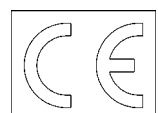


CROCUS

INSTRUCTION MANUAL



GRAIN DRYER



Grain Dryer

Preface

Please read the Instruction Manual thoroughly and ensure that all instructions concerning safety, running and maintenance are followed, in order to ensure optimal operation of the machine / equipment.

Please provide the following information when making any enquiries:

Type / Model, Fabrication Number / Year

All equipment has an attached label, giving fabrication details.



Grain Dryer

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Grain Dryer

EU – certificate of agreement

Manufacturer:

Crocus
Virkevangen 25
Assentoft
DK-8900 Randers

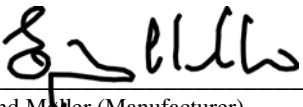
Hereby declare that this machine

Type: Crocus Grain Dryer

Model: **GS, GT, GM, GL & GXL**

is manufactured according to regulations in EU-directive from 14th June 1989 about mutual rapprochement of the legislation in each member country concerning machines (89/392/EØF) specially referring to the directorates appendix 1 regarding essential security – and health requirements relating to construction and manufacturing of machines.

4/12 03
Date


Ejvind Møller (Manufacturer)

Grain Dryer

Safety regulations

Please observe the following safety regulations for prevention of accidents.

The grain dryer must be equipped with an electronic safety cut-off switch.

Turn off and lock the electronic switch during inspection / repair of the grain dryer.

Replace the top cover and casing immediately following inspection / repair even when the grain dryer is not in use.

All electrical installation / repair must be carried out according to the regulations applicable for high voltage installations and should be carried out by an authorised electrician.

Grain Dryer

Technical description

The Crocus Grain Dryer is manufactured in an industrial design for continual drying of crops such as corn, rape seed, pulses and other cereals.

The robust construction ensures effective operation, minimises maintenance and ensures a long product life.

2. Function

The Crocus Grain Dryer is designed as a modular system with a pre-hopper section at the top.

Cereal intake into the dryer may be regulated automatically using of two level sensors.

The grain dryer itself consists of a number of sections. The number of sections is dependant upon the desired capacity. The bottom section/s act as cooler sections.

Heated air is drawn through the cereals in the drying column to dry the product. Likewise, cold air is drawn through the cereals to cool the product. The air is channelled through a number of V-shaped ridged channels which are transversely displaced in relation to each other. This ensures that the air passes through an equally thick layer of the product and that the air is uniformly distributed throughout the drying column.

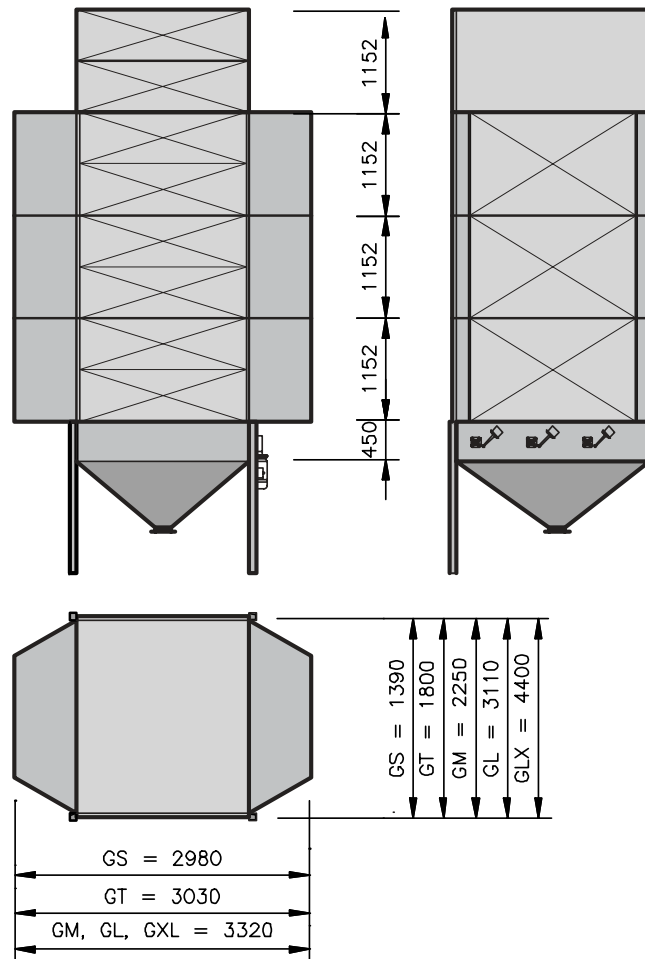
Discharge takes place via the motorised discharge section which is driven by a gear motor. The rate of discharge is controlled by interval regulation from the control panel. The trays under the discharge rollers are sprung allowing foreign bodies to pass without damaging the roller mechanism.

