

Drying Technology

- *technology for free-flowing bulk materials*
- *grain chilling technology*
- *drying technology*
- *warm air heater*
- *bulkstorage technology*
- *conveying technology*

Drying Plants

**biological and economical
ideal to ensure your crop**

business worldwide



www.goldsaat.com

goldsaat[®]

AGRARTECHNIK



goldsaat DRYING TECHNOLOGY



goldsaat-Quality for the future!

For many decades, **goldsaat** has been successfully working in the drying process and initiating some decisive developments.

The **goldsaat continuous drying systems**, which can be enlarged to cover capacities of 0,5 to 150 t/h, are of modular design. They have been built to up-to-date economical and ecological knowledge.

Our advanced developments focus on smooth and biological drying of consumer grain, brewery barley, seed corn, maize, oil seeds, pulses, rice etc. and establish priorities on energy-saving equipment.

Both established, as well as completely new drying techniques, equally influence the design of new plants. Not only the Drying process for yellow corn (i.e. drying by warm air and subsequent aeration in a silo) is used but also care is taken for an optimum energy exploitation by heat recycling, to increase the drying capacity and to decisively improve the quality of grain.

The **goldsaat cascade system** is made of corrosion-proof light metal alloy which offers both, long lifetime and smooth and non-clogging throughput. Furthermore, the warm air sections are insulated against energy loss, while blower fans may be optionally fitted at discharge or suction side.

High efficiency is one of the remarkable features of **goldsaat air heaters**. Depending on the actual application, they are direct or indirect acting, whereby the indirect acting one may be optionally completed by a change-over switch to cover both operating modes.

Air heaters by **goldsaat** reach capacities of up to 2800 kW (approx. 2,4 Mcal / h).

The **goldsaat moisture controller** may be extended to fully automate the drying process and thus prevent under or over drying and reduce necessary supervision by staff to a minimum.

Almost any problem may be resolved by **goldsaat!**

goldsaat-DRYERS:

We have always been dedicated to supplying products of high quality and reliability.

Therefore, **goldsaat ceiling duct continuous driers** are made of corrosion-proof sheet metal alloyed by aluminium-magnesium.

Many installations of our early days are still working to the satisfaction of our clients. This is certainly one of the reasons why **goldsaat** remains one of the top addresses in dryer construction.



Abb. 1: Volksbank Dransfeld, GKT-V9, 40,5 t/h

Abb. 2: Cargill, Salzgitter Rape dryer, 48 t/h

Abb. 3: Cargill, Salzgitter Rape dryer, 48 t/h

Abb. 4: Gruduva, Litauen

Abb. 5: Agrocom, Ungarn

Our products and experience will ensure and maintain the quality of your harvest!

