

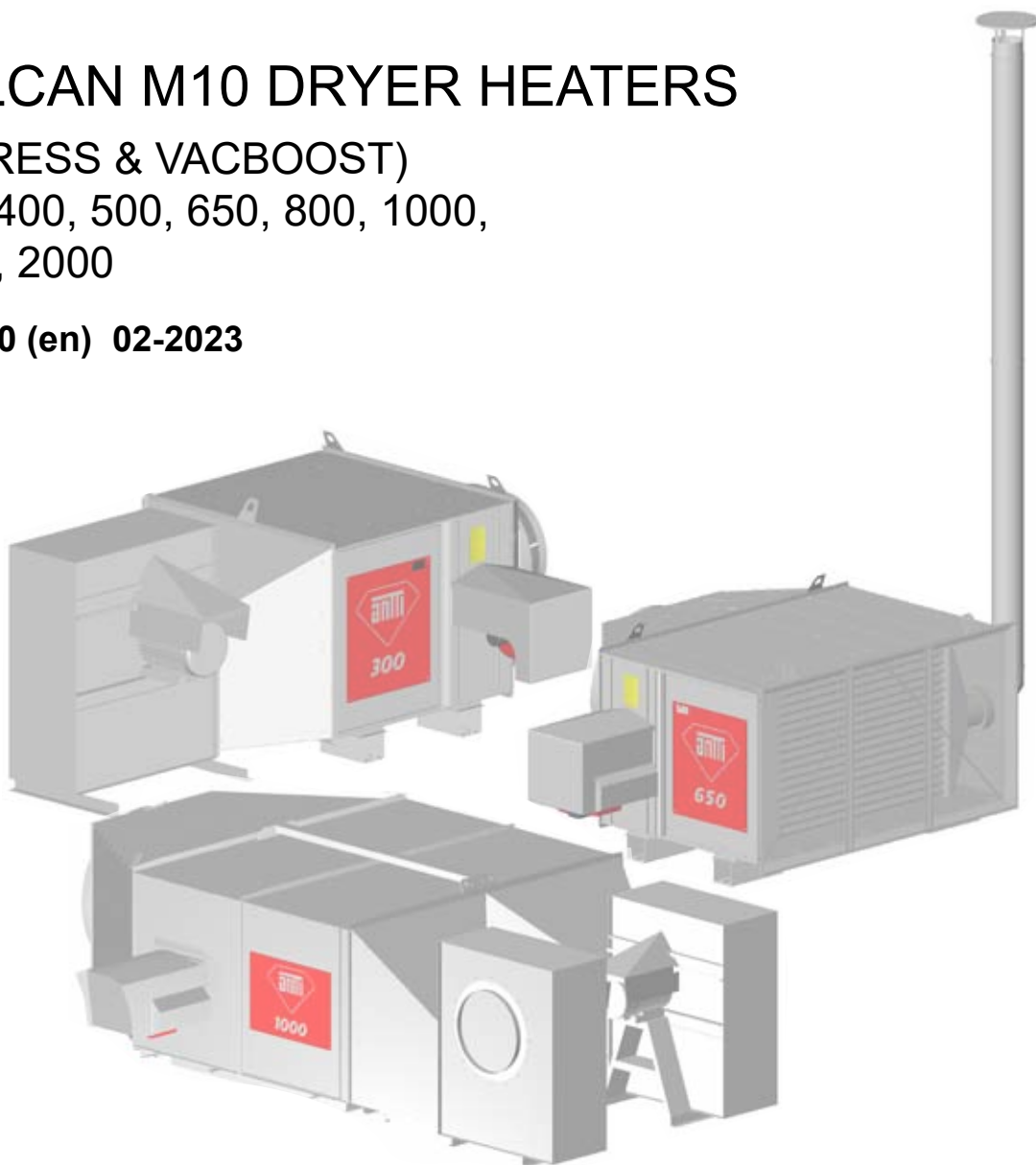
Installation and Operating Instructions

VULCAN M10 DRYER HEATERS

(HIPRESS & VACBOOST)

300, 400, 500, 650, 800, 1000,
1400, 2000

408100 (en) 02-2023



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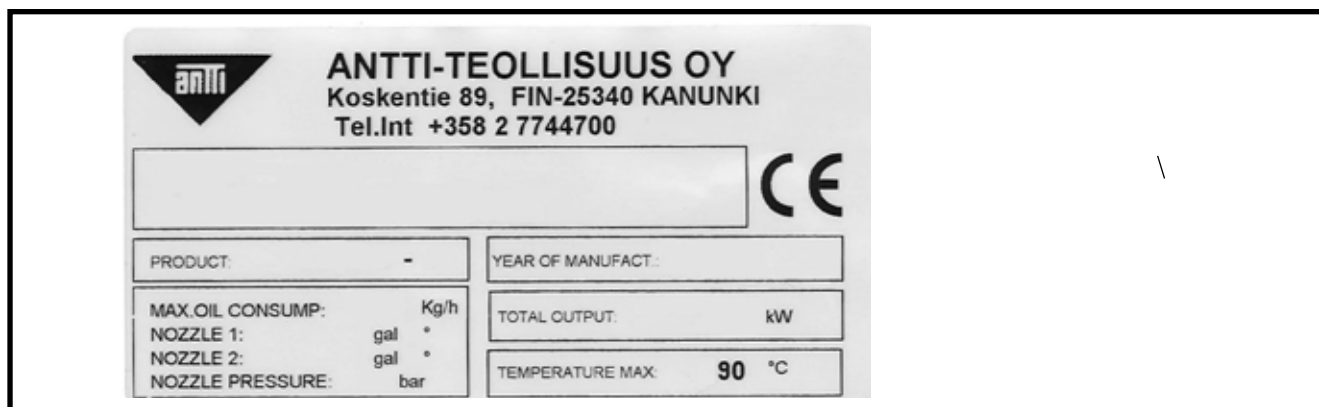


DRYER HEATER TYPE

This book deals with positive pressure and vacuum dryer heaters in the VULCAN range. Refer to the nameplate affixed to the side of the machine for detailed information about the type of your heater. Always notify the seller and the service personnel of the information in the nameplate to ensure quick assistance in case of malfunction and when ordering spare parts. To have this data available whenever required, write it down in the corresponding place on this page.

Lifting the dryer heater into position

- While lifting the heater, observe the following:
 - use all lifting lugs
 - ensure that the lifting gear stays in position in the lugs
 - only use hoists with sufficient lifting capacity
 - never go under or too near the device to be lifted
- Lift the heater without the burner into the place presented in the installation drawing or plan. Because the foundation must be level and steady, there is no need to attach the heater to its bed. Attach the blowers firmly in place.
- On the heaters 300–500, the transport support must be removed before putting the blower cone or the suction net in place.



The maximum temperatures and oil volumes given in the nameplate must be observed, and they must not be exceeded. Look up the maximum oil consumption for each pressure and nozzle size combination in the table at the end of this manual.

Output kW	Centre-part of the heater with cone	Blower cone	Blower	Suction net	
300	489 kg	55 kg	7,5 kW 193 kg	13 kg	
400	489 kg	51 kg		13 kg	vacuum
500	483 kg	51 kg	11 kW 264 kg	-	positive pressure
500	735 kg	-	-	-	vacuum
650	725 kg	-	-	-	vacuum
Output kW	Centre-part of the heater with cone	Blower cone	Blower	Suction net	Outlet cone
800	1735 kg	131 kg	2x 7,5 kW 193 kg=394 kg	24 kg	198 kg
1000	1735 kg	131 kg	2x 11 kW 264 kg=528 kg	24 kg	198 kg
1400	2300 kg				373 kg
2000	2380 kg				373 kg

