs.



Niro gives you full control over every stage of the freeze drying process.

The ATLAS freeze drying technology simply gives you the highest quality in the market. Frozen products are dried under vacuum, ensuring that the inherent solvents in the product (i.e. water) are removed as vapour. This preserves the overall product structure and size, as well as all nutrients, flavours, and colours.



In our RAY™ freeze dryers, frozen products are dried at temperatures below -18° C . No thawing of the product takes place and its quality is preserved.

Meeting market demands

Today, customers request food that is easy to prepare and keeps well without being spoiled while retaining the characteristics of fresh food. Freeze drying allows manufacturers to meet these demands by preserving the natural look and consistency of the product as well as all its flavours, proteins, and vitamins.

- The freeze drying process results in stable products with a long shelf life.
- Freeze dried products are durable at a wide range of temperatures, eliminating the need for complicated cold chain distribution systems.
- The low weight and easy handling of freeze dried products reduce shipping costs dramatically.

Unique advantages

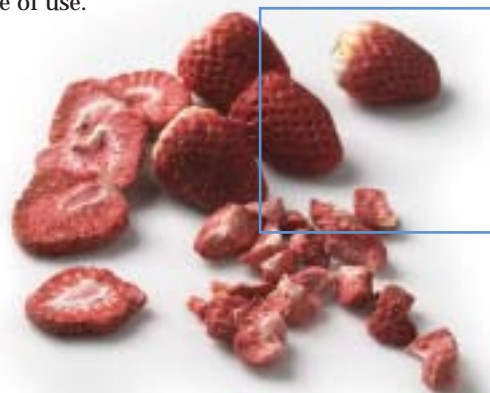
As one of the most experienced designers and manufacturers of freeze drying plants in the world, Niro combines unique technology with reliable plant operation. While providing the superior product quality you need in order to stay ahead of your competitors, our ATLAS RAY™ technology gives you unique economical and technical advantages:

On top of that, ATLAS RAY™ freeze drying plants are designed to:

- Eliminate product loss
- Reduce energy costs
- Maximise plant reliability and ease of use.

Freeze Drying Facts

3,000 KG OF FROZEN STRAWBERRIES WILL RESULT IN 300 KG FREEZE DRIED BERRIES. THE SAME AMOUNT OF CHICKEN WILL GIVE 1,000 KG OF DRIED PRODUCT.



ATLAS RAY™ Batch Dryers

Refined Efficiency

We have refined the freeze drying process to a point where we are able to supply the most efficient and economical freeze drying plant designs in the market. The advantages of selecting our equipment include:

- Negligible power loss (less than 0.1%)
- Low energy consumption
- Compact design
- Simple and reliable operation
- Uniform drying
- High sublimation capacity



Modular Design

The ATLAS RAY™ freeze dryers from Niro are designed as modular systems, with cabinet, heating plates, and vapour condensers built as individual units.

The modular design offers a number of advantages during installation and operation:

- Shorter interval between order and commercial production thanks to quick installation.
- Local subcontracting becomes a viable option for dryer assembly.
- Easy access for cleaning and maintenance.



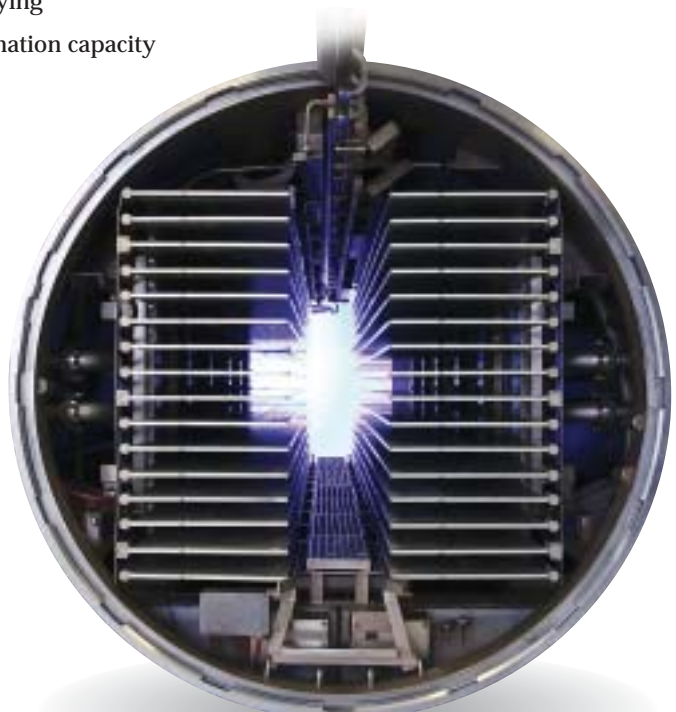
Heating plate module
Twin stacks of heating plates designed for RADIANT drying. The heating plates are made of anodized aluminium.



