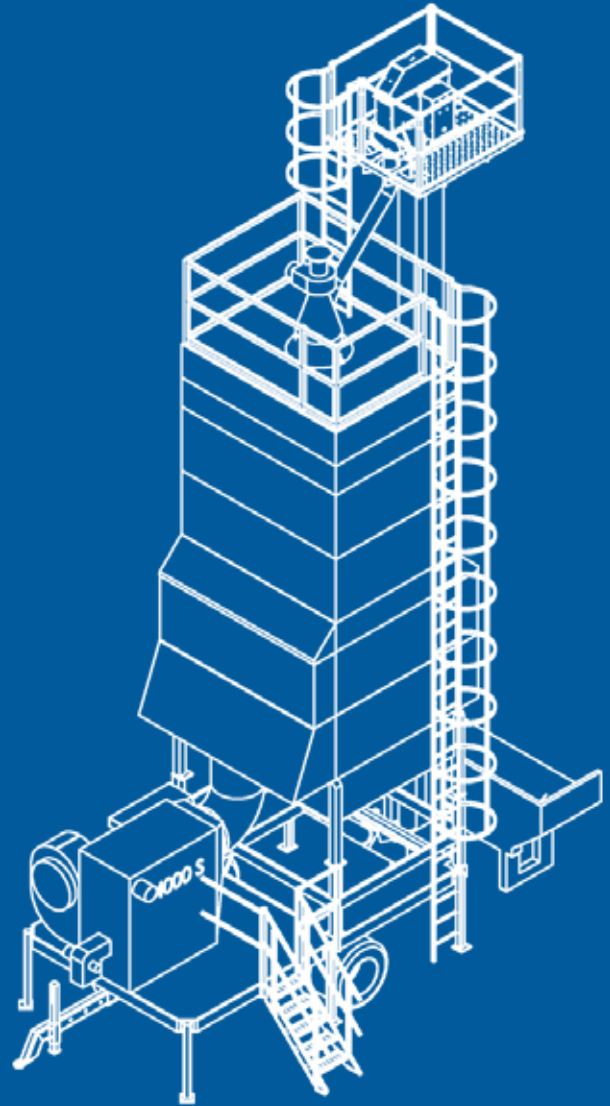


A10-1001-EN-202105



GRAIN DRYERS

PLANTAASI, SPECIAL, MAGNUM, FARMI,
COMPACT DRYER, TANDEM DOUBLE DRYER,
SW MOBILE DRYER, MW MOBILE DRYER

ASSEMBLY AND USER MANUAL

ARSKAMETALLI OY
www.arskametalli.fi



CONTENTS

Introduction.....	3
Delivery information.....	4
EU Declaration of Conformity.....	5
Safety.....	6
1. Overview.....	8
1.1. - 1.13. Dimensions.....	10
2. Installation.....	22
2.1. Base.....	22
2.1.1. Feeder.....	23
2.1.2. Bottom fan.....	23
2.2. Heat cells.....	24
2.2.1. Air channels.....	25
2.2.2. Outlet pipe.....	26
2.2.3. Levelling cell.....	26
2.3. Storage containers.....	27
2.3.1. Fill alarm.....	28
2.4. Cover.....	29
2.4.1. Compact / SW mobile dryer: cover, railings and wall ladder.....	29
2.5. Compact / SW mobile dryer: tipping hopper.....	32
2.6. Pre-cleaner.....	33
2.7. Elevator.....	34
2.7.1. Elevator piping.....	34
2.8. Control panel.....	36
2.9. Heater.....	38
2.9.1. Burner nozzles.....	40
2.9.2. Flue piping.....	41
3. Operating.....	42
3.1. Procedures before commissioning.....	42
3.2. Procedures before every season.....	43
3.4. Filling the grain dryer.....	44
3.4.1. Filling the dryer manually.....	44
3.4.2. Filling the Compact dryer.....	44
3.5. Using the grain dryer.....	45
3.5.1. Using the dryer manually.....	45
3.5.2. Using the dryer with automation.....	45
3.5.3. Using the dryer with fill automation.....	45
4. Maintenance.....	46
4.1. General procedures.....	46
5. Troubleshooting.....	47



INTRODUCTION

Production facilities of Arskametalli Oy are located in Somero, Southwest Finland. The family company has been operating for three generations and has manufactured grain handling equipment already since 1958.

Arskametalli Oy has been granted CE marking for structural welded steel assemblies and product systems as well as for internal quality control. Operations are based on the SFS-EN ISO 9001 quality system and for load-bearing structures to meet SFS-EN ISO 3834-3 welding requirements. In operations the essential requirements of the SFS-EN ISO 14001 environmental and OHSAS 18001 safety management system are taken into account.

This manual describes the assembly and operating instructions of the Arska grain dryer. Read this entire manual before installing the product. See the operating instructions and the necessary safety instructions. Successful installation and pre-trained use ensure functional operations. Keep this manual available for frequent reference and review it with new personnel.

If you need any additional information or assistance, please contact your distributor or us (www.arskametalli.fi).

DELIVERY INFORMATION

Inspection of goods

Check that the number of packages matches the packing list and that the package and the items are intact. Mark any damages and missing materials on the packing list and report to the transport company and Arskametalli. Do not install any faulty or incorrect materials.

Warranty

Arskametalli grants a 5-year factory warranty for grain dryers from the date of delivery. Electrical devices have 1-year factory warranty from the date of delivery.

The warranty requires that owner of the product makes a announcement and a warranty application immediately after broke directly to manufacturer. If the faulted part and the warranty application haven't been delivered to warranty check to the manufacturer within two weeks of breaking, it won't be dealt as a warranty issue. The manufacturer is not responsible of additional warranty given by distributor.

The warranty requires that during the assembly there has been followed valid orders and manufacturer's instructions. Warranty covers production and material faults. Warranty does not cover faults caused by wrong assembly, improper using or neglecting the maintenance.

Type plate

Dryer type plate is located in the base. The plate indicates that the product has been manufactured in accordance with the EU Machinery Directive and meets safety requirements. There's model designation, engine power, year of manufacture and serial number marked in the type plate. Always specify the serial number if you have a complaint or when ordering spare parts.



EU DECLARATION OF CONFORMITY

**Manufacturer:**

Arskametalli Oy
Saarentaantie 33
FI-31400 Somero, Finland

Product: Arska grain dryer

Model designation: Plantaasi dryer, Special dryer, Magnum dryer, Farmi dryer, Tandem double dryer, Compact dryer, SW mobile dryer, MW mobile dryer

We hereby declare that the product complies with the directives:

- 2006/42/EC Machinery Directive
- 2006/95/EC Low Voltage Directive
- 2004/108/EC Electromagnetic Compatibility Directive (EMC)

Harmonized standards that have been used:

- SFS-EN 349 + A1
- SFS-EN ISO 12100
- SFS-EN ISO 13857
- SFS-EN 60204-1:2018

Somero 1.10.2019

A handwritten signature in black ink, appearing to read 'Janne Käkönen', is written above a solid horizontal line.

Janne Käkönen, CEO
Arskametalli Oy

SAFETY

The product must be installed by a person who is suitably qualified. During assembly work follow valid safety orders.

Use the product only for its intended purpose. Do not modify the product in any way. Unauthorised modifications may impair the functionality and safety and affect the product's service life. Any modification of the product voids the warranty.

Assembly done wrong can lead to personal injuries or cause damage to the product. Incorrectly installed product may not work right and the capacity may drop. Read this manual carefully well before starting the assembly, maintaining or using.

General information

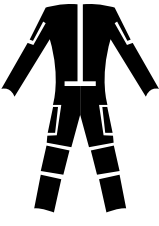
- Before performing any type of installation or maintenance work, stop the machine and turn off the power.
- The machine must not be started if all hatches, joints and covers haven't been installed such that they can be only opened by tools.
- The machine is equipped with covers and warning labels in accordance with the EU Machinery Directive. Pay attention to all warning labels before commissioning the machine.
- Always use appropriate tools, classified lifting equipment and cranes at work.
- Make sure that the railings are properly installed and that they are in good condition.
- If the machine is installed outside, motors and gears must be protected with rain covers. We also recommend to seal all pipe seams with mass.
- Do not use, assemble or maintain the product alone.
- Keep first aid kit available at all times.
- Make sure that the working area is clean, dry and well lit.
- Make sure that the person responsible of using the product has acquainted to its functions and safety orders.
- Packaging must be disposed properly.

Electrical safety

- Person who installs the electrical device must be professional, qualified electrician.
- Safety switch must be permanently installed and placed such that it's easy to reach during maintenance work.
- Make sure that the motor cover switch has been set into the right ampere referred to motor.
- Make sure that there isn't any dirt, dust, moisture or electrostatic charge in the electric devices.

Personal safety

Always wear protective equipment when assembling or using the product:

 Overalls	 Safety helmet	 Work gloves
 Safety shoes	 Hearing protection	 Safety goggles

Signal words

ⓘ **NOTE!**

The note text contains information that makes the installing easier.

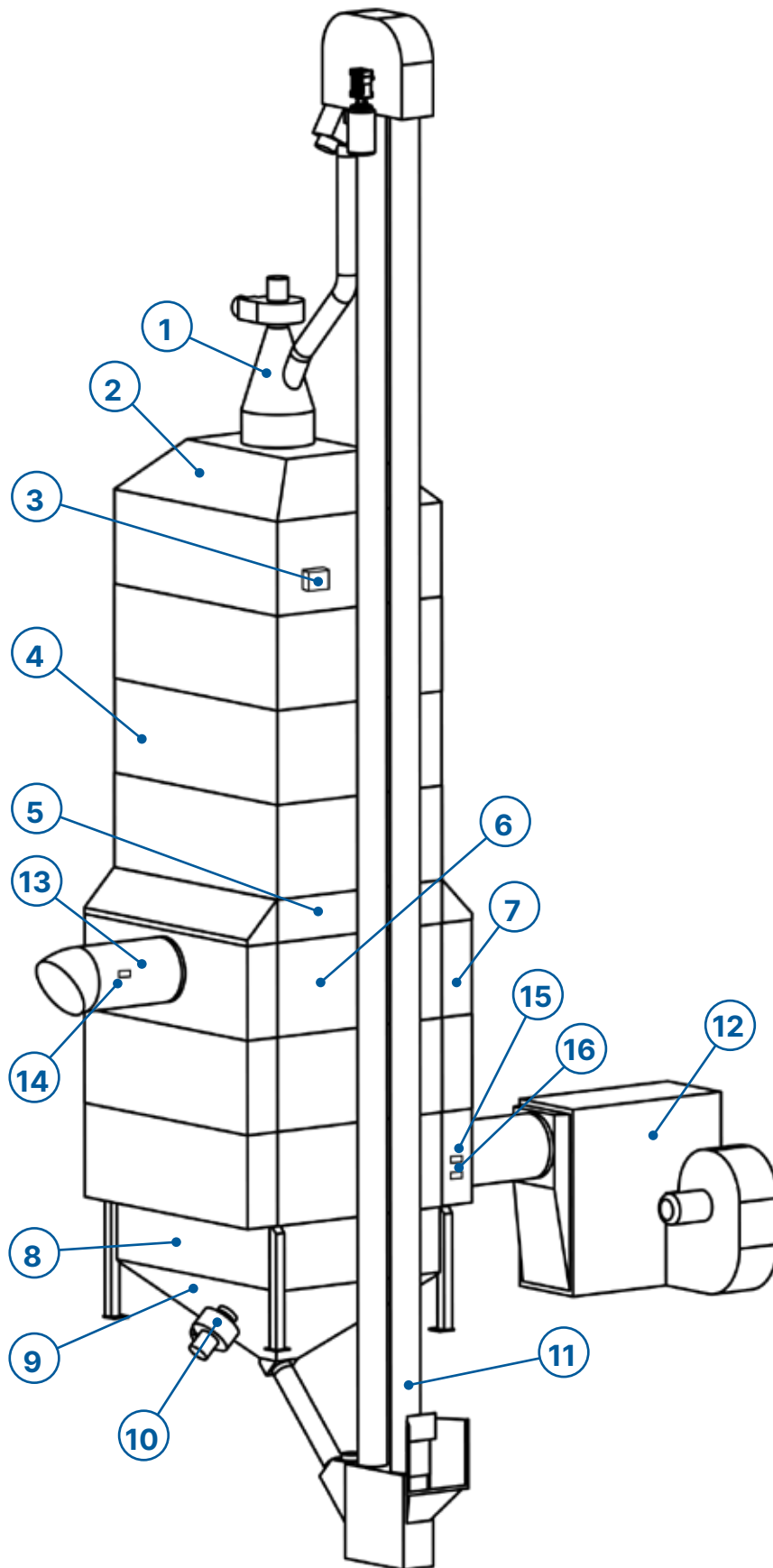
⚠ **CAUTION!**

If caution text instructions are not followed, the product may be damaged. It can also result in incorrect operation or capacity decrease.

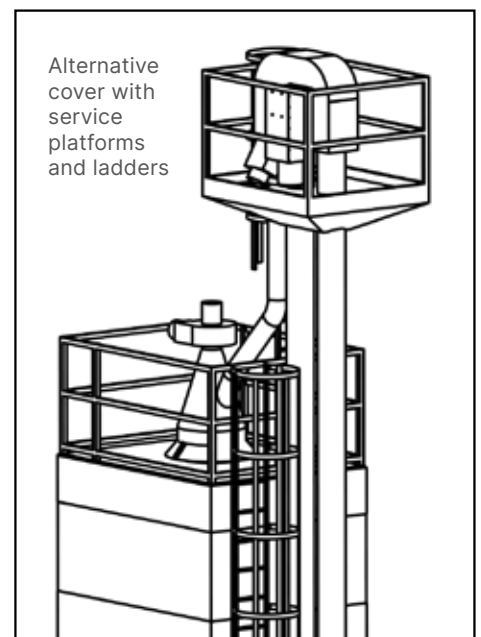
⚠ **WARNING!**

If warning text instructions are not followed, it could result in serious or life-threatening injuries.

1. OVERVIEW

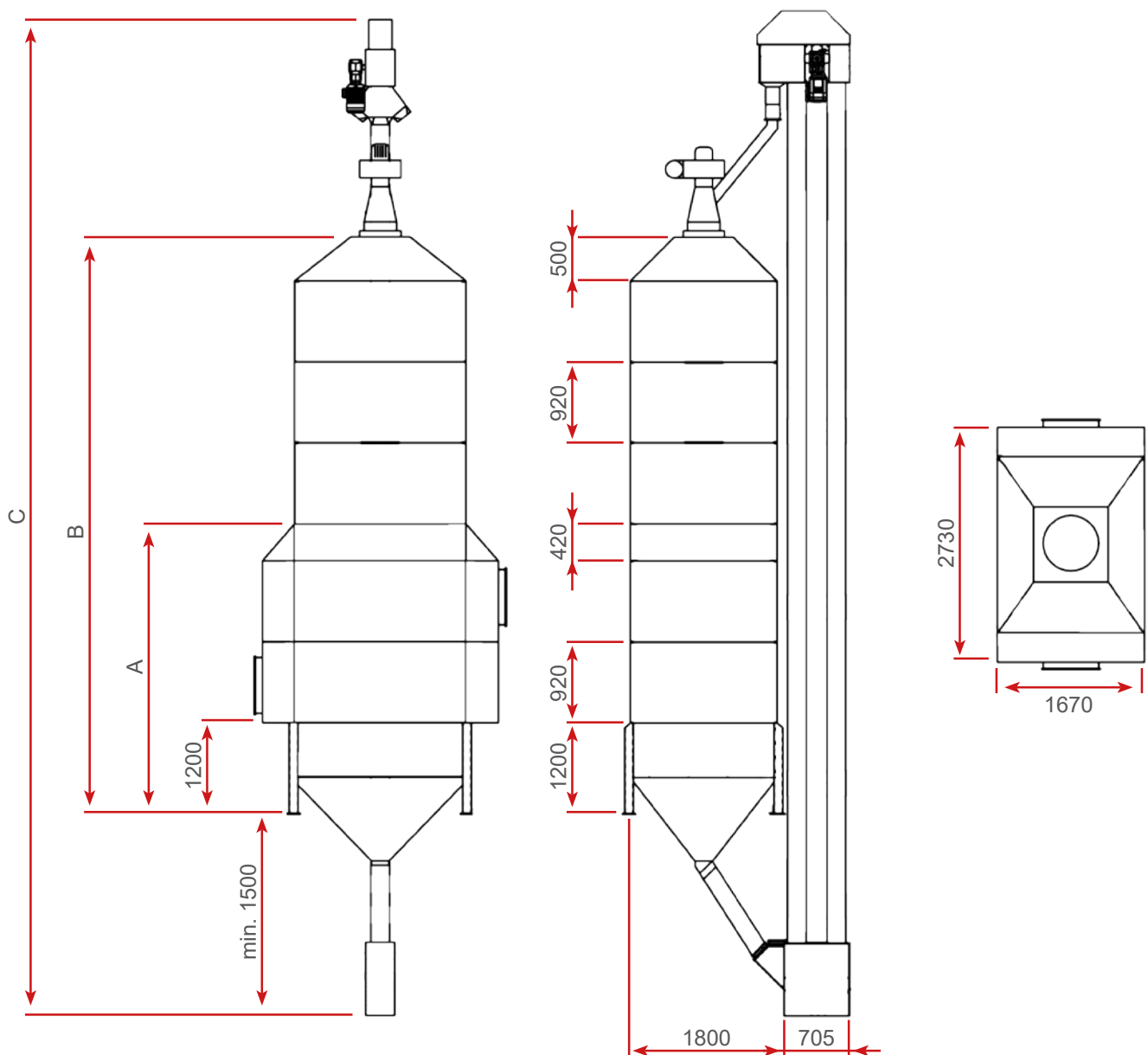


PART	DESCRIPTION
1	Pre-cleaner
2	Cover
3	Fill alarm
4	Storage container
5	Levelling cell
6	Heat cell
7	Air channel
8	Base
9	Bottom cone
10	Bottom fan
11	Elevator
12	Heat source
13	Outlet pipe
14	Thermostat A1: Outlet air temperature
15	Thermostat A2: Drying air temperature
16	Thermostat A3: Furnace overheat



