



AGRARTECHNIK GmbH

Grain dryer

Operation- and maintenance manual

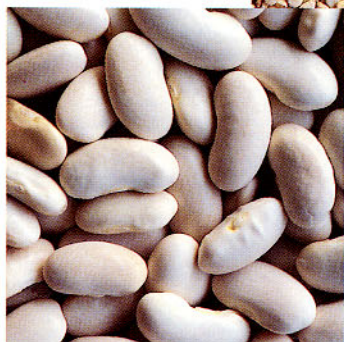
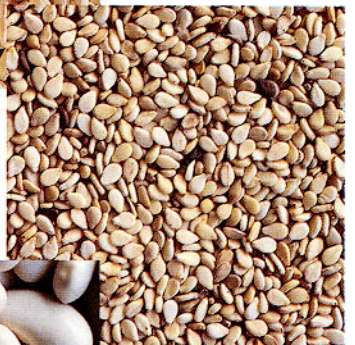
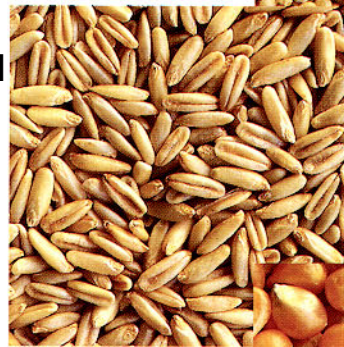
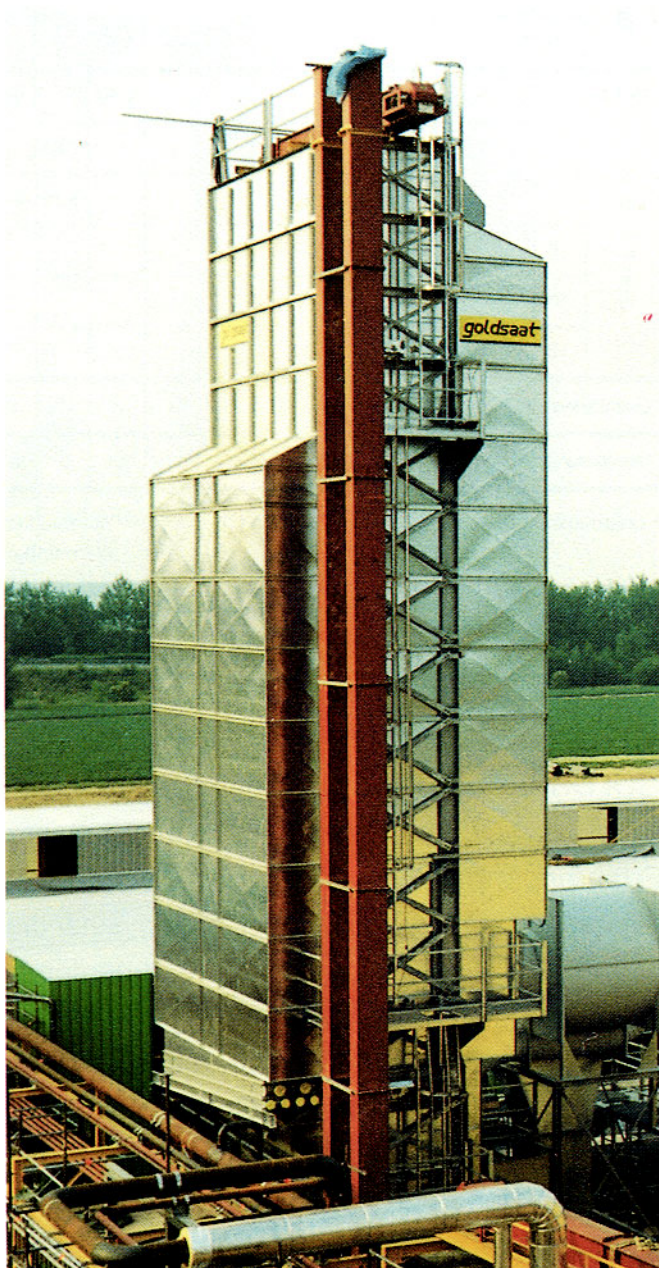


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1 General

1.1 Preface

Congratulations! You have acquired a quality product from **goldsaat** Agrartechnik GmbH. The fully automatic grain drier is characterised in particular by its qualitative high-class processing, long life and its easy to use system.

1.2 Customer name

1.3 About us - The goldsaat Agrartechnik GmbH

Since more than 50 years, the **goldsaat** Agrartechnik GmbH has been manufacturing machines and plants for the preparation of seeds. In addition to grain driers, these pickling machines are conveyors and coolers. Our products are used all over the world; thousands of satisfied customers are the best advertisement for us.

With their long years of experience, creativity and innovation, our engineers ensure that our machines and plants are always state-of-the-art.

The **goldsaat** Agrartechnik GmbH is one of the leading manufacturers of driers. We take advantage of innovative developments in the drying technology.

Quality and reliability are the epitome of our products worldwide.

1.3.1 Address



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1.3.2 Service



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1.4 The drying plant

goldsaat - Continuous drier systems are designed according to the mechanical assembly technique. Consequently, they can be upgraded and comprise of outputs of 0.5 to 150t/h.

1.4.1 Designation of the plant

1.4.2 Project number

1.4.3 Code word

1.4.4 Location of plant

1.4.5 Year of manufacture

1.5 Other aspects

This operation manual has been written with the intention of helping persons responsible for the plant to read, understand and keep all the points in mind.

It contains basic tips and instructions that must be noted during assembly, operation, maintenance, disassembly and disposal of the plant.

Therefore, fitters, mechanics and operators must read this manual carefully before assembling and commissioning the plant. Only then they can avoid mistakes and achieve an operation without faults.

The plant is built using the latest technology and complies with the stipulated safety-relevant regulations. Nevertheless, improper use of the machine can cause danger to life and limb of the operator or a third party and can also damage the plant.

The plant may be operated only in perfect condition and in accordance with the safety rules. The plant must be used in compliance with the conformity declaration supplied with the plant. Faults that might endanger safety must be rectified at once.

The complete technical documentation must always be kept close to the machine.

1.5.1 Limitation of liability

The **goldsaat** Agrartechnik GmbH assumes no liability for damages arising from

- unsuitable or improper use,
- arbitrary or incorrect assembly or commissioning of the plant by the operator or a third party,
- subsequent modifications made by the operator or a third party, natural wear,
- careless or incorrect handling, maintenance or servicing,
- violations against the operation manual,
- use of unsuitable material.

1.5.2 Copyright

The operation manual is intended for maintenance, operation and inspection personnel.

The operation manual contains instructions and drawings of a technical nature that shall not be reproduced or distributed in part or in whole, or evaluated for the purpose of competition with authorization.

Copies and extracts from the operation manual may be distributed to the plant operators exclusively for internal use only.

1.6 Target groups

The target groups for the operation manual are listed below:

table 1-1: Target groups - Tasks - Qualification

Target group	Task	Minimum qualification
Operator	Setting up the plant Changing the plant Starting and stopping the plant Rectifying minor faults Preparing material Forwarding outgoing material Providing plant with consumption material Observing flows Identifying faults and safety problems and ensuring that the plant works properly	Personnel trained in plants and machines with written knowledge in the mother tongue Initial briefing of the plant made by the owner Continuous training by the owner The operator works in accordance with the operation manual prepared by the owner
Maintenance and servicing personnel	Repairing faults Repair work Carrying out complex maintenance jobs Corrective maintenance Checking for worn parts	Fitter, electrician with extensive training in operating plants and machines and extensive training as service personnel. He works in accordance with the operation manual prepared by the owner.
Technical staff for safety	Preparing the safety-relevant part of the operation manual for the personnel working with the plant by complying with the operation manual Keeping in mind the listed safety and hazardous points	Safety technical staff with special, engineering degree or similar

2 Description of the plant

goldsaat grain driers are dome-shaft continuous driers that are made from galvanized sheet steel or a corrosion-resistant light metal alloy. As a result, they are durable and can also be installed in open air.

We have used aluminium wherever the grain comes in contact with the plant - such as side shafts and air distributors. A magnesium constituent gives the - soft - aluminium its hardness and surface resistance. With its smoothness and untreated condition, aluminium extracts micro-organisms and insect incubation, refuge and nutritive substratum.

goldsaat driers are fully automatic. Special attention is paid to the operational safety of the plant. For example, a burner only supplies the heat for the grain that it can process. The corn leaves the drier only when it has achieved the final moisture.

The desired data is entered in a regulator. Through a display you can control everything exactly - a safe and user-friendly control, which you will learn quickly.

2.1 Scope of application and proper use

The **goldsaat** grain drier is meant exclusively for the following application:

Drying grains for preparing foodstuff.



Any other application will be termed as improper use!

goldsaat Agrartechnik GmbH is not liable for any damages resulting from improper use of the plant. The owner alone is responsible for such risks.

Proper user of the plant also involves complying with the given operation manual.

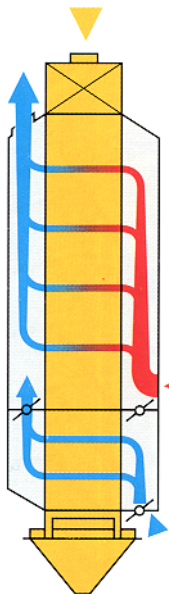
2.2 Improper use



The machine may be used only for the above-mentioned areas of application. Any application beyond that specified will be considered as improper use. **goldsaat** Agrartechnik GmbH assumes no liability for damages ensuing from improper use of the machine.

2.3 Functional principle

figure 2-1: Functional principle of the grain drier



The hot and cold air is sucked into the air dome system of the drier diagonally in the guide movement of the damp product and penetrates in branch currents, in counter and direct current.

The hot air produced in the hot air generator or cylinder burner is sucked by the fan through the hot air tube, the hot air hood and the drier compartments.

After an intensive and gentle drying process, the dried up and hot grain trickles through the stop-compartment (additional device) into the re-cooling compartment and is cooled at store temperature - depending on the ambient temperature and the continuous volume.

The throttle valve serves the main volume regulation and the regulating valve serves the intensity adjuster for the cooling capacity, there is a throttle valve even in the heat recovery appliance (WRG).

Re-cooling can be extended with the adjusting valves (variable re-cooling zone).

Re-cooling is most intense at the top closed and bottom open valve.

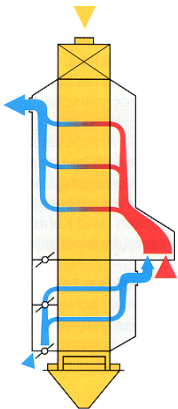
Conversely, the drying is more intense with reduced cooling.



The grain temperatures that are read on the distance thermometer are standard values

As each instrument is subject to deviations and fluctuations due to the characteristic tolerance and read application, it is especially important to perform a quality check for caking and germination capability on sensitive materials to be dried.

figure 2-2: Functional principle of the grain drier with heat recovery



The faintly saturated and still warm exhaust air is released from the lower part of the drier and intermixed with the drying supply air (after the burner).

With this, energy is saved and at the same time the exhaust air quantity is reduced.