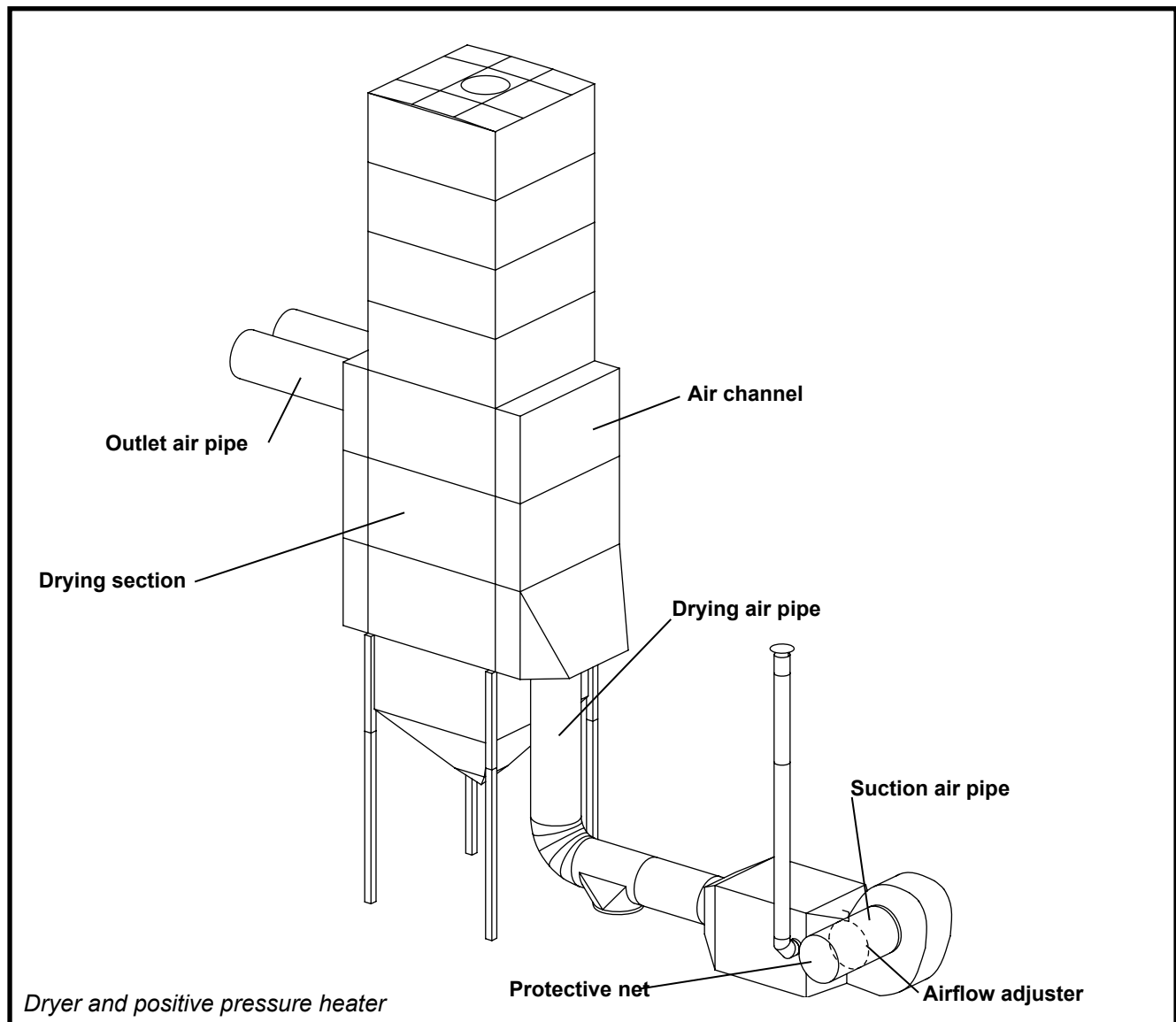


GENERAL INFORMATION ABOUT DRYING OF GRAIN

The idea of hot air drying is to conduct warm air through the grain and to evaporate moisture from both the surface and the inside of the corn. The air is routed via pipe or air duct to the drying sections, where the actual drying process takes place. The moist air is led from the drying sections to the outlet air channel, and from there via the pipes to the atmosphere. Two alternative methods can be applied for the process, positive pressure and vacuum drying. The maximum temperature of the drying air may be up to 90°C and at maximum the temperature may rise by 70 °C.

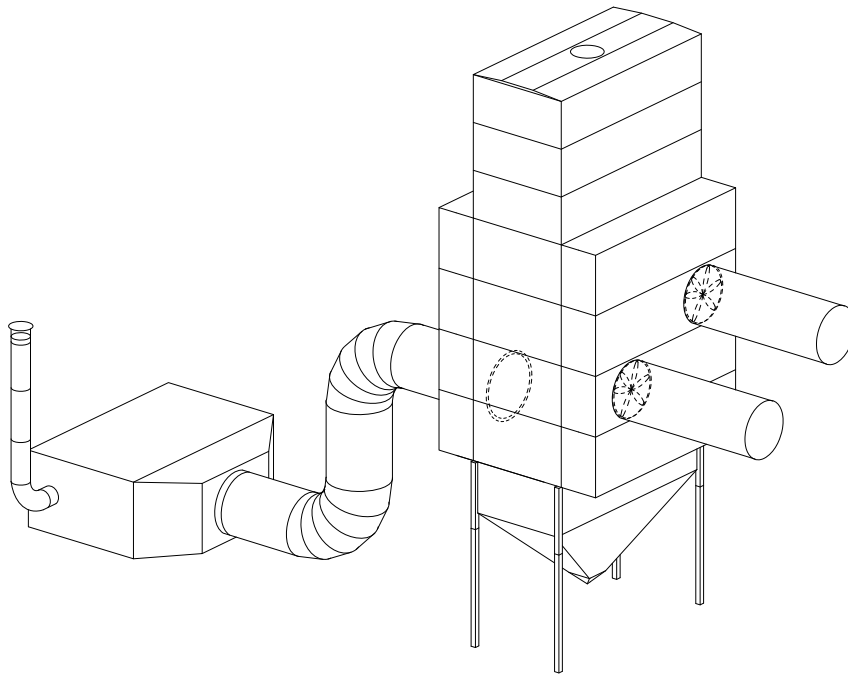
POSITIVE PRESSURE DRYING

- The positive pressure heater is intended for warming up the drying air and blowing it under pressure through the dryer.

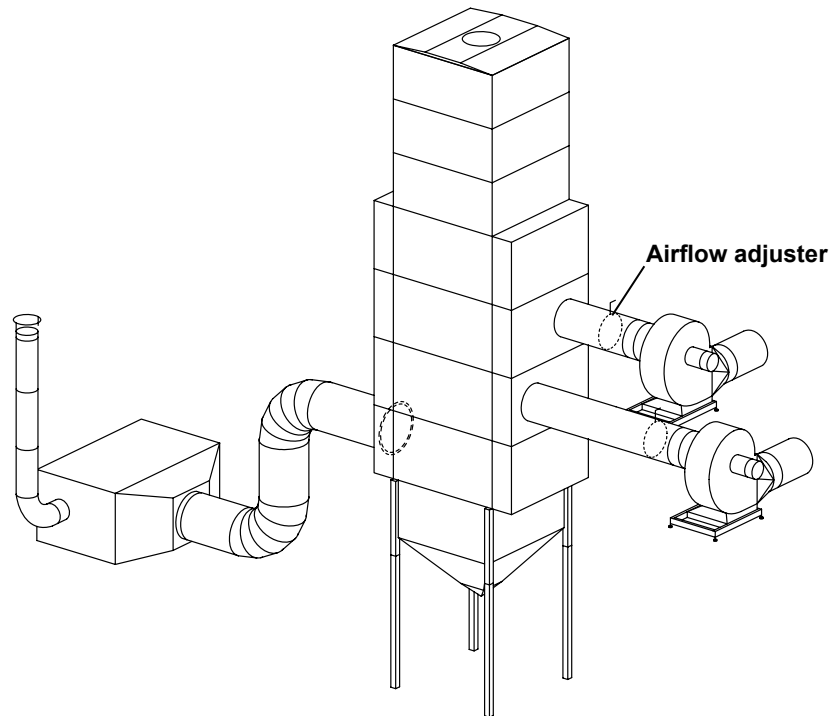


VACUUM DRYING

- The vacuum heater is intended for warming up the drying air in a grain dryer. The blower unit or units generate an airflow through the heater and the dryer.



Dryer and vacuum heater + axial blowers



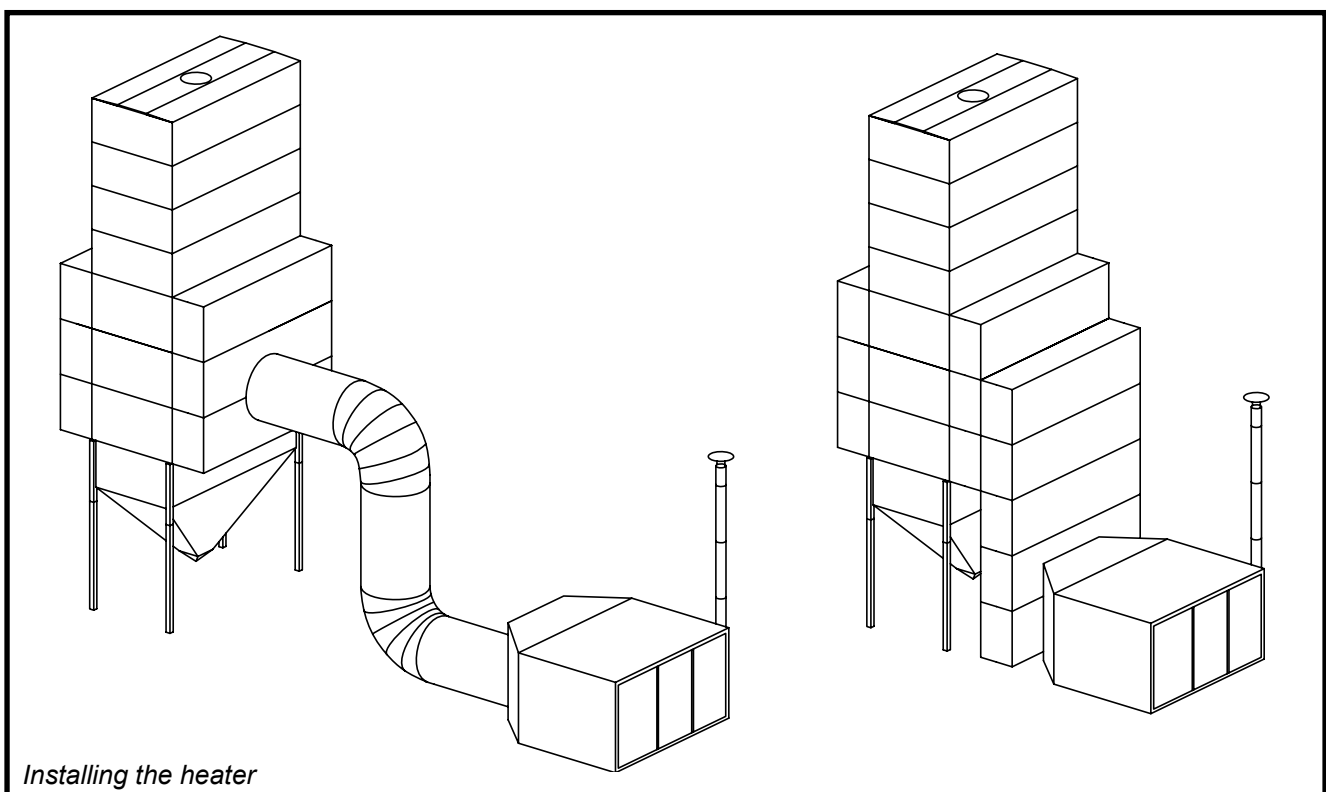
Dryer and vacuum heater + radial blowers