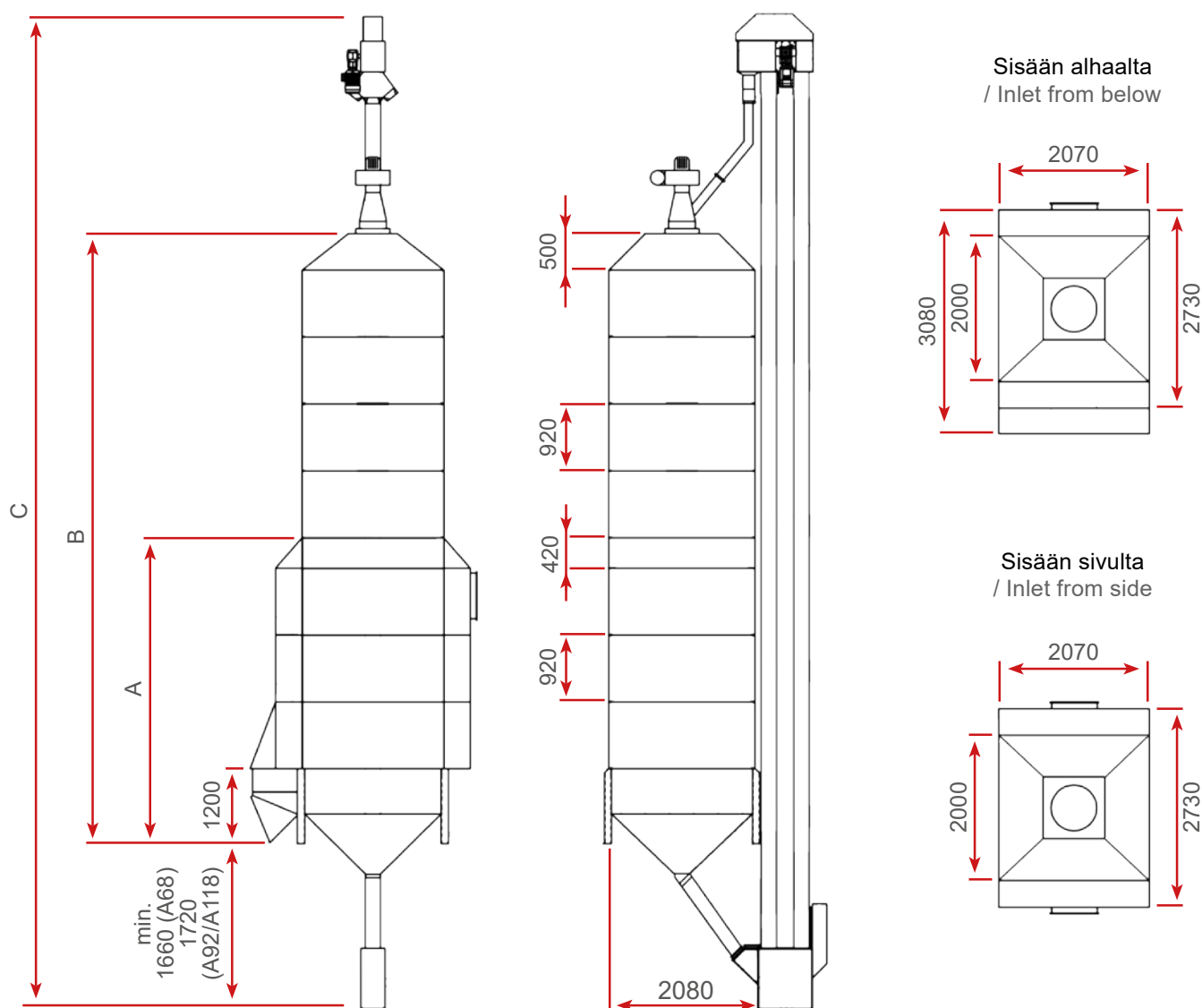
1.1. Dimensions: Plantaasi dryer

Plantaasi	A [mm]	B [mm]	C [mm]	
			Elevaattori / Elevator	
			A68	A92/A118
12,8 m ³ (2,5 + 2)	3 460	5 800	10 260	10 550
15,7 m ³ (2,5 + 3)	3 460	6 720	11 260	11 550
17,9 m ³ (3,5 + 3)	4 380	7 640	11 760	12 550
20,8 m ³ (3,5 + 4)	4 380	8 560	12 760	13 550
23,0 m ³ (4,5 + 4)	5 300	9 480	13 760	14 550



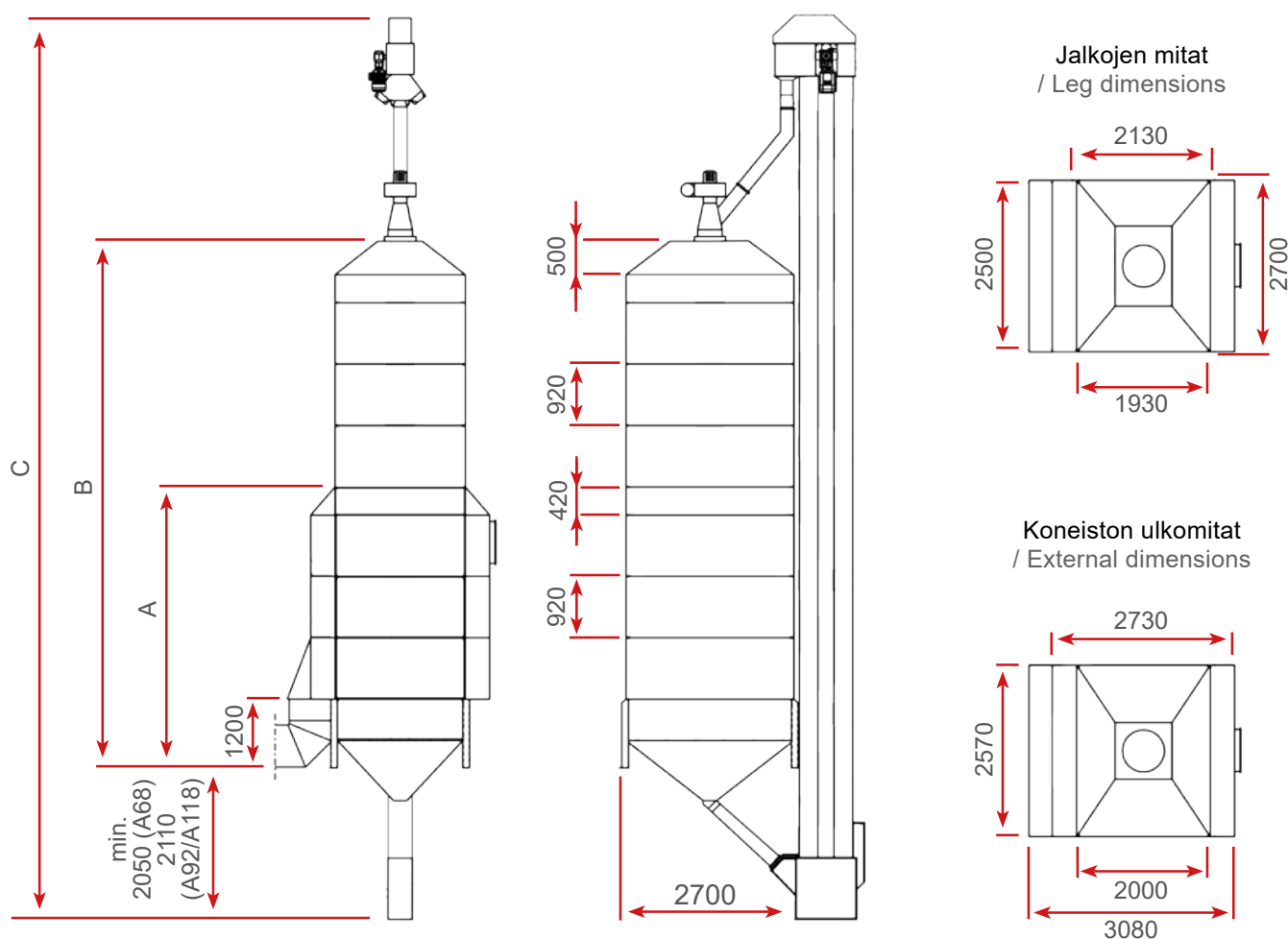
1.2. Dimensions: Special dryer

Special	A [mm]	B [mm]	C [mm] Elevaattori / Elevator	
			A68	A92/A118
15,7 m ³ (2,5 + 2)	3 460	5 800	10 260	11 050
19,3 m ³ (2,5 + 3)	3 460	6 720	11 260	11 550
22,0 m ³ (3,5 + 3)	4 380	7 640	12 260	12 550
25,6 m ³ (3,5 + 4)	4 380	8 560	13 260	13 550
28,3 m ³ (4,5 + 4)	5 300	9 480	14 260	14 550
31,9 m ³ (4,5 + 5)	5 300	10 400	15 260	15 550



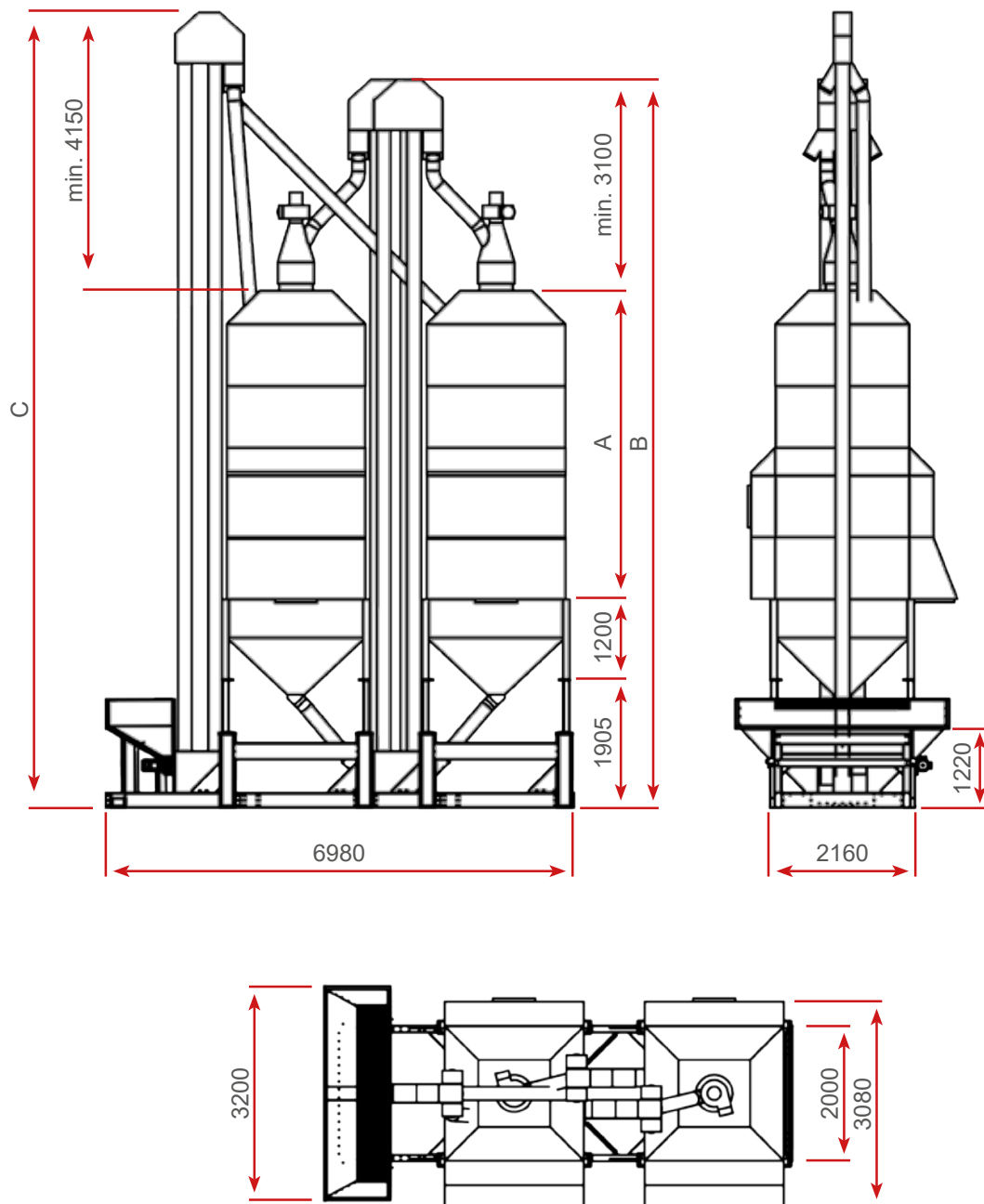
1.3. Dimensions: Magnum dryer

Magnum	A [mm]	B [mm]	C [mm] Elevaattori / Elevator	
			A68	A92/A118
14,4 m ³ (1,5 + 1,5)	2 540	4 380	9 760	10 050
16,9 m ³ (1,5 + 2)	2 540	4 880	10 260	10 550
20,5 m ³ (2,5 + 2)	3 460	5 800	11 260	11 550
22,5 m ³ (2,5 + 2,5)	3 460	6 220	11 760	11 550
24,1 m ³ (3,5 + 2)	4 380	6 720	12 260	12 050
26,1 m ³ (3,5 + 2,5)	4 380	7 140	12 760	12 550
28,6 m ³ (3,5 + 3)	4 380	7 640	13 260	13 050
33,1 m ³ (3,5 + 4)	4 380	8 560	13 760	14 050
36,7 m ³ (4,5 + 4)	5 300	9 480	14 760	15 050
41,2 m ³ (4,5 + 5)	5 300	10 400	15 760	16 050



1.4. Dimensions: Tandem double dryer

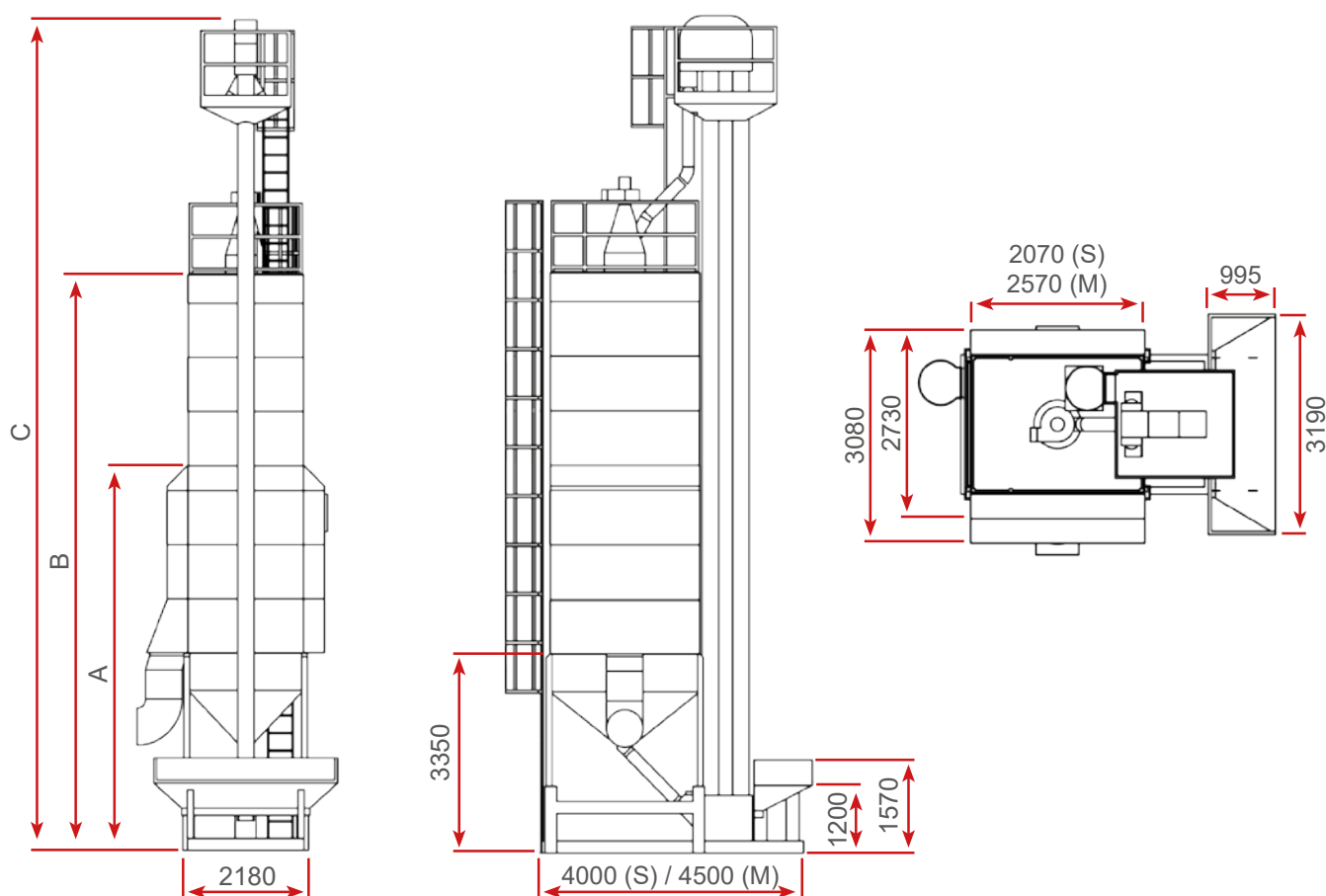
Elevaattori 3 x A68	A [mm]	B [mm]	C [mm]
2xS - 38,6 m ³ (2,5 + 3)	7 700	10 760	11 760
2xS - 44,0 m ³ (3,5 + 3)	9 540	12 760	13 760
2xS - 56,6 m ³ (4,5 + 4)	11 380	14 760	15 760