Vapour condenser module
Built-in condenser with Niro's unique automatic de-icing system. The condenser is made of stainless steel.



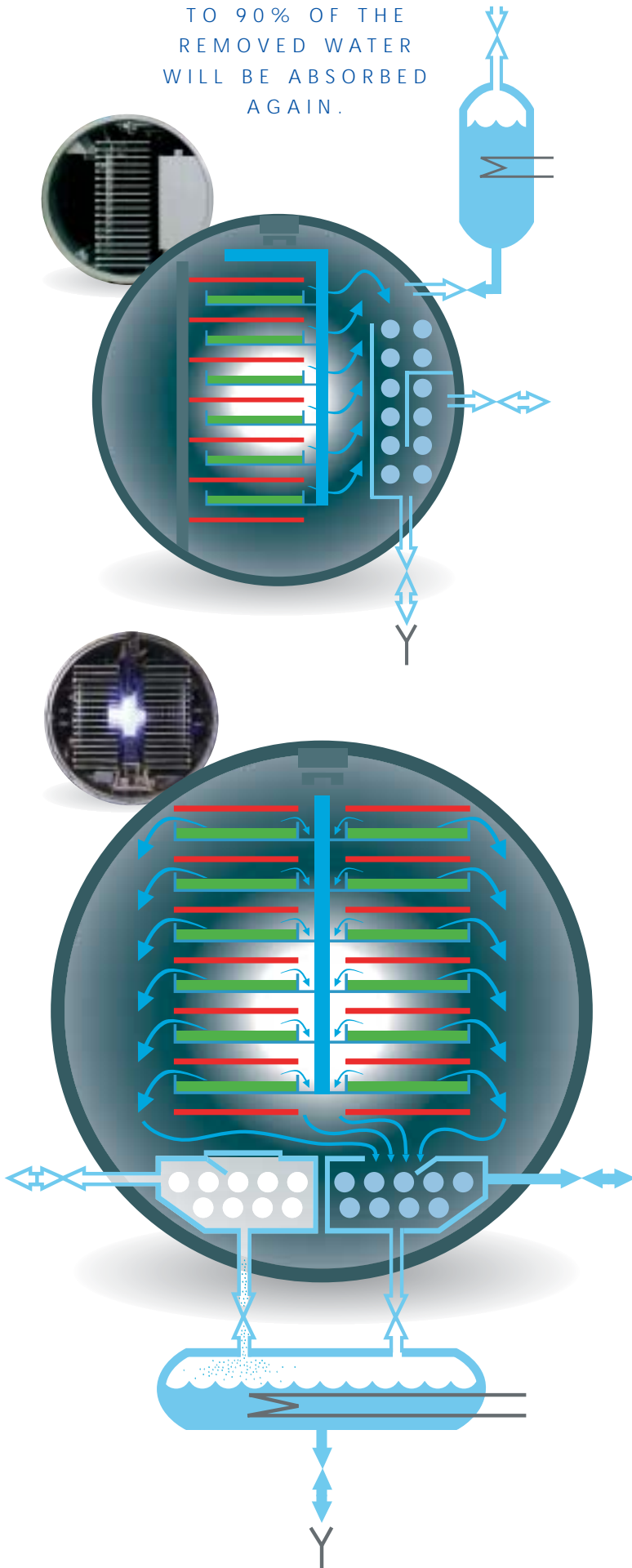
Cabinet module
Cylindrical vessel with door at one end for loading and unloading. All connections with auxiliary systems are located at the rear end.



Modular and efficient:
The ATLAS RAY™ Batch Dryers.

Freeze Drying Facts

DURING RE-HYDRATION
IN WARM WATER, UP
TO 90% OF THE
REMOVED WATER
WILL BE ABSORBED
AGAIN.