Complete Plant CROSS SECTION

Deflector hood

CentroKlin-
dust filter

Radial fan

Air exhauster

Precleaner SIVO UL

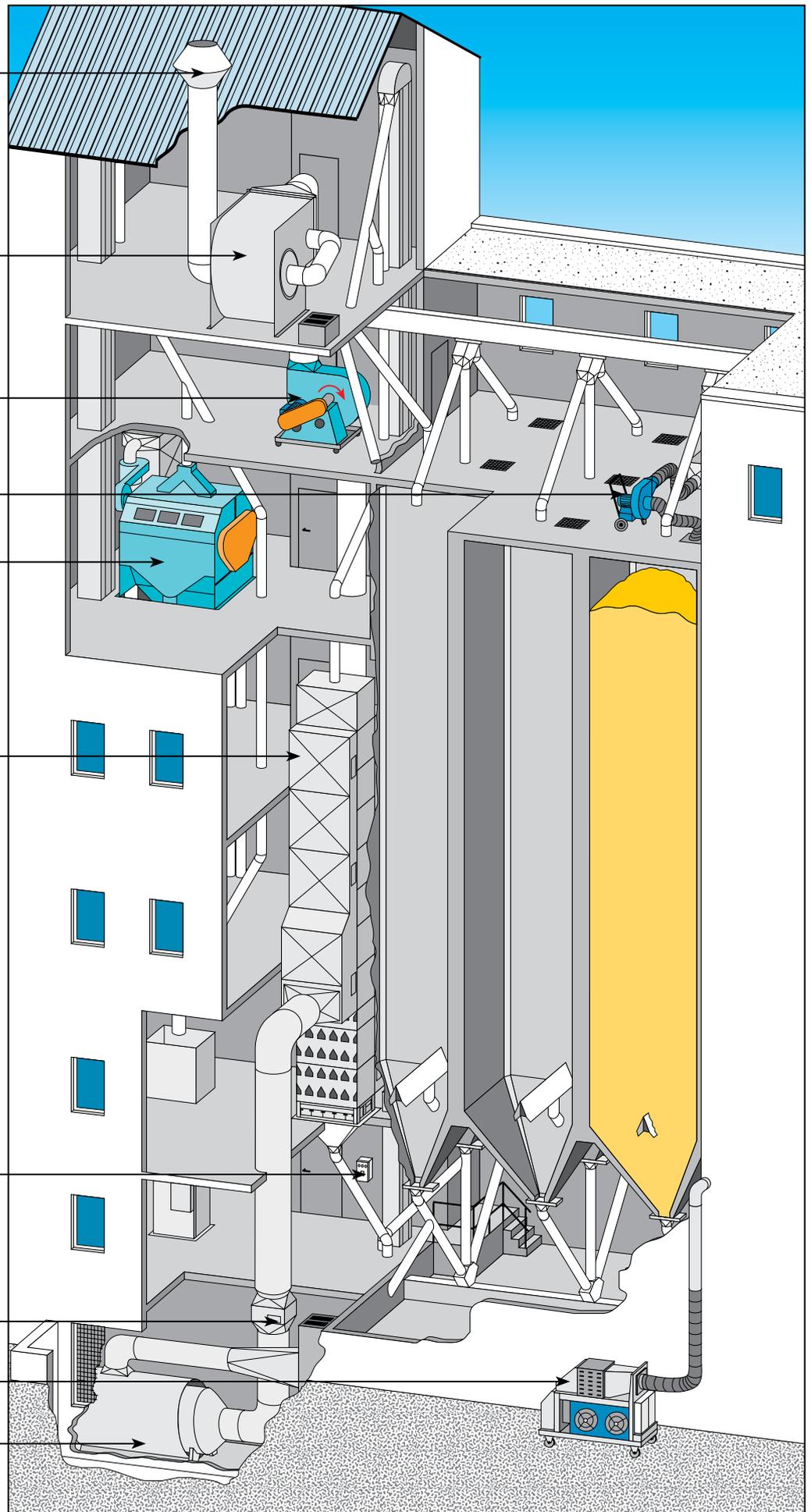
Ceiling duct
continuous dryer

Moisture controller

Fire protecting flap

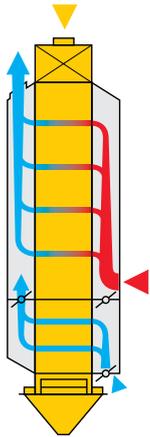
Grain cooler

Air heater



goldsaat VERTICAL DRYERS

System SP:



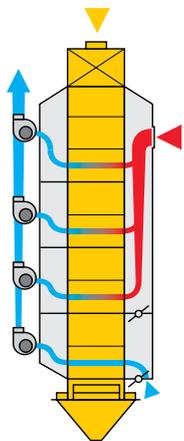
Universal continuous dryer

For the drying of cereals, maize, oil seeds, pulses, semolina of maize, coffee, rice, fine seeds, etc.

Trouble-free extraction of high or low moisture contents from the grain. Uniform drying and excellent energy exploitation.

- ▶ Grain stream
- ▶ Heat stream
- ▶ Recooling/exhaust air

System SP MOD S:



Multi-stage combination dryer >S<

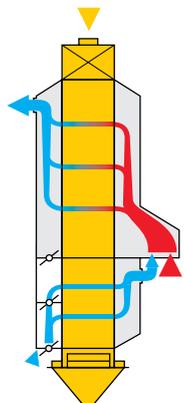
Preferably used for maize-drying. Modulating drying by patented **goldsaat** system.

Fans are positioned at the suction side of the dryer. The temperature of the warm air will be adjusted to the biological tolerance of the moist product and controlled by a mixer at the control position of the drier.

Variable cooling sections and usage of the Dryeration process upon request.

- ▶ Grain stream
- ▶ Heat stream
- ▶ Recooling/exhaust air

System SP WRG:



Continuous drier with heat recycling

Heat remaining in the grain is extracted from the lower warm air section and the upper recooling section and fed back to the main stream of warm air.