Heat recovery WRG (special appliance)



If possible, there is an increased dust deposit in the air hoods through the heat recovery appliance.

2.4 Description of the plant components

2.4.1 Hot air generator

The modern **goldsaat** hot air generators and blow pipes used are low-maintenance and come with high-noise immunity. They are safe and automatic.

You can use various types of heat exchangers to generate hot air. As a rule, indirect hot air generators that can be equipped with light oil, heavy oil or gas burners, are used. The hot air can also be generated by means of steam or hot air heat exchangers that can for example be supplied from a central heating station. They are installed just in front of the hot air hoods.

In addition, direct hot air generators or gas-heated cylinder burners are also used, which are installed in the hot air hoods of the drier.

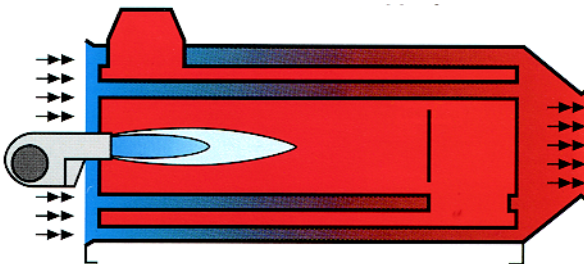
goldsaat hot air generators are manufactured with a capacity of 2,800 kW (approx. 2.4 Mcal/h). Corn or maize driers with high hourly outputs are operated with two or more units.

In indirect hot air generators, the process air is directed past the heated exchange surfaces in the counter or direct currents for heating-up. The flue gases will be diverted through a chimney. These hot air generators are low-cost and work with very good pyrotechnical efficiency of over 92%.

The indirect **goldsaat** hot air generator is built in the shape of a cylinder. The sucked in air is heated indirectly in the counter current. This means that the hot air, which is supplied to the drier, is not mixed with the flue gases. The model suitable for inflow technique and the special components ensure an optimum utilization of the heating surface. The combustion chamber is also cylindrical. It is not made from burned fire clay, rather from a high-heat resistant special steel.

A deflecting plate made from the same steel is attached at the end of the combustion chamber. The flame peaks do not touch the combustion chamber wall. The combustion chamber and the flue gas delivery are designed in such a way that a uniform load of the heat transfer surface is ensured.

figure 2-3: Indirect hot air generator



Description

Indirect
hot air generator

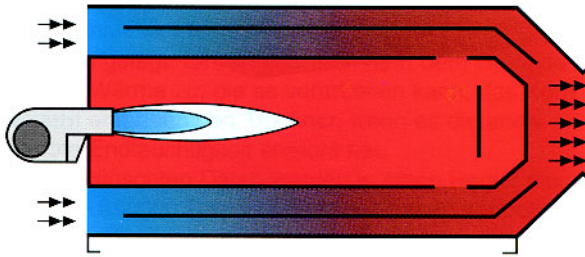
In direct hot air generators, the flue gases for the process air are mixed and directed through the material to be dried. Advantages are quick heating-up and up to 100% energy production.

The **goldsaat** hot air generator for direct hot air generation is designed in the shape of a cylinder. The fresh air entering on the front side is sucked in axial direction through the hot air generator in the form of rings and is mixed with the flue gases at a ratio of 1:35 up to 1:40 in front of the outlet flange.

Direct hot air generator

To increase operational safety, connect a spark arrester with alternating sieve!

figure 2-4: Direct hot air generator

**DANGER TO LIFE!**

Due to possible carbon deposits in direct hot air generators, DO NOT DRY any food, for ex. breadstuffs!



If required, the hot air generator can be equipped with a change-over mechanism for direct/indirect heating. In this way, maize and corn can be dried indirectly.

The cylinder burner is installed over the entire width of the fresh air suction duct of the drier. This arrangement ensures that there are no heat strands when heating the air.

Gas cylinder burner

The dominant air velocity and the progressive V-formed mixing plates lead to the sucked in process air being thoroughly mixed with the combustible gas. The special moulding of the mixing plates provides for a complete combustion and a large range of adjustment (up to 25:1).

This principle based on a specific air velocity and low pressure loss over the entire burner cross-section guarantees a uniform temperature profile and a clean combustion that meets or surpasses the stipulated standards for direct compartment air heating.

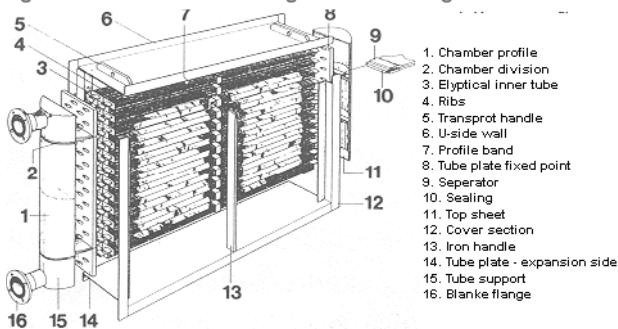
The flame length at full load is approx. 500 mm.

In the area of the cylinder burner and 1,000 m above, the fresh air suction duct is additionally lined with high-heat resistant thermax-sheet.

The hot air can also be generated by means of steam or hot air heat exchangers, that can for ex. be supplied from a central heating station.

Heat exchanger

figure 2-5: Sectional drawing - heat exchanger



2.4.2 Drier compartments (hot air and re-cooling zone)

Inside the drier shaft, the uniform distribution of hot air is given priority. Each individual grain should be exposed to the same heat current around the ring as much as possible.

To achieve this, air distributors are built-in. The shape and distance of these air distributors from each other enable a gentle drying even at higher temperatures. Moreover, the roof-shaped components cause the grains to be distracted in different directions and hereby moved.

The air distributors are alternately arranged open or closed. The volume of air is diagonal to the direction of flow of the material.

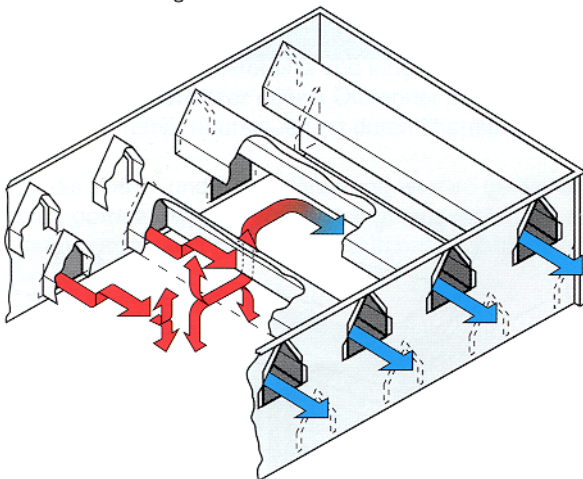
However, the volume current not only goes through the material to be dried in wattless current, but it is also steered upwards and downwards inside the fill. Therefore, the process air in the drier shaft is a combination of wattless, direct and counter current.

When drying light products, hitherto, the air had to be considerably throttled in order to prevent the grains from being pulled out of the shaft. The collection bags were designed in such a way that they were fastened in front of the openings of the air distribution shafts on the damp air side. With that, high output losses - for ex. when drying rape seed - were a thing of the past.

Besides the optimum design and position of the air distributors, the discharger also contributes to the grains leaving the shaft uniformly dried.

Below the drier shaft outlets there is a pneumatically operated slide that releases the outlets for a specific period on obtaining the desired final moisture. A moisture regulator gives the required impulses for the pneumatic cylinder frequency.

figure 2-6: Distribution of the process air in the filled-up drier shaft



Description

**Functional principle/
method**

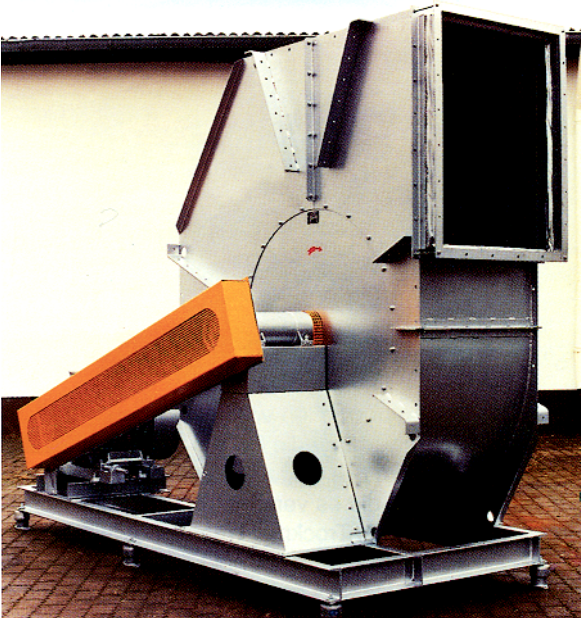
2.4.3 Fan

goldsaat uses exclusively high-capacity fans in its driers, which have an output over 80%.

With the special development of fan wheels and the special construction of the casing spiral, excellent inflow technique results are obtained. In particular, the favourable air circulation during reversal and optimization of clearance losses provide for an ideal utilisation of the blower.

In order to reduce the noise development, only fans with low rotating frequencies are used. The sound conducted through solids is absorbed by vibration dampers and flexible sleeves as far as possible.

figure 2-7: Fan



For other operation and maintenance tips on the fan, see
“Operation and maintenance manual of the goldsaat fan” on page 9-1.

Description

**Functional principle/
method**

2.4.4 Dust separator

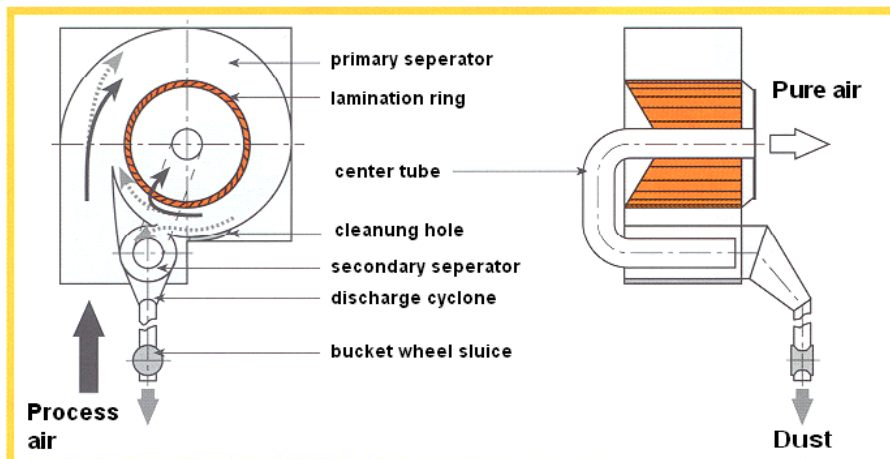
It is not permitted to work with driers without using powerful dust separators. **goldsaat** uses *CentroKlin dust separators* for its driers, which are characterised by a high level of cleaning and small dimensions.

The process air is transferred to the primary separator of the cleaner in a rotational movement. Heavy particles are pressed on the outer wall through the centrifugal force. The velocity of flow and centrifugal force are increased by the contraction of the air space. At the end of the spiral, there is a separator lip that diverts the dust to the secondary area.