1.5. Dimensions: Compact dryer (model S / M)

Compact	A [mm]	B [mm]	C min. [mm] Elevaattori / Elevator	
			A68	A92/A118
S 11,1 m ³ (1,5 + 1,5)	4 690	6 530	9 760	10 050
S 15,7 m ³ (2,5 + 2)	5 610	7 950	11 260	11 550
S 19,3 m ³ (2,5 + 3)	5 610	8 870	12 260	13 050
S 22,0 m ³ (3,5 + 3)	6 530	9 790	13 260	13 050
S 25,6 m ³ (3,5 + 4)	6 530	10 710	13 760	14 050

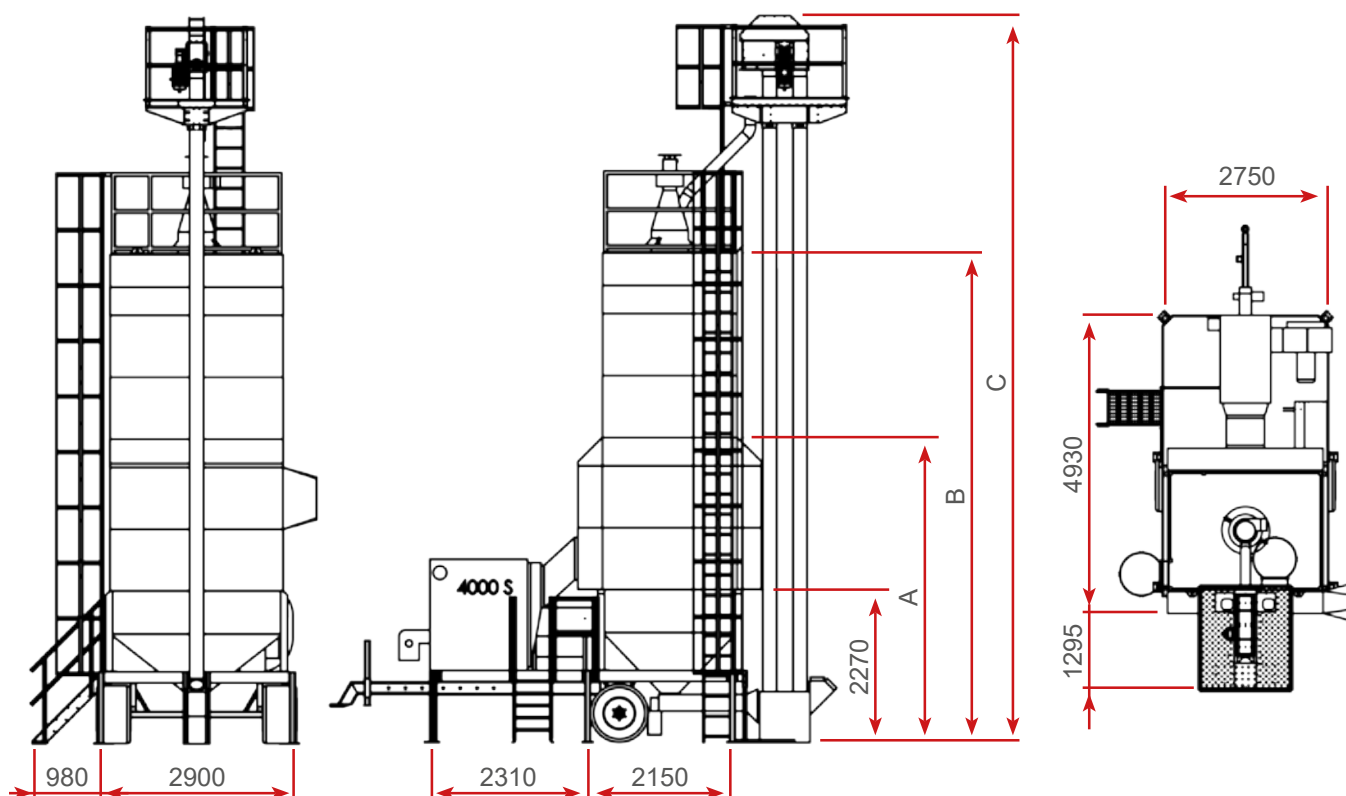
M 24,1 m ³ (3,5 + 2)	6 530	8 870	12 260	12 550
M 28,6 m ³ (3,5 + 3)	6 530	9 790	13 260	13 050
M 33,1 m ³ (3,5 + 4)	6 530	10 710	13 760	14 050
M 36,7 m ³ (4,5 + 4)	7 450	11 630	14 760	15 050
M 41,2 m ³ (4,5 + 5)	7 450	12 550	15 760	16 050



1.6. Dimensions: SW mobile dryer

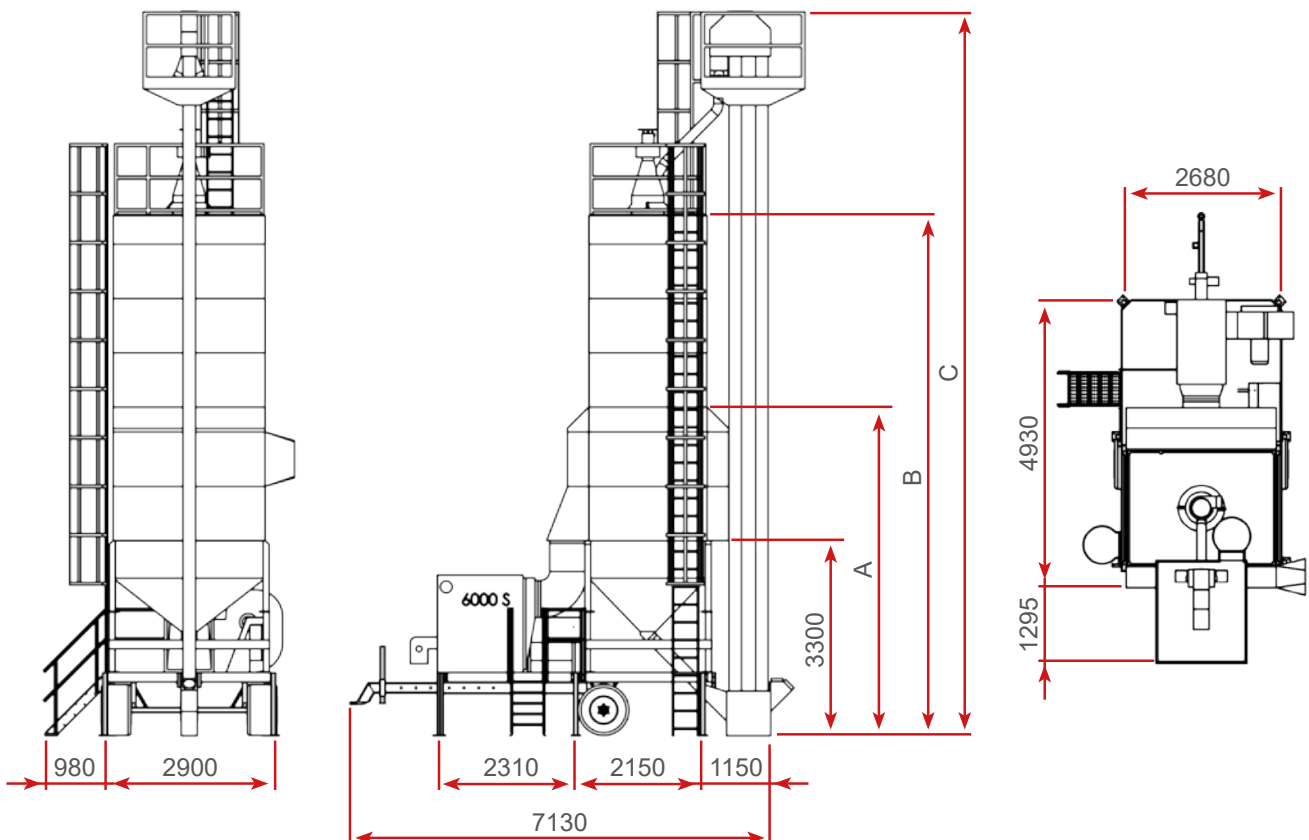
1.6.1. With bottom conveyor

SW	A [mm]	B [mm]	C min. [mm] Elevaattori / Elevator	
			A68	A92/A118
M 14,4 m ³ (1,5 + 1,5)	3 610	5 450	8 760	9 050
M 16,9 m ³ (1,5 + 2)	3 610	5 950	9 260	9 550
M 20,5 m ³ (2,5 + 2)	4 530	6 870	10 260	10 550
M 22,5 m ³ (2,5 + 2,5)	4 530	7 290	10 760	11 050
M 24,1 m ³ (3,5 + 2)	5 450	7 790	11 260	11 550
M 26,1 m ³ (3,5 + 2,5)	5 450	8 210	11 760	12 050
M 28,6 m ³ (3,5 + 3)	5 450	8 710	12 260	12 550
M 33,1 m ³ (3,5 + 4)	5 450	9 630	12 760	13 050
M 36,7 m ³ (4,5 + 4)	6 370	10 550	13 760	14 050
M 41,2 m ³ (4,5 + 5)	6 370	11 470	14 760	15 050



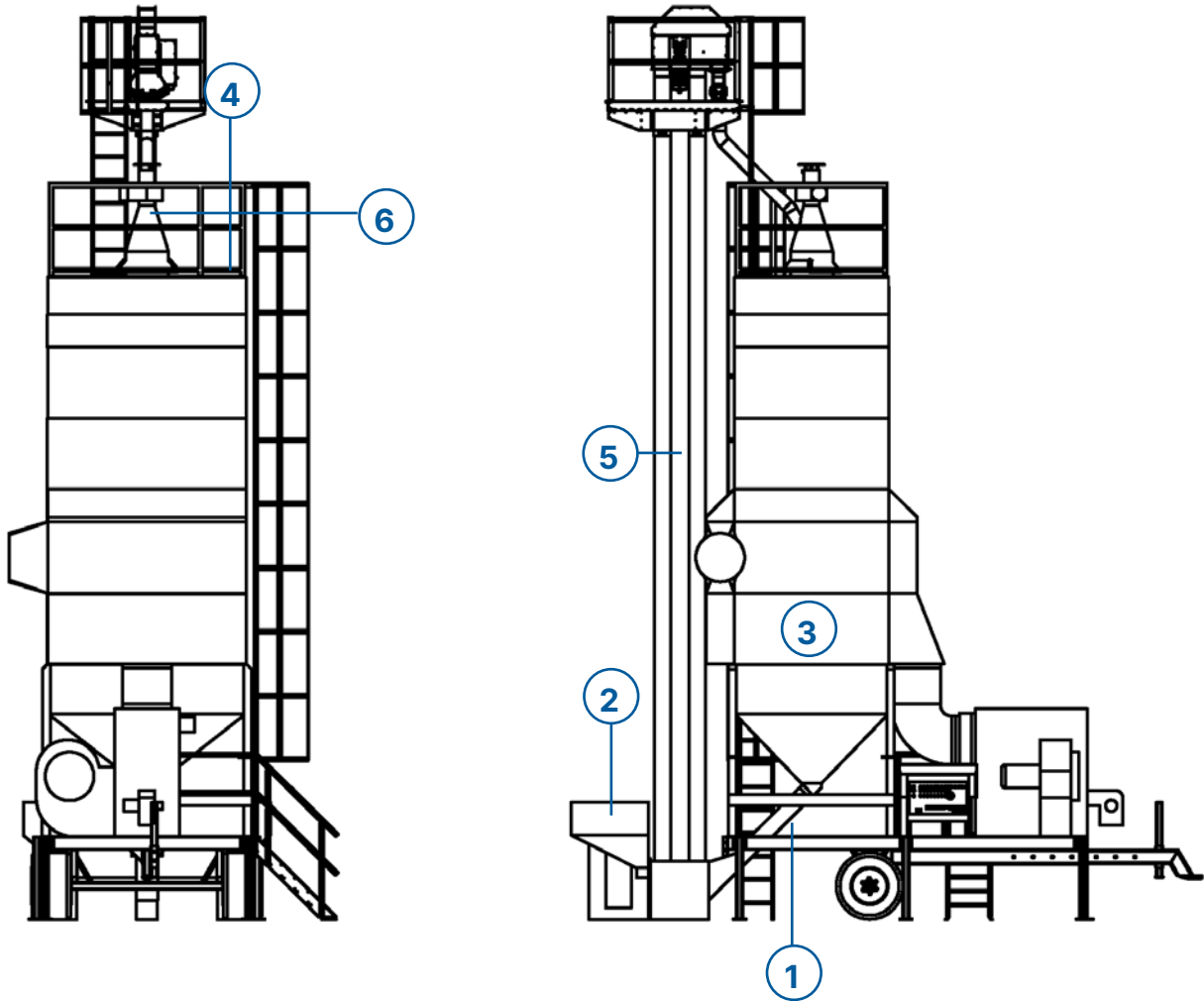
1.6.2. Without bottom conveyor

SW	A [mm]	B [mm]	C min. [mm] Elevaattori / Elevator	
			A68	A92/A118
M 14,4 m ³ (1,5 + 1,5)	4 640	6 480	9 760	10 050
M 16,9 m ³ (1,5 + 2)	4 640	6 980	10 260	10 550
M 20,5 m ³ (2,5 + 2)	5 560	7 900	11 260	11 550
M 22,5 m ³ (2,5 + 2,5)	5 560	8 320	11 760	12 050
M 24,1 m ³ (3,5 + 2)	6 480	8 820	12 260	12 550
M 26,1 m ³ (3,5 + 2,5)	6 480	9 240	12 760	13 050
M 28,6 m ³ (3,5 + 3)	6 480	9 740	13 260	13 550
M 33,1 m ³ (3,5 + 4)	6 480	10 660	14 260	14 550
M 36,7 m ³ (4,5 + 4)	7 400	11 580	14 760	15 050
M 41,2 m ³ (4,5 + 5)	7 400	12 500	15 760	16 050



SW mobile dryer assembly order:

1. Bottom conveyor or circulate piping
2. Tipping hopper
3. Dryer column
4. Dryer cover and railings
5. Elevator
6. Pre-cleaner

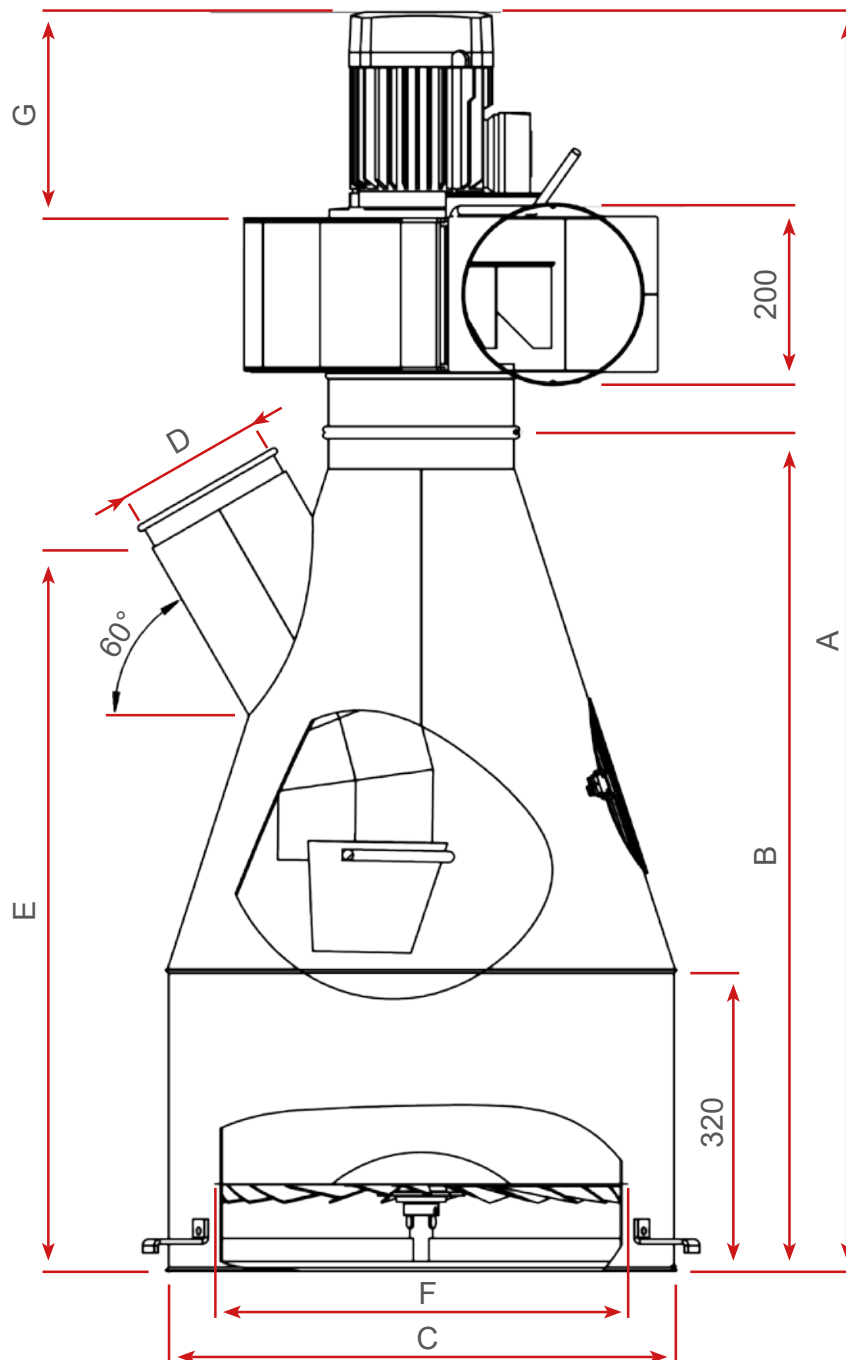


When installed outside, all pipe seams must be sealed with mass.

Rotation of every motor must be checked.