RAY™

A water-flushing de-icing system is used for the smaller RAY™ (8, 17, 30, 45 and 50) cabinets. At the end of every freeze drying cycle, the condenser is flushed with pre-heated water. Ice in the condenser melts within 10 minutes, whereupon the water is drained. This method is ideal for smaller systems, ensuring:

- Minimum investment cost.
- Simple operation.

RAY™ with CDI

The larger RAY™ (75, 100, 125 and 150) cabinets incorporate the Continuous De-Icing System (CDI). During de-icing, vapour at 25° C from the de-icing vessel condenses at the cold condenser surface, thus melting the ice. In order to restore the condenser to operating condition, the condenser chamber is closed off from the de-icing vessel. The condenser is cooled to operating temperature, resulting in the condensation of any remaining vapour. As the vapour condenses, the pressure in the condenser decreases until operating vacuum is achieved eliminating any loss of operating vacuum at switch-over between vapour condenser chambers.

The CDI system is fully automatic. It ensures:

- A maximum ice build-up to 5 mm (1/5"), resulting in a negligible temperature drop over the ice and low energy consumption in the refrigeration plant.
- Constant condenser capacity.
- High freeze drying capacity per square metre of tray surface.
- Short time from one charge to another.
- Higher overall profitability in your large-scale freeze drying process.

Advanced Simplicity:

Complete Plants with the RAY™ Concept

Advanced simplicity is the best way to describe the ATLAS RAY™ concept from Niro.



As part of the Process Engineering Division of the GEA Group, Niro offers a full range of plant services worldwide – from turnkey solutions to that vital piece of equipment that will make your freeze drying process profitable.

Service Beyond Delivery

In addition to actual plant delivery, Niro has the experience and market know-how to support you in your product research and feasibility studies.

The ATLAS RAY™ concept is the result of many years of plant and

process development based on research and collaboration with our customers in all parts of the world. The result is a freeze drying process – as shown in the diagram – that is second to none.

