



K-SERIES MOBILE DRYER

M180k, M205k, M240k, M275k, M300k, M365k ja M420k

D00125_ENG Rev. G

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1 FOREWORD

This manual contains the operating instructions for the K-series mobile dryer. Before commissioning, read this manual carefully and familiarize yourself with the procedures and precautions to ensure efficient and safe use of the device. Keep this manual available and review it with new personnel. If you need more information or assistance, contact your dealer or Mepu Oy's service number.

1.1 WARRANTY AND WARRANTY TERMS

This product is intended for professional use. Installation, operation, and maintenance require general knowledge and skills of machines and devices, as can be expected from a professional farmer.

- The warranty period is one (1) year for agricultural use, starting from delivery. The furnace firebox and heat exchanger material warranty is seven (7) years.
- The warranty does not cover damage caused by misuse or any resulting damages.
- The warranty covers manufacturing and material defects. Damaged parts will be repaired or replaced to working condition. If the damage is not covered by the warranty, all incurred costs will be charged.
- Warranty repair does not extend the warranty period.
- The warranty does not cover consequential damages, loss of profit, freight, travel expenses, downtime, modifications to the original structure, or other financial losses.
- The warranty requires that the manufacturer's instructions and applicable regulations have been followed during installation, use, and maintenance.
- The warranty does not cover premature wear or damage due to neglected maintenance.
- Warranty matters and possible costs must be agreed upon in advance with Mepu Oy before repair actions.

2 Import Information for Mobile Dryer



Risk of Falling

After installing the grain bin, attach ladders, back supports, and roof railings. Use extreme caution on wet or icy roofs.



Disconnect the dryer's supply cable from the network when:

- Removing protective covers for maintenance or adjustment
 - Cleaning the bottom of the elevator or screw conveyors.
 - Adjusting the elevator belt or conveyor V-belt tension.
 - Entering the grain bin for spreader plate adjustment.
 - Opening the burner for maintenance.



Fire Hazard: Keep the dryer and surroundings clean

- Direct the exhaust pipes of the pre-cleaner and bottom extractor far enough from the dryer, preferably through a cyclone into a waste container.
- The intake air for the furnace must be absolutely clean.
- Moist and partially dusty air from the side air ducts must be directed far enough from the dryer to prevent mixing with the furnace intake air.
- Mixing exhaust air with intake air significantly reduces drying efficiency.
- Every 100 hours, check the cleanliness of the furnace bottom and exhaust air ducts.
- Also, at the end of each drying batch, open the discharge lever located between the feeder and elevator at the back of the dryer.



Oil Spill Hazard

After adjusting the burner pressure, always close the shut-off valve of the pressure gauge. If left open, the gauge may break and oil may leak into the environment. Protect oil hoses between the oil tank and burner to prevent damage during movement around the dryer.



Additional Lighting

The drying season occurs in late summer when evenings and nights are already dark. Ensure sufficient additional lighting around the dryer for work safety.



Filling and Emptying the Dryer

When filling and emptying the dryer, ensure that bystanders are not at risk of being trapped under the moving combination or between the trailer and the hopper.



Fire Extinguishers

During the operating season, a 12 kg initial fire extinguisher, type ABE-3, must be available at the dryer.

Operating Instructions

Remember to read the operating instructions before starting installation and use!

3 Basics of Grain Drying

The preservation of threshed grain depends on its internal moisture content and the temperature achieved by the storage method. In Scandinavian and northern hemisphere conditions, the post-harvest moisture content of grain typically ranges from 15% to 45%, which requires measures to improve the grain's storability.

In the climatic conditions of the northern hemisphere, natural drying does not achieve sufficiently low moisture levels. During the harvest season, the relative humidity of outdoor air rises to between 80% and 90%. Without auxiliary equipment, drying methods cannot achieve low grain moisture.

Therefore, grain must be treated with various methods to improve its preservation. Established treatment methods include various drying techniques and, to a lesser extent, freezing the grain.

Recommended drying air temperatures:

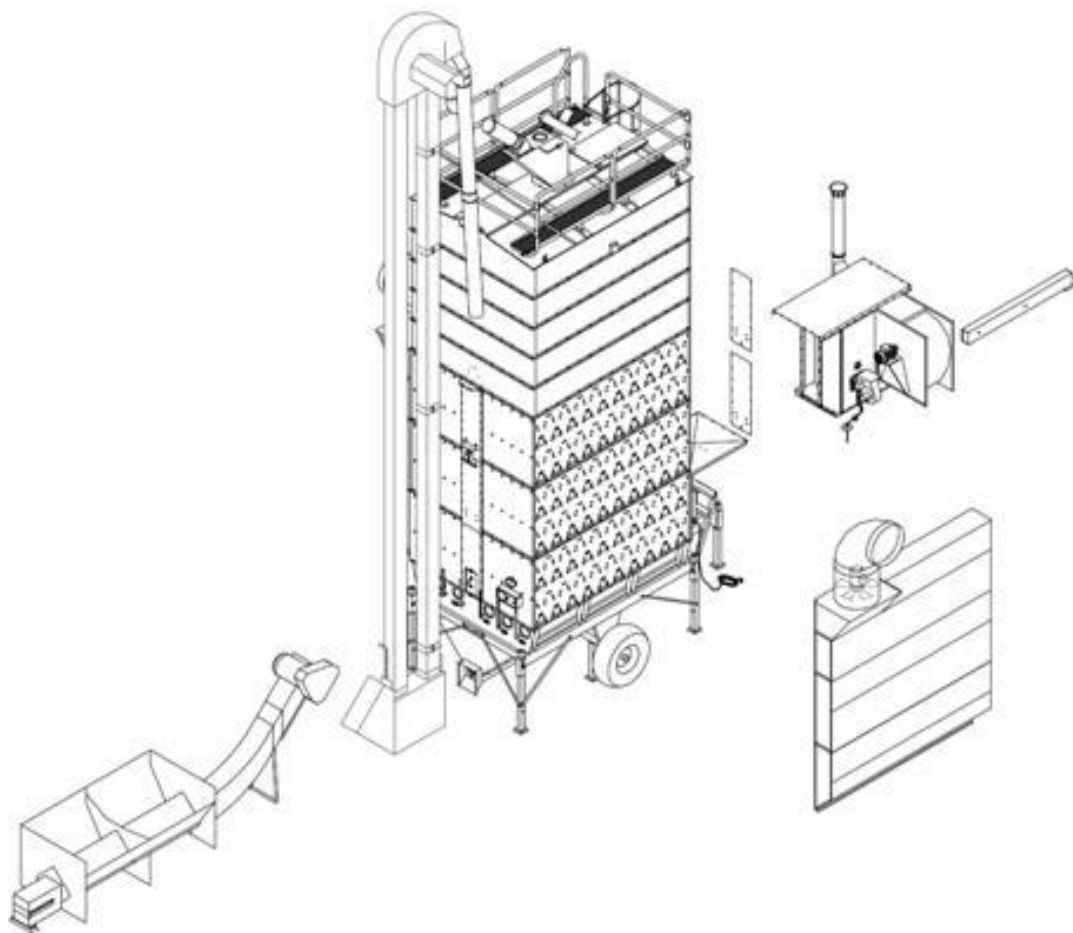
- Seed grain: 50 ... 60°C
- Bread grain: 60 ... 70°C
- Feed grain: up to 80°C

Recommended grain temperature:

- Below 45°C ... germination deteriorates

When drying with hot air, it is important to ensure the circulation and cooling of the grain to prevent local overheating.

4 Technical Specification of the Mobile Grain Dryer



4.1 Intake Pit

Grain is poured into a receiving hopper equipped with a bottom conveyor, which transfers the grain to the elevator.

4.2 Elevator

A bucket elevator with steel buckets is used as the elevator.