High energy saving and low specific heat requirement are special features of this system.

- ▶ Grain stream
- ▶ Heat stream
- ▶ Recooling/exhaust air

goldsaat MAIZE DRYERS

Constructional Features (series UL):

Characterized by following special advantages:

- parts which are exposed to weather are made of aluminium
- all parts in contact with the product are made of aluminium (Al Mg3 G22), too
- big sized dust collecting chambers
- generously designed cleaning pedestals
- useable fan platforms
- low thermal energy consumption and minimum electrical power demand

Upon request, the following may be supplied:

- multi-grading warm air sections
- heat recycling devices
- installation of silencer to reduce noise emission caused by air exhaust

Working principle (series UL):

After filling the plant with moist maize, external air is sucked in via axial fans and heated in the warm air column from where it will enter the air distributor of the drying column, run through the maize and thereby absorb moisture.

Saturated exhaust air will pass the unit via deflector hoods while partly saturated warm air will return to the fresh air in the lower section of the exhaust air column.

Drying and cooling sections may be modified by adjustable pneumatic flaps, and the warm air temperatures selected by control units.

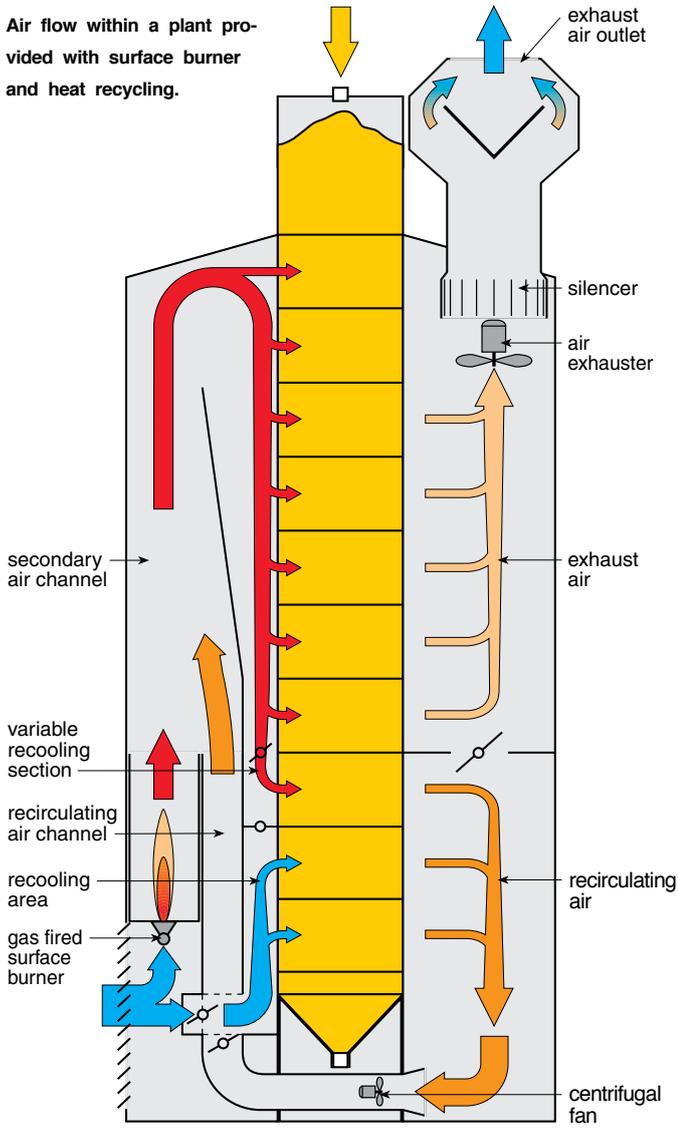
When the maize has reached the final degree of moisture, the moisture controller ensures that the dried product is released via slides (discharge system) and transported away by conveyors.