PURSUED CONFIGURATION

The normal operating environment is an element silo dryer made of steel with a vacuum heater or a positive pressure heater for the generation of heat. A grain dryer of section type is placed inside the building and the inlet and outlet air pipes are located on the opposite sides of the dryer building.

The heater can be positioned so that the air will be conducted through the air duct into the dryer's air channel. Alternatively, the air duct can be extended down to the ground enabling the heater to be connected directly to the dryer by its conversion cone; in general 800-2,000 kW.

As the blower units are presented in greater detail in the separate manual 408099, this manual only deals with them briefly.



Installing the heater

The debris pipe from the pre-cleaner must be equipped with a cyclone or equivalent for separation of debris. The separator must be located on the same side as the outlet air pipe or ingress of dust or debris into the suction opening of the heater/blower must be prevented by some other means.

The inlet air is heated by means of a vacuum heater or a positive pressure heater located in a separate masonry heater room. This heater room can be built either right beside the dryer or near it, but only if the following requirements are met:



Dryer Heater

Vulcan M10



PRESENTATION OF THE MACHINERY

The heater is delivered in several parts. The sub-assemblies of the vacuum heater are different from those of the positive pressure heater.

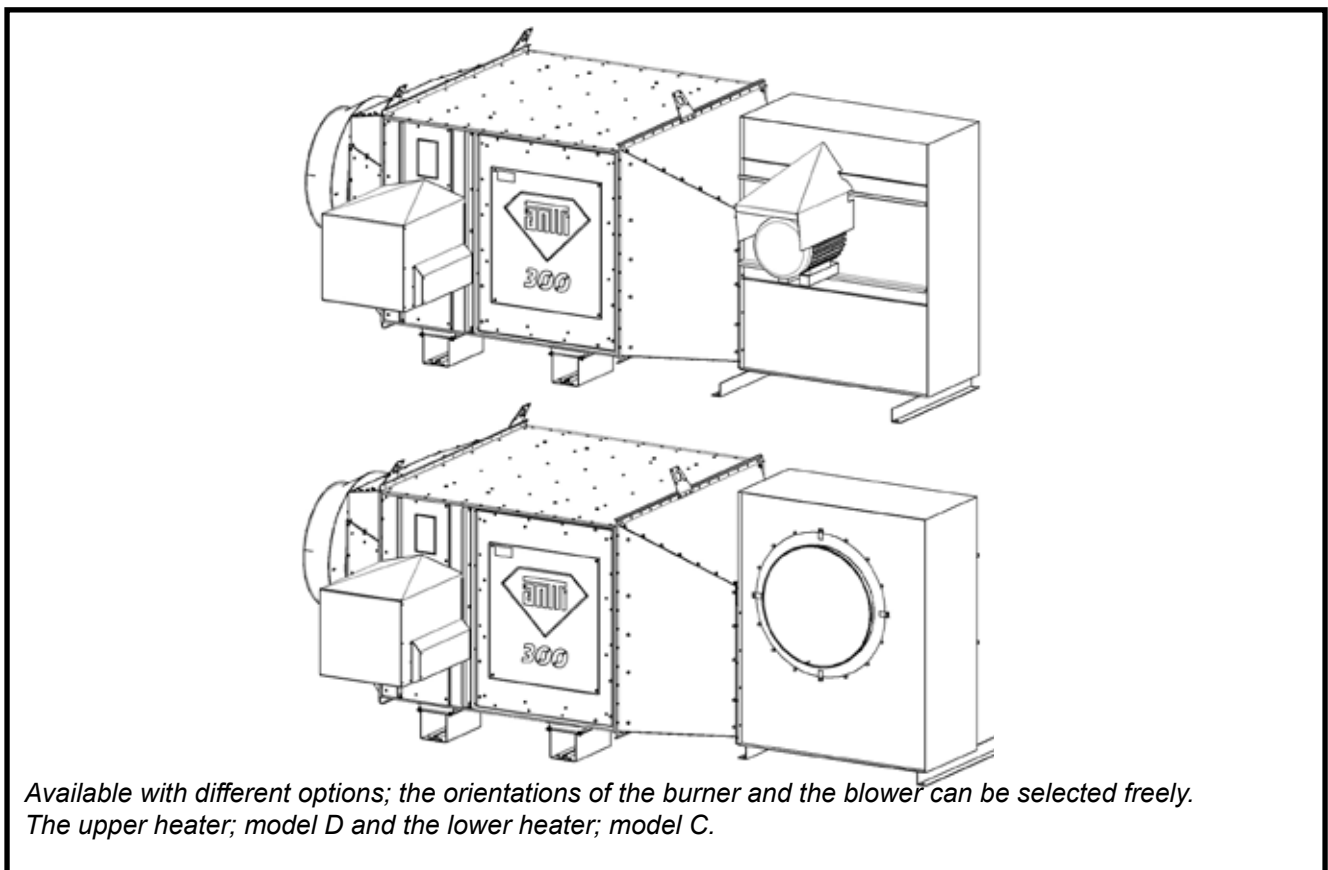
In the 300-650 kW heaters the outlet cone is attached to the heat exchanger.