The air that still contains fine dust is diverted through a laminate ring attached in the opposite direction of the flow in its direction. The remaining dust particles once again reach the primary air flow and again into the secondary separator with discharge cyclone and bucket wheel sluice.

The cleaned flowing air is delivered to the main air flow through a central tube.

figure 2-8: Functional principle of the dust separator



The waste material comprises of abrasion and residual dust particles from the dried material. They have different forms and sizes (for ex. weedy grain, coarse particles, husk, fine dust), depending on the material that is dried. They cannot be divided - i.e. in percentage according to ratio, size and properties.

The waste material is transported to the separator in almost saturated air.

Waste material is collected in sacks or containers.

If the plant is installed and maintained properly, the separator emissions lie well below the stipulated limit values.

The bucket wheel sluices have the job of hermetically separating the dust collector from the dust separator, so that no infiltrated air can enter or exit.

It comprises of two components:

- Cast iron sluices
- Rubber packing washers.

Description

Functional principle/
method




Waste material

Bucket wheel sluice

3 Basic safety

In the present operation manual, we have used the following safety-relevant symbols:

table 3-1: Symbol for hazards

Usage	Degree of danger
This symbol means direct danger for the life and limb and health of persons. Non-compliance of these tips can cause serious health problems, and even endanger the life of the affected persons.	
This symbol indicates the proper usage of the plant. Non-compliance can lead to injuries and/or cause health problems as well as damage to the plant and environment.	
With this symbol, you will receive information with view to the economical use of the plant.	

Overview of symbols used
for hazards in the manual

3.1 Safety regulations



The plant is built in accordance with the state-of-the-art technology and the stipulated safety-relevant regulations. Nevertheless, improper and unauthorised use of the machine can cause danger to the life and limb of the operator or any third party, damage to the machine and other items.



The plant must be operated in a technically perfect condition, and in full compliance with the safety regulations. The machine must be used in accordance with the conformity declaration. Faults that can affect the safety must be rectified as soon as possible.

This operation manual must always be kept close to the plant and be always available.

It is the responsibility of the owner to distribute copies of the operation manual to the concerned persons.

In addition to the applicable laws in the country of the owner, and the company-internal safety regulations for operation, maintenance and assembly, the operators must adhere to the following instructions.

Every person entrusted with the assembly, commissioning, operation, maintenance or repair of the plant must read and understand the operation and maintenance manual thoroughly. Stipulations by the electrical equipment supplier must be applied for electrical devices.

Renovations and/or changes in the plant must be undertaken only on approval from **goldsaat** Agrartechnik GmbH. **goldsaat** Agrartechnik GmbH assumes no liability for damages that might result from unauthorised changes. The conformity declaration supplied by the manufacturer will then be considered null and void.

Scope

Changes

Accident-free operation



All safety devices and operational tips provided by the manufacturer are a pre-requisite for the safe, accident-free operation of the plant.

The owner and authorised persons working with the plant are ultimately responsible for an accident-free functioning of the plant.

The owner must guarantee that

- the authorised person is suitably trained for his special tasks in compliance with the safety instructions,
- the safety instructions of a work area are forwarded to the concerned person and the same documented,
- the safety instructions are always made available and kept within easy reach of the concerned persons,
- the safety instructions are also completed and made available for the adjoining work areas,
- the safety instructions are complied with.

The owner must instruct his personnel,

- to comply with the chapter related to his tasks, and also with the instructions in the other chapters,
- to be concerned about the safety of the persons in the company and in the neighbourhood.

In addition to the instructions and operation and maintenance manual described here, the following instructions for handling the plant are also binding:

- Safety instructions of the EU member countries,
- Safety instructions applicable in countries outside the EU.

The delivered plant corresponds to the state-of-the-art technology, is safe for operation and must be operated by trained personnel.



Non-compliance would result in danger to the life and limb of the operator or a third party, damage to the plant, individual products or other items, danger for the efficient functioning of the plant.

Appliances must be restarted only under supervision of a person authorised by the owner.

Each time the appliance is restarted, it must be ensured that it is safe for operation and that there is no danger to the operating personnel.

Control and operating elements must be operated only by trained personnel.

The owner shall ensure that unauthorised persons are kept away from the machine.



Regular function checks and maintenance helps the safety!

Legal accident prevention regulations

Responsibility when restarting the appliances

The owner shall ensure that the plant is always operated in a perfect condition.

Maintenance, servicing and cleaning work must be carried out only when the plant is shut down.

Inspections on individual parts of the plant must be carried out only in compliance with the safety regulations.

Idle motion is achieved by shutting down the power supply

- In auxiliary motions => Blocking
- In drives => Emergency braking

Constantly inspect the emergency switches.

Rotating parts that one comes into contact with during operation and maintenance works must be covered with protective hoods.

All protective devices must be removed only for maintenance and repair work and must be reinstalled properly after completion of work.

When carrying out servicing, cleaning and change-over work on the plant, the work site must comply with the stipulated conditions.

Shut off the current and secure against restarting.

Remove safeties from parts that cannot be shut off electrically, and ensure that they do not restart automatically.

Work on electrical devices, cables must be carried out exclusively by trained electricians.

Plants that run continuously must not be operated without supervision as one cannot intervene in case of emergency.



Safeties must be removed and installed only by authorised and trained personnel!

Subsequently, the balance power must be destroyed by pressing the function keys.

After completing repairs, inform the authorised manager. Only then can the plant be put into operation again.

EMERGENCY Switch

Protective devices

Safeguarding the work site

3.2 Safety devices

Safety devices must not be changed, dismantled or put out of operation. Unprotected plant elements can cause injuries and danger to the life of the operator.

All safety devices such as safety switches, covers and barriers must always be operative. It is not permitted to operate the plant with defective or missing safety devices. Before starting the plant, check that the necessary safety devices are working properly. Report any damages and faults to the manager immediately!

Manual operation of sensors that help to control the plant and the safety is not permitted!

If safety devices are removed for special reasons, shut down the drives first and safeguard against unintentional start-up. If safety devices were removed, take special care. Only in exceptions can the "Start-up operation" be started. In such cases, the supervisor must keep close to an **EMERGENCY**-switch to avoid the plant from starting suddenly.

All electrical cabinets must be provided with doors. These doors must always be locked and the keys must be kept in the custody of the manager. Access to switch cabinets must be given only to authorised persons.

3.3 Hazardous zones

A hazardous zone is any area in and around the plant that poses risk of injury and damage to health.

Here, note that:

- hazardous zones are always clearly marked by warning signs and are fit with locks to prevent entry of unauthorised persons.
- during automatic operation, it is strictly forbidden for any person to remain within the danger zones.

Only objects that are absolutely necessary for operating the plant must be kept in the hazardous zones.



Some hazardous zones are areas where hot air pipes and burner cylinders are located!

3.4 Work protective measures

General



Orderliness, discipline and cleanliness are the best requirements to prevent accidents, fires and disasters.

Arbitrary handling is forbidden. This must be done only under supervision according to the instructions.

Work must be carried out only with faultless and safe tools.

Misuse of compressed air and pressure water is forbidden due to the associated danger.

It is forbidden to operate the plant in a drunken state and the consumption of alcoholic drinks during working hours is strictly forbidden.

Personal safety



Persons working near the plant must be provided with suitable protective gear.

It is not permitted to wear loose clothes or jewellery that might get stuck in any part of the plant. Long hair must be kept tied when working with the plant.

No hand gloves:

When working in the immediate vicinity of moving or rotating parts of the plant, it is forbidden to wear hand gloves.

Fire hazardous areas



In areas with easily combustible materials, do not light any fire and smoking is strictly forbidden.

Tools must always be used for the purpose they are intended.

Electrical tools and devices must be used only if they are working properly and if there is sufficient protection against electrical shock:

Checklist:

- Are the electrical tools and devices provided with safety and quality labels?
- Are they double-insulated?
- Are the wires and plugs in proper condition?

Tools**Fire protection**

Smoking is also forbidden in these areas!

There must be no open fireplaces in the vicinity.

Fire-protection devices such as extinguishers, etc. must be used properly.

3.5 Selecting staff and qualifications

Only authorised and trained personnel must run the plant independently. The persons operating the machine must have proper training in the operation of the plant and must have sufficient knowledge about the safety and work protection regulations and be capable of avoiding any dangers.

Only trained personnel may repair and rectify faults. This is especially applicable for electrical and pneumatic devices.

The owner must maintain records about the persons who are responsible, authorised and those in charge of the inspection of the plant.



Persons under the influence of drugs, alcohol or medication whose reactions will be considerably affected must not be allowed to operate, service or repair the plant.

3.6 Protective clothing

It is not always possible to rectify dangers through technical or organisational measures. Then the owner must provide personal protective clothing and devices for each person.

The local safety and accident prevention regulations must be applied when selecting the appropriate protective clothing.

Persons in charge of maintenance, repair, assembly and cleaning work on the plant must always wear suitable protective clothing.

In areas where there is danger of head injuries, of objects falling or hitting against sharp edges, always wear a protective helmet, which has been checked in accordance with the stipulated standards.

Head protection

The human eyes are the most sensitive and valuable sensory organs. Every person working in the vicinity of the plant must always wear protective goggles to prevent flying dust and other metal particles from entering and damaging the eyes.

Eyes protection

Hands are the most frequently used "tools". They can be damaged by cuts, burns, stitches, dislocations.

Hands protection



Therefore, always wear suitable hand guards!

Feet protection



Always wear suitable safety shoes!

4 Assembly and commissioning

4.1 Safety

Please note the chapter **“Basic safety” on page 3-1!**



Non-compliance would result in:

- Danger to the life and limb of the operator or a third party,
- Damage to the plant, individual products or other items,
- Danger for the efficient functioning of the plant!

4.2 Activities before commissioning



DANGER TO LIFE! - Fire hazard!

Assembly, maintenance and repairs of oil and gas lines must be carried out only by qualified personnel!

Adjustments and checking of pressure oil/ gas burners before commissioning



Never set the heat output according to the type plate of the hot air generator, rather according to the heat requirement of the drying plant. The burner must work with few switching intervals (multi-level burner).

Heat output in two-level burners:

1. Level 60%
2. Level 40%

of the required oil quantity.



If the heat output is too high, the burner is switched on and off too often. Consequently, the hot air generator is temporarily overloaded, the efficiency is low and the waste gas losses too high.



Strive for optimum control values!

An optimum combustion can take place only with optimum control values.

Comply with the norms of the Federal Act for Anti-Pollution (BIMSV)!



A faultless burner setting is possible only when the drying plant is fully filled with material to be dried.