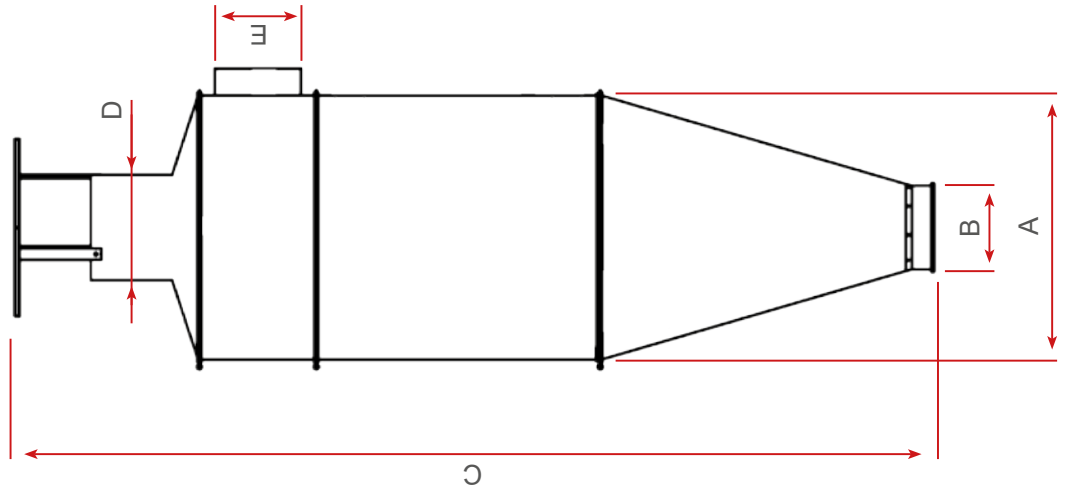
1.7. Dimensions: Pre-cleaner A200 / A250

Malli / Model	A [mm]	B [mm]	C [Ø mm]	D [Ø mm]	E [mm]	F [Ø mm]	G [mm]
A200 / 1,5 kW	1 370	910	550	160	790	450	225
A250 / 2,2 kW	1 600	1 125	700	200	900	600	280

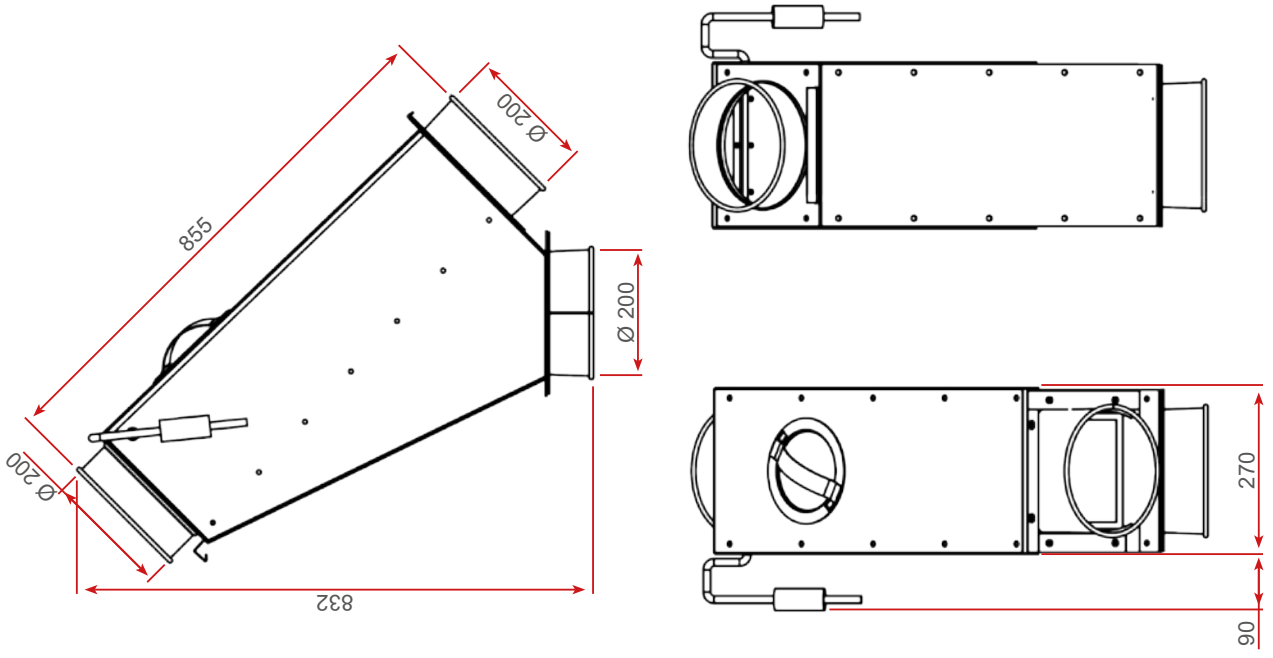


1.9. Dimensions: Cyclones

Halkaisija / Diameter	A [Ø mm]	B [Ø mm]	C [mm]	D [Ø mm]	E [Ø mm]
Ø630	630	200	2202	252	200
Ø1000	1000	315	2460	500	396

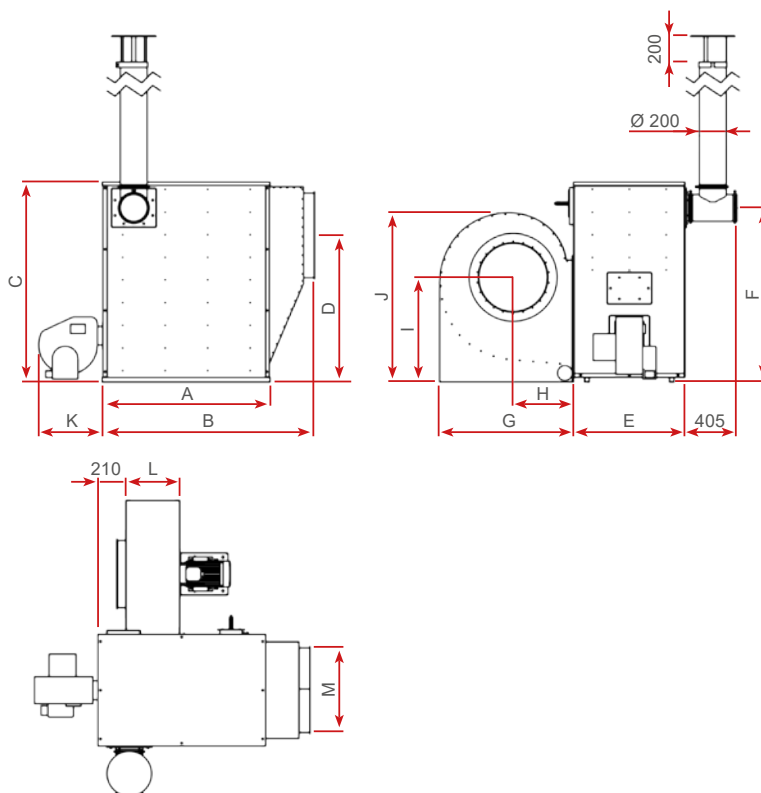


1.8. Dimensions: Seed cleaner

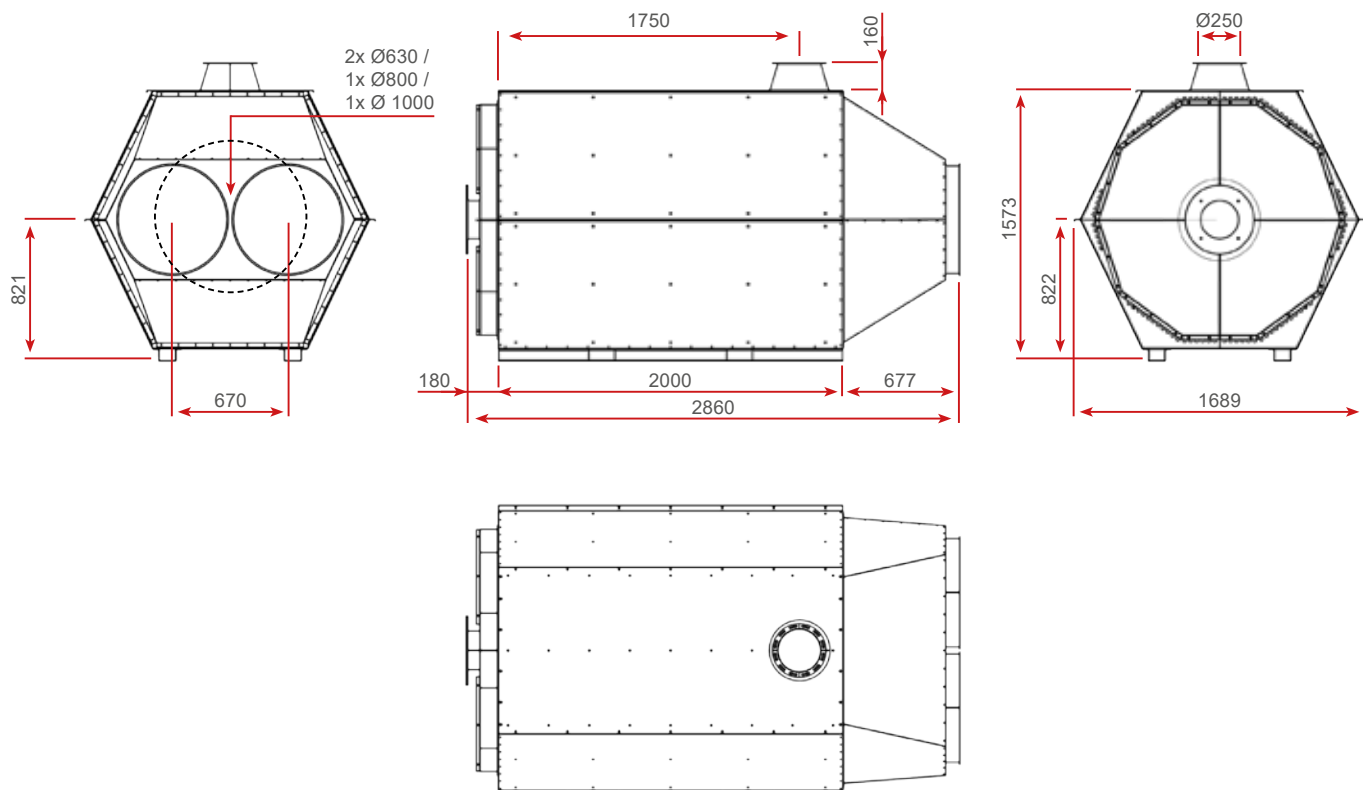


1.10. Dimensions: Overpressure heater (A model)

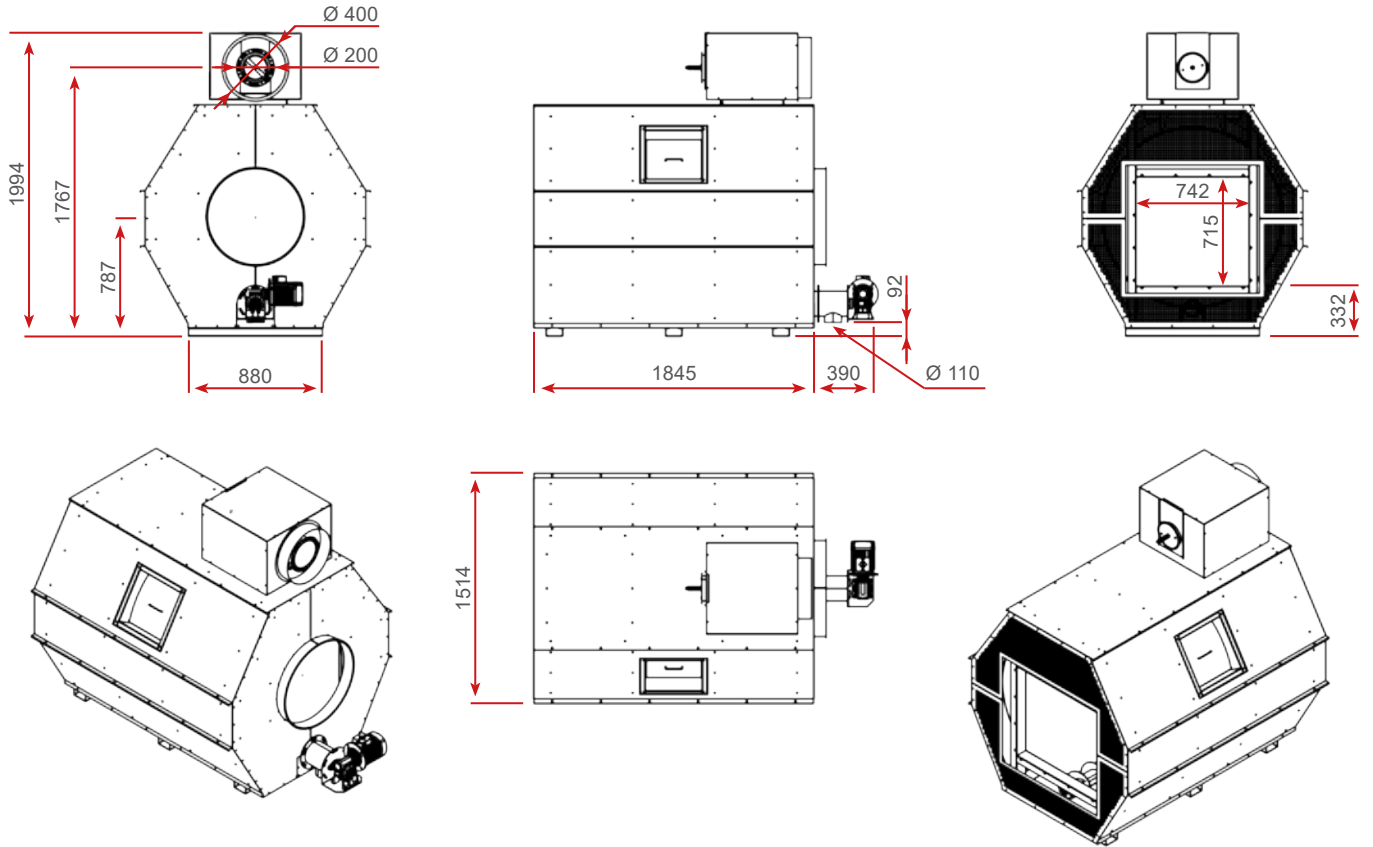
Malli / Model	3000S	4000S	6000S	6500S
A [mm]	1 120	1 235	1 235	1 570
B [mm]	1 440	1 600	1 600	2 000
C [mm]	1 390	1 640	1 640	1 820
D [mm]	1 060	1 100 / 1 245	1 245 / 1 100	1 435
E [mm]	710	830	830	830
F [mm]	1 180	1 425	1 425	1 580
G [mm]	960	1 005	1 160	1 250
H [mm]	400	455	490	540
I [mm]	680	785	865	940
J [mm]	1 125	1 250	1 400	1 530
K [mm]	400	400	400	550
L [mm]	380	400	460	480
M [Ø mm]	500	630	630	630
2-liekkipoltin / 2-stage burner	KP-26H	KP-26H	KP-26H	KP-50H



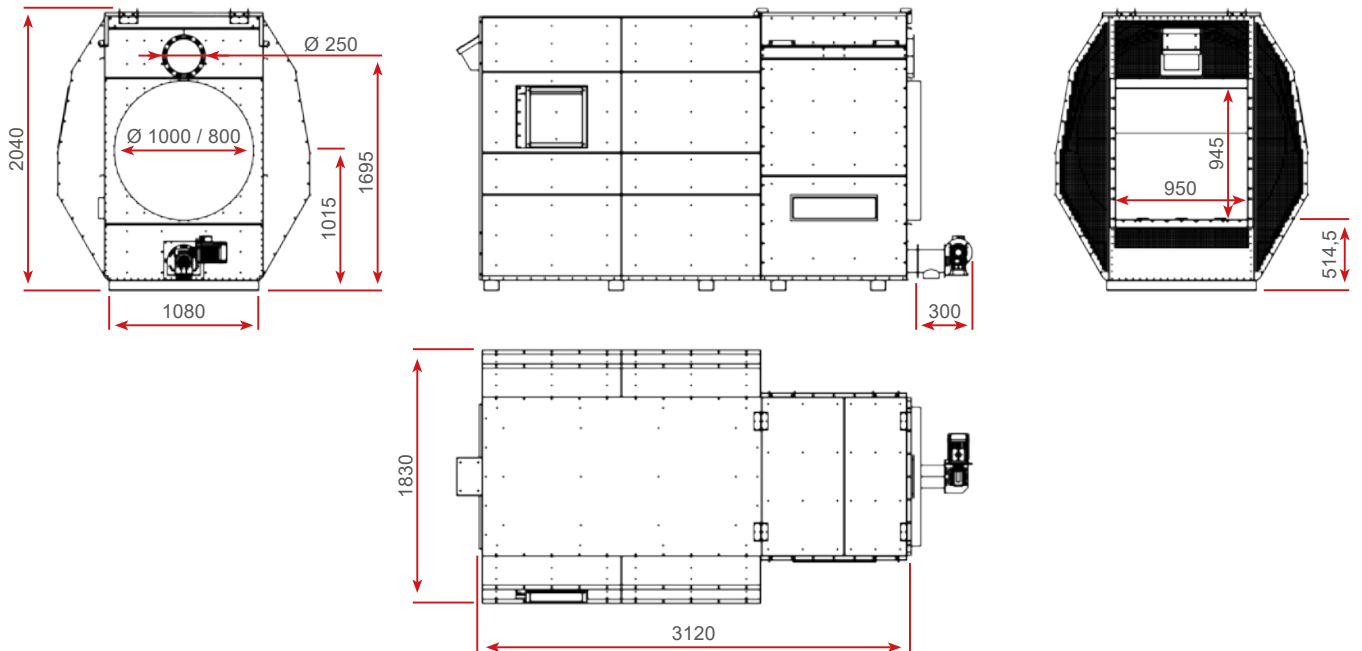
1.11. Dimensions: Vacuum heater



1.12. Dimensions: Pre-heater



1.13. Dimensions: EcoHeater

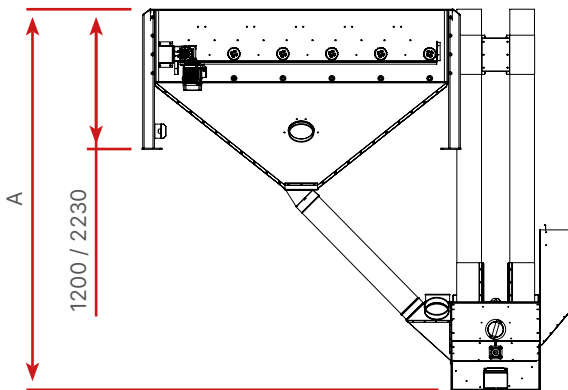


2. INSTALLATION

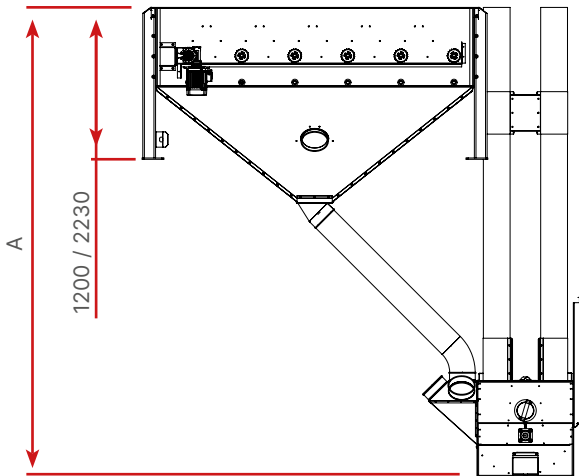
2.1. Base

Mount dryer base on sturdy platform, on top of beams or bars. When choosing installation position, make sure that the feeder through opener can be used. Through opener level is located on the opposite side of the feeder motor.

