

AIRGENEX[®]food – CHAMBER DRYING SYSTEMS

INNOVATIVE DRYING SYSTEMS FOR YOUR FOODSTUFFS

GENTLE. PROCESS-SAFE. ENERGY-SAVING.





OUR WAY OF DRYING
IS VERY SPECIAL:

VERY SAFE.

VERY FAST.

VERY GENTLE.

VERY EFFICIENT.

HARTER DRYING SOLUTIONS – COMPETENCE IN ALL ASPECTS OF DRYING.

- Gentle drying at temperatures between 20 °C and 75 °C
- High efficiency levels achieved by heat pump technology for dehumidification
- Carbon and energy saving drying process
- Drying system may be customized to best meet your specification requirements
- Drying in a closed system (exhaust-free, no interchange with ambient air, thus no dependence from climate and no impact on cleanroom conditions, emission-free drying)
- Reproducible processes (qualification, validation)
- Machine design in accordance with GMP and hygienic design requirements
- Drying may easily be combined with cooling (requiring only minor modification of machine design)
- The resulting condensate might be utilized (if it contains valuable ingredients)

GENTLE AND RELIABLE DRYING

The Airgenex® food drying system developed by Harter is capable of drying any kind of foodstuff and animal feedstuff in a gentle and energy efficient way, fast and reliably. Heat pump based condensation drying resolves drying problems and optimizes production processes. Many years of

experience in and know-how of many hundreds of drying applications ensure that you get the solutions exactly suiting your product and your production process. This is the only way to success for you, the customer. Top priority features for the drying process are as follows.

PRODUCT QUALITY

- Gentle product treatment by drying at low temperatures
- Drying parameters selected to meet quality requirements and reflect product properties
- Aroma, appearance and bioactivity are largely preserved

PROCESS RELIABILITY

- Control of drying parameters:
 - > Control and monitoring of parameters
 - > Various programmes may be set
 - > Data may be analysed
- Drying takes place in a system closed air-wise:
 - > No interaction with ambient air
 - > Independence from climate



Chamber Dryer H03-Module

LOW TEMPERATURES

Heat pump based condensation drying is capable of drying your products at temperatures variable between 20 °C and 75 °C. Temperatures up to 100 °C may be selected. Using low temperatures is a gentle way of drying your food. Drying is absolutely stress-free for your product.

Airgenex® food dryers ensure high efficiency of the drying process. Heat pump technology is used for air dehumidification. The drying operation is reliable and stabilizes your production process, thus contributing to optimizing the process.

RELIABLE AND EFFICIENT

Projects realized so far have shown that the condensates obtained may contain volatile aromas and flavours. Harter's condensation drying always puts you in a position to recycle the valuable condensate or its ingredients.

VALUABLE CONDENSAT

LESS TIME, LESS ENERGY

Compared with exhaust air dryers and conventional fan-based systems, our Airgenex® food dryers require much less time for drying, which is, of course, dependent upon the drying temperature and the texture of the product to be dried. This is achieved by using the alternative physical approach of heat pump based condensation drying. Optimum air conditioning and air routing ensure energy and, thus, cost savings.

HARTER drying systems are basically closed – no interchange with ambient air and, thus, no dependence from the climate. This helps to achieve positive results in terms of bioactivity, aromas and appearance.

CLOSED SYSTEM

Sulphurization or addition of ascorbic acid to retain colour, for example, is not required. The dried products do not require any additional flavouring.



**THE BEST TREATMENT
FOR YOUR PRODUCT**



Food and pet food are delicate goods requiring optimum processing. Product integrity and safety have top priority in the drying process.

Our integrated heat pump system with its constant process parameters ensures reliable drying while low temperatures warrant gentle drying of your products. The closed system produces good results in terms of appearance, aroma and bioactivity.

The heat pump based condensation drying technology implemented in our Airgenex® food dryer is the optimum answer to your drying needs.

APPLICATIONS

We develop, design and manufacture drying systems both for batch and continuous operation. Our technology is modified to meet your specifications. All drying related parameters for your specific application are determined by prior tests in our pilot plant station.