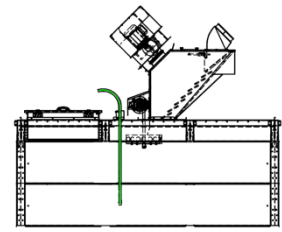
The lower conveyor located under the dryer's bottom cone is equipped with a rotation monitor. The rotation monitor stops the machine if the conveyor becomes blocked.

4.3 Pre-cleaner and Spreader

From the elevator, the grain flows directly through a grain pipe into the pre-cleaner, from where it moves straight to the spreader plate. The motor-driven spreader plate's function is to distribute the grain evenly throughout the entire grain bin.

4.4 Grain Buffer

Wet grain expands as it warms. As drying progresses, the volume of the grain decreases significantly. The grain compartment of the mobile dryer is optimized to function under all conditions. The spacious grain bin serves to buffer fluctuations in grain level that occur due to pre-cleaning and drying.



Railings and a walkway, included in the standard delivery, are attached to the upper part of the grain bin. The standard delivery also includes a fill guard installed on the roof. There is a manhole on the roof with a hatch leading into the bin, for example, for adjusting the spreader plate or cleaning the grain bin.



4.5 Drying Cells

The drying cell contains plenty of air laterals. Drying is uniform because air is blown into the central channel between adjacent drying cells, from which moist air is discharged through the drying cells to the outer sides into exhaust air chambers. There is a cleaning/inspection hatch at the rear of the central channel. For drying small batches, there is a shut-off hatch between the cells to prevent airflow.

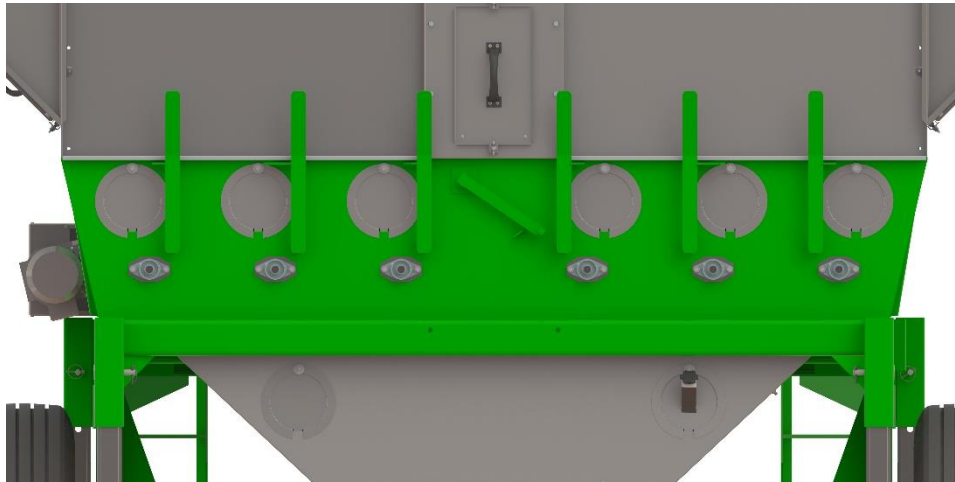
4.6 Exhaust Air Chambers and Exhaust Fans

The exhaust air chambers on the sides of the dryer collect the moist air coming from the drying cells, which is then directed to exhaust ducts on the sides of the dryer. One of the exhaust ducts has a thermostat that measures the temperature of the exhaust air. The thermostat's digital display is located in the electrical control center.

Exhaust fans for the exhaust air chambers are standard on models M300k and above, and available as an accessory for models M180k – M275k. The fans are intended to reduce moisture condensation in the exhaust air chambers and also provide better ventilation for the drying room.

4.7 Feeder

During drying, grain flows evenly from the rotating feed rollers to the conical bottom below. There are six feed rollers. Each end of the feeder device has an opening hatch for cleaning the feed rollers.

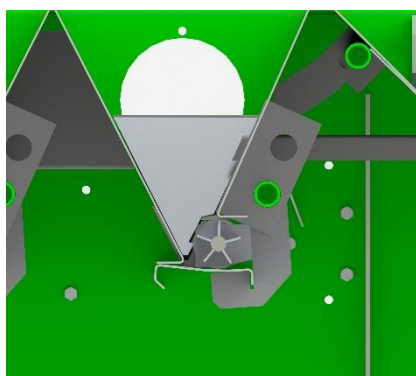


The volume of the feeder device is 0.81 cubic meters. The shafts are mounted with ball bearings at both ends and with a nylon sliding bearing in the middle. Under each feed roller, there is a bottom hatch that can be opened for variety change or for cleaning after the season.

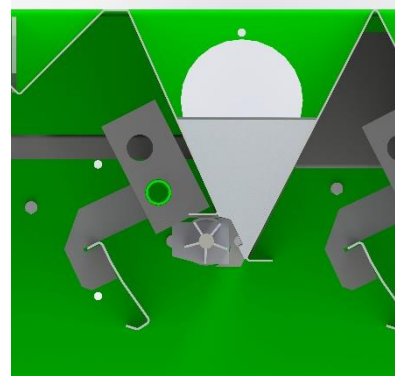
The feed roller operates reliably even with wet grain, and the feed rate remains constant in terms of volumetric flow throughout the drying process, regardless of grain moisture. However, it should be noted that the mass flow increases towards the end of drying as the grain size decreases.

Steep-ridged feed cones ensure a uniform drying process and reliable circulation under all conditions. The structure of the feeder device is very tight, also allowing the drying of small seeds (e.g., rapeseed).

The feeder device is equipped with a bottom hatch locking mechanism, which is used to close and open the bottom hatches. The opening mechanism is crank-operated.



Closed



Open

In a feeder device equipped with a crank-operated bottom hatch opening mechanism, each bottom hatch has its own crank for opening and closing. In such a feeder device, the second and fifth cranks (see illustration) are equipped with an intermediate position, which allows control of the grain flow to the bottom cone when opening the cranks.



During drying or filling, all bottom hatches must be closed!

Bottom hatches must not be closed if there is grain in the bottom cone (risk of damage).

The feeder device is powered by a frequency converter-controlled gear motor, which transmits the rotational movement to the feed shafts via a chain. At the factory, the grain circulation speed is set so that the grain circulates at approximately 182 hectoliters per hour. The feed amount can be adjusted steplessly using the control knob located in the electrical control center.



4.8 Bottom Cone and Extractor, Sampling Device

A steep-sided bottom cone is made of durable, hot-dip galvanized steel plate. The bottom extractor removes dust and vapor from the bottom cone, keeping, for example, the elevator clean throughout the drying process. From the feed rollers, the grain falls via the sloping cone surface onto the bottom conveyor located at the base of the cone, which transports the grain to the elevator. At the rear of the bottom cone, there is a sampling device. The sampling device makes it easy to monitor the progress of drying. Remove the cover and tilt the sampling tube downward, allowing the grain to flow into the sampling container.



4.9 Burner

All models are equipped with an efficient and long-lasting dryer furnace. The power range of the furnaces is 250–500 kW. The fan power/airflow rates are: 4.0–11 kW / 14,000–24,500 m³/h.

In the cylindrical combustion chamber, the burner flame burns in the center of the chamber, from where the heat is conducted to vertical lamella heat exchangers. The combustion chamber is made of fire-resistant steel. The vertical heat exchangers distribute the heat evenly and efficiently, ensuring good efficiency and durability of the burner.

4.10 Electrification

The dryer's equipment electrification and automation are pre-installed. The dryer is ready for use once the electrical connections of the machine's devices are plugged into their designated sockets, the machine is connected to the power grid, and the oil burner hoses are installed in the oil tank. The elevator and receiving hopper are connected separately.



Before starting maintenance work, always remember to turn the main switch to the OFF position or disconnect the supply cable from the power network.



4.11 Frame

A sturdy steel beam frame and large pneumatic tires allow the basic part of the dryer to be moved at a maximum speed of 50 km/h. When using the dryer, the frame must be supported at five points. On models M240k and above, the wheel axle is supported with axle supports. To save space, the drawbar can be detached.



