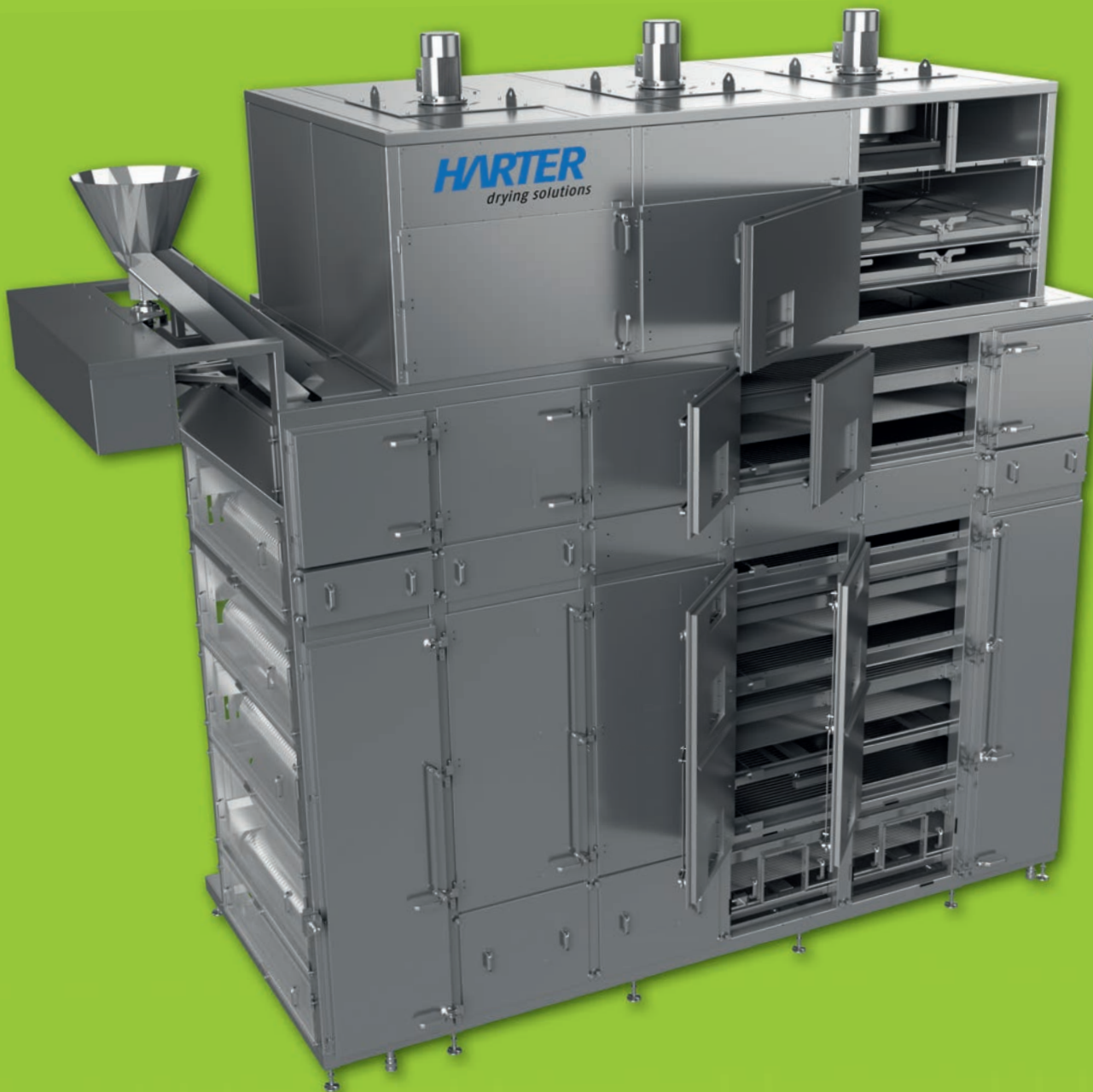


AIRGENEX® food –
Continuous Operation Systems

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** (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® 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, and us, the supplier. 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



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, is



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.

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.

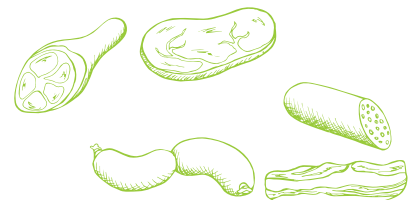


TROPICAL FRUITS

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?