For drying to be successful, a perfect match of air dehumidification and air routing is required. Extremely dry, unsaturated air, at low temperatures,



FRUITS AND VEGETABLES

Fruits and vegetables are gently dried at the desired temperature or the temperature best suited for the product – normally between 35 °C and 65 °C. If you dry raw fruits or vegetables and want to preserve their vitamins and protein structures, we recommend drying temperatures below 42 °C. This way, they actually remain in an uncooked state – with all its benefits for your special product idea.

is routed exactly to the place where humidity is to be absorbed. We implement the Airgenex® process in a wide variety of applications.

Our food drying systems are cleanable according to the food standard.

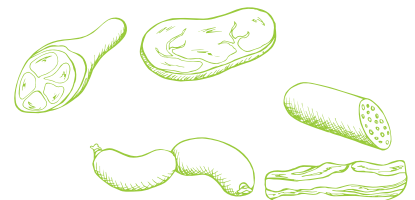


TROPICAL FRUITS

Our gentle way of drying makes snacks from tropical fruits much more durable and taste almost fresh. If dried where picked their transport is facilitated by the 80 percent reduced water content, and they are less susceptible to deterioration by environmental conditions.

MEAT AND SAUSAGE PRODUCTS

Do you wish to create a new snack? Sausage chips, salami chips, ham chips or dried meat, meat chips, beef jerky or any other odd idea – taking us as your technology partner will be a large step towards advancing your plan!



SHELL FRUITS AND NUTS



We minimise the residual humidity in the relatively dry shell fruits, if required either to best prepare them for grinding or to enhance their shelf life.

FEEDSTUFF AND PET FOOD



Are you looking for a low temperature drying method to preserve the valuable ingredients? Or a system requiring higher temperatures to sterilize your product? We have a solution to meet any requirement!



MEDICINAL AND SPICE PLANTS

Our gentle low temperature drying method is helpful in manufacturing your products. Applications in this field are very diverse and individual. So are our drying solutions.

ALGAE

Algae have versatile uses. When ground into powder they may be used in food supplements or pharmaceutical products. Our gentle drying method ensures that the valuable agents of the plant are preserved.



DIGESTATES AND POMACE



Do you need a drying system for a planned up-cycle product? We can help you develop a new valuable product from what seems to be waste material.

CONFECTIONERY



Do you want to dry the raw paste for your product in a gentle and uniform way? Or does your product have a coating that requires gentle drying? We design batch or continuous solutions for your production.

Do you have a different product?

Do you want to develop an upcycle product?