Heating devices to maize dryers:

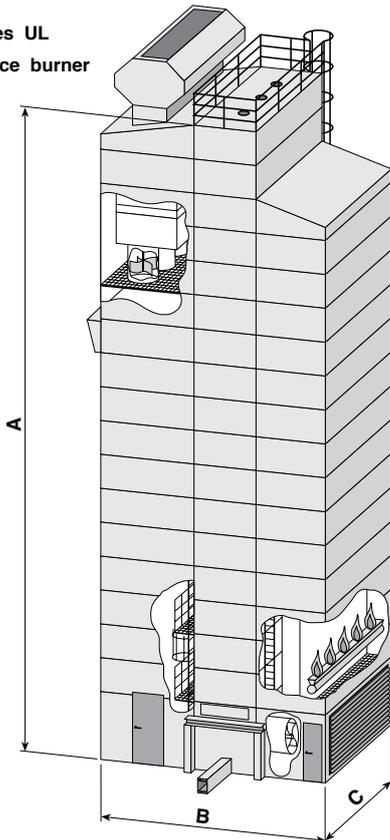
Heating may be done by:

- indirect/direct generation of warm air by oil or gas fired burners or two-fuel burners
- allgas surface burners, heat exchangers for warm water or steam

Air flow within a plant provided with surface burner and heat recycling.



Maize drier, series UL
Heating by surface burner



Selection chart, Maize drier

Type UL Installation depth-/ Nominal size	Dimensions (mm) **			Moisture product Capacity (kg/h)*
	A	B	C	
V 5 - 5/2	10200	5900	2500	3000
V 5 - 10/2	15800	6600	2500	6000
V 8 - 9/2	14700	5900	4000	8000
V 8 - 12/2	18100	6600	4000	11000
V 10 - 12/2	18100	6600	5000	14000
V 12 - 12/2	18100	6600	6000	16000
V 12 - 15/2	21500	6600	6000	20000

* Design
Extraction: 20% (35% on 15%)
Ambient temperature: 10°C, relative moisture: 80%
Warm air temperature: 130°C / direct heating / gas

** at a frame height of approx. 1800 mm

goldsaat FLAT BED DRYERS



Flat bed driers are an alternative to continuous driers and especially suitable for viscous goods. Uniform and careful drying is guaranteed.

They are used for the drying of cotton, acorns, carobs, shred products, oil seeds, pepper, grain, rape, maize, etc.

Following remarkable features characterize the universal **goldsaat** flat bed dryer (GUF):

- cost saving concept at favourable price
- high efficiency and universal utilization spectrum
- independent from building, mobile execution available upon request
- efficient dust cleaning
- 5 expandable base types

Description of drying process:

The moist product passes the big wall-mounted drawer-like canister and falls onto the drier's floor. Thickness of layer is adjustable and dosing done by feeding cylinder or slide valves.

The moist product will be transported and turned by rotating turner. Transport speed of dried product is adjustable so that the drying process as well as the amount of moisture extraction may be regulated.

The product is dried by warm air which is generated by directly or indirectly fired durable **goldsaat air heaters** and the temperature automatically controlled by thermostats.

For the feeding of warm or cold air, silent **goldsaat radial fans** are used which will evenly press warm or cold air through the product to be dried.

Having passed the drying and cold air section, the dried product will reach the outlet.

Due to time-controlled stopping of turner, the dryer may also be used as salt dryer.

Control unit:

For all control functions, GUF-dryers will be supplied with a completely equipped control unit, including timer for the regulation of drying capacity.

Dust cleaner:

To comply with different demands of practice, you may choose between three systems:

1. Hermetical hood

This hood type which covers the whole GUF drying surface allows a dust-free drying process since the arising dust will be directed to cyclones or dust filters connected to the outlet side.

This execution is especially suitable for residential areas.

2. Immediate dust cleaner

With this type, only the roll-over carriage will be intensively cleaned since most of the dust will arise here.

Dust will be blown through the rubber plate pipe which is positioned above the dryer into the cyclone or dust filter.

3. Exhaust air collecting hood with flexible walls and suction device

This type is provided with lateral rubber cloth to:

- ensure dust-free drying process
- observe the dryer bed or control the product being dried

Dusty air will be evacuated by air exhausters.

goldsaat RICE DRYERS

For the drying of paddy-rice, **goldsaat** has developed special dryers which have proven reliable in many rice cultivating countries under most severe conditions.

Very good drying results are not only achieved with Paddy-rice, but also with peeled rice, any cereal, pulses, coffee, fine seeds etc. It does not matter if drying is done by one or more passages, in one or more drying columns. With the correct temperature careful drying is always guaranteed and cracking or damage of corn avoided.