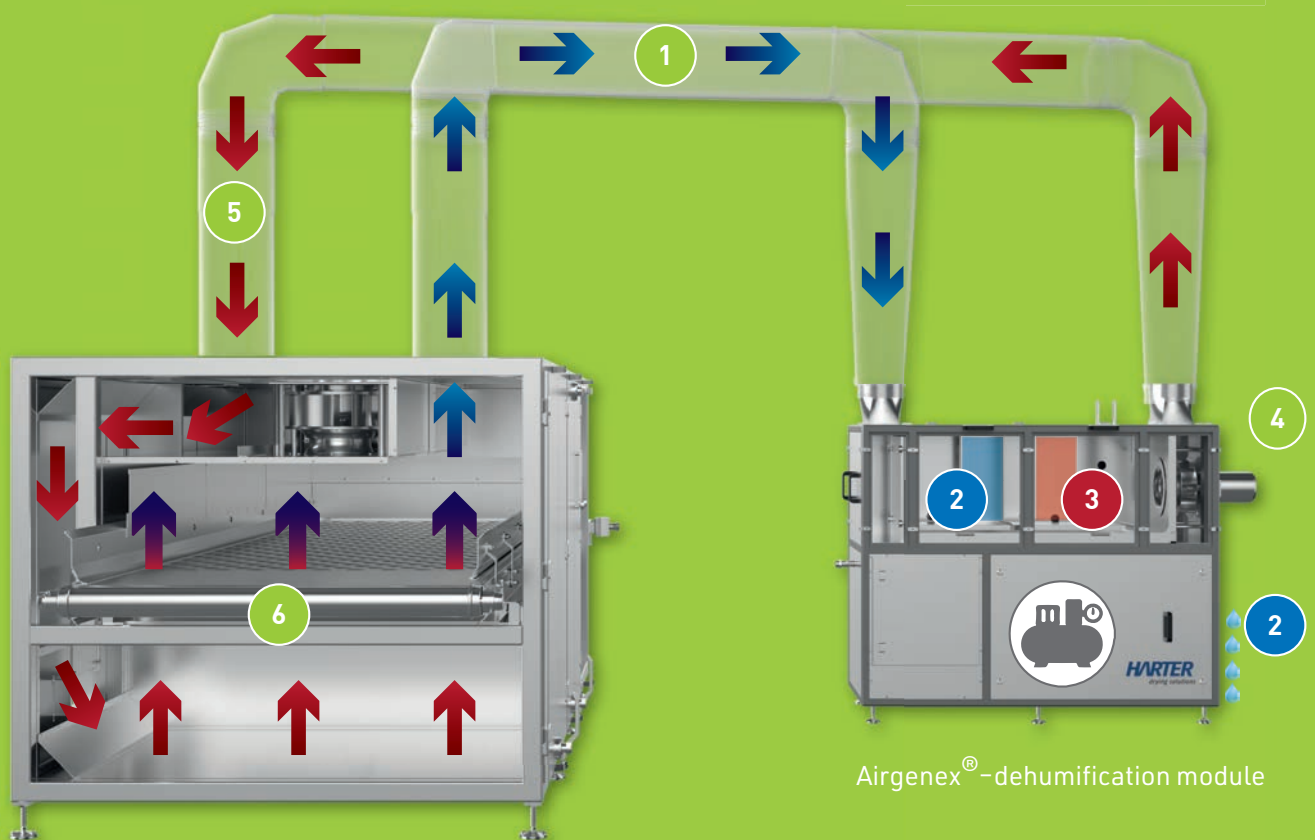
Or do you have a quite different idea?

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

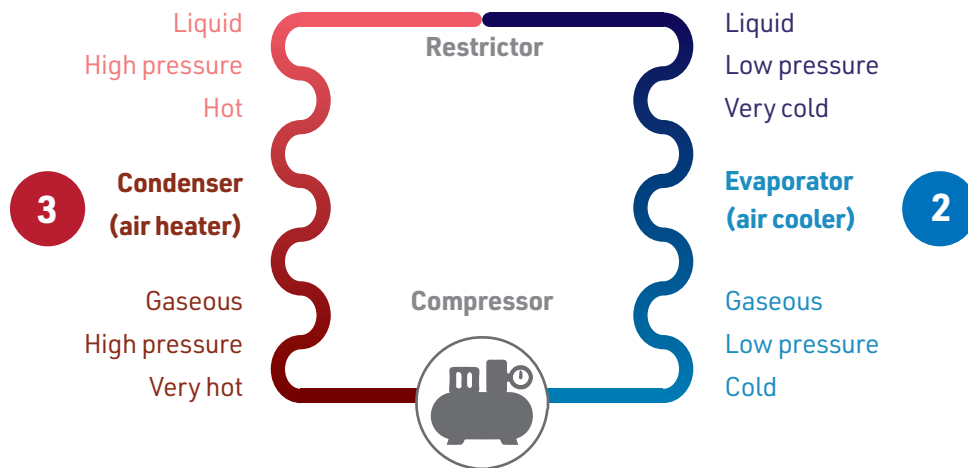
Harter's low energy drying systems are capable of drying your foodstuff in a gentle, reliable and uniform way to obtain the desired dry matter content.