The lifting points are located inside the base and are marked with stickers. When mounting the base, make sure that there's at least 45° angle in the circulate piping between the bottom cone and elevator. Check the minimum measure from table below.



DRYER	ELEVATOR	MIN. A [mm]
Plantaasi	A68	2 700
	A92 / A118	2 740
Special	A68	2 865
	A92 / A118	2 920
Magnum	A68	3 260
	A92 / A118	3 310



DRYER	ELEVATOR	MIN. A [mm]
Plantaasi	A68	3 140
	A92 / A118	3 280
Special	A68	3 300
	A92 / A118	3 460
Magnum	A68	3 690
	A92 / A118	3 850

⚠ NOTE!

Farmi dryer or MW mobile dryer: See base installation instructions from the separate manual (A10-1015).

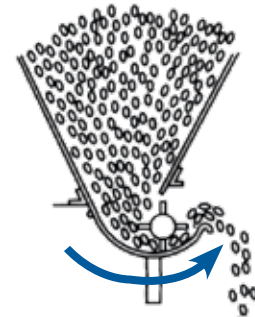
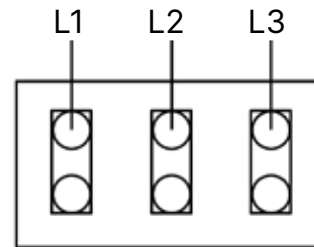
2.1.1. Feeder

Connecting with frequency inverter: When you connect the motor wires, make sure that you have installed the strips correctly (motor connected to the triangle).

Directive feeding speed 15Hz, when cooling standard value is 22Hz (not adjustable).

⚠ CAUTION!

Check the feeder's direction of rotation!

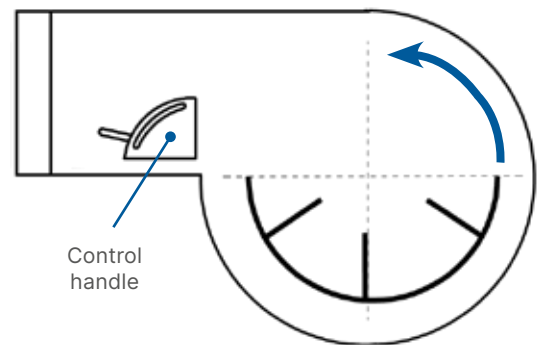


2.1.2. Bottom fan

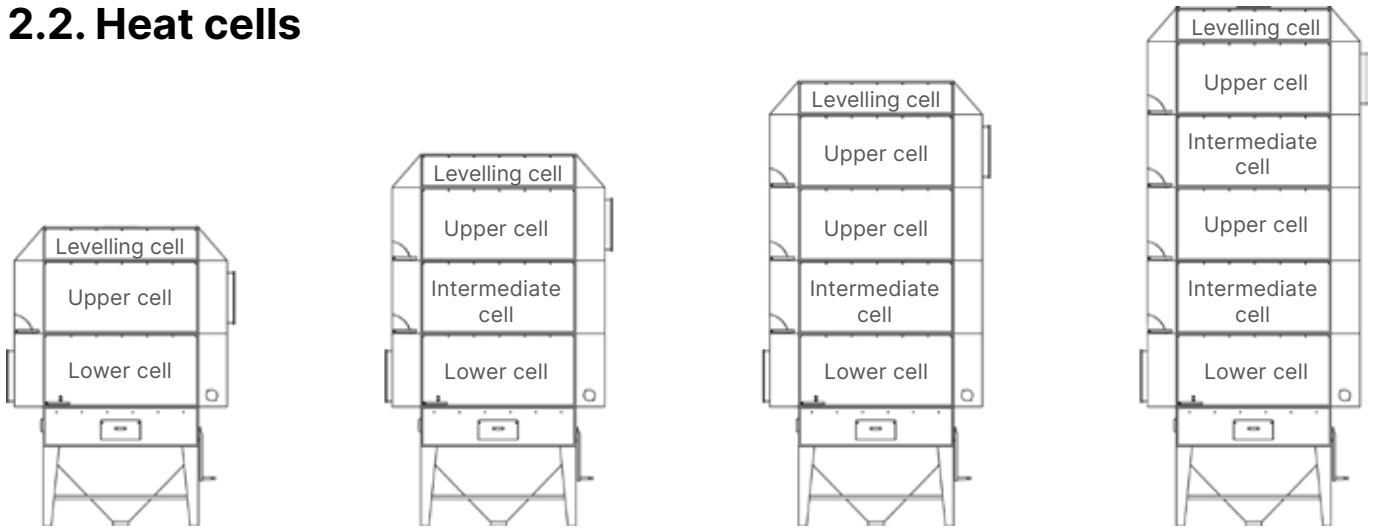
Bottom fan is used in over pressure dryers. Install the fan with Ø200mm bind to bottom cone's other outlet in the base. Direct the fan's outlet according to the trash pipe.

⚠ CAUTION!

Check the motor's direction of rotation!

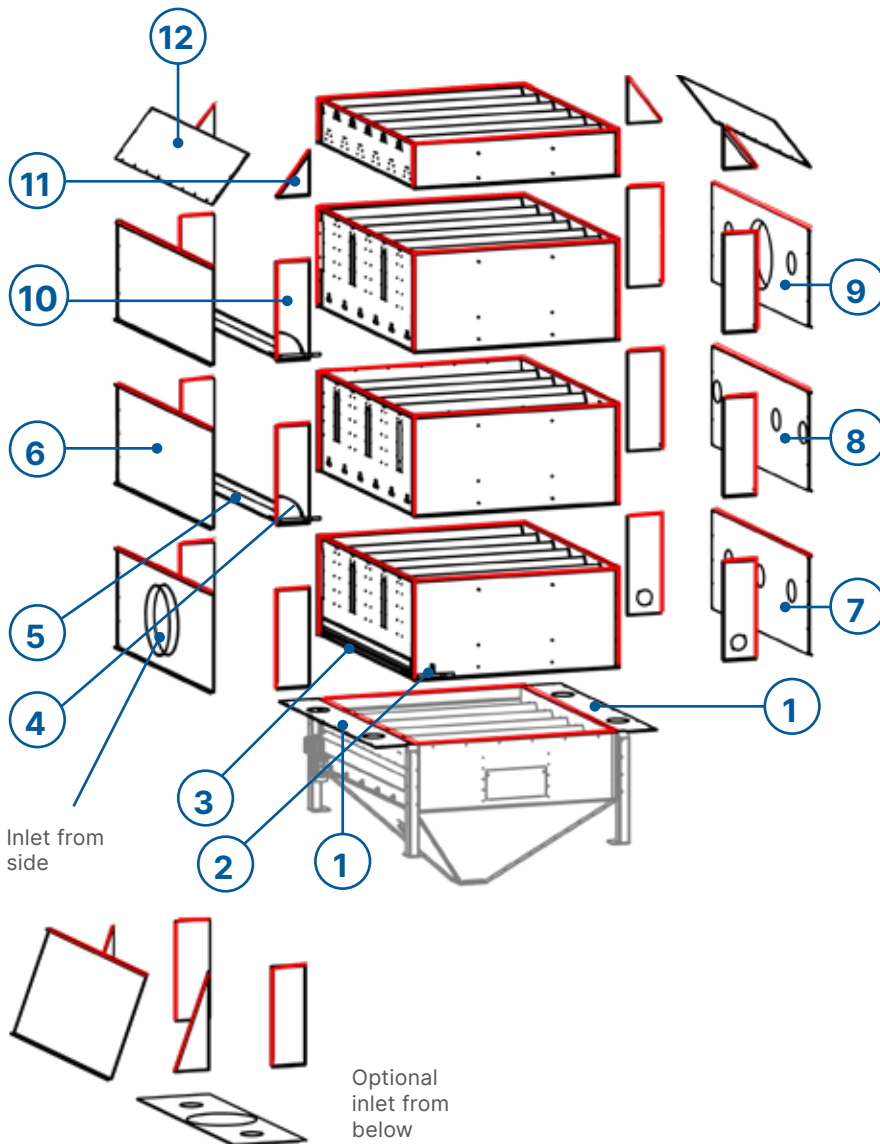


2.2. Heat cells



⚠ CAUTION!

Check the assembly direction and order of the cells before starting mounting!



HEAT CELL PARTS

PART	DESCRIPTION
1	Bottom plate
2	Small grain hatch handle + locking
3	Small grain hatch
4	Closing hatch handle + locking
5	Closing hatch
6	End plate (inlet)
7	End plate 3 x Ø200 (outlet)
8	End plate 4 x Ø200 (outlet)
9	End plate 2 x Ø200 + 1 x Ø630 (outlet)
10	Widening plate
11	Widening plate, top plate
12	Top plate

Attach sealing inside hole row's according to picture in the previous page (red markings: sealing).

Lift lower cell on top of the base. Make sure that small grain hatch is on the inlet side. Place assembly bolts 8×16mm to their holes, but leave the nuts loose. Install bottom plates between the base and lower cell by lifting the cell a bit. Tighten the bolts.

Install rest of the cells. The lifting points are located inside the cells and are marked with stickers. It's allowed to lift two cells at the same time.

! NOTE!

Farmi dryer or MW mobile dryer: See cell installation instructions from the separate manual (A10-1015).

2.2.1. Air channels

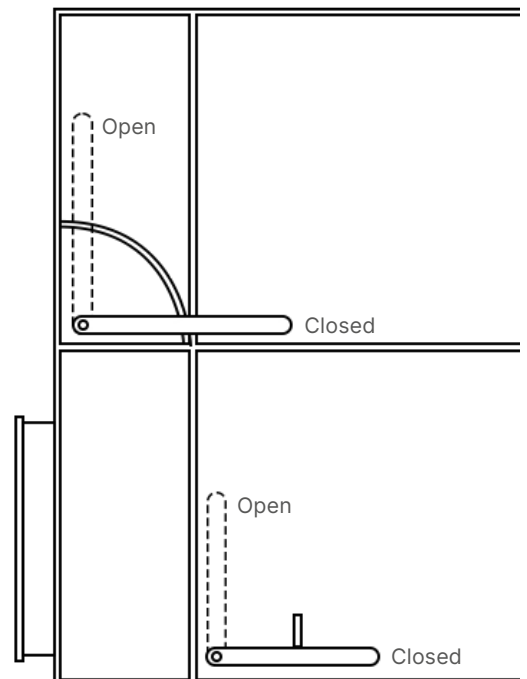
You can install the inlet air channels at the same time as the cells or afterwards. Seal the air channels according to picture in the previous page (red markings: sealing).

Outlet side's end plates have Ø240mm cleaning hatches by the outlet notches. The lowest side plates of the outlet side have cleaning hatches.

Install the air channel closing hatches to the heat cell widening plates on the inlet side. Lowest widening plate has small grain hatch. Install the closing hatch so that the shaft remains above it. Attach locking part and handle outside the widening plate.

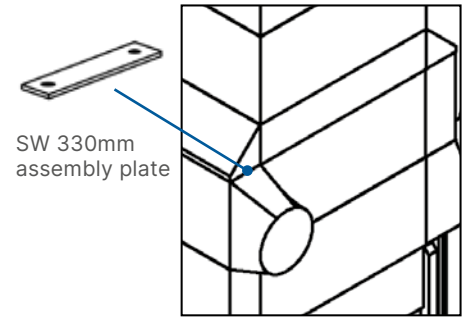
! NOTE!

Farmi dryer or MW mobile dryer: See air channel installation instructions from the separate manual (A10-1015).



2.2.2. Outlet pipe

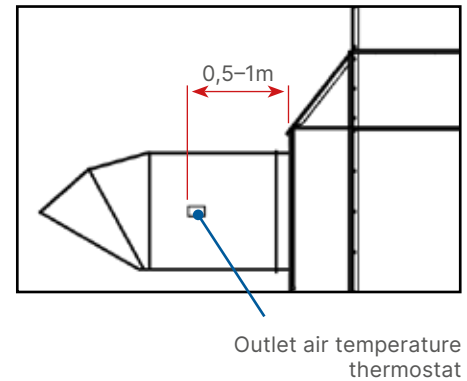
If the dryer is mounted inside a building, you need to install outlet piping through the building. Piping is installed to the highest heat cell on the outlet side. Design the piping as short and straight as possible. We recommend to attach a curve to pipe end to prevent water from entering inside the pipe.



! NOTE!

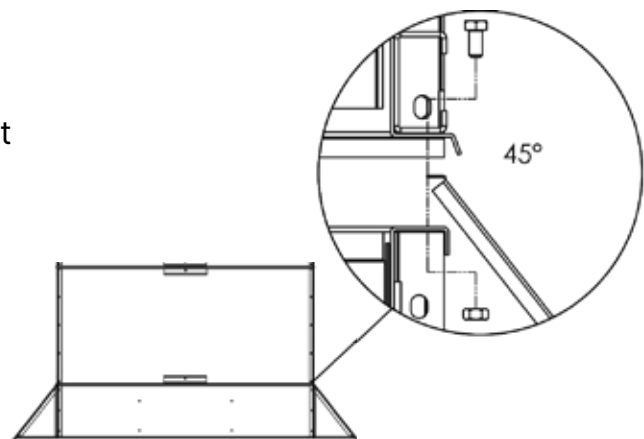
SW mobile dryer: install assembly plate to top edge of the outlet pipe.

Install the outlet air temperature thermostat inside the outlet pipe (to the side or below) with 0,5 – 1 meter distance from the air channel. Drill a Ø16mm hole to the pipe, push the spiral inside and attach with two drill screws. Spiral is delivered inside the control panel. Push the sensor to the tip of the spiral and lock it's cable in place using the plastic clip provided with the spiral.



2.2.3. Levelling cell

Install levelling cell on top of the highest top cell. Attach top platess on place between the levelling cell and storage container before installing the storage containers.

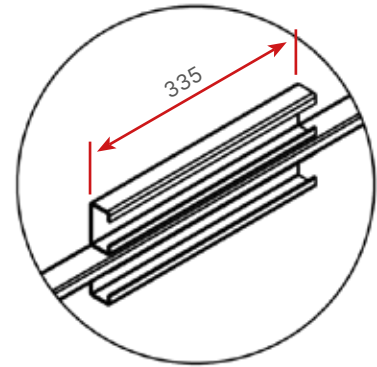
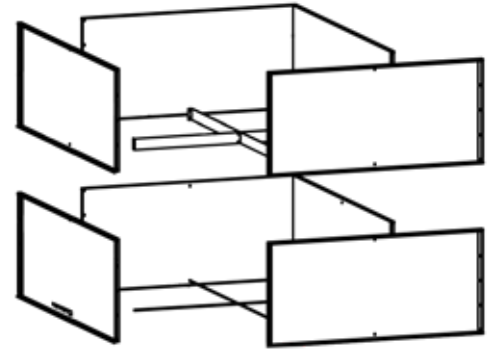


2.3. Storage containers

Assemble storage containers before mounting them on top of the levelling cell. Attach cross supports on the horizontal seams of the storage container layers. Long part of the support is attached parallel to the notches of the cells and shorter parts (2 pcs) crossing the notches. Support attachment points are strengthened with a reinforcement installed outside the container (C profile 335mm). Use M10×30 hex screws and nuts and M10 square washers to attach the reinforcements (washers under the nut and screw base).

Lower edge's cross support of the lowest storage container is made of threaded rod. Attach rods with M10 nuts. Attach reinforcement and square washer on the outside of the container.

Dryer cover replaces the highest storage container's top edge cross support.



Cross support reinforcements

⚠ NOTE!

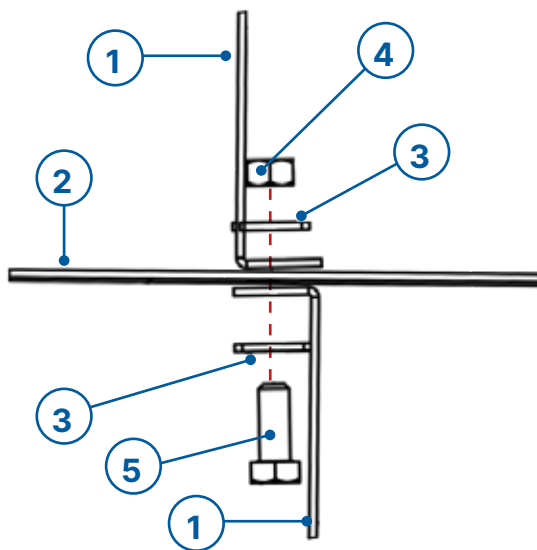
Lowest storage container is thicker material, if there's more than three containers on top of each other.