Carry out the following tasks on the hot air generator, drier and safety elements before commissioning:

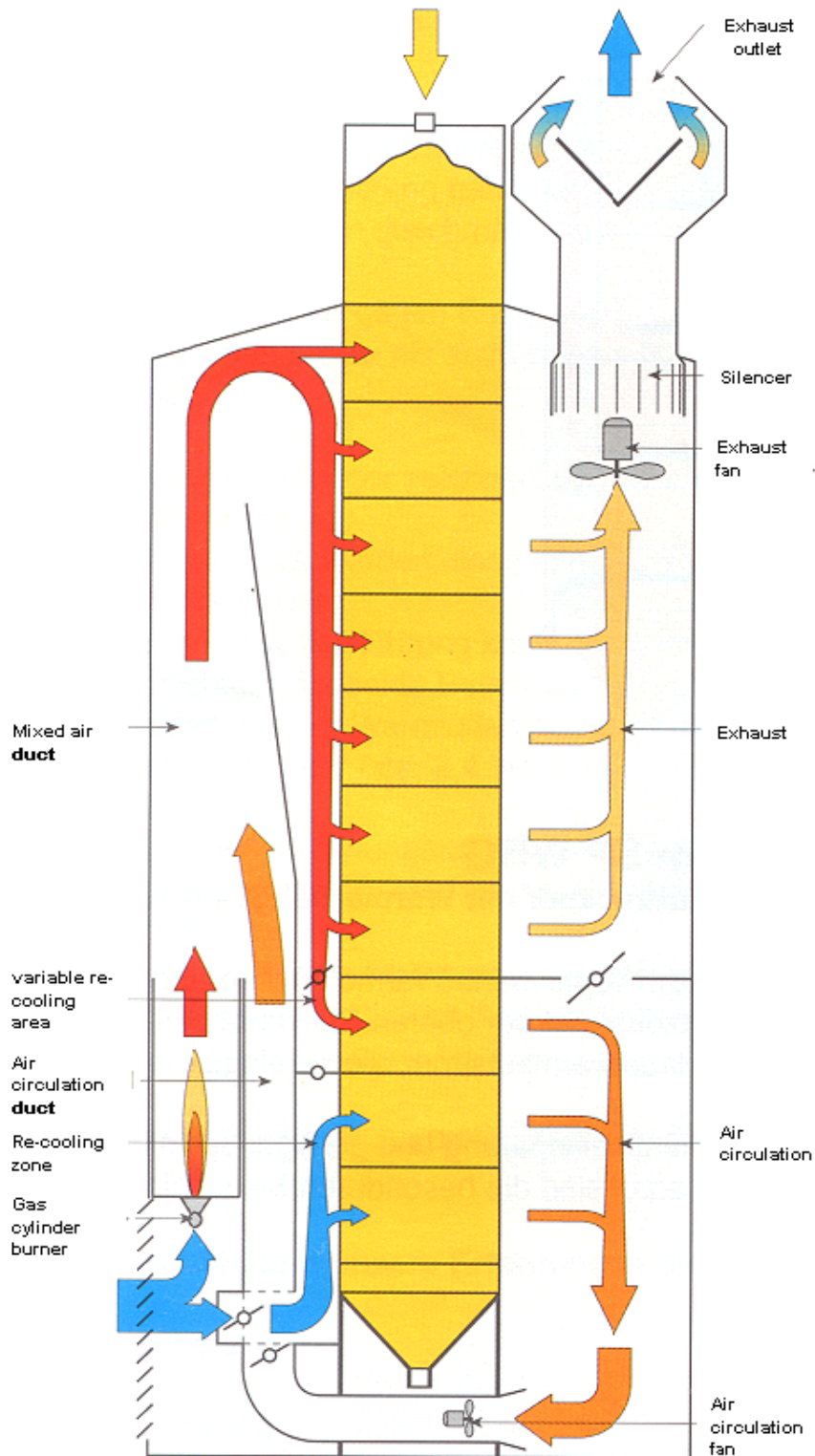
1. Set the safety thermostat to 160°C.
2. Set the hot air thermostats or regulators to the desired temperature.
For hot air thermostats:
1st level at max. temperature,
2nd level approx. 5 - 10% lower.
3. Fire protection valves must be locked in open position. Check this position!
4. In direct hot air generator: Spark arrester and filter must be provided. The spark filter must have a free cross-section, i.e. must be cleaned.
5. Set the adjusting valves of the variable re-cooling zone: The re-cooling is most intense with top closed and bottom open valve.
Vice-versa the drying is more intense with reduced cooling, for ex. at high moisture withdrawal and absolutely when drying maize.



The safety thermostats must be operated only by technical personnel!

Adjustment and checking

figure 4-1: Construction features and air valve settings



4.3 Commissioning

A circuit diagram for commissioning and operation is given in the Annex in chapter *“Operating elements and flow” on page 5-2.*

Before commissioning, the material to be dried must be filled in the drier. At the same time, the fans must not be running, as otherwise it can cause turbulence. This turbulence can cause the material to go into the air hoods. The drier may be switched on only when it is filled up.



During continuous operation, the entire drier pillar - including the pre-container - must be constantly filled up. If the volume reduces, then larger quantities of material are immediately sucked in, trickle into the exhaust hood and will be pressed into the separator.

4.3.1 Pre-drying


Undertake the following tasks and settings immediately after continuous filling:

table 4-1: Settings for pre-drying

Pre-drying	Barley Seeds	Consumables	Fodder Maize
1. Set the hot air temperature and switch on the exhaust fan and burner:	35°C - 45°C	55°C - 60°C	90°C - 100°C
2. Before starting the hot air fan, close the throttle valve (air flow regulation for the full exhaust). 3. Open it again at full rotational speed or regulate it depending on the type of fruit. No grain must be sucked in. Throttle higher for rape seed.			
Dry the damp material depending on the sensitivity and humidity:	20 - 30 minutes	20 - 30 minutes	20 - 30 minutes and longer

For continuous operation, note the following

table 4-2: Settings for continuous operation

Continuous operation	Barley Seeds	Consumables	Fodder Maize
1. Start the delivery and the WRG ^a -fan and regulate the continuous flow depending on the humidity withdrawal (see example)			
2. Set the hot air to working temperature:	50°C - 65°C	70°C - 90°C	100°C - 130°C
3. Adjust the exhaust flow, strive for maximum air flow. When drying rape seeds, you must throttle higher. Adjust the WRG-air flow. No grain must be sucked in. 4. At regular intervals, measure the material to be dried and if necessary, adjust the delivery. 5. For too dry grains, select a higher and for too moist grains, select a lower delivery capacity. 6. If the regulation of the grain temperature can be maintained by the delivery, keep the hot air temperature constant. Quicker pass = reduce grain temperature Slower pass = increase grain temperature			
 Adhere to the permitted maximum grain temperature	38°C - 42°C	45°C	60°C - 70°C
Depending on the humidity, a constant drying glow is achieved at the following drying times:	approx. 30 - 60 minutes	with higher withdrawal in approx. 50 - 80 minutes	approx. 180 - 240 minutes

a.Special model

If grain temperature variations occur, without the hot air temperature or delivery being adjusted, the humidity of the filled up material has changed.

End drying with filled-up plant

table 4-3: End drying with filled-up plant

	Barley Seeds	Consumables	Fodder Maize
1. Switch off the burner and delivery.			
2. With the exhaust fan cool the drier filling:	15 - 20 minutes	20 - 25 minutes	30 - 40 minutes
3. Shut off the fan(s).			

table 4-4: Start drying in filled-up plant

	Barley Seeds	Consumables	Fodder Maize
1. Set the hot air temperature:	35 - 45°C	55 - 60 °C	90 - 100°C
2. Start the fan(s) and burner. Pre-heat the filling:	15 - 20 minutes	20 - 30 minutes	20 - 30 minutes
3. Start the delivery and adjust the hot air temperature:	50 - 65°C	70 - 90°C	100 - 130°C

Start drying in filled-up plant

table 4-5: End drying with emptied plant

	Barley Seeds	Consumables	Fodder Maize
1. Cut off the delivery and set the hot air thermostats at pre-heat temperature:	35 - 45°C	55 - 60 °C	90 - 100°C
2. Drier and pre-heating container must be filled. Dry the entire filling until the desired final moisture is achieved:	35 -45 minutes	40 - 60 minutes	20 - 30 minutes
3. Shut off the burner and start the delivery.			
4. Adjust the delivery in such a way that a faultless re-cooling is guaranteed. If grains are sucked into the humidity air hood, reduce the exhaust flow.			
5. Clean the plant, by using the fan to suck it clean.			
6. Shut down the entire plant.			

End drying with emptied plant

1. Fill the plant with the fan(s) switched off
2. Set the hot air temperature to a pre-drying temperature of 50 - 55°C.
3. Shut the throttle valve(s) for the complete air flow and the WRG air flow regulation (if any, special model) and start the fan(s).
4. Open the air flow regulation(s) slowly, until the rape seed grains are sucked into the exhaust hood. Then **immediately** throttle the regulation(s), so that no more rape seed grains are sucked in.
5. Dry the first rape seed filling approx. 30 - 40 minutes before, depending on the humidity with 50 - 55°C.
6. Adjust the hot air and working temperature at 70 - 80°C.
7. Adhere to the grain temperature. It should be approx. 40 - 50°C.
8. Check if rape seed grains are still being sucked in. Check the cleaning cover in the exhaust hood. If necessary, throttle the air flow regulation(s).

Drying rape seed

1. Fill the plant with the fan(s) switched off.
2. Set the hot air temperature to a pre-drying temperature of 90 -110°C.

Drying maize

3. Shut the throttle valve(s) for the complete air flow and the WRG air flow regulation (if any, special model) and start the fan(s).
4. Open the air flow regulation(s) slowly, until the maize grains are sucked into the exhaust hood. Then **immediately** throttle the regulation(s), so that no more maize grains are sucked in.
5. Dry the first maize filling approx. 30 - 40 minutes before, depending on the humidity with 60 - 70°C.
6. Adjust the hot air and working temperature at 100 - 130°C.
7. Adhere to the grain temperature. It should be approx. 70 - 90°C.

Check if maize grains are still being sucked in. Check the cleaning cover in the exhaust hood. If necessary, throttle the air flow regulation(s).

1. Fill the grain drier continuously.
2. Begin immediately after ending the filling process with the drying of the maize.

Special features when drying maize grain



If you are filling the drier in batches, avoid intervals longer than one hour.
Do not fill the plant with maize that have extremely different moisture levels.

Example:

5 t maize with 30% moisture and 5 t maize with 40% moisture level can be controlled by the moisture regulator only approximately to the desired final moisture level.



Longer idle periods in the filled plant can cause bridge formations over the air domes.
If longer idle periods are unavoidable, the plant must be emptied.



If the plant is restarted after a long idle period without first emptying it and without checking the drying shaft for clogging, it can lead to uneven grain flow and subsequently to fires.
As individual brown and if possible black (burnt) grains in the material are normally an indication of clogging (bridge formations) over the air domes, empty the plant without delay, after shutting it.

Check the empty drying pillars for clogging and foreign particles inside the hot air and exhaust hoods.



Before refilling, remove all cloggings and foreign particles.



Discoloured grains can arise from impermissible high hot air temperatures or through individual weedy grains (for ex. with poor maize quality).