Towing the mobile dryer when it is filled is strictly prohibited.

5 Commissioning and Placement of the Mobile Grain Dryer

The mobile grain dryer does not require a building around it. Its structure allows operation outdoors without separate shelter. However, it is recommended to construct a lightweight, unheated shelter around the dryer or use a modular silo as a grain storage, which also provides walls for the building. When constructing a more permanent structure, building permit issues must be taken into account.



Always contact the municipal building and fire authorities before installation.

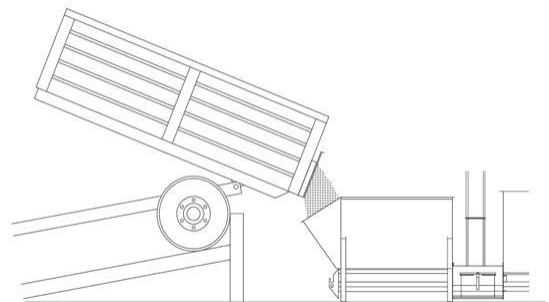
5.1 Mobile Grain Dryer Placed in a Covered Space

The airflow of a dryer placed in a covered space must be managed so that dust coming from the dryer's cleaners and outlet channels does not mix with the intake air of the drying facility.

When selecting the installation site, the availability of electrical and oil connections must also be considered. The location of the oil tank or barrels should be chosen so that the oil pipes are not in passageways and therefore cannot be damaged. The distance of the oil tank must comply with local fire authority regulations.

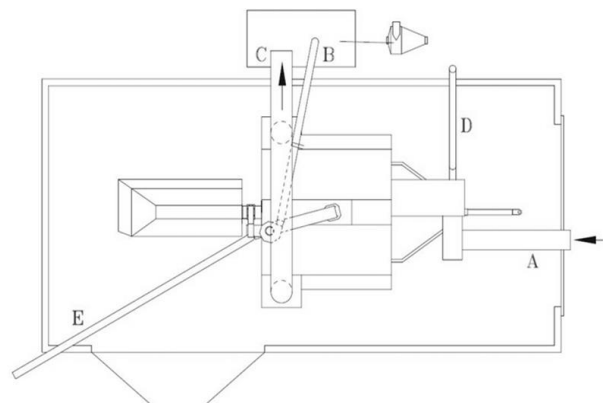
Otherwise, the installation site of the dryer should be chosen from the most advantageous location for drying, and sufficient driving and turning areas should be reserved for the trailer-tractor combination. The installation site should be as level and firm as possible under the dryer frame, for example, a concrete slab. Additionally, factors such as dust and noise should be taken into account.

Before commissioning the drying facility, it is advisable to build a barrier for the trailer to prevent damage to the receiving hopper. If the tipping height of the trailer is low, it is recommended to build a ramp for the receiving hopper.



Airflows in a covered space

- The furnace intake air must be taken from outside the building using an additional duct (A).
- The trash/dust pipe from the pre-cleaner and bottom extractor (B) must be routed outside the building, into a separate dust collection box via a cyclone.
- The exhaust air blower pipes (2 pcs) are routed outside (C).
- The flue is routed outside (D).
- The grain pipe is installed so that loading is flexible (E).
- Ensure that the furnace always receives dust-free intake air under all conditions.



5.2 Power Supply

The machine's electrification and automation are pre-installed and factory-tested, except for the elevator and the receiving hopper's feed conveyor. The machine is equipped with a 10-meter power cable with a 63A plug ready for use.

All actuators are connected to the sockets located at the bottom of the control center.

The rotation monitors for the bottom conveyor and elevator, as well as the dryer's fill guard, are connected to the M12 junction box.



- **SX1** = Elevator rotation monitor
- **SX2** = Bottom conveyor rotation monitor
- **17.1X1** = Dryer fill guard

Dryer Electrical Supply

The supply cable is connected to a 63A socket. When connecting the cable to the network, the main fuses must be at least 25A – 63A, depending on the equipment of the machine. When the machine is connected to the network and the main switch is turned to position I, the work light next to the control center will turn on.



The fuse size for the machine is determined by the model and equipment.
When connecting the dryer to the electrical network, ensure that the main switch is in the OFF position.

Rotation Direction

During factory testing, the rotation directions of all motors have been checked (except for the elevator and the receiving hopper feed conveyor). However, when connecting the dryer at the installation site, the rotation direction of each actuator must be checked. The easiest way to do this is by checking the rotation direction of the furnace fan. Use the dryer's program switch in position 3

(drying) for about 3 seconds, after which the rotation direction of the furnace fan can be checked. The correct rotation direction is indicated on a label under the fan's intake opening.



If the dryer's power supply is moved to another socket or its extension cord is changed, the rotation direction must be checked again. Also note that the power supply must be five-wire, i.e., L1, L2, L3, N, and PE.

5.3 Control cabinet

Group fuses and residual current circuit breaker. Protective fuses and residual current circuit breaker for actuators.

Main switch. Located on the side of the center. The electrical equipment of the dryer can be disconnected from the mains. Always turn to the OFF position when servicing.

Drying mode selector switch. See section: 6. Operation of the Dryer, page 20.

Emergency stop button. The emergency stop button stops the operation of the dryer in the event of damage or danger (to be used only in emergencies).

The electrical center is pre-installed, adjusted, and test-run at the factory.



Type plate of the cabinet.

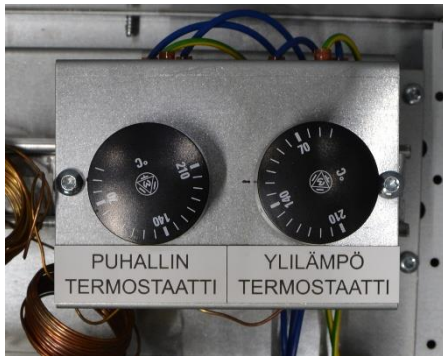
With the label number and year, you can obtain additional information from the factory if necessary.



Indicator Lights and Control Buttons

The drying mode selector switch must be in the 0 position when I want to use manual controls.

Actuator	Purpose of the Actuator
Emergency stop reset	Resetting the emergency stop circuit. Before resetting, all emergency stop buttons must be released. The emergency stop button can be released by turning it. After this, press the reset button.
Cooling	Illuminates when cooling is on
Drying	Illuminates when drying is on
Dryer full	Illuminates when the dryer is full
Rotation monitor fault/reset	Illuminates when there is a fault in the rotation monitor, stops the equipment. Pressing the button will acknowledge the fault indicator.
Overheat	Illuminates if the overheat limit has been exceeded
Motor protection / Frequency inverter fault	Illuminates when the motor protection has tripped or the frequency converter is faulty or without power.
Channel fan	Can be enabled or disabled during drying
Feeder speed control	Adjust how quickly the grain circulates in the dryer
Channel fans	Manual control of the channel fans
Elevator	Manual control of the elevator
Lower conveyor	Manual control of the lower conveyor
Filling conveyor	Manual control of the filling conveyor
Pre-cleaner	Manual control of the pre-cleaner
Feeder/bottom suction fan	Manual control of the feeder/bottom suction fan
Main fan	Manual control of the main fan
Cooling time clock	Adjust the length of the cooling time. See section: 6.4.2 Cooling time clock
Drying control thermostat	Adjust the drying temperature limit, i.e., at what temperature the process switches from drying to cooling.
Burner / 2-Stage thermostat	Adjust the blowing temperature from the furnace to the dryer.



The fan and over-temperature thermostats are read at the nine o'clock position. Both have been pre-set at the factory. See section: Factory Settings, page 19.

The fan thermostat manages the after-cooling of the furnace, while the over-temperature thermostat acts as a safety limit in case the furnace overheats.



The thermostats are already set at the factory. Do not adjust the thermostat settings.

5.4 Oil

In order to maintain the warranty on the oil burner, a fixed oil piping system must be installed and commissioning must be carried out by an oil burner installation company approved by Tukes.