⚠ NOTE!

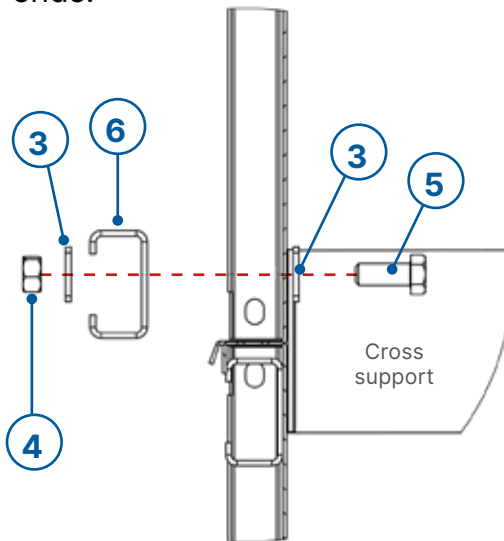
Farmi dryer or MW mobile dryer: See storage container installation instructions from the separate manual (A10-1015).

PART	DESCRIPTION
1	Cross support, short
2	Cross support, long
3	Square washer
4	Nut M12
5	Hex screw M12×30
6	Reinforcement

Cross support, center:



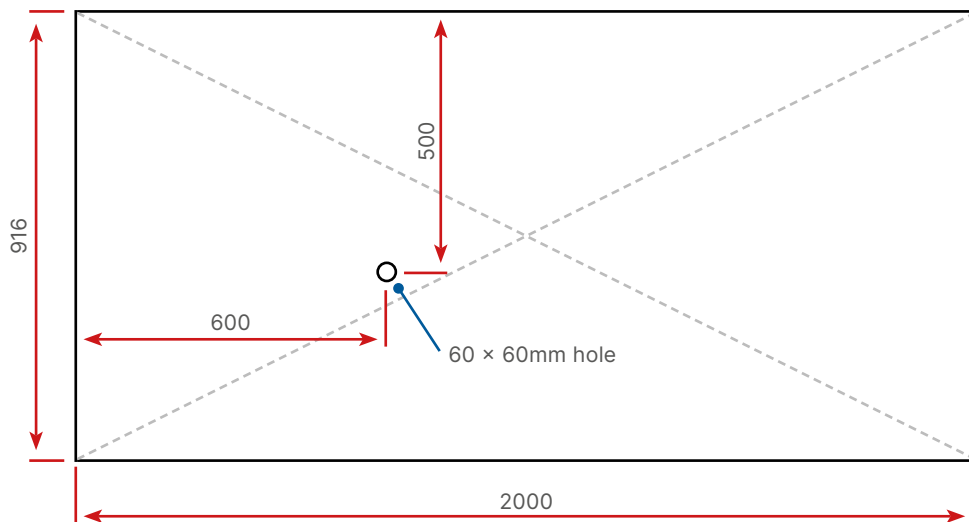
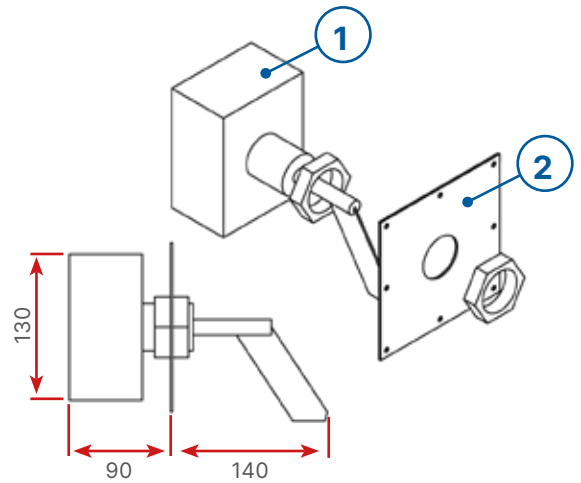
Cross support, ends:



2.3.1. Fill alarm

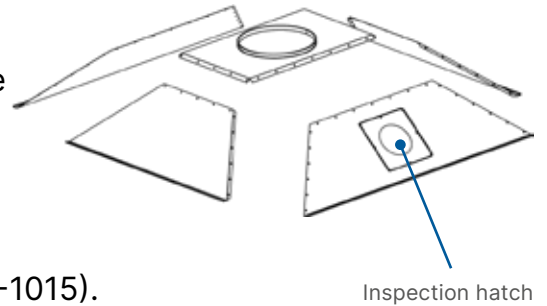
When the dryer is full, control panel pilot light (Fill automation button) turns on. When using the fill automation, the alarm controls the actuator of the motored elevator shutter (option) in the tipping hopper.

1. Attach fill alarm (1) to the fastening plate (2) with 1¼" nuts.
2. Make a 60 × 60mm hole to the highest storage container according to the picture below.
3. Slide fill alarm to place and attach the fastening plate with drill screws.



2.4. Cover

Dryer cover consists of five parts. Assemble the cover with 8 × 16mm bolts and mount it on top of the storage container. Note the position of the inspection hatch.



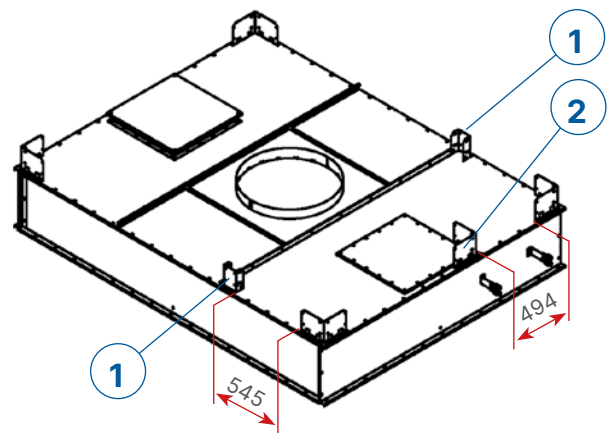
! NOTE!

Farmi dryer or MW mobile dryer: See cover and railing installation instructions from the separate manual (A10-1015).

2.4.1. Compact / SW mobile dryer: cover, railings and wall ladder

Cover has attachment points (4pcs) for railing corner posts. Install extra attachment points to long sides (2pcs) and to short side (1pcs) at the ladder rise point.

Attach two extra attachment points (1) to cover's horizontal and vertical seams with M8 screws and nuts. Attach extra attachment point (2) to cover horizontal seam with screws and with 6,3×19 drill screw to the cover. Seal the attachment points with mass.

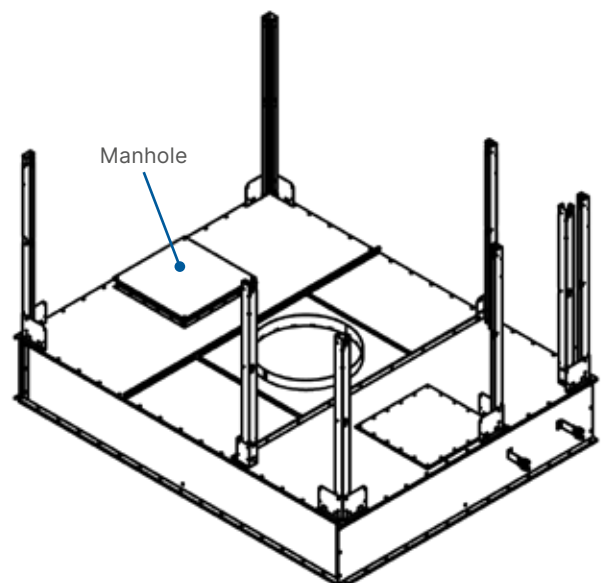


! NOTE!

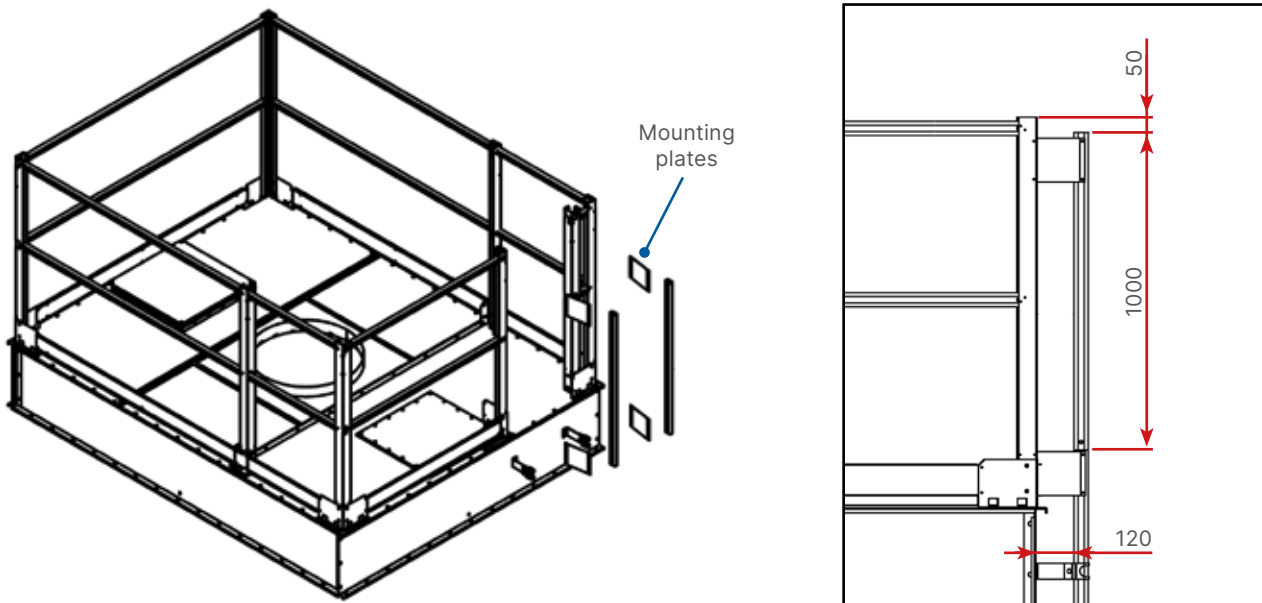
When choosing mounting position for ladder, note air channel closing hatches location.

Install ladder rise point to opposite side of the manhole, left or right to short side. This manual shows the rise from the right side. Left sided rise is made by installing shorts side's extra attachment point as a mirror image relative to the instruction.

Attach railing posts to attachments with M8 screws and nuts. Install railing pipes and foot rail on place and attach with drill screws.

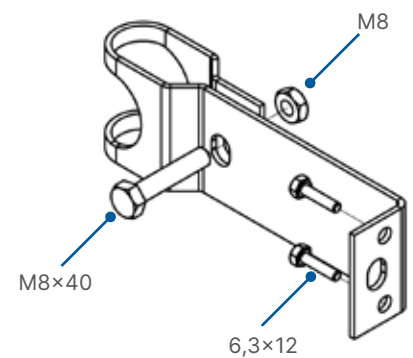


Attach handrails (2pcs) to ladder rise posts with mounting plates (4pcs). The upper end of the handrails is 50mm below the ends of the handrail posts. Attach with drill screws.



1. Bend the bracket around the ladder handrail.
2. Attach bracket to ladder with M8×40 screws and nuts.
3. Attach bracket with M8×20 screw and nut or with 2pcs D6,3 drill screws.

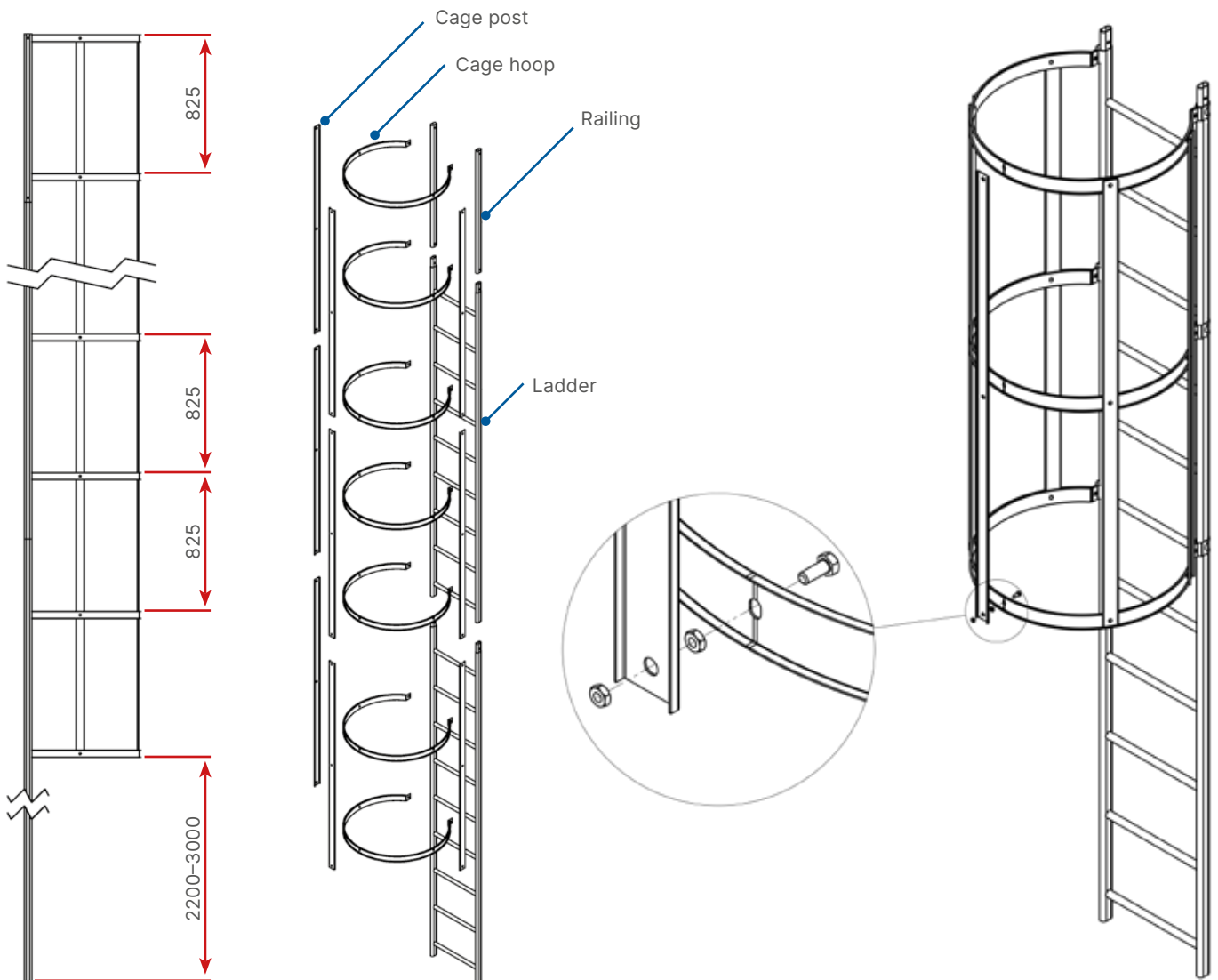
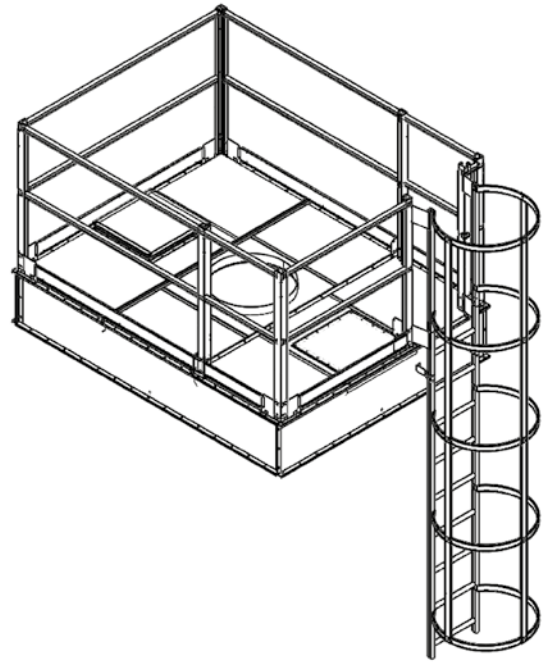
Attach ladder to dryer column with drill screws using ladder brackets (one pair / layer). Connect ladder elements to each other and attach them to handrails.



Attach the highest cage hoop to roof ladder handrail's top part and the rest with 825mm intervals. Bend cage hoops end's around the ladder posts and attach them with M8×40 screws and nuts.