5 Operation

5.1 Safety

Please note the chapter **“Basic safety” on page 3-1!**

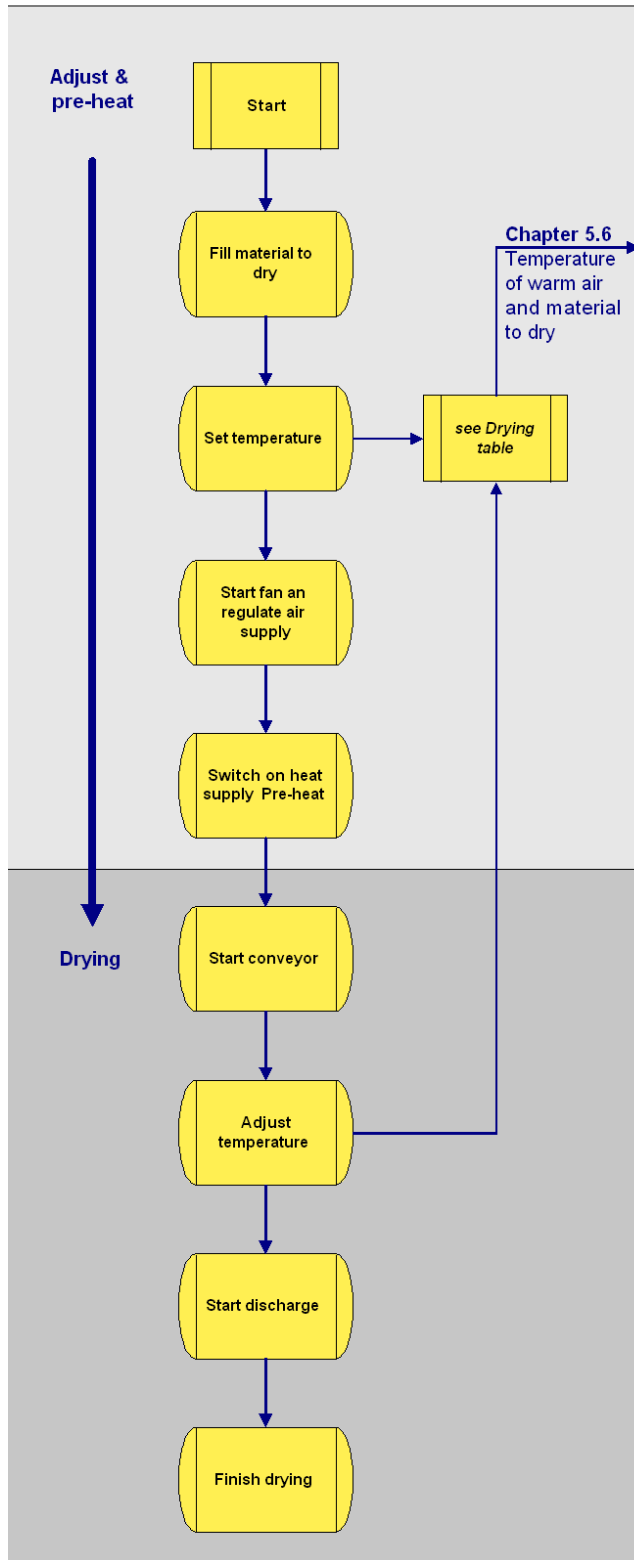


Non-compliance would result in:

- Danger to the life and limb of the operator or a third party,
 - Damage to the plant, individual products or other items,
 - Danger for the efficient functioning of the plant!
-

5.2 Operating elements and flow

figure 5-1: Operation flow diagram



5.3 Operation of the 2-point regulator for moisture regulator and hot air control

With the moisture regulator, continuous driers can be automated. The regulator ensures a uniform final humidity with less tolerances of the product to be dried at the drier outlet. This is also possible with high moisture differences at the drier inlet, as long as the quantity is minimum one drier filling. The regulator controls input humidity levels of 45% (for ex. maize) at the desired final moisture up to minimum 7% (for ex. rape seed and sunflower seeds).

The device comprises of two electronic 2-point regulators with actual value display and nominal value limiter and the two pertinent resistances (PT 100).

The delivery electronics (SPS) includes this when provided with a moisture regulator.



Following products can be monitored with this regulator: wheats, rye, barley, oats, maize, rice, sunflower seeds etc.

The resistance sensor located in the grain flow determines the temperature - "upper" approx. 1.25 m below the pre-container and "lower" approx. 0.25 up to 0.75 m over the re-cooling zone. These temperatures will be displayed at the assigned two-point regulator as actual values.

At different intake moisture levels, the temperatures scanned by the "upper" resistance sensors change (in more moist goods lower, in drier goods higher temperatures).

Similarly, the "lower" sensors - depending on whether the material to be dried is too moist or already dry.

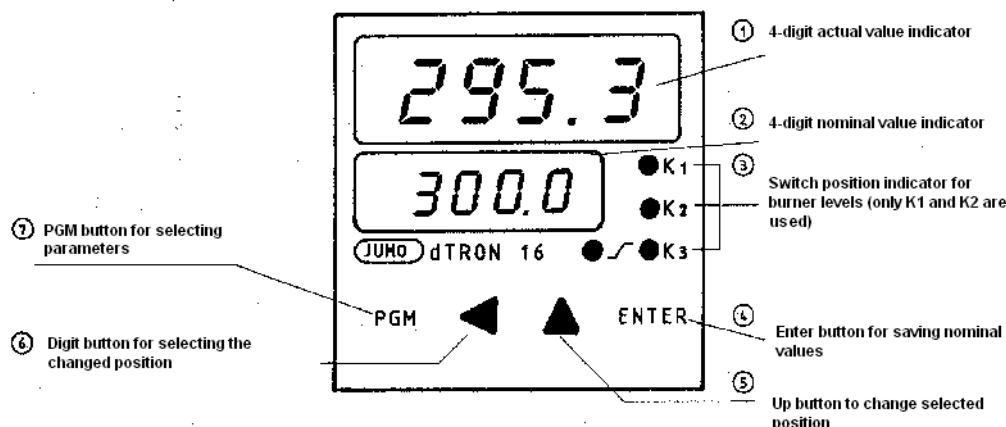
The delivery electronics uses this information to differentiate the rate of the flow of the drier contents - depending on the inflow moisture - into three speed levels, in order to keep the determined final moisture constant.

Description

Method

5.3.1 Model up to 1998

figure 5-2: Control unit of the 2-point regulator



- Main switch **On**
- Display 1 (red) shows: **8888**
- Display 2 (green) shows: **8888** blinking
- Wait approx. 8 seconds, then the displays are readable.

Operating condition:

Display 1 (red) displays the current status of the hot air temperature (actual value). Display 2 (green) displays the desired hot air temperature (nominal value).

Variation condition:

The modified nominal value appears in the display (red).

(In GF "upper" and "lower" grain temperature)

- Press **Key 7 (PGM)** 1x (in the display 2 (green), the current nominal value is visible)
- Press **Key 6 (left arrow)** until the desired position in the display blinks.
- Press **Key 5 (up arrow)** until the desired figure in the display appears.
- Select and set next figure(s) with the **Key 6 and 5 (from arrow)**.
- Save the change by pressing **Key 4 (Enter) once**.
- Complete the settings by pressing **Key 7 (PGM) once**.
- The set nominal value appears in display 2 (green).
- The actual value appears in display 1 (red).

Changing the nominal value for the hot air temperature in °C

Operation

(Limit value setting, for ex. from factory at 7 - 10 °C)

- Press **Enter-key** and keep it pressed; also press the **PGM-key**
- In the display 2 (green), AL appears
- Press the **Left arrow** key, until the desired position in display 1 (red) blinks.
- Set the desired numerical value by pressing the **Up arrow** key.
- Save the entry by pressing the **Enter-key**.
- Wait approx. 30 seconds until the normal display reappears. If the normal display does not appear, press the **PGM** key 9x.

Setting the temperature difference between nominal value (level 1) and level 2.

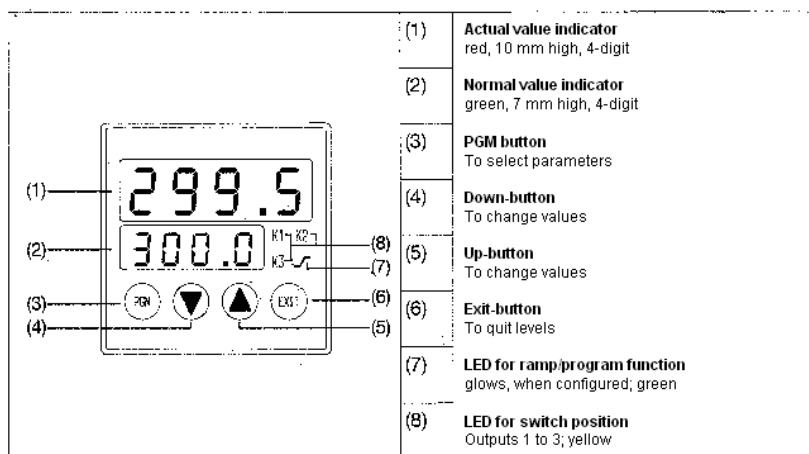
(Difference when cooling, for ex. from factory at 4 -5 % C°.

- First press the **Enter-key** and keep it pressed. Also press the **PGM-key**.
- In the display 2 (green), AL appears
- Press the **Key PGM** 5x; in the display 2 (green) HYS.1 appears.
- Press the **Left arrow** key, until the desired position in display 1 (red) blinks.
- Set the desired numerical value by pressing the **Up arrow** key many times or keep it pressed (then the figures run automatically).
- Save the entry by pressing the **Enter-key**.
- Press the **PGM-key** 4x or wait approx. 30 seconds, then normal display appears.

Set the temperature limits, when the burner level 1 (K 1) is re-started

5.3.2 Model from 1999

figure 5-3: Control unit of the 2-point regulator



- Main switch **On**
- Display 1 (red) shows: **8888**
- Display 2 (green) shows: **8888** blinking
- Wait approx. 8 seconds, then the displays are readable

Operating condition:

Display 1 (red) displays the current status of the hot air temperature (actual value). Display 2 (green) displays the desired hot air temperature (nominal value).

Variation condition:

The modified nominal value appears in the display (red)

((Limit value setting, for ex. from factory at 7 - 10 °C)

- Press **PGM-key** and keep it pressed for 2 sec.
- In the display, AL 1 appears
- Set the desired numerical value by pressing the **Up arrow** and **Down arrow** key. The set value is automatically accepted after approx. 2 sec.
- Wait approx. 30 seconds until the normal display reappears. If not, press the **Exit-key**.

(Difference when cooling, for ex. from factory at 4 -5 % C°.

- First press the **PGM-key** and keep it pressed for 2 sec.
- In the display, AL appears
- Press the **Key PGM** 5x; in the display, HYS.1 appears.
- Set the desired numerical value by pressing the **Up arrow** and **Down arrow** keys many times. The set value is accepted automatically after approx. 2 sec.
- Wait approx. 30 seconds, until normal display appears. If not, press the **Exit-key**.

Operation

Setting the temperature difference between nominal value (level 1) and level 2.