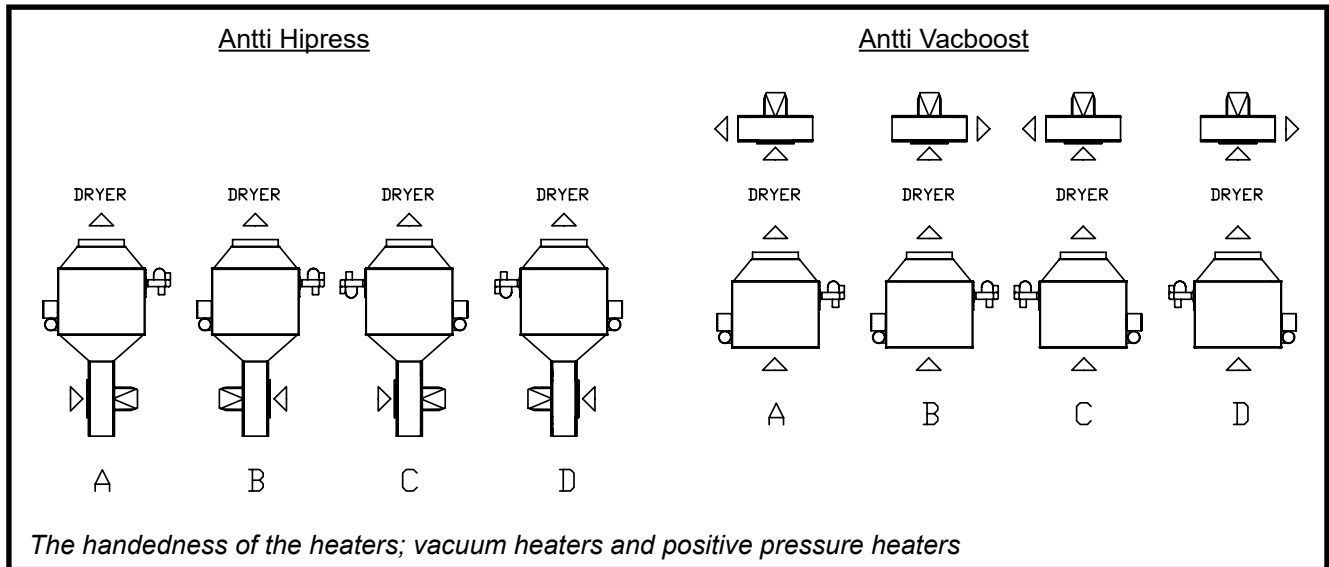
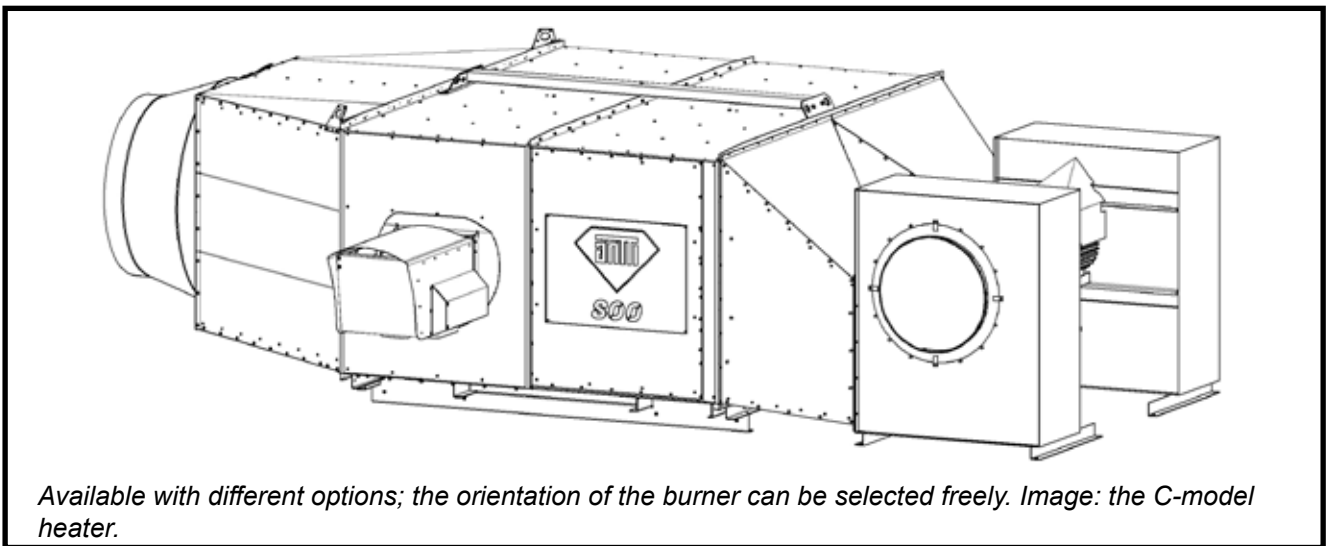
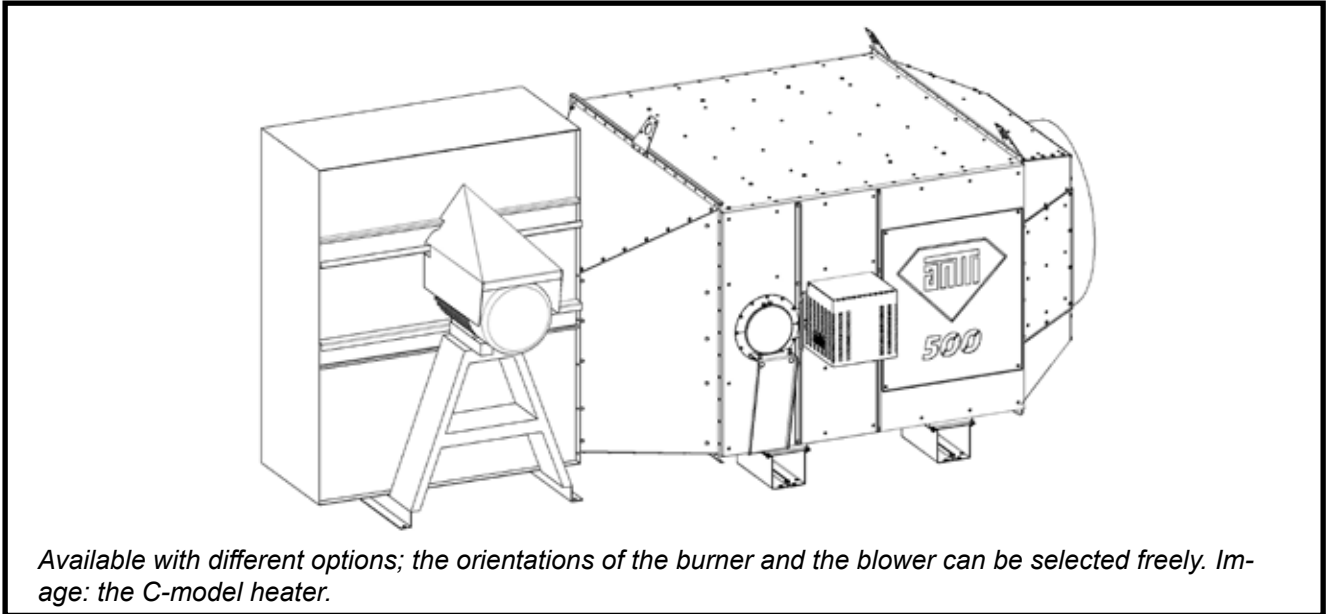
- The other components of the vacuum heater are: suction net, oil burner, oil burner cover, flue pipes, aspirator with equipment, and the required installation material.
- The other components of the positive pressure heater are: suction cone, blower with equipment, oil burner, oil burner cover, flue pipes, and the required installation material.

Delivery of the 800-2,000 kW heaters comprises:

- Components of the vacuum heater: heat exchanger, outlet cone, suction net, oil burner, oil burner cover, flue pipes, aspirators with equipment, and the required installation material.
- Components of the positive pressure heater: heat exchanger, outlet cone, blower cone, blowers with equipment, oil burner, oil burner cover, flue pipes and the required installation material.

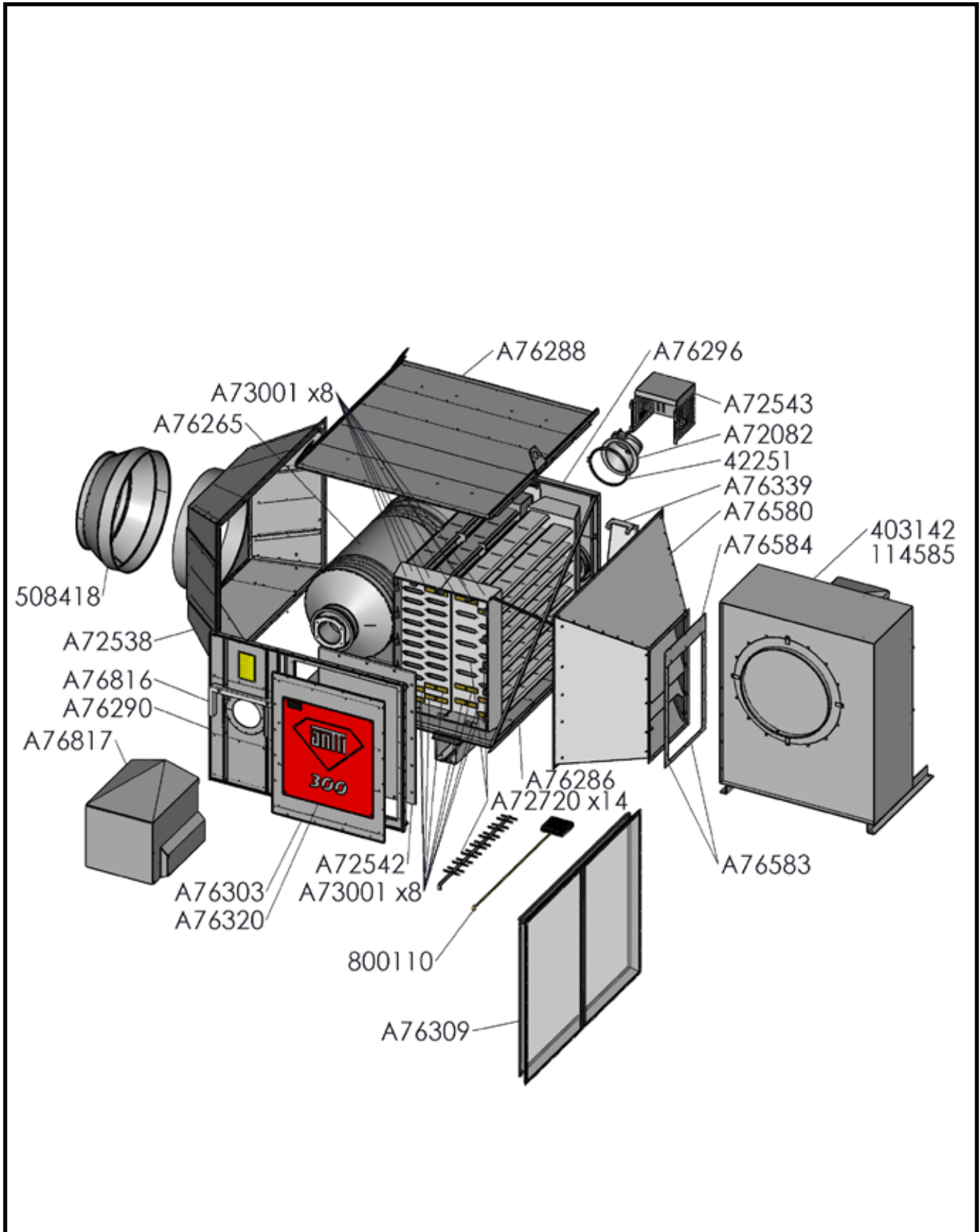
In addition the air pipe/pipes must also be fixed. The electric installation in the control centre of the grain dryer must be performed by an electrician. In addition is required a light-oil tank and a pipeline from the oil tank to the oil burner which complies with the regulations.