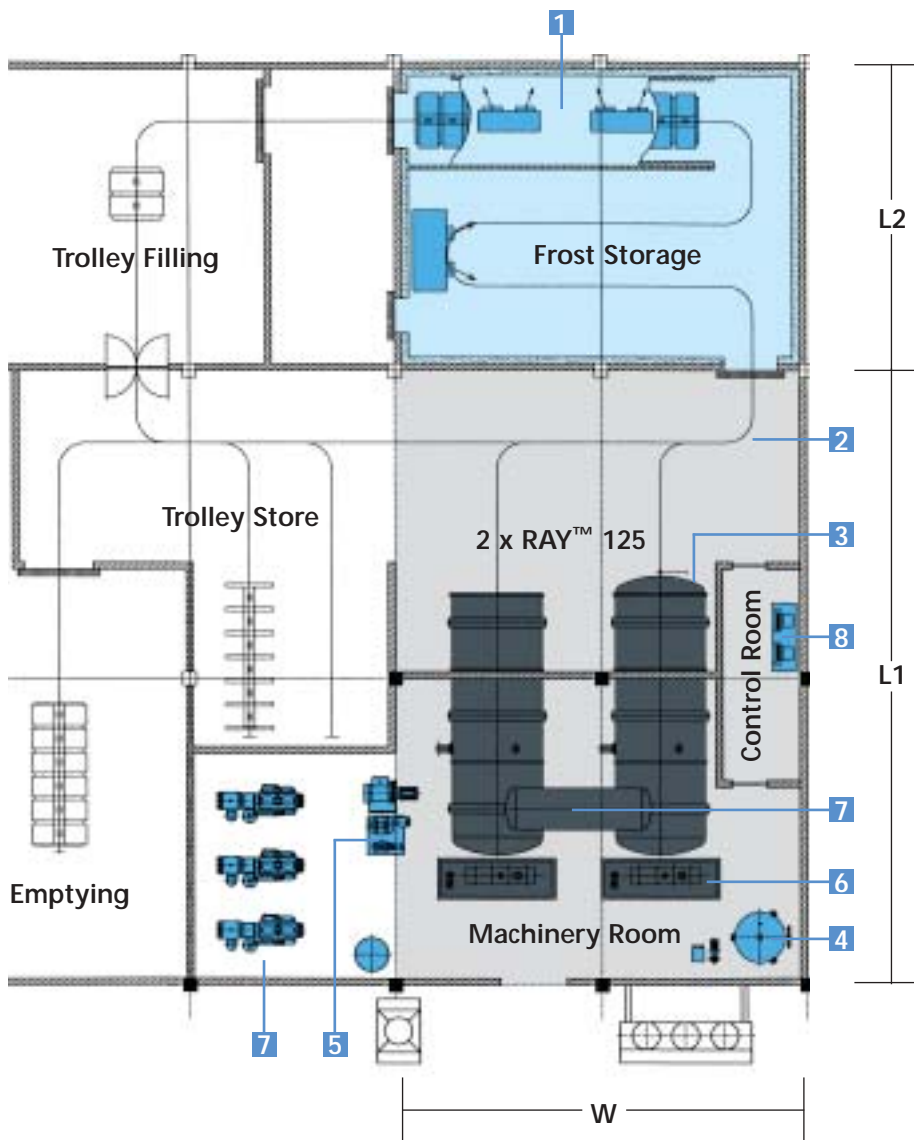
The Full Range

The ATLAS RAY™ plant is capable of handling most freeze drying operations. Niro has the perfect freeze drying solutions with the CONRAD™ plant for continuous operation and the RAY™-S dryer for sterile processes. Call your local agent for details.



2 RAY™ 125-S plants for sanitary applications.

Monitor the entire process on-site or from a central control room.



- 1 Tunnel freezing/frost storage**
One 8-hour preparation shift provides sufficient product for 24 hours of freeze drying. Freezing is by the “first in/first out” principle.
- 2 Transport by overhead rail**
Trolleys carry the product trays from freezing, through freeze drying, to emptying. A simple, hygienic, and safe system.



TYPICAL CAPACITIES	RAY™					RAY™			
	8	17	30	45	50	75	100	125	150
Effective tray area (m ²)	7.6	16	26	39	45	68	91	114	136
Normal sublimation capacity: (kg H ₂ O/hour)	17	35	60	85	105	160	200	250	300
Typical input capacity solids 15% (kg/24 hours)	190	400	650	975	1125	1780	2375	2965	3560
Output capacity (kg/24 hours)	28	60	100	150	175	275	370	460	550
Building requirement per cabinet (based on two more units)									
Freeze drying (WxL1) (m ²)	36	48	60	60	72	96	108	120	132
Freezing+cold storage (WxL2) (m ²)	N/A	12	24	24	36	48	60	80	96

spare parts delivery, Niro is your partner through the entire process.



3 RAY™ freeze dryer

Fully automatic control of the drying cycle for each batch. Just close the door and press the button.

4 Heat supply system

Drying is carefully controlled throughout the temperature range – from below freezing temperature (brine) or room temperature (cooling water) up to 130°C – to ensure perfect product quality.

5 Vacuum system

Process vacuum is achieved in less than eight minutes.

6 De-icing

Type CDI

7 Refrigeration system

Incorporates highly efficient refrigeration compressors with automatic capacity control.

8 PC/PLC control system

The control system ensures optimal operating conditions throughout the plant – freezing, drying and associated heating, vacuum and refrigeration systems. Remote control via modem supplied as option.

Freeze Drying Facts

EFFICIENT AND GENTLE: FREEZE DRYING REMOVES ONLY WATER AND PRESERVES ALL NUTRIENTS, FLAVOURS AND OTHER PRODUCT PROPERTIES.



After Sales Service

Your Partner for Original Niro Parts and Services



More than Just a Dryer

Niro has the process know-how and industry expertise to be more than just your supplier - we can become your partner. Our research facilities are at your disposal for pilot freezing and freeze drying tests of all food and related products, and our service engineers are always on hand to support production management during start-up, train factory staff, and provide on-the-spot assistance.

A Local Partner with a Global Presence

For every industry, in any culture, all over the world, Niro makes a difference with innovative and reliable solutions. Our network of offices, subsidiaries, representatives, and spare parts offices provide service on a global scale.

For further enquiries, contact your local Niro office or visit us at www.niro.com



Freeze Drying

ATLAS RAY™ Plants for the
Food and Beverage Industries.

*Niro is a world leader in industrial
drying, with spray drying, freeze
drying, and fluid bed processing as
core technologies. The Niro companies
are part of the Process Engineering
Division of the GEA Group.*



GEA Niro A/S

Process Engineering
Division

A company of mg technologies group

Niro A/S · Gladsaxevej 305 · PO Box 45 · DK-2860 Soeborg · Denmark
Tel: +45 39 54 54 54 · Fax: +45 39 54 58 00 · food.dairy@niro.dk · www.niro.com