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



Drying module
(here: belt dryer)

OPERATING PRINCIPLE OF A HEAT PUMP



1

Moist air is taken from the drying module and passed to the Airgenex® dehumidification module.

2

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

3

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

4

The process air fan circulates the air between the dehumidification 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.

CONTINUOUS OPERATION DRYERS

For production volumes where batch operation is impracticable, continuous operation drying systems are used. We customize our drying technology to perfectly meet your requirements. From various options, we develop, together with you, the most

efficient solution for your product. Access openings and lids are provided for easy and quick cleaning and maintenance. Our customized, special Airgenex® condensation drying system will help to make your product stand out from competition.

SINGLE BELT DRYER



Single Belt Dryer

Our single belt solutions are the best choice when it comes to drying sensitive products that may be moved minimally, only, while being dried. The items to be dried are placed on a belt pervious to air and conveyed through the drying chamber otherwise unmoved. Defined direction and speed of air flow, minimum required drying temperature and as-needed drying time are the process parameters that ensure process reliability.

MULTIPLE BELT DRYERS

Our multi-belt dryers are the suitable solution for bulk material requiring extended belt lengths to become completely dry. In this application, the items to be dried are conveyed by multiple belts pervious to air in vertical array. This allows efficient pass-through times and space-saving layouts to be achieved. The controlling drying parameters are much the same as for single belt drying.



5-Belt-Dryer

CONTINUOUS BARREL DRYERS

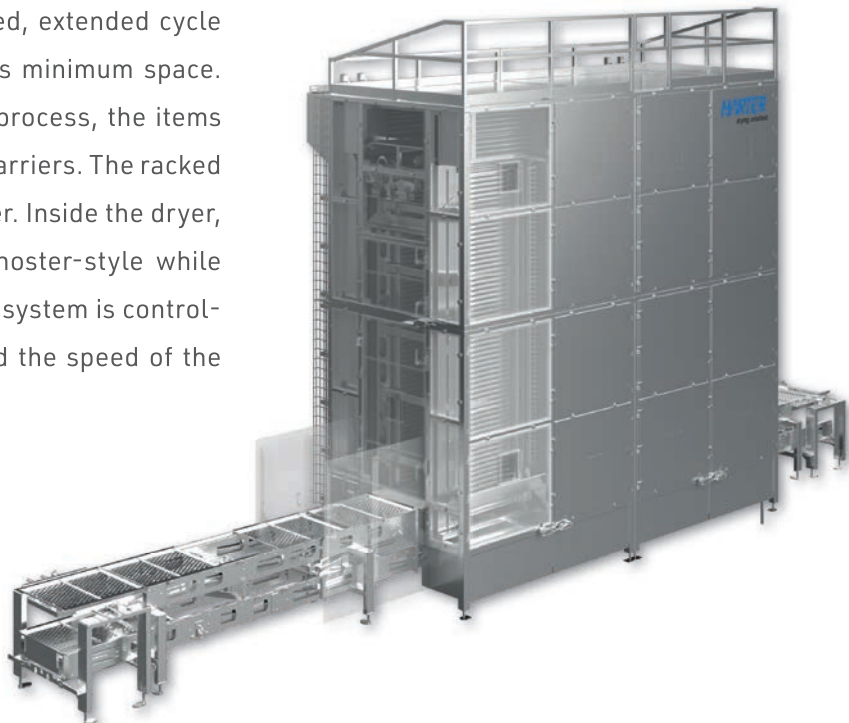


Barrel dryer

Barrel drying is best suited to dry very small sized bulk material. Upon completion of an upstream process, the material to be dried is loaded into the barrel. The material is conveyed to the barrel exit by the combined action of barrel rotation, small angle inclination of the barrel body and blades mounted on the interior walls of the barrel. The process air is drawn through the barrel by way of counterflow and ensures uniform drying.

PATERNOSTER DRYERS

The paternoster dryer is the type of choice if a continuous drying process for separated, extended cycle time items is desired that requires minimum space. Upon completion of an upstream process, the items are separately placed on product carriers. The racked items are then loaded into the dryer. Inside the dryer, the products are conveyed paternoster-style while being dried. The size of the drying system is controlled by the drying temperature and the speed of the process air flow.