Temperature control by thermostats ensures simple operation. Using the **goldsaat moisture controller** will automate the drying process, even with bulk goods with most different moisture contents.

To generate warm air, we recommend the oil fired **goldsaat air heaters** which work either direct or indirect.

goldsaat TECHNOLOGY

Lifetime of **goldsaat dryers** is practically unlimited. Every part in contact with the corn – such as lateral columns and air distribution systems – is made of aluminium.

A certain quantity of magnesium makes the „soft“ aluminium hard and the surface resistant. The corrosion-proof material is especially suitable for outdoor installation.

But the most important aspect is provided by experience:

Due to the fact that aluminium is smooth and not treated, microorganismes and larva are deprived from refuge and fertile soil.



Drying unit without collecting pockets (special execution) ▼

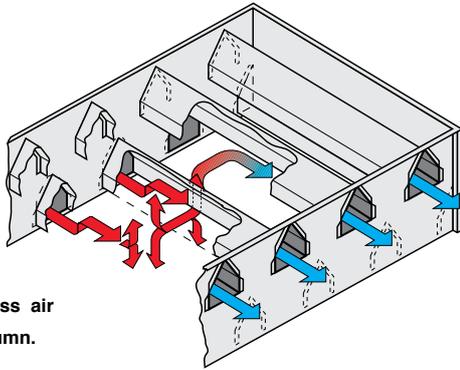
▲ Drying unit with collecting pockets



Warm air distribution:

To ensure that almost every corner of every single grain is exposed to the same stream of warm air, we concentrate on a uniform distribution of warm air within the dryer column.

This is achieved by air distributors, shape and space of which enable careful drying, even with higher temperatures. Furthermore, rooflike installations make sure that the grain is deflected to different directions and, at the same time, moved.

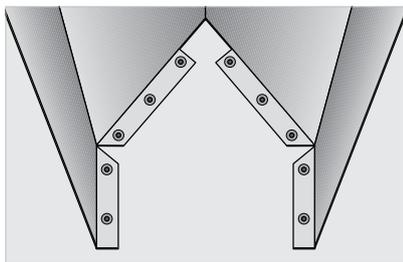


Distribution of process air with filled dryer column.

Air distribution:

Arrangement of air distributors changes from open to closed. Air does not only cross the flow direction of the product but also deflects upwards and downwards within the product.

Thus, process air in the dryer column is a combination of axial-flow, unidirectional flow and crossflow.



Fixing the air distributors (fig. special execution)

goldsaat COVERINGS



Trapezoidal profiles with high-quality synthetic coating protect against weather conditions and mechanical damage.

We may not only provide individual painting but also special isolations to prevent heat loss and reduce the noise level.

goldsaat FANS



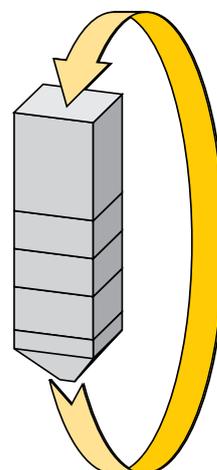
For dryers, **goldsaat** exclusively employs high performance fans, efficiency of which exceeds 80 % by far.

Special formation of fan wheels and special design of the case spiral ensure that excellent fluidic results are achieved.

Above all, good guidance of air during deflection and optimized reduction of losses by gaps lead to ideal utilization of the fan.

In order to reduce the noise emission only fans with low rotation speeds are used. Vibration dampers and flexible sleeves will almost completely absorb vibrations.

goldsaat RECIRCULATING DRYERS

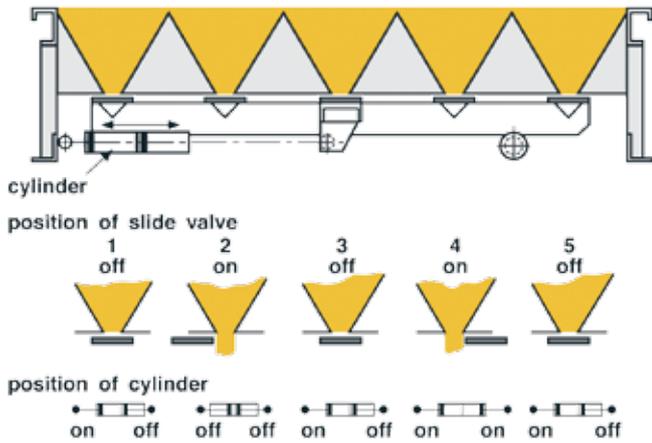


goldsaat recirculating dryers are especially characterized by uniform drying and good energy exploitation.