The grain dryer may be emptied completely by tipping the discharge trays during discharge.

The grain dryer is controlled and monitored from a control and flow panel.

Grain Dryer

Technical data



The drying column is produced in 2 –3 mm galvanized steel plate. It can be delivered painted. Crocus grain dryer is designed for outdoor as well as indoor installation.

The drying column is produced in 5 sizes: GS, GT, GM, GL and GXL.

The drying column consists of:

- pre hopper
- x numbers of drying/cooling sections with variable cooling zone.
- discharge with gear motor.

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Grain Dryer

Technical data

Sections	weight incl. corn (tons)					Total height (meter)					Capacity (tons/hour)					Heat Demand (kW)				
	GS	GT	GM	GL	GXL	GS	GT	GM	GL	GXL	GS	GT	GM	GL	GXL	GS	GT	GM	GL	GXL
2	7	10	--	--	--	5,0	5,2	--	--	--	2,9	3,8	--	--	--	180	240	--	--	--
3	9	12	15	22	31	6,1	6,3	6,5	7,0	7,7	4,8	6,4	8,0	11,2	16,0	290	380	480	680	971
4	12	16	19	27	39	7,3	7,5	7,7	8,2	8,8	5,8	7,7	9,6	13,4	19,1	350	460	570	800	1143
5	14	20	23	32	46	8,4	8,6	8,8	9,4	10,0	7,7	10,2	12,7	18,3	26,1	460	610	760	1070	1529
6	16	22	26	37	53	9,6	9,8	10,0	10,5	11,1	8,7	11,5	14,4	20,2	28,9	520	680	870	1220	1743
7	18	25	30	42	60	10,7	10,9	11,1	11,6	12,3	10,5	13,9	17,7	24,9	35,6	640	850	1070	1500	2143
8	21	29	34	47	67	11,9	12,1	12,3	12,8	13,4	11,4	15,1	19,1	27,0	38,6	700	930	1140	1600	2286
9	--	--	--	52	74	--	--	--	14,0	14,6	--	--	--	31,6	45,1	--	--	--	1850	2643
10	--	--	--	57	81	--	--	--	15,1	15,7	--	--	--	33,8	48,3	--	--	--	1960	2800
11	--	--	--	62	89	--	--	--	16,3	16,9	--	--	--	38,5	55,0	--	--	--	2350	3357
12	--	--	--	67	96	--	--	--	17,4	18,0	--	--	--	40,6	58,0	--	--	--	2450	3500

Conditions:

Capacity is quoted as intake capacity for Barley dried from 20-16% at 85° C air temperature
External air temperature 15° C with 75% humidity.

Cooling 5-10 ° C above cooling temperature.

Content per section:

Type	GS	GT	GM	GL	GXL
m ³	2,28	3,04	3,80	5,30	6,80
tons	1,7	2,26	2,8	4,0	5,1

At 0,75 t/m³

Air content per section:

Type	GS	GT	GM	GL	GXL
Nm ³	5100	6800	8500	12500	17000

We reserve the right of alteration.



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Grain Dryer

Operating instructions

1. Functions.

Control of the drying process can be divided into a series of functions that can be classified as mechanical and control panel functions.

These functions are described below.

1.1 Mechanical functions.

The air regulation valves on the warm side of the dryer are used to divide the warm side into drying and cooling zones.

When using a cooling zone the lowest air regulation valve is opened and the valve above the section closed.

There is only one regulation valve on the air extraction side. It must always be closed during operation.

The discharge trays are adjusted according to crop and desired crop flow speed.

If the dryer is to be emptied quickly then the trays should be opened just so much that the crop is not discharged constantly.

With a change of crop and / or cleaning the trays may be tipped down completely.

Air regulation on the extraction side can take place in two ways – either using "false air intake" or by covering part of the ventilator fan itself.

The air regulation valves determine the amount of air being drawn through the dryer. When drying lightweight crops the amount of air must be reduced in order to avoid expelling the kernels or seeds from the dryer. The opposite applies with heavy crops.

1.2 Control panel functions.

Many control panel functions are specific to the installation. This section describes therefore four of the most common functions.

Discharge (aut/man) is a choice between automatic and manual discharge.

If the switch is set to "**man**" the discharge section will run constantly until it is stopped manually. This position is often used when emptying the dryer.

If the switch is set to "**aut**" all of the built-in safety precautions are activated and discharge is controlled automatically.

Grain Dryer

Discharge (temp/time) determines whether the automatic discharge function should be controlled according to a time interval or by temperature.

If the switch is set to "**time**" it is possible to regulate the discharge interval and thereby the speed with which the crop passes through the dryer with the help of the potentiometer "**discharge time**".