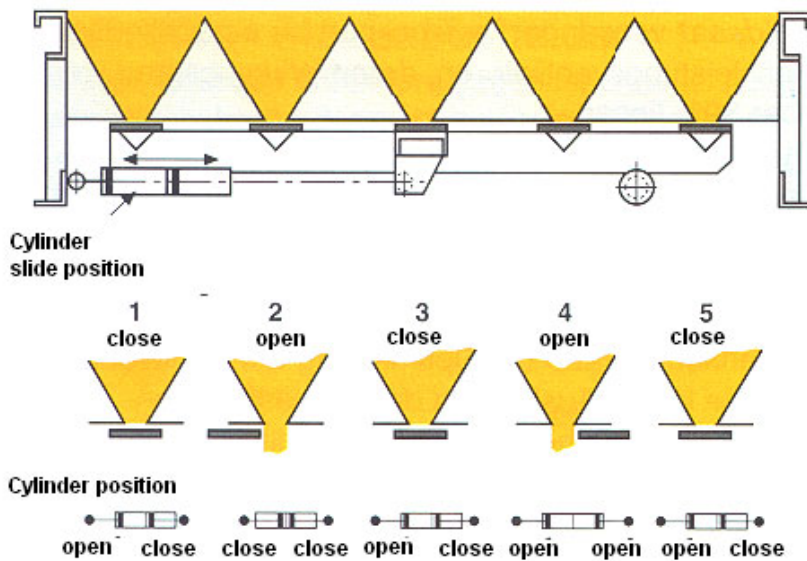
Set the temperature limits, when the burner level 1 (K 1) is re-started

5.4 Delivery electronics

The delivery is an adjusting element for controlling the grain flow volume. By adjusting the delivery electronics, the required quantity of material to be dried is discharged according to the drier capacity and desired moisture withdrawal. A slide system that runs on rolls is built into the delivery system. The slide is moved by a two-way cylinder.

Controlling is done via a programmable control system (SPS) with the following sequence:

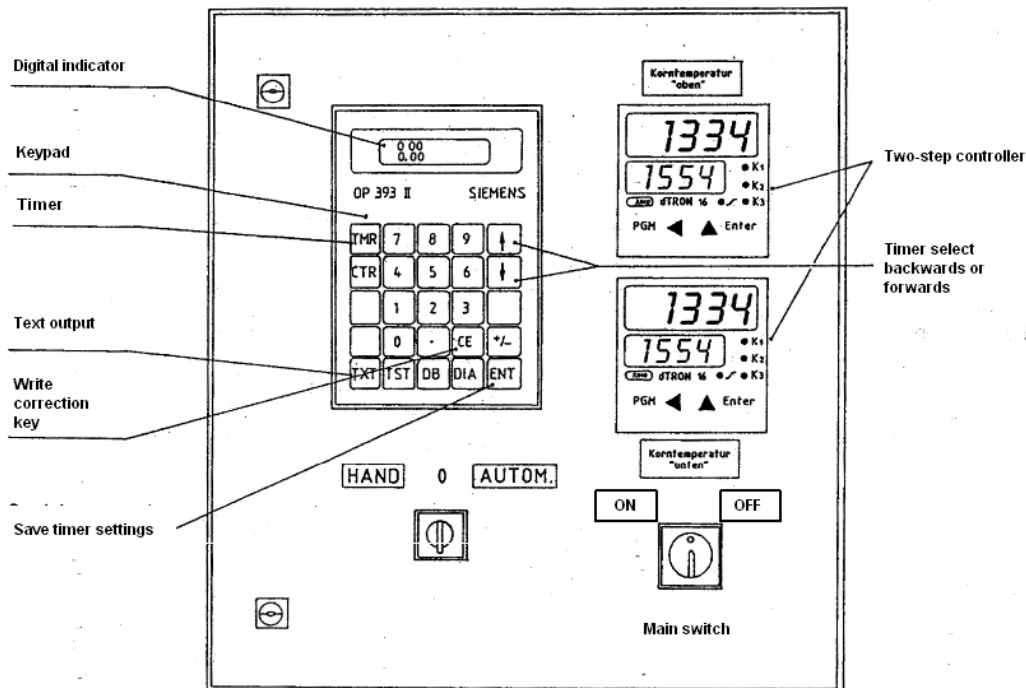
figure 5-4: Cylinder function and settings



The slide is shut during product stop - hereafter called Timer 1 (TMR), pause between 2 work cycles in seconds. During product flow the slide is open - hereafter called Timer 3, slowing time in seconds.

figure 5-5: Control field of delivery electronics with moisture regulator

Operating the keypad



Rotate the main switch to **ON**.

As soon as numbers appear on the digital display, you can call and modify data with the keypad (only in timers allocated from the factory).

Select the desired timer (see ***“Timer allocation without moisture regulator” on page 5-11***) with the **TMR** key and the **1 - 9** keys. The pre-setting can be called with the **ENT** key and finally changed with the keypad **1 - 9**.

You can delete incorrect entries with the **CE**-key. When you have finished, press the **ENT**-key.

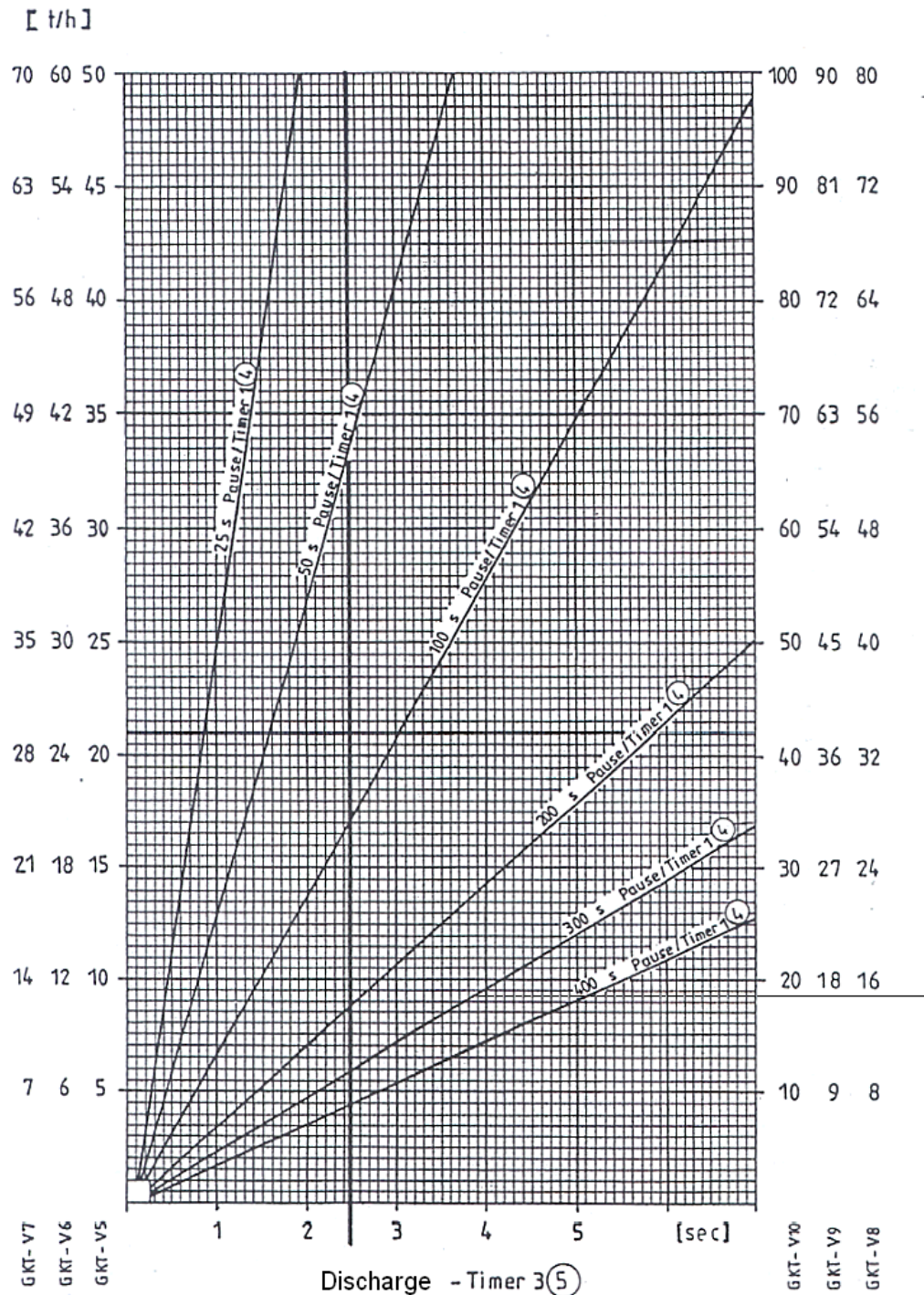
By pressing the **Up arrow** key, you can display the next timer, by pressing the **Down arrow** key, the previous timer.

Encircled positions only with moisture regulator

Circle: Set switch **Manual-O-Autom.** to hand (both two-point regulators are inactive - up to the actual value display)

With the help of the following diagram: ***“Delivery capacities”*** fix the discharge capacity of the drier (depending on the drier capacity and the moisture withdrawal):

figure 5-6: Delivery capacities



Attention - TIMER 3 (5) - when burner is on
not above 2,5 sec.
hole speed of
sequent conveyors

Enter corresponding seconds in timer 1 (4) and timer 3 (5). Put the drier into operation according to the manual. (See **"Commissioning"** on page 4-4.)

At switch position **Manual** dry until the desired final moisture is achieved (measure several times with regular moisture analysers).

If the material to be dried is still too moist after frequent tests, shorten the discharge time (slower flow). Extend timer 1 **④** or shorten

timer 3 **⑤**. If the material is too dry, proceed in the other way.

If the desired final moisture is achieved, you must make the following settings:

- Transfer the time entry from timer 4 to timer 2
- Enter approx. half the time from timer 4 in timer 3
- Enter double the time from timer 4 in timer 1
- Enter the displayed actual values of the two-point regulator as nominal values (up/down arrow keys)



The nominal temperature set "lower" should never exceed the maximum desired grain temperature! Nominal values for the "upper" and "lower" grain temperature must be made in the same way as the nominal values for the hot air temperature.

- Set the **Manual-Autom.** to **Autom.** The moisture regulator now keeps the final moisture level constant.



Note down the determined figures (timer and two-point regulator); you can always re-enter them for the same kind of products and same final moisture levels.

For new products or those with different final moisture levels, you must re-determine the settings as described above.