Due to the fact that the product is permanently mixed, thermal load of grain is reduced, thus air temperature in the dryer may exceed the temperature that is acceptable with drying of immobile layers.

This type of dryer is equally suitable for cereal, maize, rape, sunflower seed, peas and beans.

goldsaat DELIVERY SYSTEM



In addition to optimum design and position of air distributors, the delivery system helps the grain to leave the column in uniformly dried condition.

As soon as the required moisture content is reached, a pneumatically activated slide valve which is fitted below the discharge opening of the drier column will release openings for a certain period of time and thus lowering the grain in batches and in layers.

A moisture controller will provide the necessary impulse to control the speed of the pneumatic cylinder.

goldsaat COLLECTING POCKETS



Until today, drying light products demands for considerable throttling of air to avoid ripping off the grain from the column.

The collecting pockets (DBGM) have been designed for installation to the orifice of the air distribution channel, on the moist side of the air.

Thus drop in performance – e.g. with rape drying – is a thing of the past.

goldsaat CONTROL

goldsaat dryers operate fully automatic

Special attention has been given to reliable operation which is demonstrated by a burner that supplies the grain with an acceptable quantity of heat only.

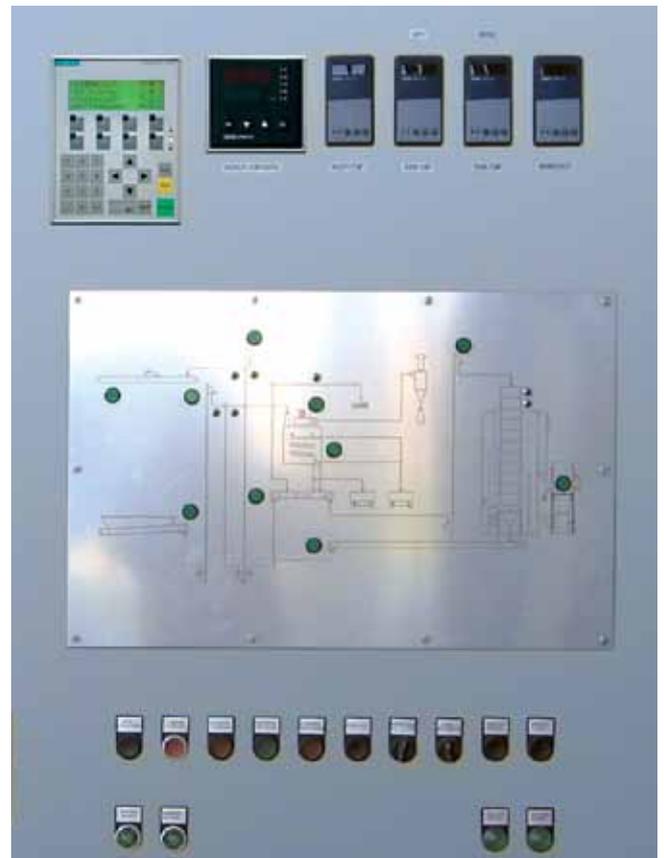
The grain itself will leave the dryer only after the scheduled moisture content has been reached. Required data is fed to a controller and may easily be verified at the display. A safe and user-friendly control that you will become acquainted with quickly.

The moisture controller is an ideal supplement to the delivery electronics and automatization of the drying process. It consists of 2 electronic on-off-controllers with digital indication of the actual value, ideal value controller and 2 Pt 100 thermistors.

This moisture controller must ensure that a pre-selected final moisture content of the product being dried is reached and kept, even with bulk goods of different moisture contents.

Both Pt thermostats which are installed at the beginning and at the end of the drying section determine the temperature of the grain and transfer these values to the electronic control (SPS).

This in turn regulates the throughput speed through the slide valves on the delivery system. Depending on sensed temperatures, the delivery system will operate faster (with dry bulk goods) or slower (with wet bulk goods).



goldsaat AIR HEATERS



Modern **goldsaat** air heaters and utilized blast burners require little maintenance and are insensible to trouble. They work safely and automatically.