You can obtain information about approved installation companies from the authorities in the relevant country. Details regarding the burner and its installation can be found in the burner's instruction manual, which is included in the dryer's documentation.

5.5 Chimney

The machine is supplied with flue pipes, connecting bands, an ash/cleaning elbow, and a rain cap. The ash/cleaning elbow is connected to the outlet pipe on the side of the furnace, and 2 or 4 metres (depending on the size of the machine) of flue pipe with a rain cap are then attached. The flue components are intended for outdoor use. If installing indoors, additional insulation is required, so it is advisable to consult the local fire authority before installation.



The placement and height requirements of the flue must be discussed with the local fire or building authority.

5.6 Dryer Furnace

Commissioning

Once the electrical and oil connections have been completed on site, the dryer furnace installed in the mobile dryer is fully ready for use. Before starting the drying phase, check the following items on the furnace:

- The oil hoses are correctly connected (the arrows on the filter and pump indicate the suction and return directions).
- The oil filter is in a vertical position.
- The furnace explosion and cleaning hatches are closed.
- The flue is compliant with regulations and firmly attached to the dryer.

Two factors related to the furnace significantly affect the economic efficiency of drying: firstly, the furnace must be clean, and secondly, combustion must occur without sooting. Therefore, carefully read the burner operating and maintenance instructions before commissioning. The burner's settings must always be checked by a burner technician to ensure combustion is as clean and oil-efficient as possible. The warranty conditions require annual maintenance of the burner by a professional.

Burners and Nozzles

The nozzle outputs in the table are intended for an oil pressure of 10 bar. The nozzle outputs can be reduced from the table values if necessary. Likewise, the ratio between stage 1 and stage 2 flames can be adjusted, but the total output for the nozzles must not be exceeded.

Oven type	Burner	Max output [kg/h]	Nozzle size I flame	Nozzle size II flame	Nozzle output kg/h
250	Oilon B 40 A2	23	4 gal 80°	2 gal 80°	14.2 + 7.4 = 21.6
310	Oilon B 40 A2	29	5 gal 80°	2 gal 80°	18.5 + 7.4 = 25.9
400	Oilon KP 50 H	38	6 gal 80°	3 gal 80°	23.4 + 11.6 = 35
500	Oilon KP 50 H	48	8.5 gal 80°	4 gal 80°	33.1 + 14.2 = 47.3

The nozzle spray angle must be 80 degrees. Exceeding these nozzle power ratings will void the warranty.

Furnace temperature settings

When the drying air temperature rises above the burner thermostat set value, the burner stops and reignites when the temperature drops by 2–4°C.

The oven is equipped with a dual-flame burner (B 40 A2 or KP 50 H); the thermostat has two set values, one for single flame and one for dual flame. Note that the single-flame set value must be higher than the dual-flame set value. The aim is for the burner never to shut off during drying; instead, the dual flame compensates for outdoor temperature fluctuations. When the outside temperature

drops, the dual flame operates for longer, whereas rising outdoor temperatures reduce the need for the dual flame.

The overheat thermostat's set value is higher than that of the burner thermostat, ensuring the oven temperature does not rise excessively. If the dryer is stopped mid-drying, the fan thermostat will only stop the oven fan once the oven temperature has fallen below the fan thermostat's set value.

Factory settings

Device	Type	Factory Setting	Function
Fan Thermostat	Capillary	50 °C	The fan starts when the temperature is exceeded. Note: always operates when the dryer is powered on.
Burner Thermostat 1-flame	Digital	90 °C	Switches off flame 1 at this temperature. The nozzle must be sized so it does not extinguish flame 1.
Burner Thermostat 2-flame	Digital	80 °C	Switches off flame 2 at this temperature.
Overheat Thermostat	Capillary	115 °C	When the temperature is exceeded, it triggers the overheat fault.
Drying Control Thermostat	Digital	50 °C (30-50 °C)	Factory setting 50 °C, normal use 30-50 °C adjustment. When the value is exceeded, it switches to cooling.
Cooling Timer	Digital	1h:30min	When cooling is active, the timer counts down. Once the time is up, the device switches off. Minimum value is 1 min.
Pre-cleaner/Base Extractor Adjustment	Manual	1/2	Set to halfway. If opened too much, grain is carried into the waste.
Pre-cleaner Weight	Manual	Right at the base	Balances the flow of grain into the dryer.
Main Fan Adjustment	Manual	Fully open	Restricts the airflow if necessary.
Partial Batch or Centre Channel Hatches	Manual	Open	Normally open. Closed for partial



			batches. Allows or prevents air flow to the top drying cells.
Feeder Hatches	Manual	Closed	Kept closed. Opened if necessary during emptying.
Feed Rate	Electric	5	Set halfway. Measure the time during emptying with the feeder and adjust the feed speed if necessary.

6 Using the Dryer

The drying process consists of four different phases: filling, drying, cooling, and emptying.

6.1 Filling the Dryer

Preparations

Before starting, check the appropriate tipping height for the trailer and consider building a barrier for the trailer to prevent damage to the discharge hopper.

Make sure of the following before tipping:

- The feeder's shut-off gates are closed. Ensure that all shut-off gates close properly.
- The distributor at the top of the elevator directs the grain into the drying machine.
- The intake damper of the pre-cleaner is properly adjusted so that grains do not fly into the waste pipe.
- All inspection hatches are closed.

6.1.1 Filling

After the preparations, filling of the dryer can begin by turning the selector switch on the electrical panel to position 2 ("filling"). This starts the conveyor system, as well as the motors for the pre-cleaner and spreader.

If necessary, for example during trailer changeover, the filling stage can be stopped using the selector switch. It is a good idea to empty the conveyors of grain to minimize the risk of blockages when starting the next filling stage. The control center of the dryer is equipped with standard start and stop steps which, when used according to the instructions, automatically empty the conveyors of grain.

The filling guard stops the filling when the grain level reaches the filling guard sensor. When the dryer is full, there should be about 30 cm of free air space downward from the lower edge of the spreader. At the beginning of drying, the grain level may rise momentarily before settling in the dryer, so it is important to leave at least 30 cm of free air space from the lower edge of the spreading disc.

If the dryer becomes too full (effectively preventing the spreading disc from operating), the spreading disc cannot rotate and its motor protection will trip. Reset the motor protection and remove grain from the dryer.

To empty the dryer, turn the divider away from the dryer, move the trailer under the pipe, and set the selector switch to position 1 (emptying). Monitor the grain level through the manhole. Stop emptying by turning the selector switch to position 0 once enough grain has been removed.



6.2 Drying

6.2.1 Preparations

Before starting the drying process, ensure the following:

- The divider is in the drying position.
- The thermostat setpoints have been checked.
- The oven connections and adjustments have been checked.
- Ensure the burner switch is in position 2.

NOTES FOR DRYING VERY WET GRAIN

The machine operates differently from normal years if the grain moisture content is over 25%. When drying very wet grain, it is advisable to gradually increase the temperature to prevent the grain from clumping and to ensure the grain moves evenly through all parts of the machine.

Between drying batches, check that no clumps of grain have remained in the corners of the dryer; if necessary, remove any clumps.

6.2.2 Drying

Once all items have been checked, drying can begin. First, set an appropriate cooling time on the cooling timer; this depends on the size of the machine or the outside air temperature. For small machines, about 1 hour is sufficient, and for larger machines, 1.5 hours. However, set the cooling time so that the dried batch circulates at least once. In hot weather, the cooling time should be longer.



After this, turn the program selector switch to position 3, “drying.”

The drying phase begins with the main air blower starting. The burner ignites only after a delay. The dryer has a staggered start, which controls the conveyor system during the drying phase. Once the burner has ignited, check the operation of the dryer.