Paternoster dryer with four levels and four Airgenex® dehumidification modules

SPECIFICATIONS

AIRGENEX[®] 6.000

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



Airgenex[®] 6000 dehumidification module

AIRGENEX[®] 40.000

Standard temperature range:	20 °C to 75 °C
Airflow rate:	20,000 m ³ /h
Supply voltage:	400V/50 Hz/3 Ph
Connected load max:	120.0 kW
Operating power:	100.0 kW
Dimensions:	4300 x 2300 x 3000 mm



Airgenex[®]40000 dehumidification module

Other AIRGENEX[®] sizes (9.500 / 15.000 / 30.000) may be used.

More than one AIRGENEX[®] dehumidification modules may be used in a system as required to achieve the specified throughput.

CONTROL – SMART IN EVERY DETAIL

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

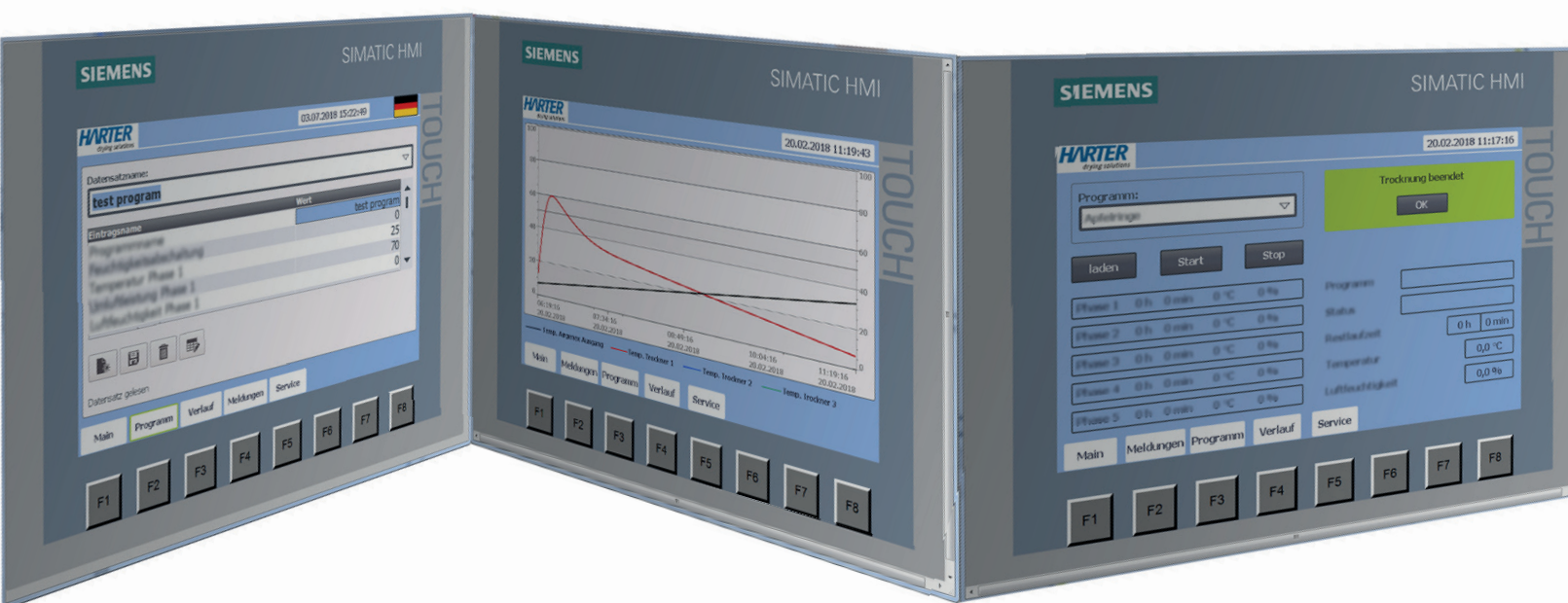
ADJUSTABLE DRYING PARAMETER COMBINATIONS

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.



CHAMBER DRYERS – THE MODULAR SOLUTION FOR SMALLER BATCHES

Our chamber drying systems offer best results for many foodstuff drying applications. The H01 series module is ideally suited for drying foodstuffs in a gentle and uniform way. The dryer may be extended by as much as four modules if required. The drying chambers are supplemented by Airgenex® dehumidification modules. For more details refer to our chamber dryer brochure.



H01-Chamber dryer module



H01compact

H01 *compact* – the compact dryer for product development and laboratory use 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.

OPTIONAL DRYING SOLUTIONS FOR BATCH OPERATION

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.

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® 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.

YOUR FULL-SERVICE PARTNER FOR DRYING



CARBON-SAVING




PILOT PLANT STATION



GOVERNMENT SUBSIDY



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