With indirect air heaters, the process air will be guided across the heated exchanger surface whereby it will be heated up. Fumes must be deflected through a chimney.

Air heaters operate economically and provide excellent firing efficiencies of more than 92 %

With direct air heaters, fumes mix with process air and float the goods being dried.

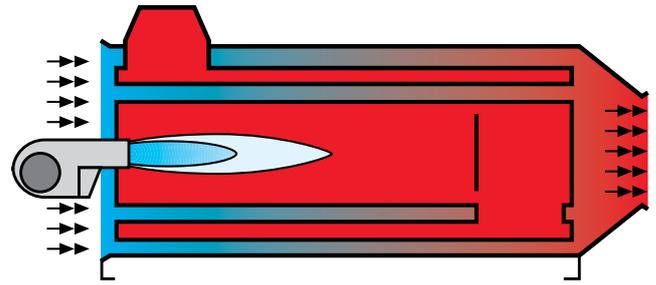
Whilst application is restricted (bread grain!), quick heating and almost 100 % energy exploitation are most advantageous features.

Upon request, **goldsaat** air heaters are supplied with change-over device for direct/indirect heating which allows for direct drying of maize and indirect drying of grain.

Warm air may be also generated by steam or water heat exchangers which are fed by e.g. a district heating station.

We also supply gas-fired surface burners which are installed into the warm air hoods of the driers.

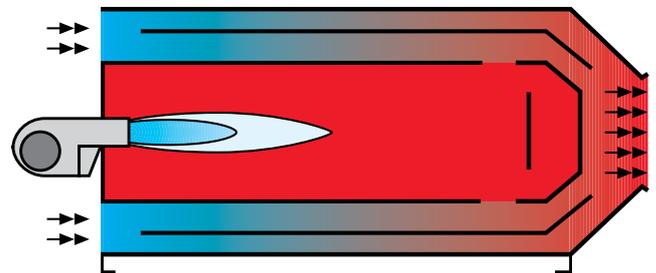
The **goldsaat** air heaters are designed for capacities of up to 2800 kW (approx. 2,4 Mcal/h). High performance driers for grain or maize are equipped with two or more aggregats.



Flow of heated air in air heater.

above: indirect heat exchanger

below: direct heat exchanger



Oil burner for light and heavy oil

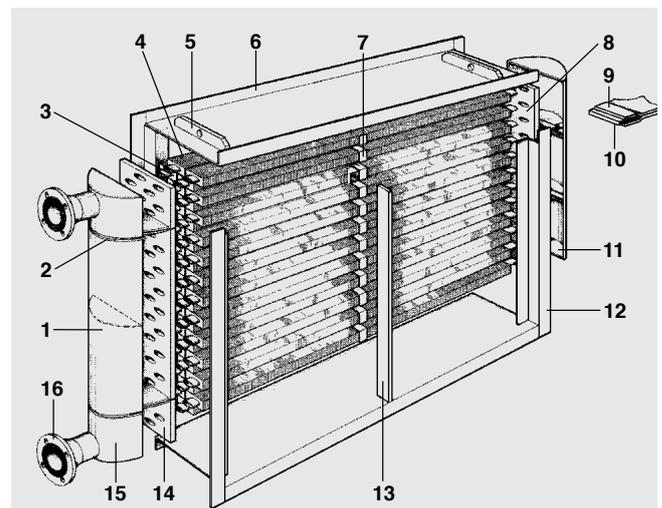
Gas burner for natural and liquid gas ▼



Heat exchanger for hot water and steam (right)