If the switch is set to "**temp**" the rate of discharge is regulated according to the temperature of the corn and based on the humidity of the crop. It is therefore possible to automatically control the rate at which the crop is dried using this function.

2. Start.

Empty the dryer.

Adjust the discharge trays until they are in a horizontal position.

Reset the control current.

Start filling the dryer.

Stop filling when the crop has covered the highest level sensor. (The control panel includes a stop signal when the highest level sensor is activated.)

It is possible for the ventilator fan to run whilst filling the dryer. This reduces the amount of dust. In this case, the lowest air regulation valve on the extraction side should also be opened.

Set the desired cooler zone.

Close the lowest regulation valve on the air extraction side.

Start the ventilator fan.

Set the desired warm air temperature.

Start the furnace.

Adjust the air flow until only a few individual seeds or kernels are sucked out of the dryer.

Start the discharge section after approx. ½ hour. Start the discharge section once the furnace is started when drying rape seed.

The first product to be discharged is not dry and must therefore be re-circulated. Samples should be taken after approx. 1 hours operation and the rate of discharge adjusted. Once the desired water content is reached, adjust the rate of discharge every half hour until the water content is stable.

Grain Dryer

3. Drying choices.

The control panel provides the user with two alternatives for operation.

3.1. Manual control.

Manual control is activated when manual discharge is selected.

This means that there is continual discharge, dependant upon other control panel settings.

In this case, the pass through rate can only be adjusted by adjusting the discharge tray position.

3.2 Automatic control.

Automatic control is activated when automatic discharge is selected. There are two options for automatic discharge control, based upon a time interval or dependant upon temperature.

3.2.1 Time interval control.

When the time control is selected it is possible to set the discharge interval using the potentiometer.

In the "min" position running time is short and the interval between operation long. In the "max" position operation time is long and the interval between operation short.

Regulate the discharge interval until the desired drying percent is achieved. (See section 2)

If the water content of the crop filled into the dryer changes, it is necessary to regulate the rate of discharge in order to maintain a constant water content in the dried product.

3.2.2. Temperature control.

When the "temp" control is selected the pass through rate is determined by the corn temperature. This indirect control of the pass through rate is based upon the humidity of the corn – the higher the water content, the lower the temperature and the longer the interval between discharge. The opposite is true of crops with low water content.

The discharged products humidity is regulated and stabilised with the time interval control. (See section 3.2.1). Once humidity is stabilised, switch to time controlled discharge by setting the discharge thermostat to the corn temperature shown. The discharge interval is automatically controlled here after by the corn temperature.

With larger variation of water content the rate of discharge should be regulated again. Where water content is to be greatly reduced it is recommended that the product be re-circulated through the dryer several times.

Grain Dryer

3.3 Batch drying

Set the drying air temperature.

Set the drying time.

Start the batch drying.

When the drying time has expired the furnace is automatically shut off and the ventilator fan runs for approx. 30 min. In order to cool the crop.

Start transport.

Start discharge.

Discharge is automatically shut off after ½ an hour.

4. Stopping the dryer

With automatic control of continual drying, when the crop falls below the lowest level sensor in the pre-hopper the furnace stops supplying warm air to the dryer.

If the dryer stops due to a fault, the fault should be repaired and the dryer restarted.

When restarting the dryer do not change the discharge rate.

With **manual stop**, stop discharge and furnace first. Let the ventilation fan run for at least 30 min. for cooling purposes.

With restart start the ventilator fan and furnace first.

Pre heat in approx. 10 min. before starting discharge.

When drying rape-seed start discharge directly after starting the furnace.

Grain Dryer

Maintenance instructions

It is necessary to keep the dryer clean throughout the drying period. Changes in air flow, the rate at which grain passes through the dryer and /or to the heat supply reduces the dryers capacity.

It is necessary therefore to regularly check and clean the following:

The discharge section, air channels and air foils. These must be kept clean from dust, chaff, straw and other foreign bodies that may inhibit free passage through the dryer.

In connection with the furnace, the fresh air intake and boiler room must be kept clean.

Where the heat source is a water-heated radiator this must also be kept clean. How often it should be cleaned depends upon the amount of dust in the specific room.

Empty the dryer completely and clean prior to longer periods with drift stop. Empty and clean the dryer sections themselves and the air channels on both sides of the dryer.

1. **Bearings**

The bearings for the discharge rollers should be checked and lubricated for every 2.000 hours of operation.

2. **Gear / gear motor**

The gear is pre-filled with oil on delivery. Use Texaco Merapa 220, BP Energol GR-XP 220 or Shell Omela 220.

An oil change is recommended after the first 600 hours of operation. Likewise, the screws between the gear housing and the cover should be tightened.

Here after, oil change is recommended after 5.000 – max. 8.000 hours of operation and at latest after 3 years of operation.

Clean the gear motor of dust and dirt with pressurised air.