As the drying process starts, the grain feeding mechanism also begins operation. The feeder, located at the bottom of the dryer, evenly feeds grain to the bottom cone, from where it moves horizontally in the lower conveyor at the base of the machine. The lower conveyor transfers the grain to the elevator, which moves it through the pre-cleaner and spreader disc back to the grain chamber. The temperature of the exhaust air is monitored via a sensor installed in the exhaust air channel. When the set value is reached, the automation stops the drying operation and starts cooling.

The feeder is set to factory settings. This setting should be checked for your specific grain variety. If, for example, you are drying rapeseed or grain that is wetter than usual, the feeder setting must be adjusted. Also, monitor the operation of the pre-cleaner and adjust its settings as needed.



Ensure the moisture content of each batch with a moisture meter before emptying.

The drying phase now continues until the drying thermostat, which measures the exhaust air temperature, cuts off the burner. After this, the cooling phase begins automatically and lasts for the period set on the cooling timer (1 – 1.5 hours). Once the main air blower has stopped, the drying phase (cooling) is complete. If a power cut occurs during the drying phase, the drying phase will resume automatically when power is restored. Always check the drying result before emptying the dryer. Take a sample from the sampling device and verify the moisture content of the grains using a moisture meter.

6.3 Emptying the Dryer

6.3.1 Preparations

Turn the divider to the emptying position towards the silo or trailer.

6.3.2 Emptying

Start emptying by turning the selector switch to position 1, “emptying.” Adjust the emptying speed using the feed mechanism speed controller.

The grain is transferred by the lower conveyor to the elevator, which lifts it up. From the elevator, the grain falls onto the divider, which directs the grain via a pipe into the storage silo or trailer.

When the flow of grain from the discharge pipe stops, check that the dryer is empty via the inspection hatches on the feed mechanism. After checking, always remember to close the bottom hatches. Switch off the dryer by turning the selector switch to position (0).

6.3.3 Switch of Variety or Seasonal Maintenance

The bottom of the elevator can be emptied of grain by opening the maintenance hatch found at the base of the elevator. Only open the hatch once the main switch of the dryer has been turned off.

The lower conveyor trough can be emptied by opening the hatch locking latches. Before opening the hatches, disconnect the power supply to the lower conveyor, for example, by removing the supply cable’s power plug from the socket.



The bottom hatches of the feed mechanism must not be closed if there is grain in the bottom cone (risk of breakage).



If you open the elevator maintenance hatches or the lower conveyor trough hatches, make sure that the main switch of the dryer is turned off. Always ensure that the conveyor control is de-energised before starting any maintenance work.

6.4 Dryer Settings

6.4.1 Filling Sensor Adjustment

The filling sensor is adjusted by raising and lowering the sensor holder located on the roof of the dryer (see picture). The rod should be set to the lowest position and only raised upwards if necessary. Take into account the change in grain volume due to heating—leave room for the grain to expand if you raise the sensor.

6.4.2 Cooling Time Clock

The lower row of the cooling clock's display shows the set cooling time in hh:mm, and the upper row shows the remaining cooling time.



6.4.3 Burner Thermostat Adjustment

Type of burner thermostat: ATR144

Operation: The thermostat is used to adjust the drying fan air temperature. The blower temperature is shown at the top of the thermostat display during drying.

Setting:

1. Flame Temperature Adjustment (Drying Temperature)



This is the basic display of the thermostat. Adjust the drying temperature using the arrow keys (▶ / ◀). The set temperature is shown on the lower row (e.g., 90). The current measured drying air temperature is shown on the upper row.

2. Flame Temperature Adjustment



Press the Set (SET) button once to access the Alarm 1 (AL. 1) menu. Adjust the 2nd flame temperature using the arrow keys (▶ / ◀). The adjustable temperature is shown on the top row. Set the temperature 10 degrees lower than for the 1st flame. The thermostat will return to the main display 5 seconds after the last button press.

Example: 2-flame burner:

When adjusting the temperature in wagons equipped with a 2-stage burner (B 40 and KP-50H), both temperature settings 1 and 2 are used. Value 1 sets the 1-flame value, and value 2 sets the 2-flame value. These values determine when the flame is switched off. The aim is to regulate the temperature using the 2-flame setting. The 2-flame is switched off when the temperature is too high. The 1-flame is intended to burn continuously and should not be interrupted. If the 1-flame is extinguished, the nozzle is too large and must be reduced. The temperature difference between 1 and 2 should be about 10 °C.

For example, if you want a drying temperature of 80°C, set value 1 to 90°C and value 2 to 80°C.

Note during night-time drying that the values may vary due to the cold outside temperature.

C = 1 flame request on

A1 = 2 flame request on



6.4.4 Drying Thermostat Adjustment

Drying Control Thermostat Type: ATR144

Operation: The upper row displays the actual measured temperature in the exhaust air duct. The thermostat is used to control the transition of the dryer from drying to cooling. During drying, the upper row shows the exhaust air temperature. When starting the drying process, set the thermostat to a sufficiently high temperature, for example, 50 °C.

Settings:



Adjust the final drying temperature using the arrow keys ( ja ). The grain dryer will switch to cooling when the temperature set on the lower row (for example, 38°C) is reached. The upper row of the display shows the current value measured by the sensor (for example, 18.6°C).

Operation: As drying progresses, the moisture of the grain is measured with a moisture meter. Once the desired moisture level is reached, the current temperature displayed on the thermostat is read.

Then, according to the instructions above, set the thermostat to a value that is 0.1 °C lower than the value shown on the display.

Example: If you want the grain at 13% moisture, and the moisture meter shows 13%, the exhaust air temperature on the thermostat display is 37.5 °C. Set the thermostat to 37.4 °C.

In this case, the dryer switches to cooling, provided that the temperature is still 37.5 °C.

The drying result varies somewhat depending on the grain variety, so suitable values should be determined through experience for different varieties. If the temperature of the blown air changes significantly, it will also affect the drying result. Also, if the outside air temperature is much lower than the set values, for example at night, the set values will change from those set during the day.

6.4.5 Feeder Adjustment

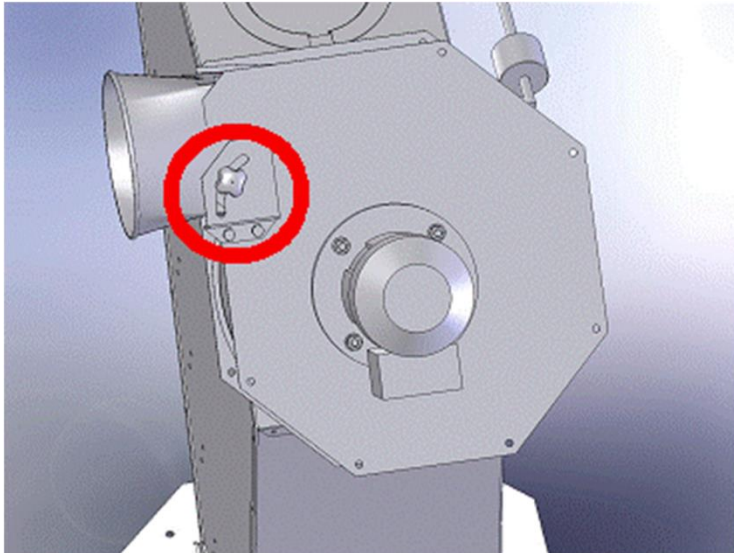
The feed rate can be increased or decreased by controlling the geared motor frequency converter using the "Feeder Speed Guide." The table below provides indicative values for the grain circulation speed. If you want to determine the exact circulation speed, the easiest way is to empty through the feeder device and record the time it takes.



Feeder guide	speed	Frequency converter (Hz)	Gear motor	Volumetric flow (m ³ /h)	tn/h
0		7	1400rpm i=41.4 Z1=16 and Z=23	9.4	7.5
5		25	1400rpm i=41.4 Z1=16 and Z=23	23.4	18.5
10		50	1400rpm i=41.4 Z1=16 and Z=23	37.7	30

6.4.6 Adjustment of the pre-cleaner fan

The adjustment of the fan must be carried out by monitoring the cleaning result. The damper is opened until the sound of grains "rattling" can be heard in the pre-cleaner. Then, close the damper slightly and leave it in this position. The cleaning result must be monitored to ensure that grains are not unnecessarily discharged among the waste.