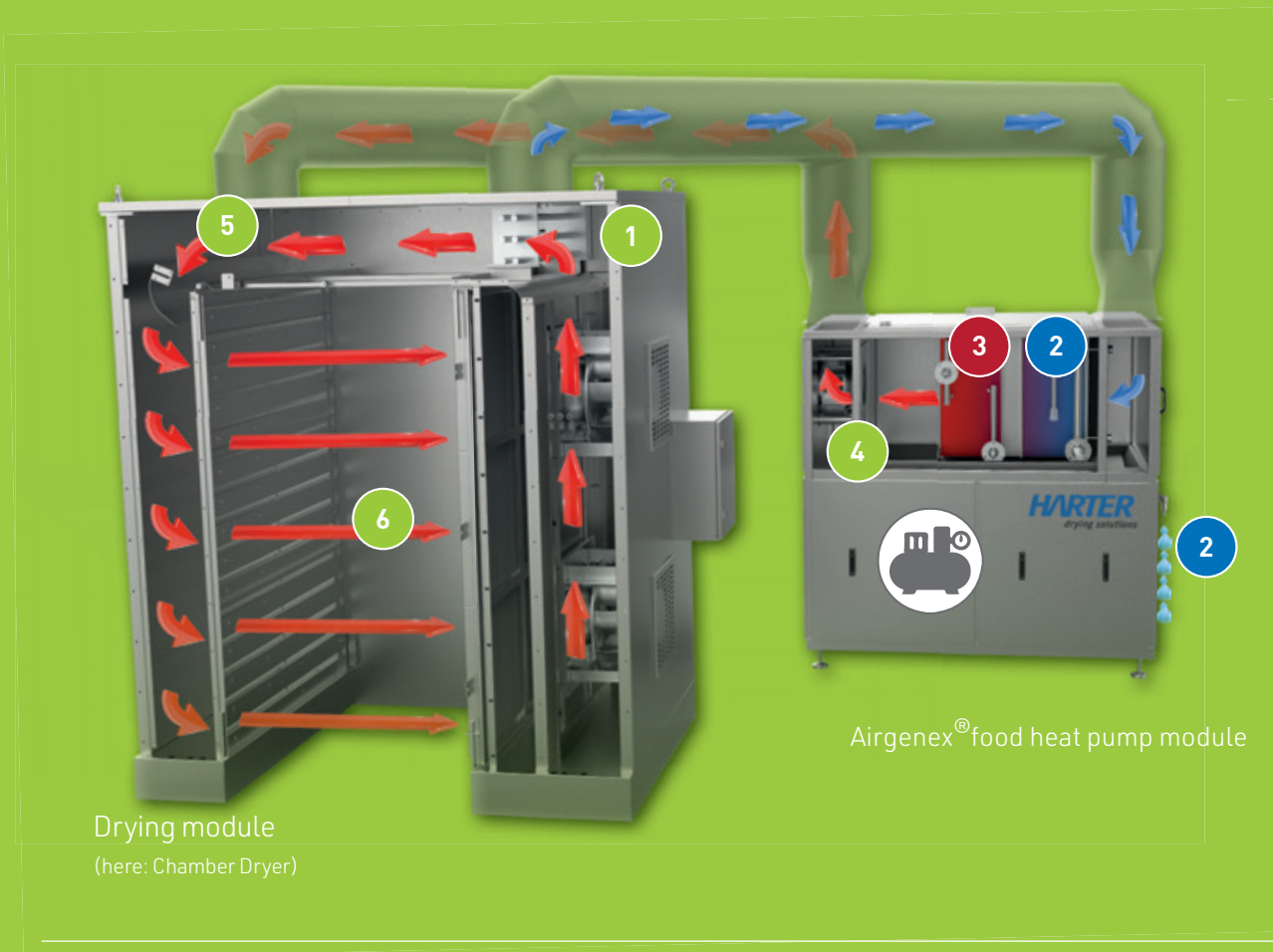
Or do you have a quite different idea?

Whatever considerations you make – we are innovative and our pilot plant station is available to explore ways of meeting your drying needs. You can count on us as your technology partner.

DRYING IN A CLOSED AIR CIRCUIT – WITH NO SUPPLY AND EXHAUST AIR

Harter's low energy drying systems are capable of drying your foodstuff in a gentle, reliable and uniform way to obtain the desired dry matter content.

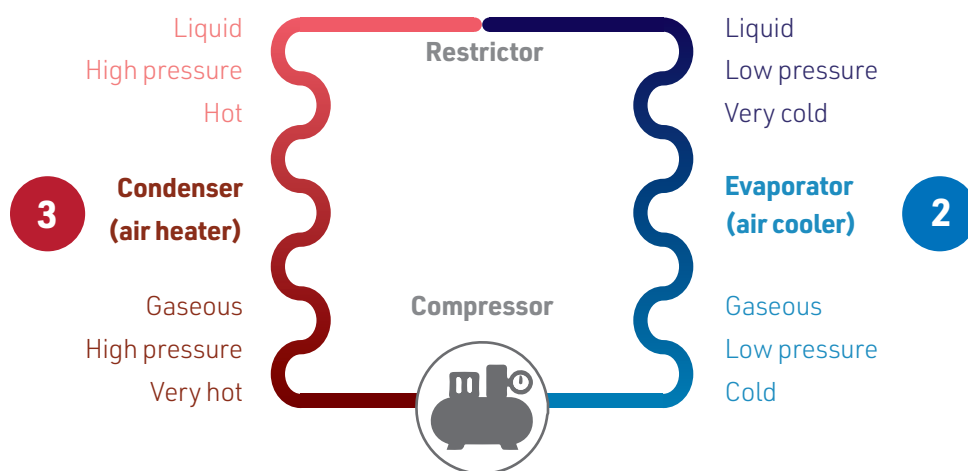
The drying system consists of a drying module and one or more –heat pump modules. The purpose of the heat pump module is to provide the necessary dry process air. The drying module is the place where items are dried.