Spare part drawing 300, 2023 ->

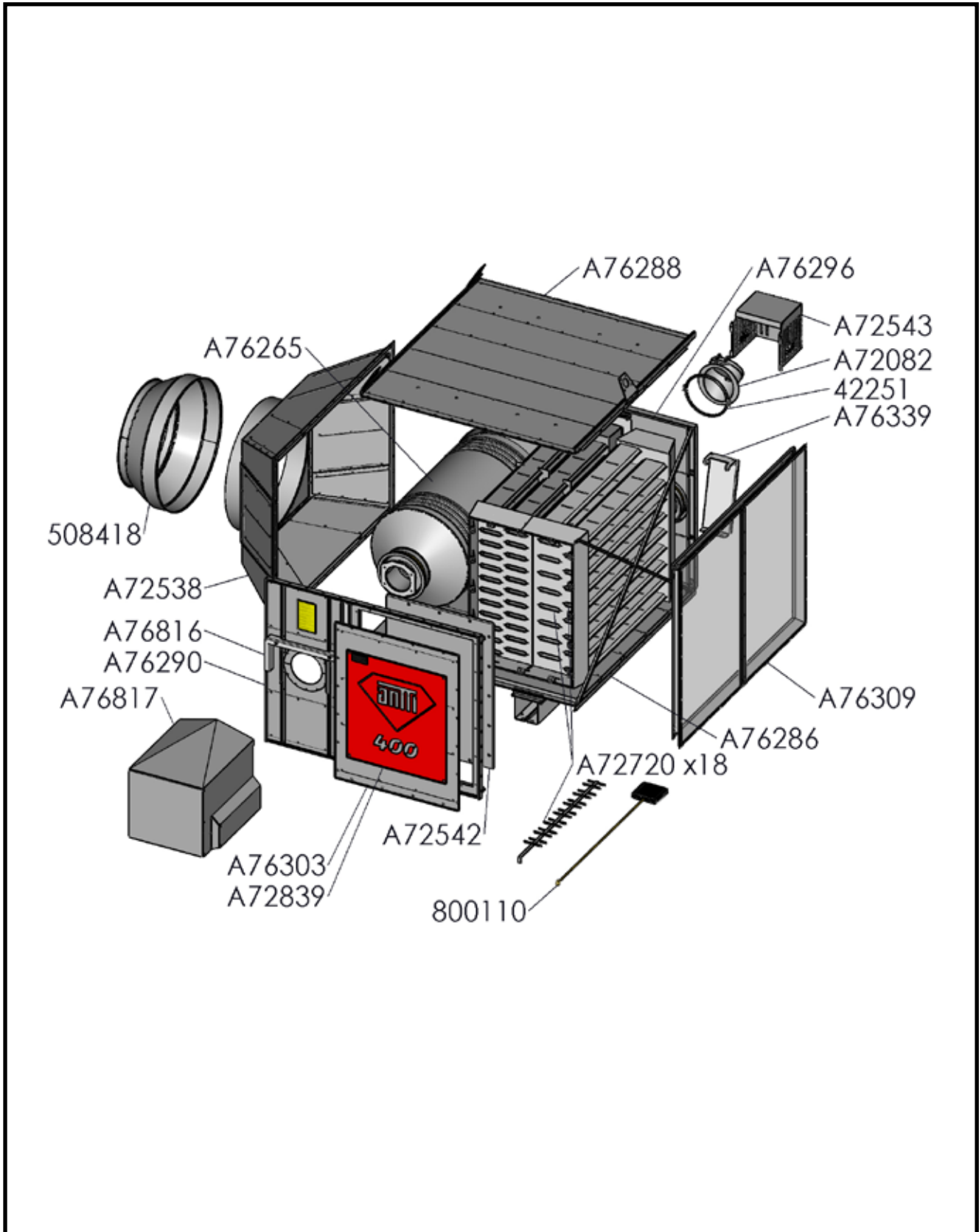




Item	Denomination		Dwg. no.	Pcs.	Weight
A76286	HEATER JACKET LOWER 300 KW 19		A76286	1	63
A76288	HEATER JACKET UPPER 300 KW 19		A76288	1	45,7
A76290	HEATER JACKET SIDE BURNER 300 KW 19		A76290	1	17
A76296	HEATER JACKET SIDE FLUE 300 KW 19		A76296	1	44
A76265	HEATER EXCHANGER 300 KW 19		A76265	1	202,5
A72538	HEATER OUTLET CONE 200-500 KW 10		A72538	1	43,3
508418	ADAPTER FOR AIR DUCT D630/800 A/J		31904	1	6,3
A76580	HEATER BLOWER CONE M21	positive pressure heater	A76580	1	51
403142	RADIALFAN ÅKERSTEDTS 7,5kW LEFT	alternative, for positive pressure heater		1	193
114585	RADIALFAN ÅKERSTEDTS 7,5kW RIGHT	alternative, for positive pressure heater		1	193
A72720	HEATER SMOKE BLOCK 200-500 KW M10		A72720	10	0,5
A72542	HEATER EXCHANGER WELD SWEEP DOOR 300 KW 10		A72542	1	17
A76303	HEATER JACKET DOOR 300 KW M19		A76303	1	17,3
A76320	NAMEPLATE HEATER 300 KW M19		A76320	2	3,7
A76816	HEATER BURNER COVER ATTACH 200-500 KW		A76816	1	1,4
A76817	HEATER BURNER COVER 300-650 KW M22		A76817	1	10,2
A72082	DR HEATER TUBUL OVERPRESSURE HATCH A1000		A72082	1	6,7
42251	GRAIN PIPE BAND 2-PART L/L D2500		42251	1	0,4
104243	SOCKET SCREW M6X70 AM			2	
110530	NUT M6 DIN 934			2	
A72543	HEATER EXPLOSION HATCH 200-500 KW 10		A72543	1	3,7
A76309	HEATER SUCTION NET 300 KW 19	in vacuum heater	A76309	1	12,1
115550	GLASS FIBRE BAND 6X 15 MM			4,5	
115579	GLASS FIBRE BANDD 3x9			25	
800110	TUBE BRUSHA 30X160 L=1200			1	0,65
A76339	HEATER FLUE PIPE SUPPORT 300-500 KW M19		A76339	1	2,7
A73001	HEATER TUBE SHUTTER WELDED ASSEMBL 300 KW M10		A73001	16	0,2
A76583	HEATER BLOWER CONE FITTING STRIP SIDE 7,5KW			2	0,5
A76584	HEATER BLOWER CONE FITTING STRIP UPPER 7,5 KW			1	0,8