5.4.1 Timer allocation without moisture regulator

table 5-1: Timer allocation 1

Timer	Function
Timer 1	Time for setting the pauses between two work cycles
Timer 2	Reserve time for moisture regulator
Timer 3	Discharge time (opening time for delivery slide)



You can even enter times with decimals, for ex. 0.5 seconds



Note that the time selection does not overload the delivery devices.

table 5-2: Timer allocation 2

Timer	Function
Timer 4 - 9	Reserve function, not allocated
from Timer 10	Functions such as timer allocation with moisture regulator

5.4.2 Timer allocation with moisture regulator

table 5-3: Timer allocation 3

Timer	Function
Timer 1	Level 1 - long pause



For light display - moist/moist - both two-point regulators vary (for upper and lower test points) from the defined nominal value (about double pause time of timer 2)

table 5-4: Timer allocation 4

Timer	Function
Timer 2	Level 2 - medium pause



For light display - dry/moist, or vice-versa - only one two-point regulator varies (for upper and lower test points) from the defined nominal value (about pause time of timer 4)

table 5-5: Timer allocation 5

Timer	Function
Timer 3	Level 3 - short pause



For light display - dry/dry - both two-point regulators exceed (for upper and lower test points) the defined nominal value (about half pause time of timer 2)

table 5-6: Timer allocation 6

Timer	Function
Timer 4	only manual operation

Time for setting the pauses between two work cycles (according to timer 1 for plants without moisture regulator)

table 5-7: Timer allocation 7

Timer	Function
Timer 5	(Discharge time) opening time for delivery slide

The pauses and work times for a desired final moisture are determined with timers 4 and 5. These values should then be accepted for timer 2.



You can even enter times with decimals, for ex. 0.5 seconds



Note that the time selection does not overload the delivery devices.

table 5-8: Timer allocation 8

Timer	Function
Timer 6 - 9	Reserve-Function - not entered
Timer 10	Time for opening the secondary air valve before opening the delivery slide (lead time OPEN)
Timer 11	Time for shutting the secondary air valve after shutting the delivery slide (slowing time CLOSE)



Timer 10 and 11 are not visible on the allocation plate of the switch cabinet door, as these times are already entered at the factory,

Timer 10: 1 Second,

Timer 11: 2 Seconds. It prevents product suction during the discharge time.

table 5-9: Timer allocation 9

Timer	Function
Timer 12	Delivery monitoring

Time entry only for error message

5.4.3 With complete switch cabinet delivery by goldsaat

figure 5-7: Control unit of delivery electronics

Operating the keypad

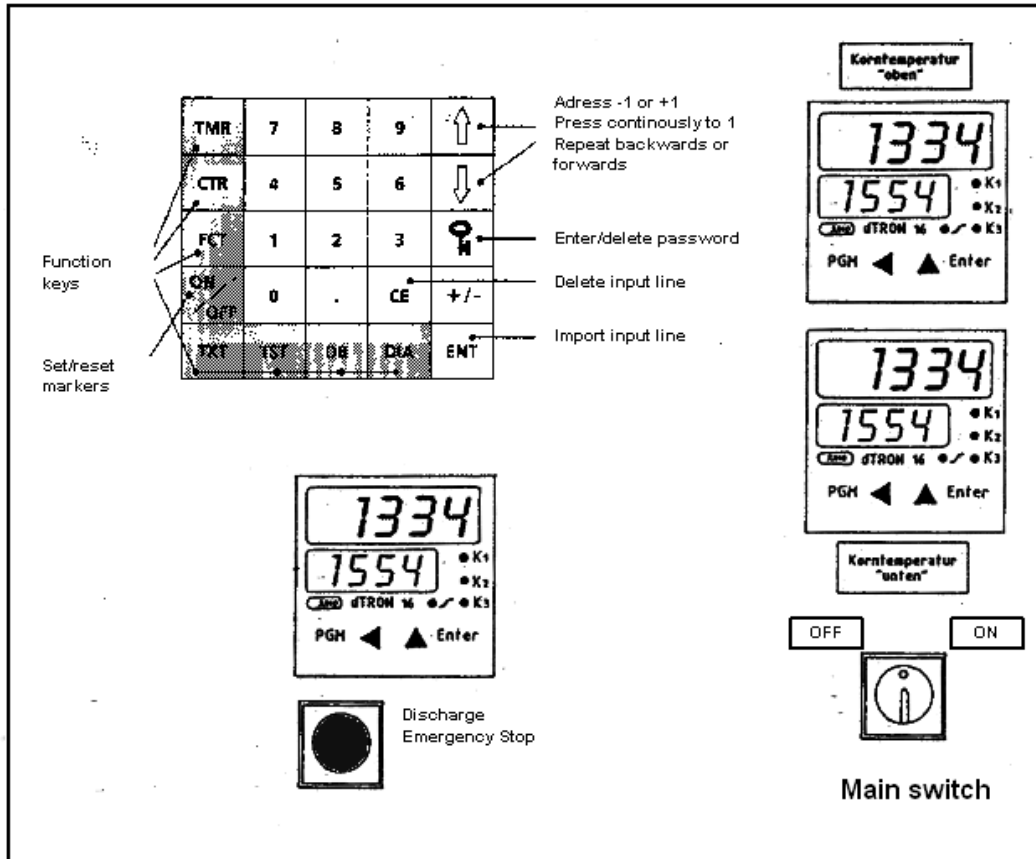


table 5-10: Timer allocation 10

Timer	Function
Timer 9	Time exceeding, discharge in EMERGENCY
Timer 12	Delivery monitoring

Time entry for error message and shutting down entire plant

Timer	Function
Timer 13	Time entry between empty-message in drier pre-container and shutting down discharge with burner
Timer 14	Time entry for shutting down fans according to timer 13
Timer 15	Pre-heat time exceeding

5.4.4 Switch on and off plant and units

The entire drying plant can be controlled by the control unit *OP 393 III*. You can select the individual functions with the **FCT** key, which you ultimately start and stop with the **ON/OFF**-key.

1. Press **FCT**-key
2. Enter function number of the following table

table 5-11: Function codes table

FCT-No	Description	Meaning
1	Pre-heating	Fan (dust sluice) and burner run
2	Manual mode drying	Fan (dust sluice) and burner run. Discharge works according to timer 4 as pause time
3	Automatic mode drying	Fan (dust sluice) and burner run. Discharge works via moisture regulator.
4	Only fan	Only the fan runs (dust sluice)
5	Empty	Only the discharge work. Timer 4 is used as pause time.
6	Ventilate	Ventilator (dust sluice) runs. Discharge works according to Timer 4 as pause time.

3. Press function number with the transfer key **ENT**.
4. Press **ON/OFF** key. The function is started.

If during operation, you press a second function in a function, then the first function is automatically reset.

Example: The drier runs in manual mode and you want to switch to "Automatic drying". On starting function 3 "Automatic drying", function 2 "Manual drying" is shut off.

With the **EMERGENCY-Stop** key, you can stop the discharge cycle briefly. This is necessary for example, when the collector inside the discharge is not emptied quickly enough. On re-pressing the **EMERGENCY-Stop** key, the discharge cycle restarts. If the **EMERGENCY-Stop** mode of the discharge is kept longer than the time defined in Timer 9, the control switches to function 4 "Only fan".

Procedure

Remark

5.5 Pneumatic exhaust throttle valve

To prevent the product from being sucked, a pneumatic operated throttle valve reduces the total air flow during the discharge time.

Approx. 1 second before opening the slide, the throttle valve is opened at the secondary support. Hereafter called Timer 10, lead time **OPEN**.

Approx. 2 to 15 seconds after shutting opening the slide, the throttle valve is closed again at the secondary support. Hereafter called Timer 11, lead time **CLOSE**.

5.6 Hot air and material temperatures

Decisive for the performance of the drying plant and the quality of the dried material is the condition of the moist product, adherence to the permissible temperatures and the climatic conditions.

The grain temperature of the product to be dried is always important. We recommend the following drying temperatures:

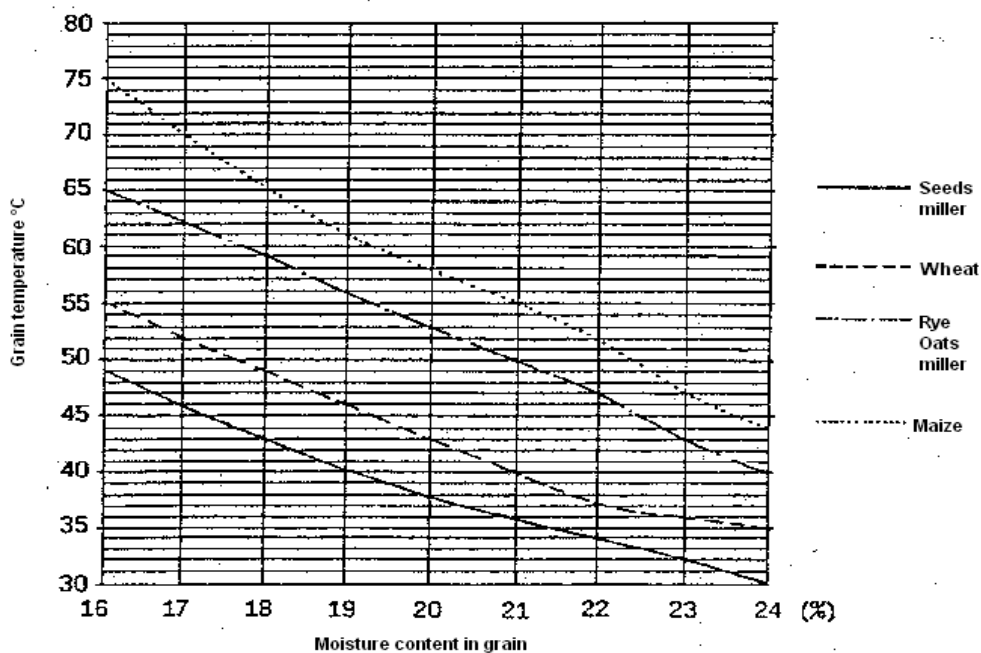
table 5-12: Drying temperatures of various types of grain (standard values)

Product	Temperature [°C]				Water content [%]		Water discharge [%]	
	Hot air		Product					
	Consumable	Seed/barley	Consumable	Seed/barley	Consumable	Seed/barley	Consumable	Seed/barley
Wheat	75-90	50-65	40-50	35-40	20	19	4	3
Rye	80-90	50-70	50-55	35-45	20	19	4	3
Barley	85-90	60-70	50	35-40	20	19	4	3
Oats	85-90	60-70	53	35-40	20	19	4	3
Maize	110-140	55-65	60-70	35-40	35	20-21	20	6
Barley for fodder	100-110	-	60	-	20	-	4	-
Oats for fodder	100-105	-	60	-	20	-	4	-
Rape seed for oil production	75-85	55-65	40-45	35-40	14	-	5	-
Poppy for oil production	75-85	60-65	40-45	35-38	-	-	-	-
Sunflower seeds for oil production	70-80	55-65	40-45	35-40	14	-	9	-
Beans, peas	40-45	35-50	35-40	30-35	-	-	-	-

table 5-12: Drying temperatures of various types of grain (standard values)

Product	Temperature [°C]				Water content [%]		Water discharge [%]	
	Hot air		Product					
	Consumable	Seed/barley	Consumable	Seed/barley	Consumable	Seed/barley	Consumable	Seed/barley
Soya beans	80-95	-	45-55	-	14	-	9	-
Turnip seeds	-	60-65	-	35-38	-	-	-	-

figure 5-8: Grain maximum temperatures (according to sprinkler)



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As each instrument is subject to deviations and fluctuations due to the characteristic tolerance and read application, it is especially important to perform a quality check for caking and germination capability on sensitive materials to be dried.

The hot air temperature directly depends on the grain temperature. For ex. at low moisture withdrawal and relatively dry products, there is only a small difference between grain and hot air temperatures. Therefore, the hot air temperatures must be kept low, and the grain flow must be regulated at higher speeds.