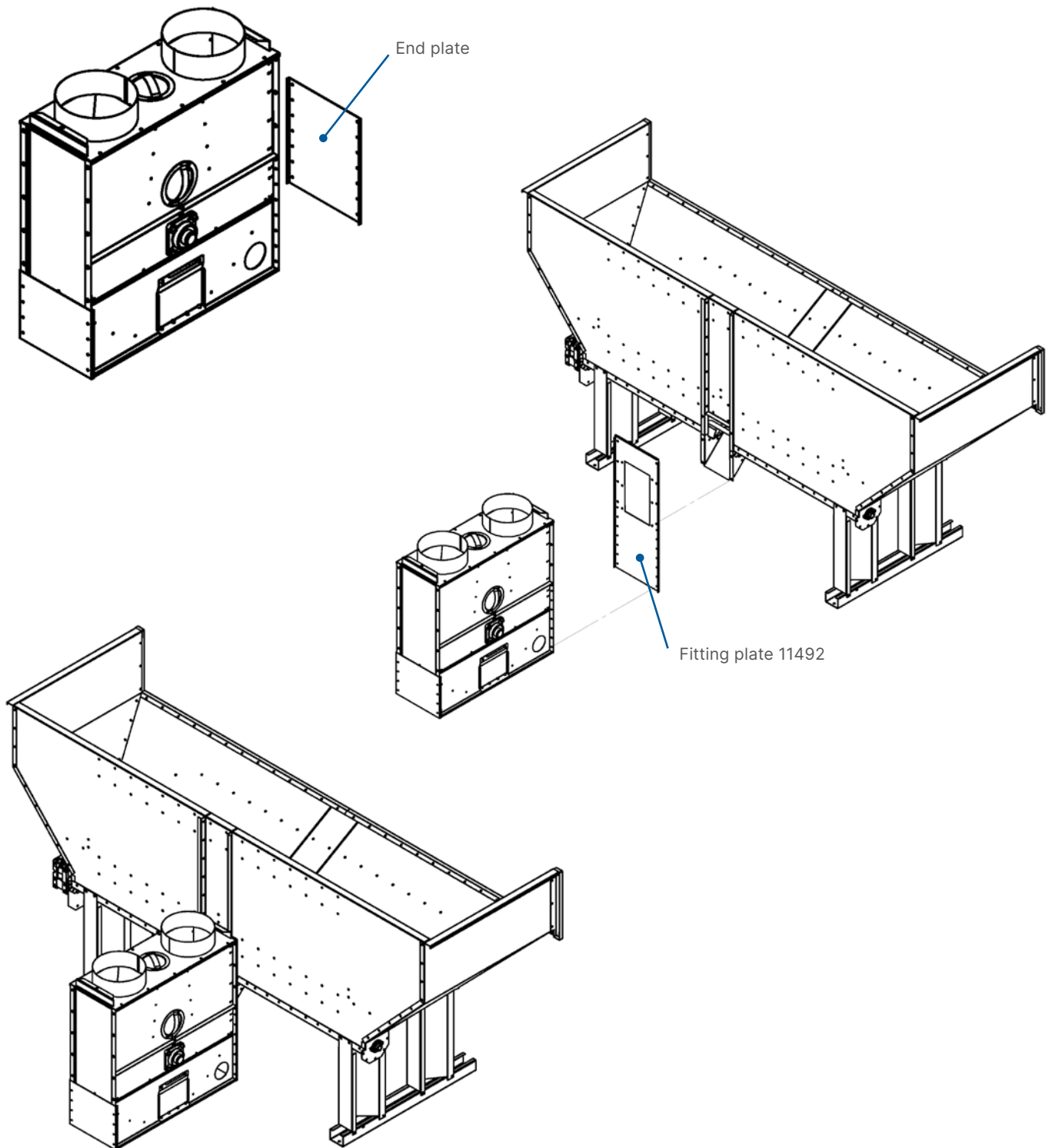
Install M8×20 screws with nuts to cage hoops so that the screw head remains inside the hoop. Next, install the cage posts outside the hoops with M8 nuts (first mounted nuts are trapped between the hoops and posts).

The cage should extend to 2,2 – 3 meters height from the level where ladder start to rise. If necessary, you can cut the extra length off the cage posts. Sweep the chips that are formed during the drilling from the galvanized plate to prevent corrosion.



2.5. Compact dryer / SW mobile dryer: tipping hopper

If you have A92 or A118 elevator. Remove elevator end plate and attach fitting plate to the tipping hopper. Attach tipping hopper to the elevator.



2.6. Pre-cleaner

Pre-cleaners A200 and A250 are installed on top of the dryer cover. There will remain 50mm replacement air hole between the pre-cleaner and cover. Do not block this opening.

Use spiral-seam pipe as trash pipe. You can direct the fan outlets freely according to trash piping. Design the piping with minimal turns.

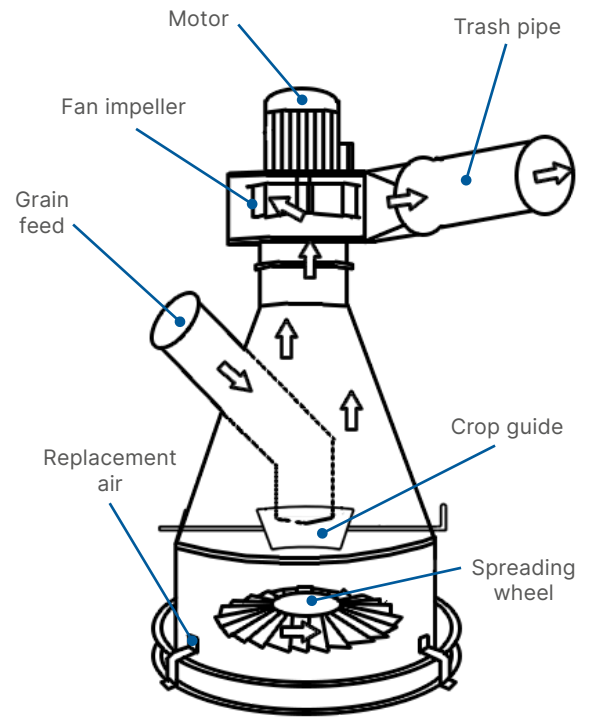
- A200: Attach fan with Ø200 bind on to the bottom part.
- A250: Fan and cone part overlap, so bind is not needed.

⚠ CAUTION!

Don't combine bottom fan's and pre-cleaner's trash piping.

ⓘ NOTE!

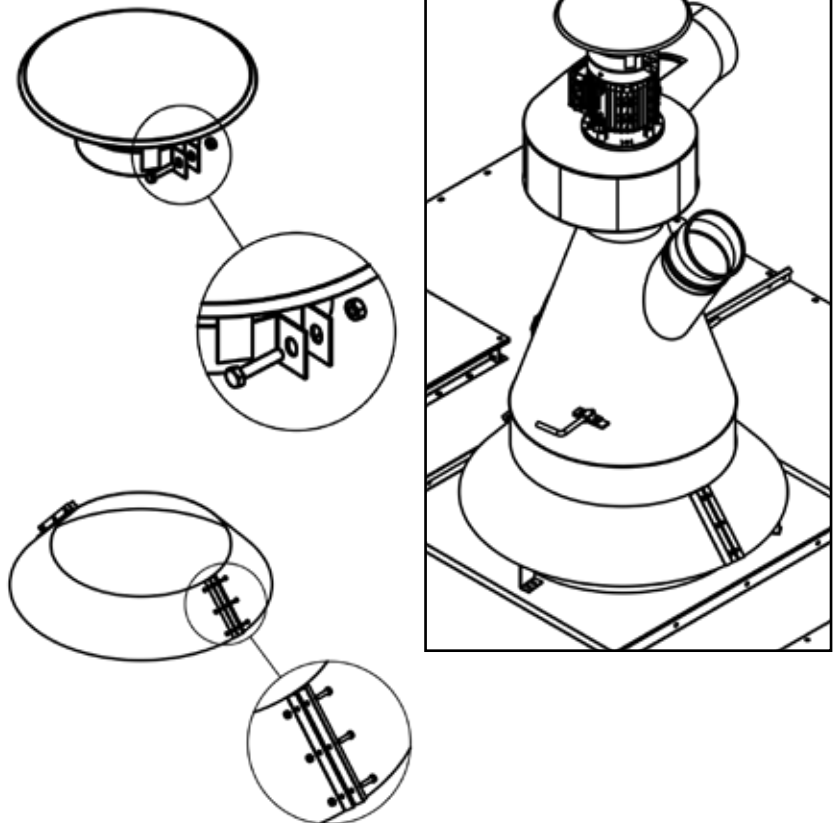
Farmi dryer or MW mobile dryer: See A300 pre-cleaner's installation instructions from the separate manual (A10-1015).



2.6.1. Pre-cleaner rain covers (option)

Attach fan's rain cover on top of the motor with M8×40 hex screw and nut.

Pre-cleaner's lower part's rain cover is assembled from two parts with M6×40 hex screws and nuts. First connect the other ends of the cover parts, leave the nuts loose. Bend the parts around the pre-cleaner's lower part and attach them with screws and nuts. Tighten the cover on place such way that there remains a 75mm gap between the cover and dryer cover for replacement air.



2.7. Elevator

See elevator installation instructions from the separate manual (A30-1001).

2.7.1. Elevator piping

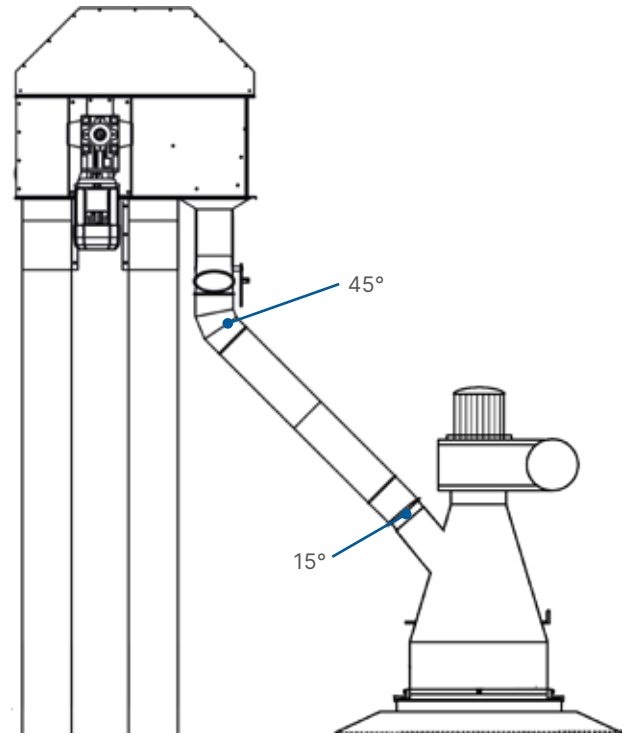
Install a 15° curve to pre-cleaner inlet, so that the pipe attached to the curve is in 45° angle.

Install a grain or telescope pipe to the curve.

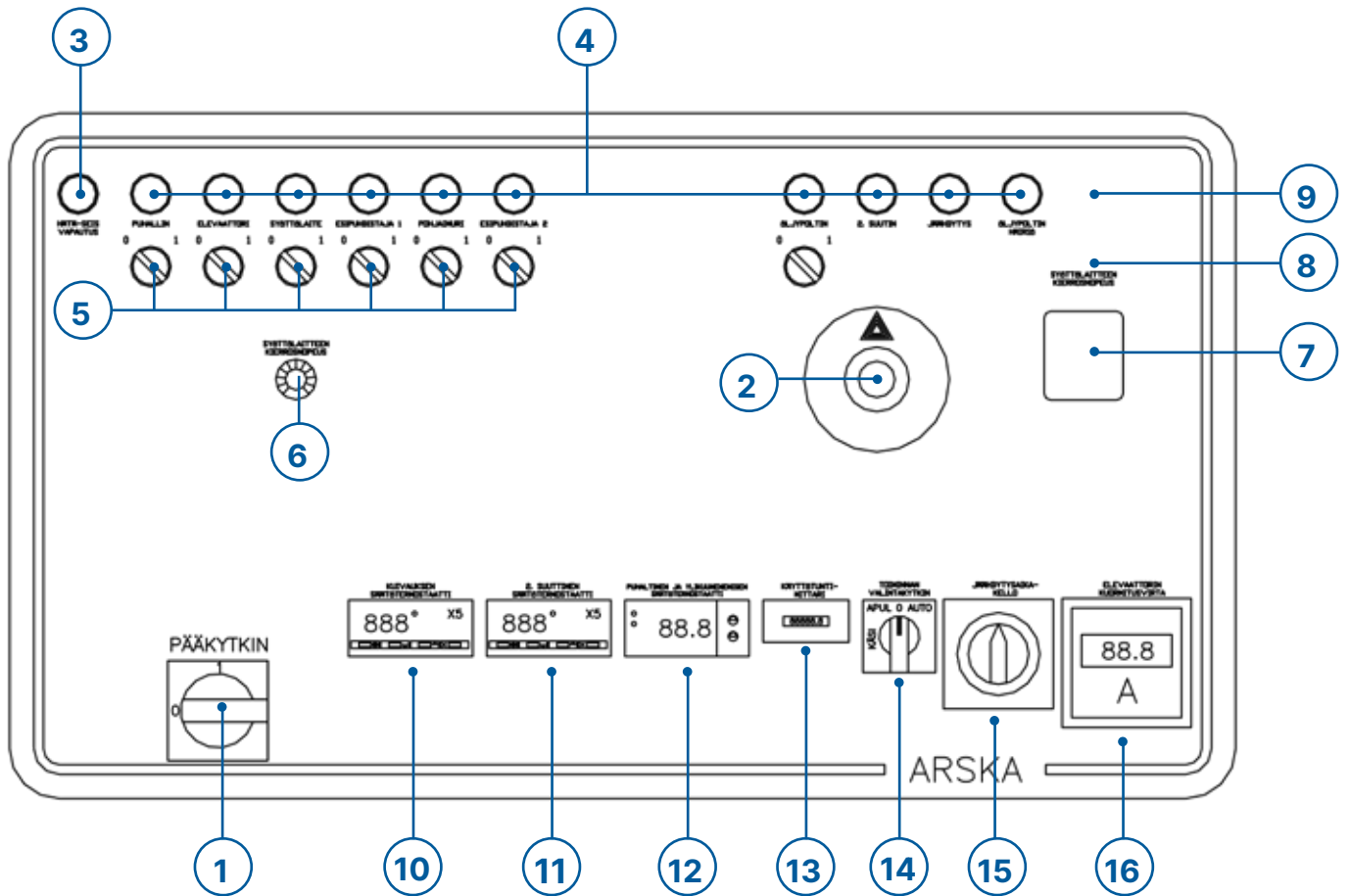
Install a grain or telescope pipe to middle outlet of the elevator divider. The pipe should point straight downwards.






Attach the pipes with 45° curve. This curve wears out easily, so we recommend cast iron parts (curve and pipe).

Design the piping to grain bins starting from the farthest discharge point. This ensures a sufficient downward angle to the pipeline without the pipelines of the nearby bins being obstructed.



2.8. Control panel



Thermostat settings: Push button  down and the display shows the setting value. When you keep the  button down you can change the value with buttons  and . When you let go of the  button, the selected value will remain in effect.

1	Main switch
2	Emergency stop switch Stops the hardware function. Release by turning the button clockwise
3	Emergency stop switch release Reset button, which allows the automation after using the emergency stop switch
4	Motor pilot lights
5	Motor switches
6	Feeder's variable control
7	Feeder's frequency display standard 15 - 17Hz, in cooling 22Hz (not adjustable)
8	Elevator shutter switch (option) Controls the shutter's actuator (option). Actuator shuts the hatch automatically, when the fill automation is selected.
9	Fill automation Start button, works also as an pilot light for the fill alarm
10	Thermostat A1, outlet air temperature: starts cooling Thermostat has 0,1 hysteresis. For example, setting 39 (SP1) cooling starts at 39,1 degrees.
11	Thermostat A2, drying air temperature: controls oil burner's 2-nozzle Thermostat has 2° hysteresis. For example, setting 70° (SP1) oil burner's 2-nozzle shuts at 72 degrees and lights up at 70 degrees
12	Thermostat A3: Furnace overheat thermostat Default settings (not adjustable): Oil burner shuts down, if the drying air temperature raises over 90°. Furnace fan stays at work. Burner lights up again, when temperature goes under 50°.
13	Hour meter: Counts heater fan's operating hours
14	Function selector switch KÄSI = manual use TÄYT = drying function (filling / drying / cooling) 0 = stop AUTO: = drying function (drying / cooling)
15	Mechanic cooling timer
16	Elevator motor power display Motor power values with 100% loading: 4kW = 8,5A 5.5kW = 11,3A 7.5kW = 15,2A

2.9. Heater

⚠ CAUTION!

Install the heater and the fan to solid ground to prevent it from resonating. Fire danger increases if trash gets into the heater intake air.

Heater must be placed in a heatresistant house according to construction drawings. If the heater house isn't made by masoning with bricks or casted with concrete, you should check from the local fire authority what kind of structure meets the requirements.

In front of the oil burner there should be at least 80cm free space to do maintenance procedures. Heater can be also placed in a factory made heater house.

Locate the heater so that the air pipe can be as short as possible when it goes into the dryer machinery.

Low pressure / bio heaters: Replacement air hatches must be big enough, so that there won't form any low pressure to the heater room.

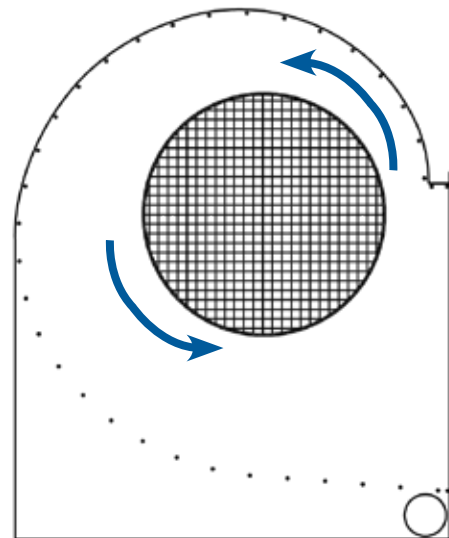
Over pressure: Replacement air must be lead to fan's inlet from outside air, as dustfree place as possible.

Air hole's lower edge must be at least 100cm above the ground measured from the outside. Put a filter on the pipe to cover the air hole.