Spare part drawing 400, 2023->

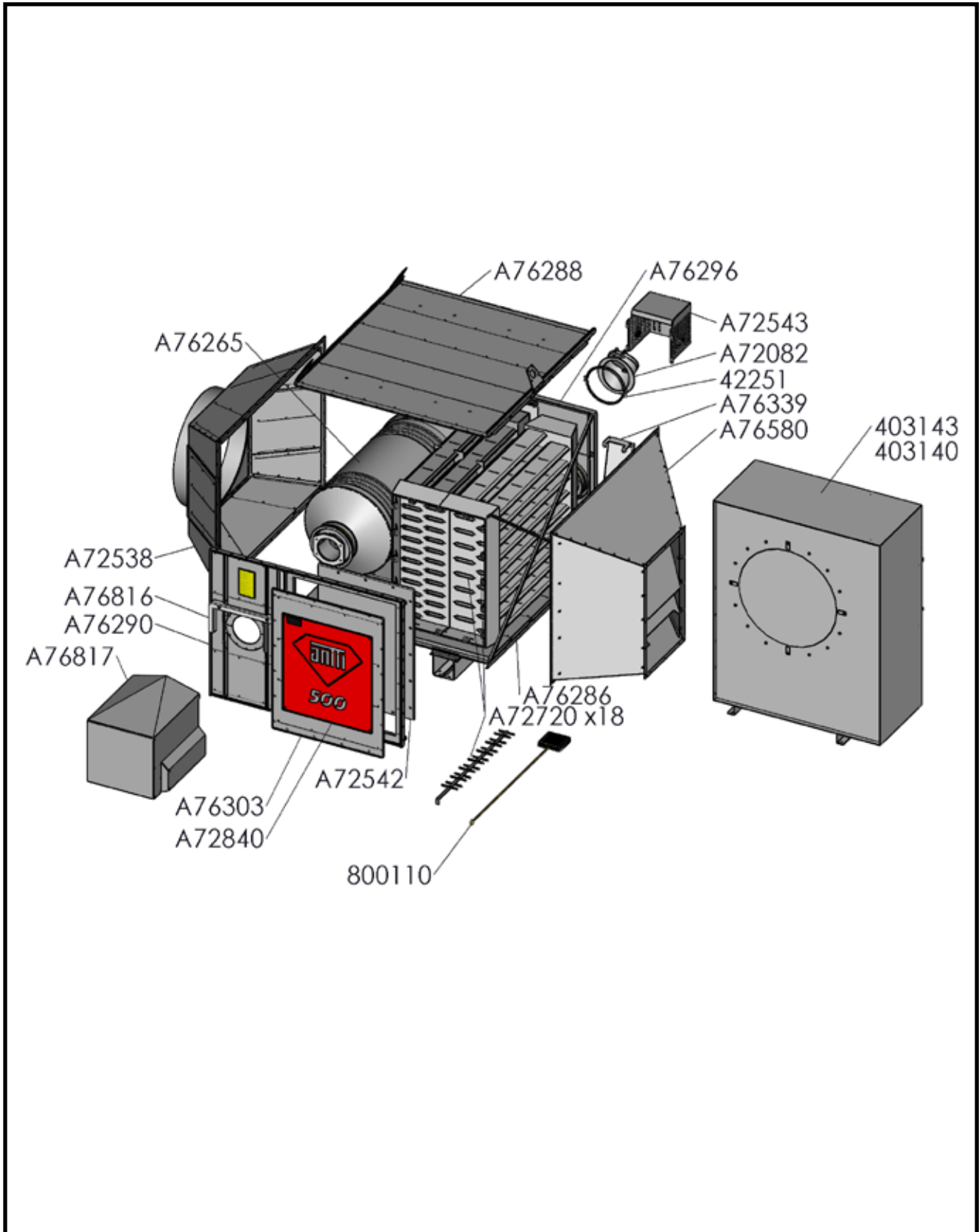




Item	Denomination	Dwg. no.	Pcs.	Weight
A76286	HEATER JACKET LOWER 400 KW 19	A76286	1	63
A76288	HEATER JACKET UPPER 400 KW 1	A76288	1	45,7
A76290	HEATER JACKET SIDE BURNER 400 KW 19	A76290	1	17
A76296	HEATER JACKET SIDE FLUE 400 KW 19	A76296	1	44
A76265	HEATER EXCHANGER 400 KW 19	A76265	1	202,5
A72538	HEATER OUTLET CONE 200-500 KW 10	A72538	1	43,3
508418	ADAPTER FOR AIR DUCT D630/800 A/J	31904	1	6,3
A72720	HEATER SMOKE BLOCK 200-500 KW M10	A72720	18	0,5
A72542	HEATER EXCHANGER WELD SWEEP DOOR 400 KW 10	A72542	1	17
A76303	HEATER JACKET DOOR 400 KW M19	A76303	1	17,3
A72839	NAMEPLATE HEATER 400 KW M10	A72839	2	3,7
A76816	HEATER BURNER COVER ATTACE 200-500 KW	A76816	1	1,4
A76817	HEATER BURNER COVER 300-650 KW M22	A76817	1	10,2
A72082	KDR HEATER TUBUL OVERPRESSURE HATC A1000	A72082	1	6,7
42251	GRAIN PIPE BAND 2-PART L/L D250	42251	1	0,4
104243	SOCKET SCREW M6X70 AM		2	
110530	NUT M6 DIN 934		2	
A72543	HEATER EXPLOSION HATCH 200-500 KW 10	A72543	1	3,7
A76309	HEATER SUCTION NET	A76309	1	12,1
115550	GLASS FIBRE BAND 6X 15 MM		4,5	
115579	CERAMIC BAND KERABAND 3x9		25	
800110	TUBE BRUSH 30X160 L=1200		1	0,65
A76339	HEATER FLUE PIPE SUPPORT 300-500 KW M19	A76339	1	2,7



Spare part drawing 500, Hipress 2023 ->

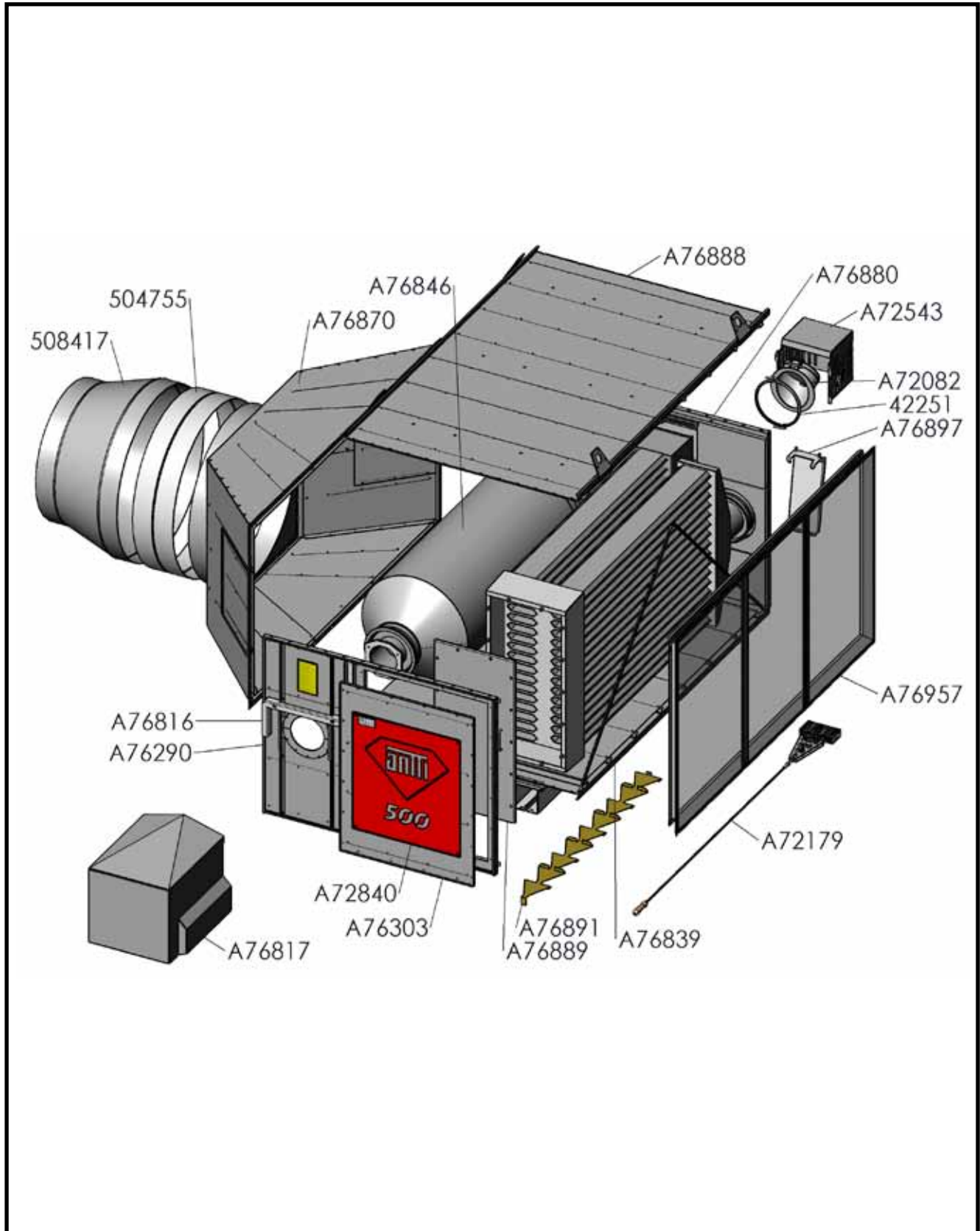




Item	Denomination		Dwg. no	Pcs.	Weight
A76286	HEATER JACKET LOWER 500 KW 19		A76286	1	63
A76288	HEATER JACKET UPPER 500 KW 19		A76288	1	45,7
A76290	HEATER JACKET SIDE BURNER 500 KW 19		A76290	1	17
A76296	HEATER JACKET SIDE FLUE 500 KW 19		A76296	1	44
A76265	HEATER EXCHANGER 500 KW 19		A76265	1	202,5
A72538	HEATER OUTLET CONE 200-500 KW 10		A72538	1	43,3
A76580	HEATER BLOWER CONE M21	positive pressure heater	A76580	1	51
403143	RADIALFAN ÅKERSTEDTS 11kW LEFT	alternative, for positive pressure heaters		1	264
403140	RADIALFAN ÅKERSTEDTS 11kW RIGHT	alternative, for positive pressure heaters		1	264
A72720	HEATER SMOKE BLOCK 200-500 KW M10		A72720	18	0,5
A72542	HEATER EXCHANGER WELD SWEEP DOOR 500 KW 10		A72542	1	17
A76303	HEATER JACKET DOOR 500 KW M19		A76303	1	17,3
A72840	NAMEPLATE HEATER 500 KW M10		A72840	2	3,7
A76816	HEATER BURNER COVER ATTACH 200-500 KW		A76816	1	1,4
A76817	HEATER BURNER COVER 300-650 KW M22		A76817	1	10,2
A72082	DR HEATER TUBUL OVERPRESSURE HATCH A1000		A72082	1	6,7
42251	GRAIN PIPE BAND 2-PART L/L D250		42251	1	0,4
104243	SOCKET SCREW M6X70 AM			2	
110530	NUT M6 DIN 934			2	
A72543	HEATER EXPLOSION HATCH 200-500 KW 10		A72543	1	3,7
115550	GLASS FIBRE BAND 6X 15 MM			4,5	
115579	CERAMIC BAND KERABAND 3x9			25	
800110	TUBE BRUSH 30X160 L=1200			1	0,65
A76339	HEATER FLUE PIPE SUPPORT 300-500 KW M19		A76339	1	2,7