The more moist the grain, the higher the difference of both temperature measuring points

Following temperature levels are used for hot air:

table 5-13: Examples, approx. temperatures

Dried material	Temperature
Leguminous plant	40 - 55 °C
Seeds, browned barley	45 - 65°C
Consumable	70 - 90°C
Fodder	90 - 105°C
Fodder maize	100 - 105°C

Setting examples

5.7 Brief tutorial with examples

Approx. 20.000 kg/h at 4% water withdrawal (from 20% to 16%)

Maize capacity approx. 6.500 kg/h at 20% water withdrawal (from 35% to 15%)

Encircled positions only with moisture regulator

1. Make the settings according to chapter *“Adjustment and checking” on page 4-2*
2. Fill the plant with material to be dried.
3. Shut all throttle valves (not the adjusting valve of the air hoods).
4. Start the fan.
5. Open all the throttle valves and the adjusting valve for the re-cooling only so far that no material is sucked in (this is important for rape seed and sunflower seeds etc.)
6. Set the main switch to **On** and adjust the switch **Manual-0-Autm.** to **0**.
7. Switch on the burner.
8. Adjust the hot air temperatures and dry before for 20 to 30 minutes (without delivery).
 - For corn at 55 - 60°C
 - For maize at 90 - 100°C
9. Start the delivery devices for material.
10. Set the delivery main switch to **ON** (only in plants without moisture regulator).
11. Set the delivery capacity as follows (see also diagram: *“Delivery capacities” on page 5-9*):
 - Corn: for expected average capacity approx. 20 t/h
 - Timer 1 ④ Pause at for ex. 50 seconds
 - Timer 3 ⑤ discharge time at for ex. 1.5 seconds
 - Maize: for expected average capacity 6.5 t/h
 - Timer 1 ④ Pause at 200 seconds
 - Timer 3 ⑤ Discharge time at 1.7 seconds
12. Set the hot air temperature to 70 - 80°C (for maize at 100 - 130°C).
13. Set the switch **Manual-0-Autom.** to **Manual**.
14. Introduce the discharged dried material back into the moisture cell (if poss. in the drier) until the desired final moisture is achieved. Then deliver it to the drier cell.
15. If the material is still too moist after many tests (in corn after approx. 1.3 hours, in maize after approx. 4 hours), shorten the discharge time (slower flow). Extend the Timer 1 ④ or reduce timer 3 ⑤.
- If the material is still too dry, proceed in the other way.
16. Make the remaining settings to activate the moisture regulator.

5.8 Transportation and Storage

Pipes and cables must be laid in such a way that nobody trips on them.

All connections, such as screws, fastenings, pneumatic lines and electrical lines must be removed before transporting the machine. Individual parts and large components must be carefully attached and secured to lifting appliances, so that there is no danger of any components falling. Use only suitable lifting appliances and sufficient bearing capacity.



Not not hold up and/or work under hovering heavy goods!

Only trained persons must transport heavy goods. The guide must be available to the operator at all times.

Use appropriate transportation and storage places for storing the machine, components and units.



Do not block emergency and safety exits or passages used by persons or vehicles!

(also see: ***“Disassembly and disposal” on page 8-1***)

Do not store machines, components and units in the hazard zones of other machines, components and units.

Machines, components and units must be stored in a safe position.

Hereby, note the following points:

- Comply with the specific storage regulations, such as:
 - Storage for emergencies,
 - Size,
 - Weight,
 - Distance to adjoining devices,
 - Temperature,
 - Humidity,
 - what must be disposed off and how?
- Load plans load distribution and point of gravity of the machines, components and units to be stored,
- Stability of the machines, components and units,
- Permissible floor loads of areas where the machines, components and units are placed.

Secure movable components and parts to prevent them from moving.

Transportation

Storage

6 Maintenance

6.1 Safety

Please note chapter **“Basic safety” on page 3-1!**



Non-compliance would result in:

- Danger to the life and limb of the operator or a third party,
 - Damage to the plant, individual products or other items,
 - Danger for the efficient functioning of the plant!
-

6.2 General cleaning work

Always keep the fresh air outlets clean and remove any dust deposits immediately. Try to find the source of the dust and remove it. No grain collection pits or other sources of dust must be placed near the fresh air outlets. Place the fresh air outlets in such a way that no grain, husk or dust can be sucked in or can fall into the heating chamber.

Fresh air outlets

Check all air circulating parts (drier hoods, air pipes, fan, dust separator, hot air generator, if any: spark arresters) daily for impurities.

Remove any deposits (injected grains, light particles, dust, condensation dust layer etc.) inside and outside immediately.



If there are large quantities of injected grains in the plant parts, there is a fault in the machine. Rectify it immediately before restarting the machine.

These cleaning tasks must basically be carried out after (in WRG plants (special design) even two or three times) the drying season. During the cleaning process, look for any damages in the machine. Carry out repairs immediately after the drying season.

For separators: always sink the waste material or supervise waste material transfer, as waste material pipes produce an inadequate level of separation.

Check the bucket wheel sluices for leakages every year. If there are any leakages it might affect the functioning of the dust separator.

Bucket wheel sluices

In steel sluices, replace the rubber packing washers if necessary. Cast iron sluices must be checked by the manufacturer.

6.3 Electrical latches

Carry out the following inspections every year before the start of the drying season:

The burner can be commissioned only when the fan is switched on. The burner must automatically be switched off in case the fan stops working or is switched off.

Latch, fan-burner

On pressing the built-in end switch, the entire plant must shut down. (not in external installation)

Latch, fire-protection valve with complete arrangement

If the specified temperature is exceeded, shut down the entire plant. The plant must not restart independently (Thermostat with lock).

Latch, safety thermostat on drier with complete arrangement

Switch off pressure oil burner when the specified temperature is exceeded. It must not restart when the temperature drops (Thermostat with lock). (not in gas cylinder burner)

Safety thermostat on hot air generator

Compare the switch precision of the thermostats with the hot air thermometers. Check the thermometer for hot air and grain temperature for display accuracy. Replace if display is not accurate.

Switch precision of thermostats

6.4 Oil or gas burner and hot air generator

The oil or gas burner must be checked and if necessary set once a year by an authorised person from the manufacturing company. At the same time, he must check that the entire plant is working properly. All defects and faults must be rectified.

Remove all carbon deposits from the hot air generator and the flue gas pipes after 3 drying periods. Increased sooting in the plant can affect the efficiency of the heating plant and increase oil consumption.

Check the combustion chamber for highly overused surfaces. Contact the supplier in case of damage.

Gas cylinder burner



Before beginning any maintenance work, switch off or disconnect all end switches, regulators, etc. belonging to the combustion unit.

Using a wire brush remove all scales and residue from both sides of the mixing plate. All outlets of the mixing plate must be kept clean.

Check the mixing plates for any missing or loose screws. Replace and if necessary tighten screws.

Check all combustible parts. If openings - even partly - are blocked, open them with a sharp object. The burner openings in the castings are:

- 1.7 mm for "NP-1" and "NP-2",
- 2.0 mm for "NP-3"

6.5 Battery change

Replace the buffer battery of the automation device every year.

Use only the following type of battery: Lithium 1/2 AA, 3.4 V/850 mAh.

Replace the battery when the automation device is shut off.



Lithium batteries cannot be loaded. Danger of explosion!
Please throw used batteries in the special waste disposal.

7 Finding and repairing faults

7.1 Safety

Please note chapter **“Basic safety” on page 3-1!**



Non-compliance would result in:

- Danger to the life and limb of the operator or a third party,
- Damage to the plant, individual products or other items,
- Danger for the efficient functioning of the plant!

7.2 Drier fires

When smoke is detected, immediately shut off the entire drying plant with the **Emergency-Off-Switch**. Block the air feed paths and shut the throttle. Inform the fire brigade.



Do not empty the drier. The outlets for cleaning must be opened only for extinguishing the fire, as acidic material entering it might cause a fire or increase the fire.

Notify us. The contact address is given in chapter **“Address” on page 1-2.**

7.3 Characteristic faults and remedies

The characteristic faults and their repair known to us are listed in the table below:

table 7-1: Characteristic faults and their repair

FAULT																	REMEDY		
Stroke control	Changed fan noises	Delivery and moisture withdrawal unequal	Drying plant breaks down	Cyclone does not separate properly	Grains trickle from shut off delivery	Air heater has too high flue gas temperatures	Flame strikes back at the burner	Burner breaks down	Fan breaks down	Grains in the hoods	Fan sucks in grains	Insufficient cooling	Hot air temperature changes	Hot air temperature too high	Hot air temperature too low	Moisture reduction too high	Moisture reduction too low	Grain temperature too high	Grain temperature too low
															x		x		x
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FAULT				REMEDY			
Stroke control							
Changed fan noises	x						Cleaning doors or covers are open
Delivery and moisture withdrawal unequal	x	x					Foreign bodies
Drying plant breaks down		x					Delivery sheet not snapped shut
Cyclone does not separate properly							Fan wheel dirty
Grains trickle from shut off delivery			x				Clean spark arrester
Air heater has too high flue gas temperatures	x						Check bucket wheel sluice
Flame strikes back at the burner				x			Check discharge valves and cylinder
Burner breaks down					x		
Fan breaks down							
Grains in the hoods	x			x			
Fan sucks in grains	x			x			
Insufficient cooling	x				x		
Hot air temperature changes	x						
Hot air temperature too high							
Hot air temperature too low							
Moisture reduction too high							
Moisture reduction too low	x					x	
Grain temperature too high							
Grain temperature too low	x						

8 Disassembly and disposal

8.1 Safety

Please note the chapter **“Basic safety” on page 3-1!**



Non-compliance would result in:

- Danger to the life and limb of the operator or a third party,
- Damage to the plant, individual products or other items,
- Danger for the efficient functioning of the plant!

8.2 General hints

8.2.1 Disassembly

Please note the special instructions for plant components when disassembling the plant (see **“Plants” on page 9-1**).

The plant may be disassembled only by qualified personnel.

The technical personnel must carry out a danger analysis before disassembly. Based on this analysis, the owner must prepare a disassembly instruction list for the plant.



Keep all emergency facilities ready!

Please note chapter **“Transportation and Storage” on page 5-21** when disassembling and storing the plant.

8.2.2 Disposal



Keep all emergency facilities ready!

Please note chapter ***“Disassembly and disposal” on page 8-1*** when disassembling and storing the plant.

Before disposal, check for any environmental risks. The personnel in charge of the disposal must be instructed accordingly.



Comply with all legislation stipulations and any disposal instructions specified by the manufacturer when disposing the operating material and components!

All operating material (grease, batteries, plastics, metals) must be disposed in accordance with the legal stipulations. Dusters and other cleaning material must be disposed off separately.

9 Plants

9.1 Operation and maintenance manual of the goldsaat fan

9.2 Terminal diagrams

9.2.1 Terminal diagram for feed electronic without humidity regulator

9.2.2 Terminal diagram of feed electronic with humidity regulator and burner control

9.3 CE-Conformity declaration