Adjustment of the pre-cleaner leveling plate.

The purpose of the leveling plate is to distribute the incoming grain mass as widely as possible onto the steps of the pre-cleaner, ensuring maximum cleaning efficiency. When properly adjusted, the leveling plate moves freely during filling and drying. If the leveling plate presses down too much, it may cause the pre-cleaner to become clogged. Conversely, if the leveling plate is too light, it will not distribute the grain mass evenly, resulting in poor cleaning performance.

When adjusting the leveling plate, it should be noted that moving the weight closer to the shaft makes the leveling plate lighter, and moving the weight further from the shaft increases the pressure of the

leveling plate. A good starting adjustment is as light as possible, that is, with the weight positioned close to the shaft.



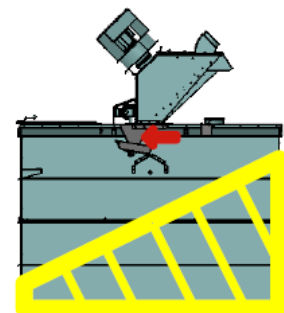
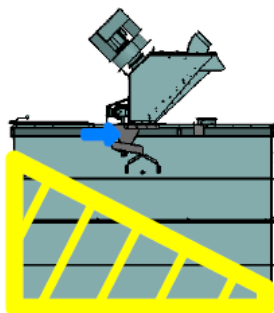
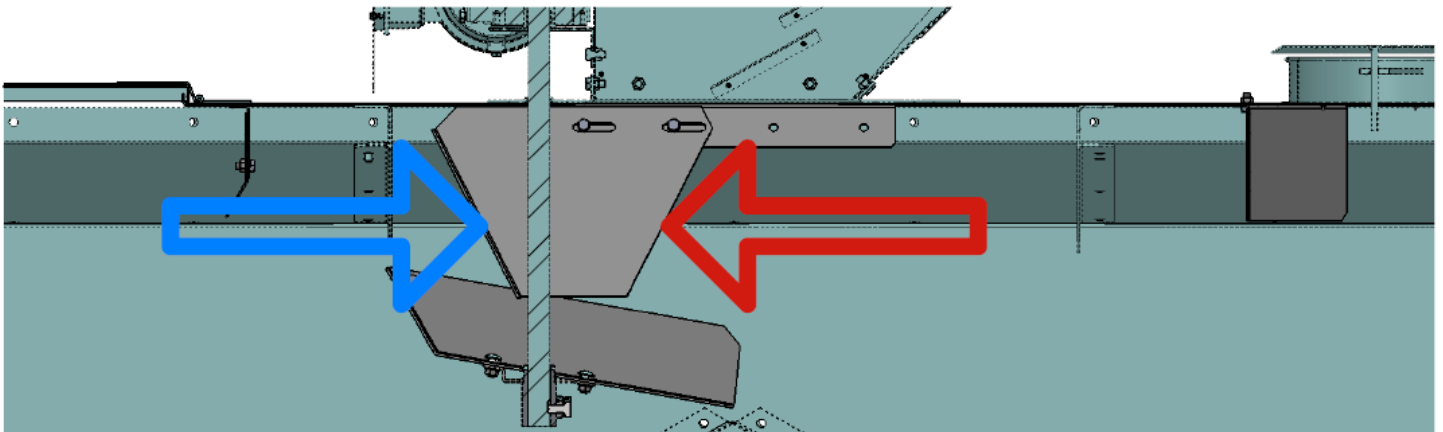
6.4.7 Adjustment of the spreading plate

Suppilon säätö:

- Siirrettäessä suppiloa lähemmäs levittimen akselia, siirtyy viljan levityksen painotus kohti miesluukkaa.
- Siirrettäessä suppiloa kauemmas levittimen akselistä, siirtyy viljan levityksen painotus kohti huohotinta.

Funnel adjustment:

- Moving the funnel closer to the spreader shaft shifts the grain distribution toward the manhole.
- Moving the funnel further away from the spreader shaft shifts the grain distribution toward the vent.



6.4.8 Airflow Adjustment

The airflow can be adjusted using the damper located at the intake of the furnace blower. Turning the damper toward the closed position decreases the airflow. It is not recommended to close the damper completely, except when drying a very small batch or when the material being dried is extremely light.



6.4.9 Partial Batch Drying

When the quantity of grain to be dried is significantly smaller than the actual capacity of the dryer, there is a risk that, during the drying phase, the upper air laterals will open into the grain compartment as the grain dries. In this situation, warm air escapes from the dryer through the opened brush beams, and some grain may also be carried into the air ducts. For such grain batches, the dryer is equipped with a partial batch closure plate (operated from the back of the machine).

When beginning the drying of such a batch, turn the closure plate to the "closed" position at the back of the machine. Close the furnace's intake port to reduce the airflow.

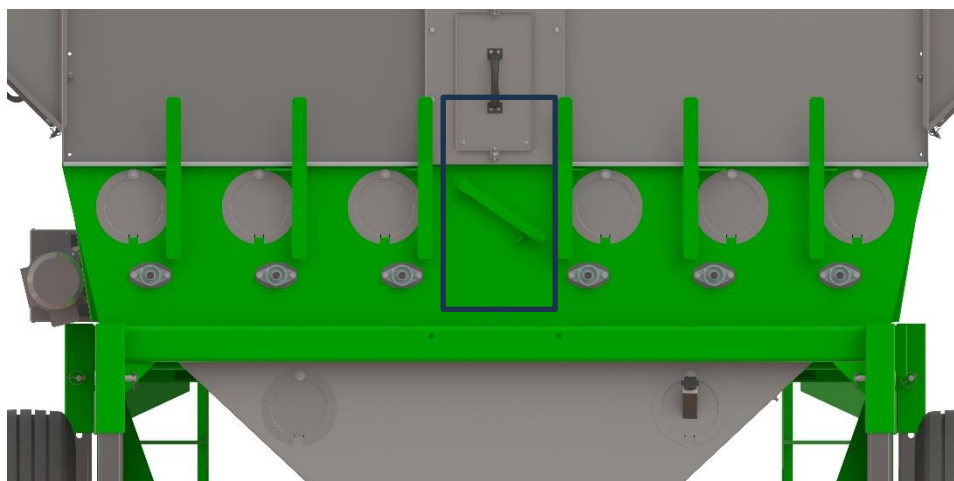
The central closing hatch acts as the partial batch hatch, preventing air from entering the upper cells or parts of the cell. In larger models, there may be two central closure hatches stacked on top of each other. These allow the drying volume to be divided into three sections.

During partial batch drying, the exhaust air temperature may partially transfer to the side air duct. As a result, the drying thermostat may activate the cooling phase earlier than usual, which could leave the batch moister than intended. Therefore, monitor the exhaust air temperature and the drying progress of the grain more closely than usual, and continue drying if necessary.



6.4.10 Cleaning the Central Channel after Partial Batch Drying

During partial batch drying, grain may have bounced onto the central hatch. Open the central hatch so that the grain flows to the bottom of the central channel. Clean the central channel and the base of the furnace; this helps prevent the risk of fire in the dryer.



6.5 Drying Different Grain Varieties

6.5.1 Drying Rapeseed

Before starting the drying of rapeseed, four basic adjustment procedures are performed:

- The feed quantity of the feeder is reduced.
- The air volume of the main blower is reduced by about half.
- The air damper of the pre-cleaner is closed almost completely, i.e., set to the minimum cleaning position.
- The air damper of the lower suction fan is set fully closed, i.e., set to the minimum suction position or the plug is disconnected.