Spare part drawing 500, Vacboost 2023 ->

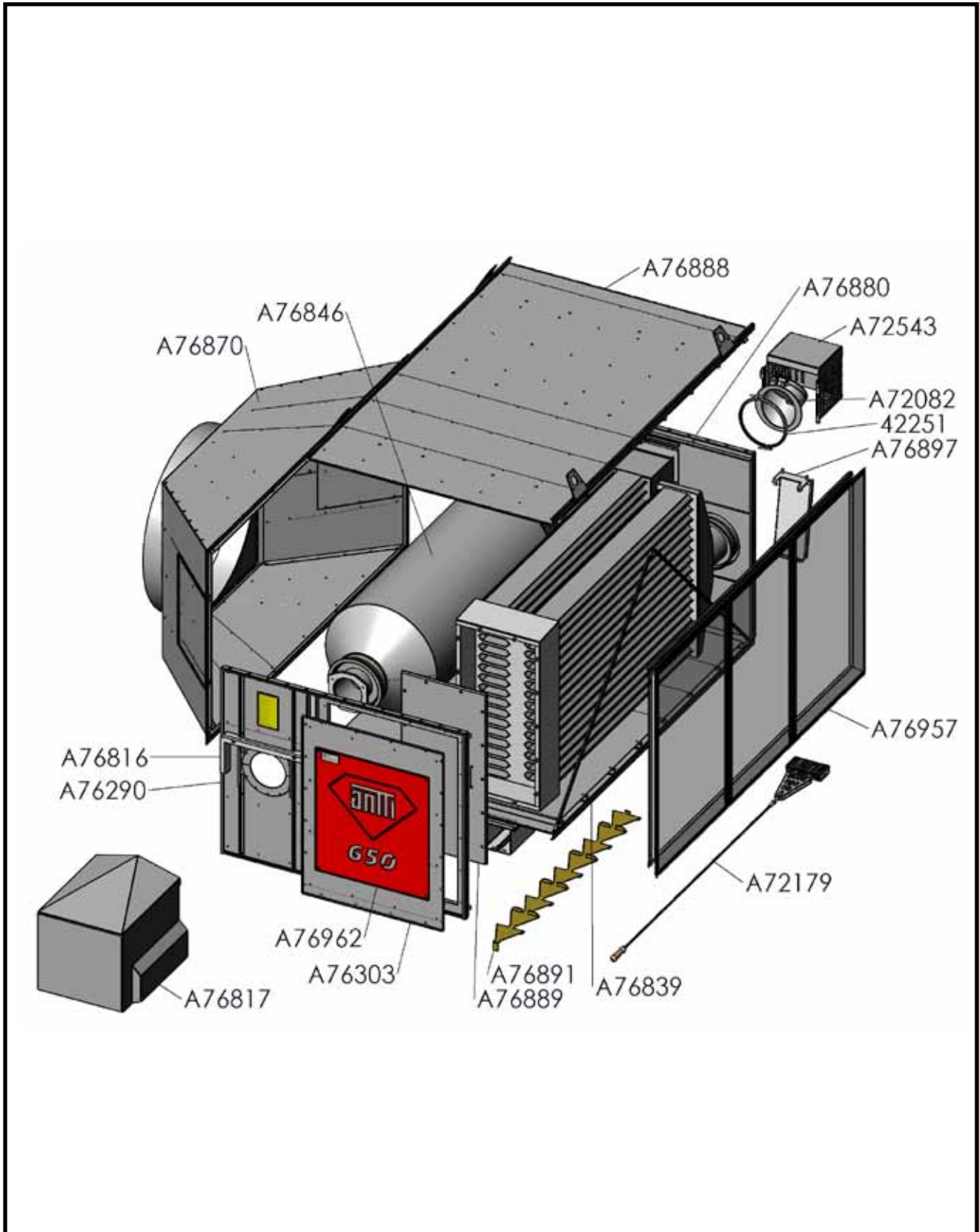




Item	Denomination	Dwg. no	Pcs.	Weight
A76839	HEATER JACKET LOWER 500 KW M23	A76839	1	115
A76888	HEATER JACKET UPPER 500 KW M23	A76888	1	71,5
A76290	HEATER JACKET SIDE BURNER 500 KW M23	A76290	1	20,3
A76880	HEATER JACKET SIDE FLUE 500 KW M23	A76880	1	44,2
A76846	HEATER EXCHANGER 500 KW M23	A76846	1	255
A76870	HEATER OUTLET CONE 500 KW M23	A76870	1	78
A76891	HEATER SMOKE BLOCK 500 KW M23	A76891	33	1,72
A76889	HEATER EXCHANGER WELD SWEEP DOOL 500 KW M23	A76889	1	14,4
A76303	HEATER JACKET DOOR 500 KW M23	A76303	1	17,3
A72840	NAMEPLATE HEATER 500 KW M23	A72840	2	3,7
A76816	HEATER BURNER COVER ATTACH 500 KW M23	A76816	1	1,4
A76817	HEATER BURNER COVER 300-650 KW M22	A76817	1	10,2
A72082	DR HEATER TUBUL OVERPRESSURE HATCH A1000	A72082	1	6,7
42251	GRAIN PIPE BAND 2-PART L/L D250	42251	1	0,4
104243	SOCKET SCREWO M6X70 AM		2	
110530	NUT M6 DIN 934		2	
A72543	HEATER EXPLOSION HATCH 200-500 KW M10	A72543	1	3,7
A76957	HEATER SUCTION NET 500 KW M23	A76957	1	
115550	GLASS FIBRE BANDA 6X 15 MM		4,5	
115579	CERAMIC BAND KERABAND 3x9		25	
A72179	TUBE BRUSH 40X240 L=2200		1	
A76897	HEATER FLUE PIPE SUPPORT 500 KW M23	A76897	1	2,7
508417	AIR PIPE ADAPTER RCLU D1000/800		1	9,9
504755	AIR PIPE SLEEVE FOR PART MF D1000		1	4