6 Air circulation inside the cabinet dryer: optional air routing through the trolley



OPERATING PRINCIPLE OF A HEAT PUMP



1

Moist air is taken from the drying module and passed to the Airgenex[®] food heat pump module.

2

The moisture condenses on the air cooler fins and runs through the collector to the condensate drain where it leaves the heat pump module.

3

The air heater heats the dry air to the required process temperature.

4

The process air fan circulates the air between the heat pump module and the drying chamber.

5

The dry unsaturated air is supplied to the drying module where it mixes with the controllable main recirculation air and passes over or through the products to be dried.

6

The main recirculation air circulates within the drying chamber and ensures uniform drying.

SERIES MODELS

CHAMBER DRYER H01 Series

Many Opportunities

The H01 series module is ideally suited to drying foodstuff in a gentle and uniform way. Further modules may be added to the system as required to obtain more throughput.



H01compact

The compact dryer for product development and laboratory use combines both the drying chamber and the Airgenex® heat pump module in a single housing. Processers may use the H01compact if the standard H01 module chamber dryer is deemed too big. This compact dryer is perfectly suited for laboratory testing small quantities of items or for developing new products – the perfect solution for start-ups to assist in the initial development of their product idea.



Specifications	H01Module	H01compact
Temperature range	20 °C to 75 °C	20 °C to 75 °C
Single layer drying	Trays of various sizes and designs may be used.	
Usable surface area	48 m ² max.	12 m ² max.
Bulk material	Pans and baskets in various sizes and designs can be used. Maximum fill height is 175 mm.	
Usable volume	1.00 m ³ max.	0.2 m ³ max.
Dimensions [L x W x H]	2800 x 2300 x 3000 mm ¹⁾	1500 x 1060 x 1950 mm
Power input max	23.4 kW ¹⁾	8.6 kW
Rated power	11.9 kW approx. ¹⁾	4.2 kW approx.
Voltage/frequency	230/400 V, 50 Hz	230/400 V, 50 Hz
Air volume	10,000 m ³ /h max.	4,500 m ³ /h max.

¹⁾Airgenex® 6.000-heat pump module included, further combination possibilities on page 16

POSSIBLE COMBINATIONS

DRYING MODULES

Our drying systems may be extended by adding further modules to meet the requirement for more throughput. Your system may comprise up to five drying chambers combined with one or more Airgenex® modules.

With all these options, you are perfectly free to plan your future!

BASIC CONFIGURATION:

All chamber dryer modules have standard components as follows.

- 1.4301 stainless steel housing (AISI 304), double wall, sound and heat insulated (AISI 304);
- Integrated air recirculation system for forced air routing inside the drying chamber
- Airgenex®-air ducting system for constant supply, distribution and return of Airgenex® conditioned process air inside the dryer
- Two process air fan
- Drying chamber door
- Temperature sensor(s) [°C]
- Humidity sensor(s) [rF%]
- Heater battery, electrical (6 kW)



H01-L



H02-L



H03-L – H05-L

HEAT PUMP MODULES



Airgenex® 6.000



Airgenex® 9.500



Airgenex® 15.000

BASIC CONFIGURATION:

Heat pump based dehumidification component to condense water from the air – for direct connection to the chamber dryer modules. The energy released in the process is returned to the system through the heat pump.

All Airgenex® modules include the following standard components:

- Framework of heat insulated sections with FDA certified powder coating, RAL 9006 colour
- Double walled, insulated side panels from 1.4301 (AISI 304) stainless steel
- Coolant compressor (reciprocating piston type)
- Air cooler: Heat exchanger, fin type, with 1.4301 stainless steel core tubes, aluminium fins, epoxy resin coated
- Air cooler: Heat exchanger, fin type, with 1.4301 stainless steel core tubes, aluminium fins, epoxy resin coated
- Integrated fan for air exchange between Airgenex® and dryer
- Air filter to protect heat exchangers (filter class F7)
- Condensate drain
- Switch cabinet for basic functions