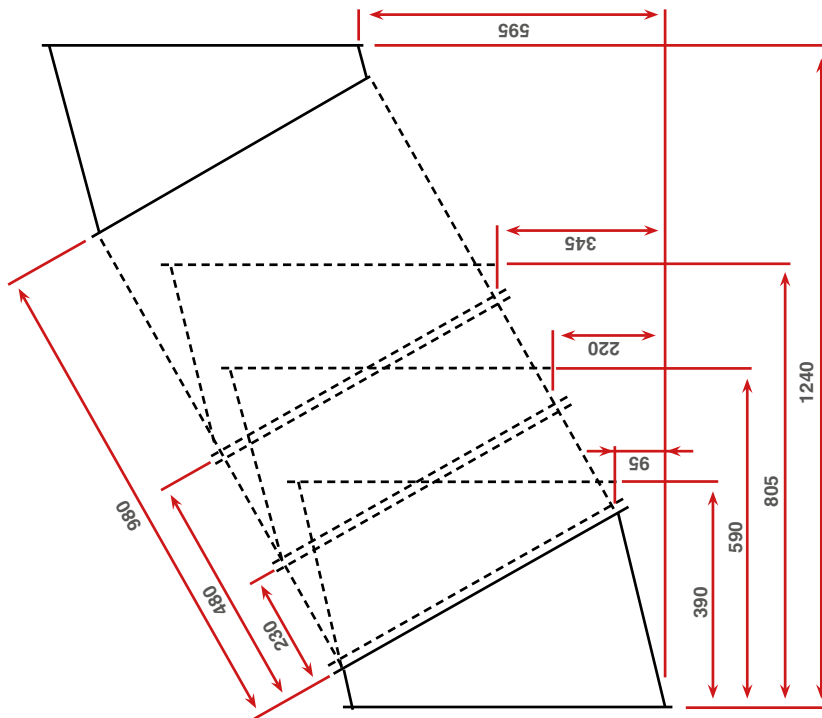
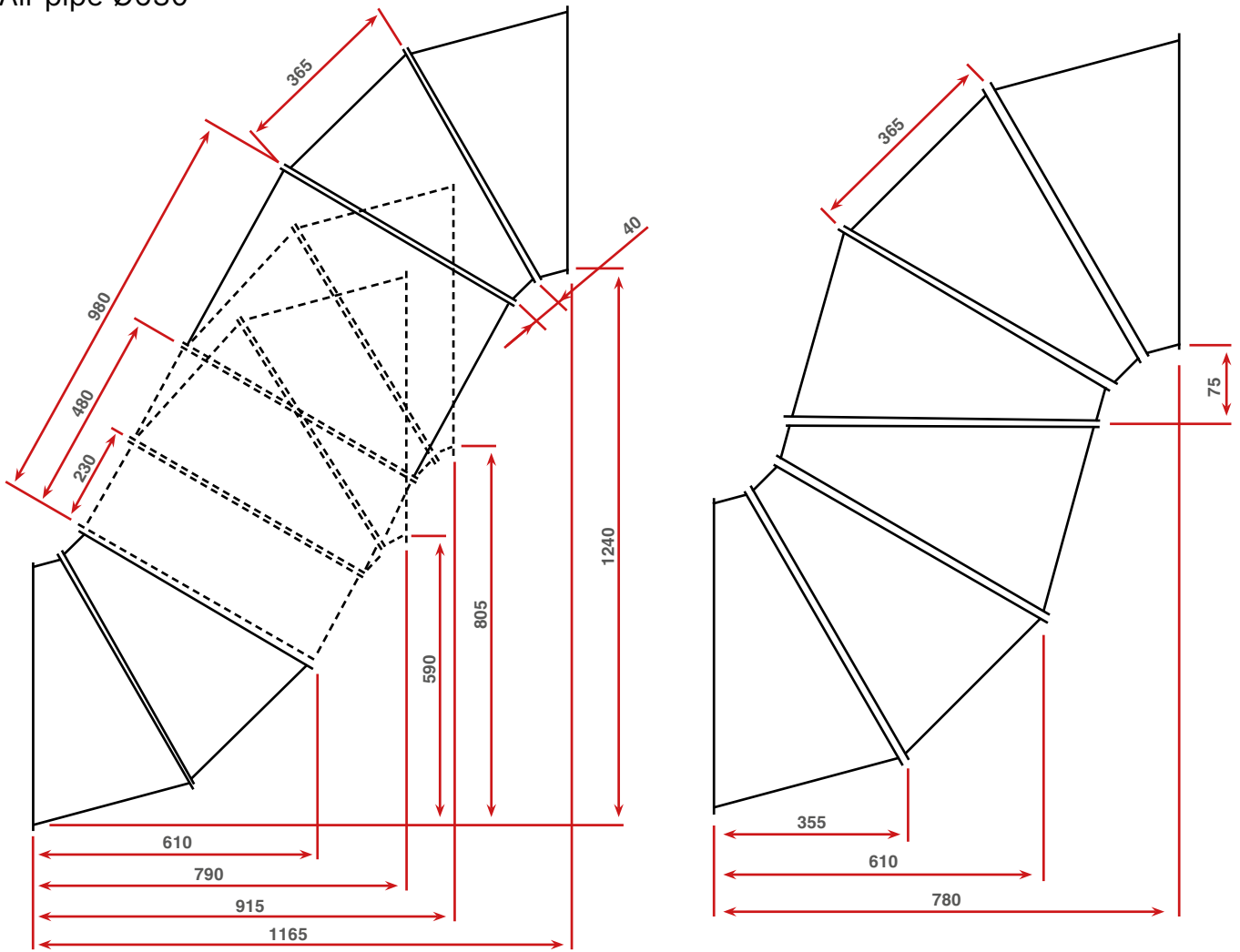
Burner replacement air: There must be two at least $25 \times 25\text{cm} / 2 \times 600\text{cm}^2$ air valves on the heater house's wall, one on the floor level and one on top of the wall.

⚠ CAUTION!

Check the fan's direction of rotation!



Air pipe Ø630



2.9.1. Burner nozzles

HEATER MODEL	OIL AMOUNT (MAX. KG / H)	NOZZLES (GAL)	OIL PRESSURE (MAX. BAR)
3000S (178kW)	17,1	2,75 + 1,75	10
4000S (254kW)	24,3	4 + 2	11
6000S (310kW)	30	5 + 3	11,5
6500S (412kW)	40,1	6 + 4	11
5500S (556kW / vacuum)	55	8 + 6	11
7000S (712kW / vacuum)	70	10 + 7	11
8000S (819kW / vacuum)	80	12 + 8	11

Note! Burner's nozzles are delivered with the smallest power possible. Check the right nozzle size during the assembly.

Oil: 3,9 mm² / s (cSt) 0,84g / cm³ 15°C

NOZZLE US GAL / H	OIL AMOUNT WITH DIFFERENT SPRAY PRESSURES (SPRAY ANGLE 80°)		
	9 BAR (KG / H)	10 BAR (KG / H)	12 BAR (KG / H)
1,00	3,60	3,80	4,16
1,10	3,97	4,18	4,58
1,25	4,50	4,75	5,20
1,35	4,87	5,13	5,62
1,50	5,41	5,70	6,24
1,75	6,31	6,65	7,28
2,00	7,21	7,60	8,32
2,25	8,11	8,55	9,37
2,50	9,01	9,50	10,40
2,80	10,10	10,60	11,70
3,00	10,84	11,40	12,50
3,75	13,50	14,20	15,60
4,50	16,20	17,10	18,70
5,00	18,00	19,00	20,80
5,50	19,80	20,90	22,90
6,00	21,60	22,80	25,00
6,50	23,40	24,70	27,10
7,50	27,00	28,50	31,20
8,50	30,60	32,30	35,40
10,00	36,00	38,00	41,60
11,00	39,70	41,80	45,80
12,00	43,30	45,60	50,00
13,50	38,70	51,30	56,20
15,00	54,10	57,00	62,40
17,00	61,30	64,60	70,80
19,50	70,30	74,10	81,80

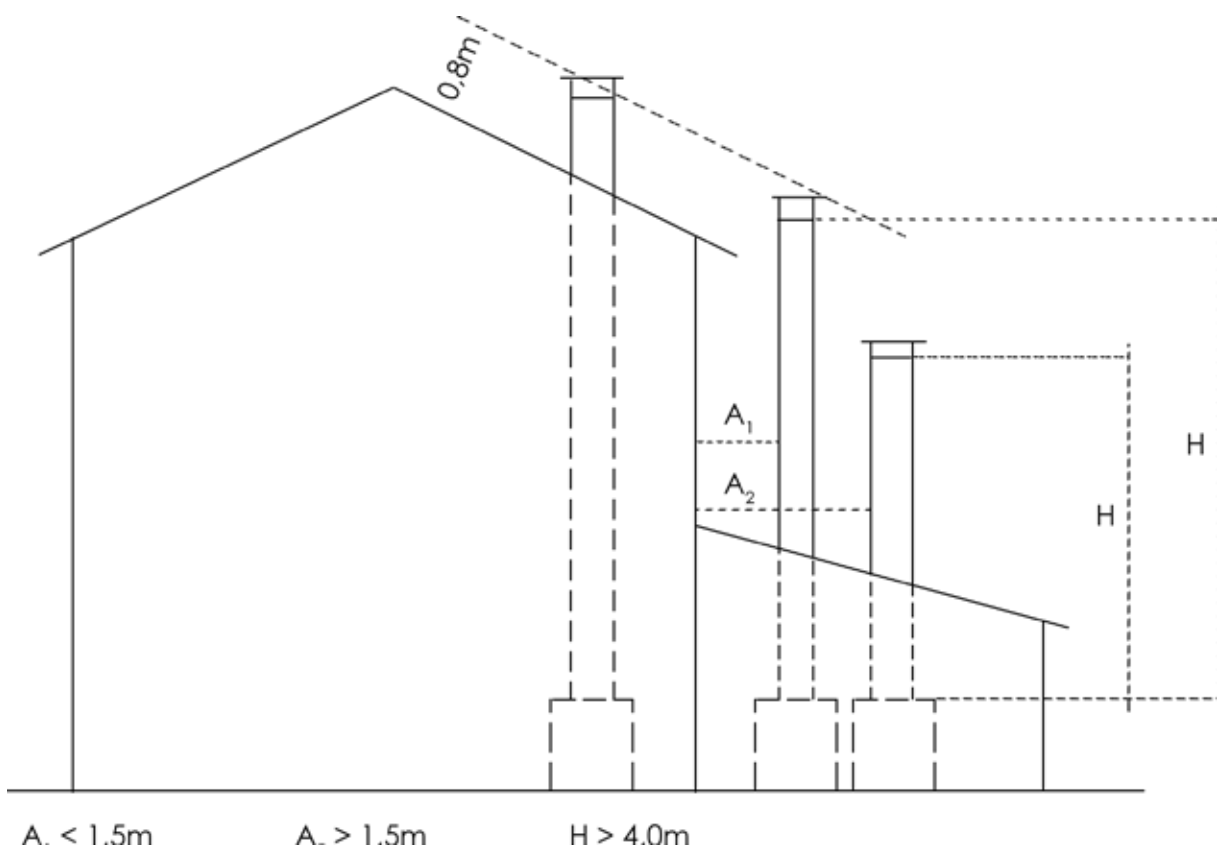
2.9.2. Flue piping

Install flue piping after the heater is in place and will not be moved. Install a rain cover on pipe's end. If the distance between the chimney and wall of the element silo is at least 150cm, flue pipe's height should be at least 400cm measured from the heater's top.

If the chimney goes through the square silo's tip roof or if it's closer than 100cm from the wall and 70cm eave's flammable structure, you must isolate it carefully well according to these instructions. If the chimney goes through the square silo's tip list or if it's less than 150cm away from the building's wall, it must extend at least 80cm over the roof or it's lengthening piece.

You must isolate the flue pipe carefully well by it's full length insofar as it will go through square silo or any other structure. Use at least 100mm thick, nonflammable and heat-resistant mineral wool, which bulk density is at least 100kg / m³ and sintering temperature is at least +900°C or with some parallel material.

Cover the insulation with at least 0,5mm thick galvanized cover pipe made of steel. Flue pipe should be made of at least 3mm thick, non-alloyed steel or parallel.



3. OPERATING

3.1. Procedures before commissioning

3.1.1. Grain dryer

Open all maintenance hatches. Check that there are no foreign objects in the dryer, such as bolts and nuts.

Make sure that all hatches, covers and pipe joints are properly closed. Pipe joints must not be open – if needed, attach a one meter long pipe to joint.

Check the correct direction of rotation of the motors.

Check that the electrical connections have been made properly.

When commissioning the dryer, observe the function of the elevator and adjust the feeder power to prevent the elevator from clogging.

3.1.2. Heater

Check the correct direction of rotation of the fan.

Make sure that there are no leaks in the flue gas piping, air piping or fuel connections.

Close all hatches and covers. Make sure that the soot hatches are sealed.

Order an oil burner technician to run the adjustments of the burner (remember warranty issues).

Check that the overheat thermostat is working by closing the air regulator and start the heater. Oil burner must shut down when heat rises over the set limit. Burner can't get back on not before temperature has dropped under the set limit.

3.1.3. Elevator

See elevator operating instructions from the separate manual (A30-1001).

3.2. Procedures before every season

3.2.1. Grain dryer

Check that the grain dryer is empty. Make sure that heat cell closing hatches and small grain hatch are open. Make sure that the feeder hoppers are closed. Grease bearings and chains.

3.2.2. Heater

Make sure that the heater is clean. Close all hatches and covers.

Make sure that the burner is working properly. Order an oil burner technician to run the adjustments of the burner if needed.

Make sure that the soot hatches are sealed (replace sealings if needed).

Check that the overheat thermostat is working by closing the air regulator and start the heater. Oil burner must shut down when heat rises over the set limit. Burner can't get back on not before temperature has dropped under the set limit.

3.2.3. Pre-cleaner

Make sure that pre-cleaner is empty. Check bearings and grease them if needed.

3.2.4. Elevator

See elevator operating instructions from the separate manual (A30-1001 (A30-1001)).

3.3. Filling the grain dryer

3.3.1. Filling the dryer manually

1. Turn the function selector switch to KÄSI.
2. Start elevator and pre-cleaner.
3. Open elevator closing hatch by the tipping hopper side.
4. When the dryer is full, *Täyttöautomatiikka Start* button lights up.
5. Close the elevator closing hatch by the tipping hopper side.
6. Shut down elevator and pre-cleaner.
7. Dryer can be filled all the way to the top, because in Arska dryers there won't form any swelling of the grain.

3.3.2. Filling the Compact dryer

1. Start elevator.
2. Open tipping hopper hatch.
3. Pour grain carefully into the tipping hopper.
4. Start the tipping hopper's bottom auger after the grain doesn't drain into the elevator by itself.

3.4. Using the grain dryer

CONTROL TYPE	FILLING	DRYING	COOLING
Standard	manual	automatic	automatic
Fill automation	automatic	automatic	automatic

CAUTION!

Oil burner won't start, if feeder motor isn't activated!

3.4.1. Using the dryer manually

1. Turn the function selector switch to KÄSI.
2. Turn fan, elevator, feeder, pre-cleaner, bottom fan and oil burner switches to position 1.

When the grain has cooled to wanted temperature, shut down the oil burner (switch to 0). Cool for 2 hours (cooling time depends of outdoor temperature). Shut down all devices.

3.4.2. Using the dryer with automation

Automation will control the drying depending on the level of equipment.

1. Turn the function selector switch to 0.
2. Adjust cooling time (1 - 3 hours).
3. Turn fan, elevator, feeder, pre-cleaner, bottom fan and oil burner switches to position 1.
4. Turn the function selector switch to AUTO.

3.4.3. Using the dryer with fill automation

1. Turn the function selector switch to 0.
2. Adjust cooling time (1 - 3 hours).
3. Turn fan, elevator, feeder, pre-cleaner, bottom fan and oil burner switches to position 1.
4. Turn the function selector switch to TÄYTTÖ.

When the grain has reached the upper limit, the actuator will shut and after 30 seconds dryer starts a normal automatic drying. You can control the actuator manually with switch. It only opens if the elevator is on.

4. MAINTENANCE

WARNING!

Turn off the main power before performing any maintenance work.

4.1. General procedures

4.1.1. Grain dryer

Check annually that the screws are tight, that any parts aren't missing and that there's not rust in the machine. Change any damaged parts.

Clean impurities from bottom cone by control hatch in the base. Open dryer cover inspection hatch and clean cover and highest storage containers from dust.

If the last time was dried rapeseed, circulate grain in the dryer so that the seeds possibly stuck on the heat cell structures would come off.

4.1.2. Pre-cleaner

Clean impurities from spreading wheel and from inside the fan.

4.1.3. Heater

Always clean the dryer heat source after the season and whenever needed. Clean the fire chamber after removing the burner. For cleaning the heat exchanger here's two cleaning hatches on top of the heater and one in flue pipe outlet.

Check and clean the oil filter often enough during season.

If the temperature drops too low, the heater's intake air safety net may freeze. Clean the net if necessary.

4.1.4. Elevator

See elevator maintenance instructions from the separate manual (A30-1001).

5. TROUBLESHOOTING

5.1. Feeder

Uneven feed

- Objects on the feed roll (wood, rock, etc.)
- Chain is broken
- Chain wheel's attachment has gotten off / broken

Feeder has shut down or won't start

- Motor's thermal protection relay has tripped or fuse has blown

Feeder works slowly

- Motor connected incorrectly (must be connected to the triangle)
- Acceleration parameter is placed incorrectly in the frequency inverter

5.2. Heater

Burner shuts down after ignition or during use

- Safety pilot has gotten dirty or is on incorrect position
- Nozzle is clogged or gotten off
- Sediment bowl is dirty
- Air leak in a oil hose or it's squashed
- Burner igniters have gotten dirty or are on incorrect position
- Oil or water in the chamber
- Oil valves are closed or there's no oil
- Soot hatch sealings are leaking

There's been a blackout in the power grid

- Heater automatically cools the drying air to 40°C degrees, which allows the oil burner to start
- If the cooling has been on during the blackout, relay (K21) will keep the cooling on

Oil burner won't start

- Oil burner motor thermal protection relay has tripped
 - Outlet air temperature thermostat (A1) has worked, cooling has started
 - Service switch isn't on
 - Oil burner has gotten off of it's hinge
 - Overheat thermostat (A3) position is too low or the heat has risen too high
 - Fan thermostat (A3) lower limit setting is too low, automation setting prevents the burner to start
-
- Old models: mechanical upper limit thermostat has elapsed (temperature risk))



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