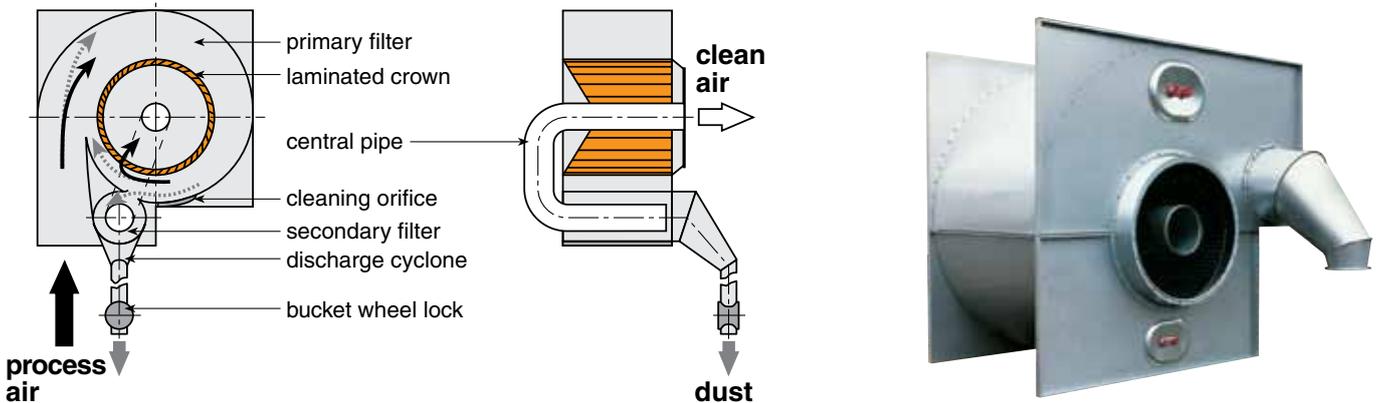
Legend, heat exchanger:

- | | |
|------------------------|------------------------|
| 1 Chamber profile | 9 Separating metal |
| 2 Chamber separation | 10 Seal |
| 3 Elliptic core barrel | 11 Head sheet |
| 4 Fins | 12 Cover profile |
| 5 Lifting handle | 13 Metallic carrier |
| 6 U-type wall | 14 Pipe expansion side |
| 7 Profile tape | 15 Pipe socket |
| 8 Pipe fixed point | 16 Welding neck flange |



CentroKlin - dust filters:

To operate driers, powerful dust filters are a must, therefore all **goldsaat** dryers use **CentroKlin** dust filters which are characterized by high cleaning efficiency and small dimensions.



Functionality:

Within the primary filter, process air is set to rotatory motion whereby the centrifugal force causes heavy particles to press to the outer wall, thereafter, it flows through the tapered air chamber with increased velocity and centrifugal force finally reaching a separating lip, deflecting the dust to the secondary filter at the end of the spiral. Still containing some fine dust particles, the flow direction of air will be reversed by a laminated crown which is installed opposite to flow direction, residual dust particles will enter the primary air stream again from where it will reach the secondary filter with incorporated discharge cyclone and bucket wheel lock. The cleaned air will be fed to the main air stream again via central pipe.



DEKRA - control center for environmental protection
(extract from measuring results)

Measurement No. 3	
Aspiration time:	30 min
Temperature (gas meter):	13° C
Vacuum pressure (gas meter):	50 hPa
Aspiration volume:	3,490 m ³
Dust amount (absolute):	8,5 mg
Measurement No. 4	
Aspiration time:	30 min
Temperature (gas meter):	13° C
Vacuum pressure (gas meter):	50 hPa
Aspiration volume:	3,538 m ³
Dust amount (absolute):	12,5 mg

Illustration opposite shows a complete dust cleaner fitted to a vertical continuous dryer:

Top section: deflector hoods with connection pipes.

Middle section: **CentroKlin** dust filter with bucket wheel lock for the discharge of dust, air exhausters are found below.

Middle section: **CentroKlin** dust filter with bucket wheel lock for the discharge of dust, air exhausters are found below. To operate properly and to create sufficient centrifugal force, the **CentroKlin** dust filters require a minimum quantity of air. With small-sized grain like rape, poppy or sesame, the process air stream must be reduced to avoid sweeping off the corn. In such cases function is maintained by adding secondary air. With smaller driers, well proven **goldsaat** cyclones are still used. If special legal regulations for dust immission must be kept, dust or nozzle filters are employed.

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Grain: cleaning, drying and chilling

business worldwide



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Conveying Technology:
 Gentle conveying of pourable goods



Drying Technology:
 biological and economical ideal to ensure your profits.



Chilling Technology:
 for a chemical-free conservation



Cleaning Technology:
SIVO UL - available for capacities of 20 - 200 t per hour



For many decades, goldsaat has been operating successfully in the area of cleaning, drying, and cooling technology. We offer you an extensive range of products and accessories!

- chillers
- warm air dryers
- air heaters
- dust removal systems
- high cell exhaust fans
- portable samplers
- grain silo duct systems
- ventilation systems with and without temperature difference control

Our products and expertise will ensure and preserve the quality of your harvest!