SPECIFICATIONS

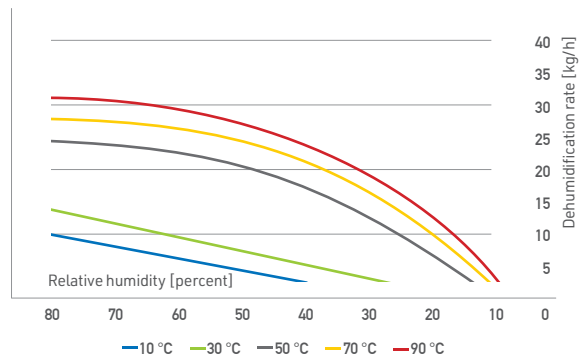
CHAMBER DRYER (H01-MODULE)

Standard temperature range: 20 °C to 75 °C
 Airflow rate: 10,000 m³/h max.
 Supply voltage: 230/400 V/50 Hz
 Connected load max: 9.8 kW

Operating power: 4.0 kW approx.
 Dimensions ext.: 1537 x 2060 x 2400 mm
 Dimensions int.: 1337 x 1060 x 2000 mm

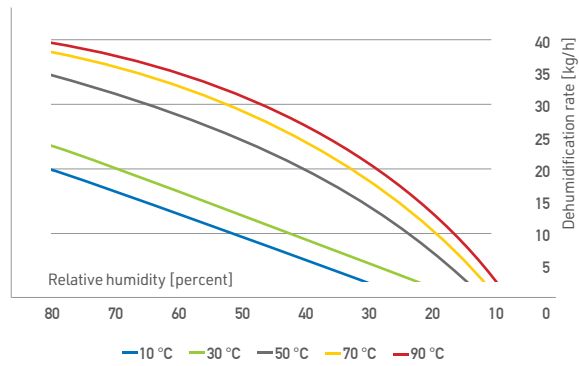
AIRGENEX[®] food 6.000

Standard temperature range: 20 °C to 75 °C
 Airflow rate: 2,000 m³/h max.
 Supply voltage: 400 V/50 Hz/3 Ph
 Connected load max: 13.6 kW
 Operating power: 7.9 kW approx.
 Dimensions: 1500 x 950 x 1600 mm



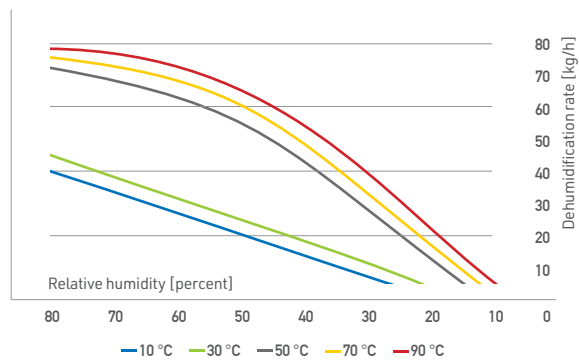
AIRGENEX[®] food 9.500

Standard temperature range: 20 °C to 75 °C
 Airflow rate: 3,000 m³/h max.
 Supply voltage: 400 V/50 Hz/3 Ph
 Connected load max: 19.9 kW
 Operating power: 9.8 kW approx.
 Dimensions: 2100 x 1150 x 1700 mm



AIRGENEX[®] food 15.000

Standard temperature range: 20 °C to 75 °C
 Airflow rate: 4,900 m³/h max.
 Supply voltage: 400 V/50 Hz/3 Ph
 Connected load max: 31.0 kW
 Operating power: 17.0 kW approx.
 Dimensions: 2300 x 1300 x 2000 mm



CONTROL – SMART IN EVERY DETAIL

- SPS-Control Siemens Simatic S7-1200
- Siemens Simatic HMI Panel

ADJUSTABLE DRYING PARAMETER COMBINATIONS

Time | recirculating air humidity | temperature over time | airflow rate

Any number of product specific recipes may be programmed and stored. Once started, the process runs in fully automatic mode until its end. The control unit also has an “expert” mode for product development.

REAL-TIME DATA TRANSMISSION AND PROCESS CONTROL

The controller may be operated and the drying process monitored in real time through the inbuilt HMI or external devices such as PC, tablet or smartphone. Drying parameter output or reading is possible at any time.