The dryer is equipped with a two-flame burner, and the second flame can be completely deactivated. By turning the burner's main switch to position one, a lower temperature is achieved. However, if the burner's power is still too high, a burner technician should be called to adjust the burner to a lower output by changing the nozzle.

6.5.2 Drying Peas

Peas are best dried by mixing them with oats in a 50/50 ratio and otherwise using the normal grain drying settings. It is also possible to dry peas alone, but depending on the condition after threshing, it is safest to first give the peas 3–4 hours of drying heat with the lowest possible circulation. Set the feeder speed to zero so that the feeder rollers rotate slowly. Once the surface of the peas has dried, adjust the feed to the normal drying speed.

6.6 Considerations for Warm Air Dryers

- The removal of dust and debris from the grain during the drying process significantly improves drying efficiency (pre-cleaner adjustment).
- Drying should aim for full batches to achieve the best energy efficiency.
- Fast feeding lowers the grain temperature, while slow feeding raises it.
- The spreader in the grain compartment ensures the area is evenly filled, creating a uniform layer of grain. This results in even airflow and a consistent final drying outcome.

7 Maintenance

The operational reliability of the dryer is a crucial factor in ensuring a successful harvest. Possible malfunctions can pose significant risks. These risks can best be avoided through proper maintenance of the machinery.

During cleaning, turn the main switch to the OFF position.

Maintenance and cleaning tasks can be divided as follows:

1. Autumn maintenance, lubrication, and cleaning immediately after the usage season.
2. Inspection run and testing always before the start of the new operating season.
3. Inspections and lubrication during the usage season.

Surfaces that are not naturally cleaned by the grain circulation should be cleaned by scraping or brushing. Likewise, inspect and, if necessary, clean the internal surfaces of the feed mechanism and the feed rollers themselves. There is generally no need to clean inside the drying cells. The discharge ends of the cells (side air boxes) and the discharge pipe should be cleaned. At the same time, check that no debris has accumulated in the warm air duct between the dryer furnace and the dryer (there is an inspection hatch in the centre at the back of the machine). Finally, ensure that these loosened deposits (“debris”) do not remain in the cell assembly. Debris can be blown out of the cells by running the fan at full power for a few minutes. Clean both the lower and upper ends of the elevator. Carefully inspect the grain pipes to detect any leaks or worn areas.

During autumn maintenance, it is advisable to decide on any additions or changes to the grain pipeline, as the operational needs are still fresh in mind. Other spare part requirements should also be considered well before the next usage season.

7.1.1 Tyres

Check tyre pressures as needed, at least before a longer transfer. At the same time, check the tightness of the wheel bolts and the attachment of the axle. Protect the tyres from sunlight. The correct tyre pressure is 3 bar.

7.1.2 Base Cone

Inspect the sides of the base cone and clean them from the front inspection hatch if necessary. Inspect and clean the bottom screw as needed. Also check the bottom suction and clean it if necessary.

7.1.3 Feeder

The oil of the feeder’s gear motor is not checked. A visual inspection can be made to detect any oil leaks from the gear motor. A heavily leaking gear unit should be replaced with a new one.

Lubricate the chains with engine oil SAE 20...30 or Universal. Adjust chain tension if necessary, but not too tight. The feed shaft bearings are greased after the operating season (once a year). Lubricate with care to avoid damaging the bearing seals.

7.1.4 Elevator

Before the start of the operating season and at least once during the drying season, check:

- The condition and tension of the elevator drive
- The mounting and condition of the pre-cleaner
- The tension of the elevator belt

There is a separate manual for the maintenance of the bucket elevator.



7.1.5 Burner

The dryer burner must be cleaned and swept immediately after the usage season. There is an explosion/sweep hatch on the front wall. At the bottom of the burner, there are cleaning hatches that can be opened with screws. Before the start of the drying season, check that there is no debris or dust on the inside bottom of the burner. Vacuum if necessary. The burner must be swept at least once a year. Only use chemicals for cleaning the burner that can be added to the fuel oil, as recommended by the fuel supplier.

Before starting the first drying batch, the dryer should always be test-run as follows: start the dryer with the burner, and close the intake air opening. Allow the temperature to rise until the burner thermostat stops the burner. This ensures the thermostats are functioning and burns off any impurities from the burner.

After sweeping, the chimney is prepared for winter either by covering the top of the chimney or by removing the chimney completely; the stub should be protected, and the starter piece turned so the flue outlet faces downwards. The explosion hatch is left open for the winter. The intake air opening for drying air at the front of the burner should be covered for the winter. Fill the oil tank for the winter.

Winter Storage

Clean the machine after the drying season. Leave all hatches open. Make sure that the power cable is not connected and that the main electrical panel's cover is properly closed.

Take conditions into account if you store grain in the dryer. The grain batch may become damp and spoil in the dryer.

8 Operational Malfunctions

The following section briefly presents some phenomena related to automation and fault detection. Check the list below for the fault location and possible measures. If the fault persists, contact the relevant service company or the manufacturer.

Fault	Cause	Remedy
Emergency stop light ON	One of the emergency stop buttons is pressed.	Release all emergency stop buttons by turning them. Press the emergency stop reset button to turn off the light.
Rotation guard fault light on	The rotation guard has stopped the machine. Blockage in the machine or the bottom conveyor screw is not rotating. The chain elevator drive belts are loose.	Check for blockages in the elevator or bottom conveyor, remove if any. Turn the power off and on from the main switch, restart the previous function. If the bottom conveyor screw is broken, repair the screw. Check and, if necessary, tighten the chain elevator belts.
Overheat fault light on	The dryer burner has overheated, the overheat thermostat has stopped the drying. Possible burner thermostat fault or incorrect setting in the burner thermostat.	Check the overheat thermostat setting. Check the burner thermostat settings. If the settings are correct, call an electrician to check the thermostats.
The machine has stopped	One of the motor protectors has tripped.	Check whether the relevant fan or conveyor is blocked. Remove blockages. Is the grain silo too full, the spreader disc cannot rotate. Remove grain from the machine. Possible motor fault. The motor with the thermal relay tripped is broken. Replace with a new motor. Check all motor protectors and reset if necessary.
Digital drying and burner thermostat displays are dark	The control circuit automatic fuse has tripped. The digital thermostat is broken.	Check the automatic fuse. If resetting the fuse does not fix the fault, call an electrician to replace the faulty digital thermostat.

<p>Burner does not ignite (dryer running) Burner fault light not on.</p>	<p>Burner power switch in position 0 Burner thermostat is incorrectly set Burner automatic fuse has tripped Feed device automatic fuse has tripped</p>	<p>Check burner power switch Check burner automatic fuse Check burner thermostat settings Check drying thermostat settings Check feed device fuse</p>
<p>Burner does not ignite (dryer running) Burner fault light on.</p>	<p>Oil has run out Fuel filter is blocked Burner not adjusted Burner faulty</p>	<p>Check if there is oil Check condition of oil hoses Check hose installation Check/replace filter and seals Reset fault If the burner does not start or the fault recurs, call burner service</p>
<p>Elevator motor protector trips</p>	<p>Blockage in the elevator Elevator belt is loose</p>	<p>Check the elevator. Rotate the elevator from the V-belt pulley: If heavy, the elevator may be blocked. If light, the elevator chain may be loose. Tighten the chain</p>
<p>In filling mode only the pre-cleaner works and in drying mode the oven fan and pre-cleaner work, otherwise the dryer is "silent". Elevator or bottom conveyor runs for a moment and stops</p>	<p>Elevator rotation guard light is on Rotation guard not faulty</p>	<p>Check for blockages in the elevator or bottom conveyor. Reset the rotation guard fault from the button Check the rotation guard cable and sensor, replace if necessary</p>
<p>Residual current circuit breaker trips</p>	<p>One of the running motors may be faulty</p>	<p>Call an electrician.</p>
<p>Dryer lights behave strangely during drying or no power to the dryer centre.</p>	<p>No neutral in the dryer supply Fuses blown in the dryer power supply Residual current device tripped Dryer supply cable damaged</p>	<p>Check supply cable Check for neutral in the supply Check dryer supply fuses Check dryer main switch</p>

 **ATTENTION!**

If you have reset a motor protection switch and the protection trips again immediately after a new start attempt, you should contact the manufacturer's service during the warranty period to agree on how to resolve the operational issue. The cause of the fault is either in the motor protection switch or in the connected motor. Therefore, it is better for the factory service, or a locally authorized electrical company according to agreement, to inspect the fault.