CONFIGURATION AND OPTIONS

CHAMBER DRYER AND DEHUMIDIFICATION MODULES / VARIANTS AND FEATURES

Air Filter (Airgenex®)	Filter class F7 to F9
Excess energy transfer	<ul style="list-style-type: none">— Air-air heat exchanger— Plate heat exchanger, cooling water
High temperature for sterilization	up to 110 °C
Additional drying chamber door	to provide an air lock (separation from production area)
Additional HMI	for air lock control (separation from production area)
Temperature sensor	PT100 [°C] (number may vary)
Humidity sensor	Relative humidity (rF) indication (number may vary)
Humidification unit	Ultrasonic humidifier for humidification process, integrated in the air circuit; 2 kg/h humidification rate
Filter wall, chamber dryer module	Filter classes G4 to F9
Heat pipe	Additional heat exchanger system to raise dehumidification rate and reduce energy cost
Weighing provision	to determine the current residual humidity content of the item to be dried
Remote servicing module	External access through LAN interface for process control and support
Recipe management	Management of specific recipes or drying profiles
User management	Management of the various user levels

THE MULTIFUNCTIONAL TRAY TROLLEY

Basic configuration:

1.4301 stainless steel rack (AISI 304), two castors, two fixed castors

Dimensions (mm):

1317 (L) x 805 (W) x 1960 (H)

BULK DRYING IN PANS OR BASKETS



Products which can be dried in bulk may be loaded 175 mm max. high. The direction of airflow is modified such that the air entering the chamber horizontally is diverted to flow vertically through the pans to finally leave the chamber horizontally again. This is the only way to ensure uniform drying of bulk products.

	Fill height max	Number of containers/trolley	Useful volume per container	Total useful volume per trolley	Container size length x width
Pan, stainless steel, small	70 mm	40	14.5 l	580 l	400 x 600 mm
Pan, stainless steel, small	100 mm	32	24.0 l	768 l	400 x 600 mm
Pan, stainless steel, small	150 mm	28	36.0 l	1.008 l	400 x 600 mm
Pan, stainless steel, large	150 mm	14	72.0 l	1.008 l	600 x 800 mm
Basket, plastic, small	70 mm	40	14.5 l	580 l	365 x 570 mm
Basket, plastic, small	132 mm	28	27.5 l	770 l	365 x 570 mm
Basket, plastic, small	175 mm	24	36.5 l	876 l	365 x 570 mm

For vertical air guidance, 1 pair of insert rails per container and air guide plates are required (2 pieces per layer).

SINGLE LAYER TRAY DRYING



Products are dried on trays using air routed horizontally.

	Number per trolley max	Useful area per tray	Total useful area per trolley	Tray size length x width
Tray, stainless steel, small	200	0.24 m ²	48 m ²	400 x 600 mm
Tray, stainless steel, small	100	0.48 m ²	48 m ²	600 x 800 mm

Perforated area, perforation specific to the product, minimum between trays 30mm

OPTIONAL DRYING SOLUTIONS USING BATCH PROCESSES

BARREL DRYERS

The variant for drying bulk material.

For uniform drying of more robust products, such as shell fruits, tubers, pomace and the like, barrel dryers are the most effective solution.



Barrel dryer

LARGE VOLUME DRYERS



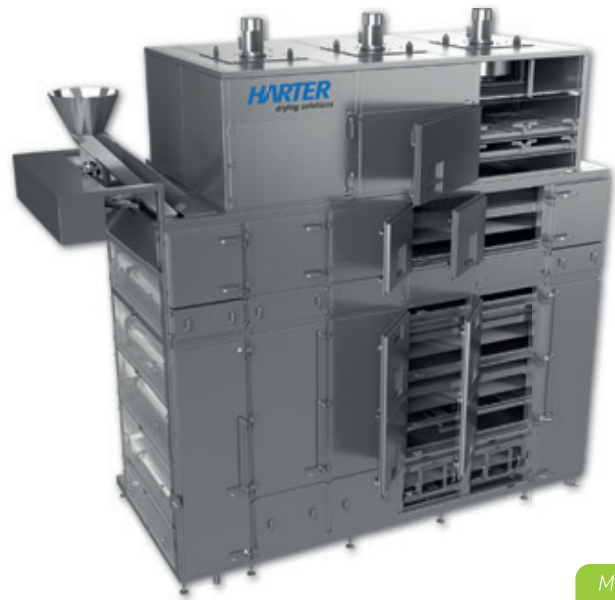
Large volume dryer

We develop customized drying systems where size and throughput are a factor.