9 Short Operating Instructions

9.1 Check at the Start of the Drying Season

- Tension and condition of chains and drive belts
- Elevator
- Check the elevator cups. Replace worn ones.
- Ensure the elevator and dryer are aligned in the same direction. Measure the distance!
- Obtain spare belts
- Clean the Oven
- Cleanliness of the heat channel (drying vault)
- Obtain a spare nozzle (spray angle 80°) and oil filter
- Cleanliness of the oven's inner base and burner
- Gear oils (feeder device, spreading disc)
- Lubricate chains and feeder mechanism bearings
- Check the cleanliness of screws, grain tank, cells, feeder device, and conical base
- Condition of the dust and debris removal piping and collection point (cyclone)
- Test run the dryer to heat

9.2 Filling

- Close all six bottom hatches of the feeder device, with the levers locked upright
- Turn the divider at the top of the elevator towards the dryer
- Start filling, set the programme selector switch to position 2
- Begin pouring grain into the feed hopper
- Monitor the filling of the dryer, avoid overfilling
- Stop the dryer; set the programme selector switch to position 0 or the filling guard will automatically stop the machine

9.3 Drying

- Turn the divider towards the dryer
- Set the cooling time on the timer to 1–1.5 hours
- Check the burner / 2-flame thermostat set values
- Check the drying control thermostat set value
- Start drying. Set the programme selector switch to position 3. The furnace fan starts.
- Monitor the start of drying. The burner and conveyors start approx. 3 minutes after the fan starts.
- The burner switches off when the exhaust air temperature reaches the set value of the drying thermostat. The burner switches off and cooling begins.
- Check the moisture content of the batch with a separate meter and continue drying if the moisture is too high.
- The dryer stops automatically when the cooling time ends.
- Turn the programme switch to position 0 and check the final moisture content of the batch with a separate meter.

9.4 Emptying

- Turn the divider from the dryer to the discharge piping. If the grain batch to be unloaded will be stored further away from the dryer with a pipeline/conveyor combination, check that any other dividers are turned in the correct direction.
- Start the extension conveyors first
- Start the dryer conveyors by turning the programme selector to position 1 for emptying.
- Adjust the emptying speed with the feed device speed controller.
- At the end of emptying, open the bottom of the warm air channel. The emptying lever is between the elevator and the feed device. Lock the lever immediately after emptying.
- At the end of emptying, check that the dryer is empty by opening and closing the bottom hatches.

9.5 After the Drying Season

- Clean and empty the entire dryer thoroughly, including the elevator
- Clean the furnace, burner and filter
- Lubricate the chains and feed system bearings
- Leave the bottom hatches open
- Leave all inspection hatches open
- Close the fuel oil valves



- Turn the main switch to position 0
- Disconnect the power supply cable
- Cover the furnace fan intake opening
- Visual inspection / maintenance / cleaning
- Remember: if you store grain in the dryer, take winter conditions into account. The batch may become moist and spoil in the dryer.
- Obtain the necessary spare parts already in autumn and fit them so that the dryer is ready for the next drying season

10 Technical Information

Designations	Type	M180k	M205k	M205k_2	M240k	M275k	M300k	M365k	M420k
Elevator Height	A [m]	8.25	8.75	8.75	9.5	10	10.5	11.75	13.5
Height	B [m]	4.6	5.1	5.1	5.8	6.3	6.8	8	9.7
Without Outlet	C [m]	3	3.5	3.5	4.2	4.2	4.7	5.4	6.6
Grain Volume	[m ³]	16.3	18.4	18.4	21.6	25.1	27.2	33.9	39.5
Min. Drying Batch	[m ³]	3.5	6.2	6.2	6.2	6.2	6.2	6.2	21
Dryer Mechanism	[ton]	5	6	6	7	7.5	8	8.5	9.4
Current During Drying	[A]	22.8	22.8	26.6	30	30	43.1	44.7	50.1
Power During Drying	[kW]	13.8	13.8	16.1	17.3	18.1	26	27	27.6
Bucket Elevator	[ton/h]	60	60	60	60	60	60	60	60
Furnace YP-		250	310	250	400	400	400	500	500
Oil Burner		B40 A2	B40 A2	B40 A2	KP50H	KP50H	KP50H	KP50H	KP50H
Main Fan	[kW]	4	4	4	5.5	7.5	7.5	11	11
Channel Fan	[kW]	-	-	-	-	-	-	2x2.2	2x2.2
Oil Hose	4.0m	-	-	-	-	-	-	-	-
Feeder		+	+	+	+	+	+	+	+
Pre-cleaner		+	+	+	+	+	+	+	+
Sampling Device		+	+	+	+	+	+	+	+
Frame		+	+	+	+	-	-	-	-
Reinforced Frame		-	-	-	-	+	+	+	+
Bottom Cone		+	+	+	+	+	+	+	+
Lower Conveyor with Motor		+	+	+	+	+	+	+	+
Drying Cell h=1186mm		2	2	2	2	4	4	4	6
Drying Cell h=500mm		-	-	2	2	-	-	2	-2
Chimney ø200mm 2.0m		1	1	1	2	2	2	2	2
3-way Divider ø200mm		+	+	+	+	+	+	+	+
Supply Cable 63A 10.0m		+	+	+	+	+	+	+	+
Control Panel		+	+	+	+	+	+	+	+
Grain Storage Layers		3	3	3	3	3	4	4	5
Service Platform		+	+	+	+	+	+	+	+
Ladder		+	+	+	+	+	+	+	+
Grain Recirculation Pipeline ø200mm 2.0m		+	+	+	+	+	+	+	+
Fill Guard		+	+	+	+	+	+	+	+
Electrical Diagram		+	+	+	+	+	+	+	+
Installation Manual		+	+	+	+	+	+	+	+
User Manual		+	+	+	+	+	+	+	+
Spare Parts Book		+	+	+	+	+	+	+	+

12 Declaration of Conformity



Vaatimuksenmukaisuusvakuutus

Declaration of conformity

Garanti av motsvarighet



Laite, Machine, Maskin:

Vaunukuivaamo, Mobile dryer, Mobil tork

Laitteen tyyppimerkintä, Type of machine, Typmärkning:

M180k, M205k, M240k, M275k, M300k, M365k, M420k

Direktiivit, Directives, Direktiv:

2006/42/EC, 2014/30/EU, 2014/35/EU

Standardit joita on sovellettu (tai niiden osia/kohtia),
(part/clauses of) standards that has been used,
(delar/paragrafer av) standarder som har använts:

EN ISO 13854:2019, EN 547-1 +A1, EN 547-2 +A1, EN 547-3 +A1, EN ISO 13849-1:2023, EN ISO 13850:2015, EN ISO 13857:2019, EN ISO 14122-2:2016, EN ISO 14122-4:2016, EN 60204-1:2018, EN 61439-2:2021, EN 61439-1:2021

Sisäisellä laadunvalvonnalla on varmistettu, että tässä eritelty laite vastaa nykyisten direktiivien ja standardien vaatimuksia.

Trough our internal quality control it is ensured that the product which this declaration relates is in conformity with the current directives and standards.

Genom inre kvalitetsgranskning försäkras att de produkter som nämns i detta certifikat är i enlighet med de nuvarande direktiv och standarder.




Lauri Jokela Tuotekehitysohjaaja / Product development director, Design direktor

4.11.2025 Yläne

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