BELT DRYERS – THE SOLUTION FOR LARGE PRODUCTION VOLUMES

Our chamber dryer systems ensure best results for many food drying applications.

Our belt drying systems with Airgenex® heat pump technology are best suited for large production volumes. They are capable of drying your foodstuff in a very gently way using a continuous process. We customize our belt dryers to exactly meet the requirements of your products, your specifications and the space available for installation. For more details refer to our belt dryer brochure.

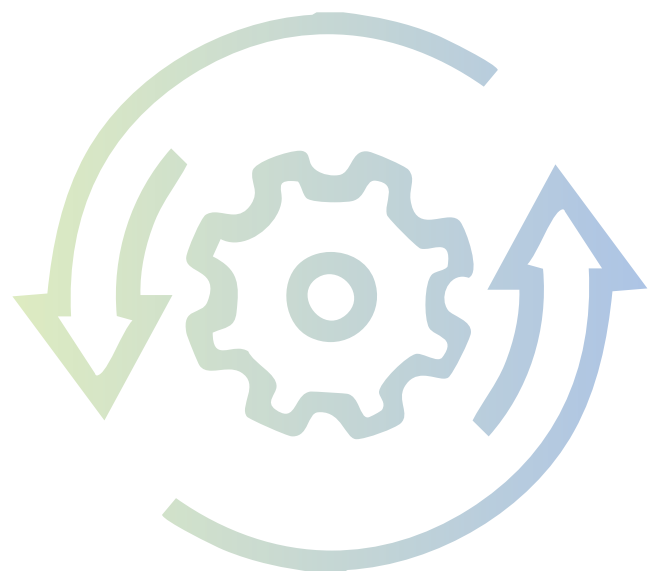


Multiple belt dryer

Conversion | Retrofit

Do you already have a dryer in use? Is it a fully functional dryer and fulfils all your quality requirements? The only drawback is the excessive energy consumption? Often fuelled by high temperatures and exhaust air?

Under certain circumstances, we equip existing dryers with our air circulation system and connect our heat pump module to the dryer. How things behave needs to be examined in each individual case.



TRIAL DRYING FOR BEST RESULTS



Our services include series of tests in our pilot plant station. This appears to be the best method for determining the parameters for successful drying. We run these tests – which you are welcome to witness – to identify the best temperature, humidity, drying time, air speed and airflow.

The documented results, our long experience plus your know-how form the basis for further system design which will also draw on approaches for solutions in many and most various projects.

ADDED VALUE AND REPRODUCIBILITY

We are an independent enterprise and have a continuous and homogeneous value chain with high know-how throughout our organization. We offer a comprehensive service package including expert advice, research, development and engineering, documentation, commissioning and after-sales-service. Our extensive vertical range of manufacture and qualified supplier management follow the lines of our „Made in Germany“ philosophy.

Decades of experience and our understanding of processes are the basis of our self-contained technology which continuously monitors and automatically controls temperature and other drying parameters of your processes. Product drying results are reproducible and support your zero defects production.

**„You need reproducible results.
We deliver them.“**

CUTTING DOWN CARBON EMISSION WITH HARTER DRYING SYSTEMS

Heat pump based Airgenex[®] food condensation drying systems have demonstrated to significantly reduce carbon emission. These systems are also capable of keeping



the process parameters stabilized.

Government subsidies may be granted for saving carbon emission.



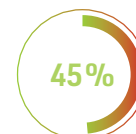
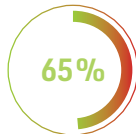
Ersparnis Energie



CO₂



Belt Dryer



Chamber Dryer



YOUR FULL-SERVICE PARTNER FOR DRYING



CARBON SAVING




GOVERNMENT SUBSIDY



PILOT PLANT STATION



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