Spare part drawing 650, Vacboost 2023 ->

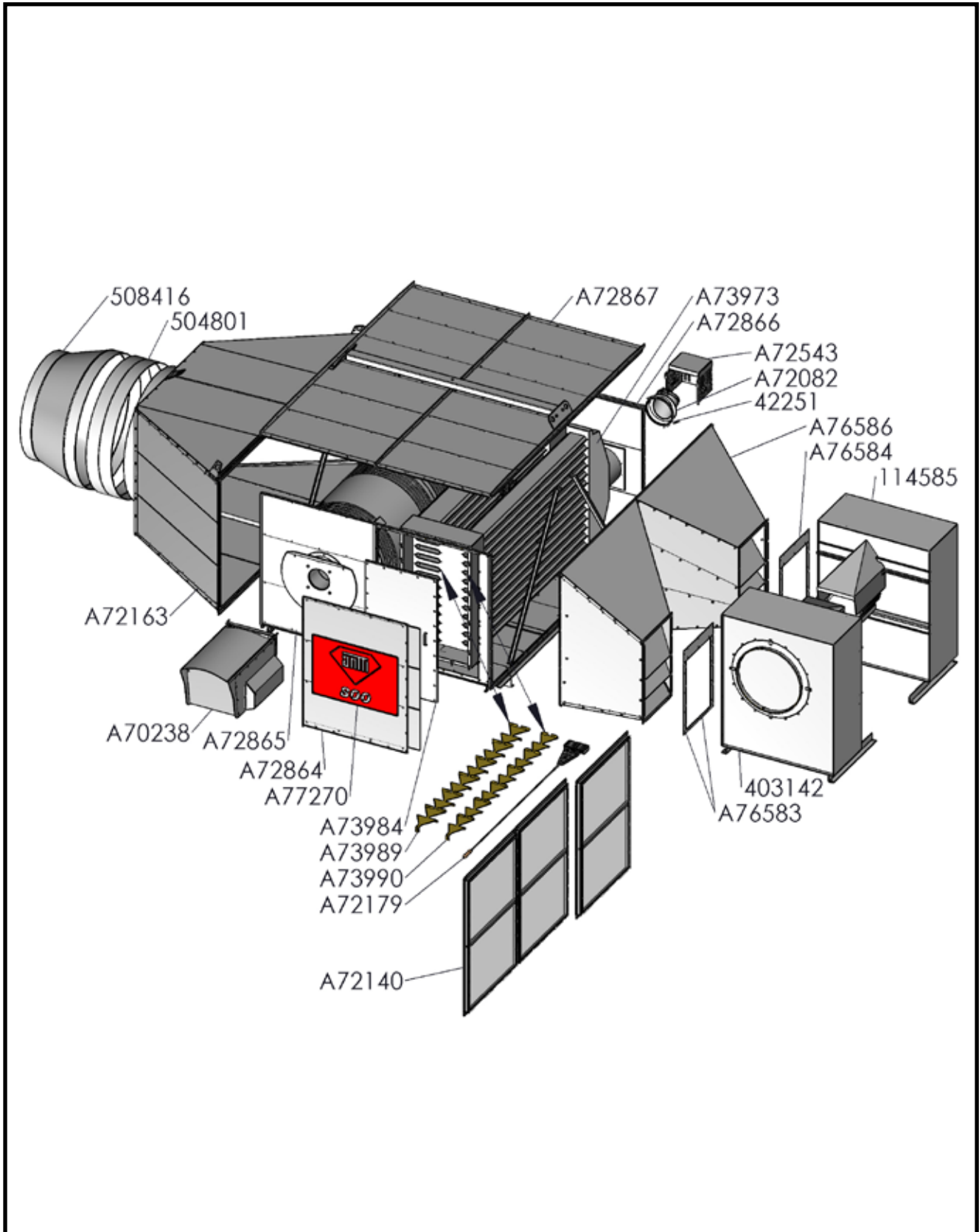




Item	Denomination	Dwg. no	Pcs.	Weight
A76839	HEATER JACKET LOWER 650 KW M23	A76839	1	115
A76888	HEATER JACKET UPPER 650 KW M23	A76888	1	71,5
A76290	HEATER JACKET SIDE BURNER 650 KW M23	A76290	1	20,3
A76880	HEATER JACKET SIDE FLUE 650 KW M23	A76880	1	44,2
A76846	HEATER EXCHANGER 650 KW M23	A76846	1	255
A76870	HEATER OUTLET CONE 650 KW M23	A76870	1	78
A76891	HEATER SMOKE BLOCK 650 KW M23	A76891	33	1,72
A76889	HEATER EXCHANGER WELD SWEEP DOOR 650 KW M23	A76889	1	14,4
A76303	HEATER JACKET DOOR 650 KW M23	A76303	1	17,3
A76962	NAMEPLATE HEATER 650 KW M23	A76962	2	3,7
A76816	HEATER BURNER COVER ATTACH 650 KW M23	A76816	1	1,4
A76817	HEATER BURNER COVER 300-650 KW M22	A76817	1	10,2
A72082	DR HEATER TUBUL OVERPRESSURE HATCH A1000	A72082	1	6,7
42251	GRAIN PIPE BAND 2-PART L/L D250	42251	1	0,4
104243	SOCKET SCREW M6X70 AM		2	
110530	NUT M6 DIN 934		2	
A72543	HEATER EXPLOSION HATCH 200-500 KW M10	A72543	1	3,7
A76957	HEATER SUCTION NET 650 KW M23	A76957	1	
115550	GLASS FIBRE BAND 6X 15 MM		4,5	
115579	CERAMIC BAND KERABAND 3x9		25	
A72179	TUBE BRUSH 40X240 L=2200		1	
A76897	HEATER FLUE PIPE SUPPORT 650 KW M23	A76897	1	2,7



Spare part drawing 800, 2023->

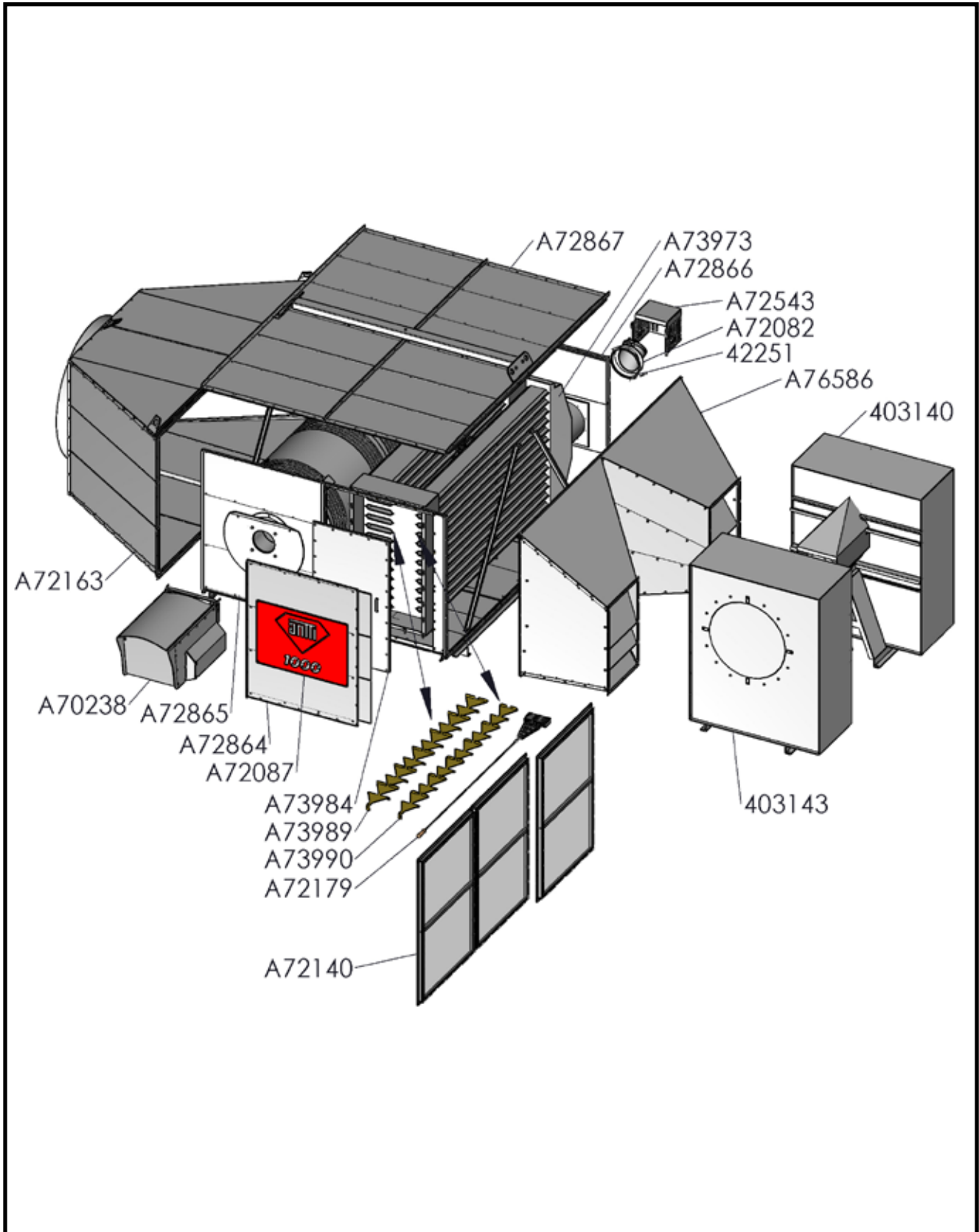




Item	Denomination		Dwg. no.	Pcs	Weight
A72867	DRYER HEATER TUBE OUTER JACKET COVERI		A72867	1	179
A72865	DRYER HEATER TUBE OUTER JACKET BURNER		A72865	1	35,2
A72866	DRYER HEATER TUBE OUTER JACKET FLUE		A72866	1	71
A73973	DRYER HEATER TUBE HEAT EXCHANGER		A73973	1	518
A72163	DRYER HEATER TUBE CONE		A72163	1	198
504801	AIR PIPE SLEEVE FOR PARTS MFF 1250			1	8
508416	AIR PIPE ADAPTER RCLU D1250/1000			1	18
A76586	HEATER BLOWER CONE	ylipaineuunissa	A76586	1	131
A76583	HEATER BLOWER CONE FITTING STRIP SIDE 7,5KW			4	0,5
A76584	HEATER BLOWER CONE FITTING STRIP UPPER 7,5 KW			2	0,8
403142	RADIALFAN ÅKERSTEDTS 7,5kW LEFT	ylipaineuunissa		1	193
114585	RADIALFAN ÅKERSTEDTS 7,5kW RIGHT	ylipaineuunissa		1	193
A73989	DRYER HEATER SMOKE BLOCK PRIMARY		A73989	14	2,9
A73990	DRYER HEATER SMOKE BLOCK SECONDARY		A73990	13	2,4
A73984	DRYER HEATER CLEANING DOOR WELDED		A73984	1	22,8
A72864	DRYER HEATER TUBE OUTER JACKET DOOR		A72864	1	33,6
A77270	NAMEPLATE HEATER 800 KW		A72841	2	4,1
41734	DR HEATER BURNER COVER OIL		41734	1	9,2
A70238	RAIN COVER BURNER ASSEMBLED.		A70238	1	14
A72082	DR HEATER TUBUL OVERPRESSURE HATCH		A72082	1	6,7
42251	GRAIN PIPE BAND 2-PART L/L D250		42251	1	0,4
104243	SOCKET SCREW M6X70 AM			2	
110530	NUT M6 DIN 934			2	
A72543	HEATER EXPLOSION HATCH		A72543	1	3,7
A72140	DR HEATER TUBUL SUCT NET	alipaineuunissa	A72140	3	7,7
115550	GLASS FIBRE BAND 6X 15 MM			5,5	
115579	CERAMIC BAND KERABANDD 3x9			41	
A72179	TUBE BRUSH 40X240 L=2300		A72179	1	4,4



Spare part drawing 1000, 2023->

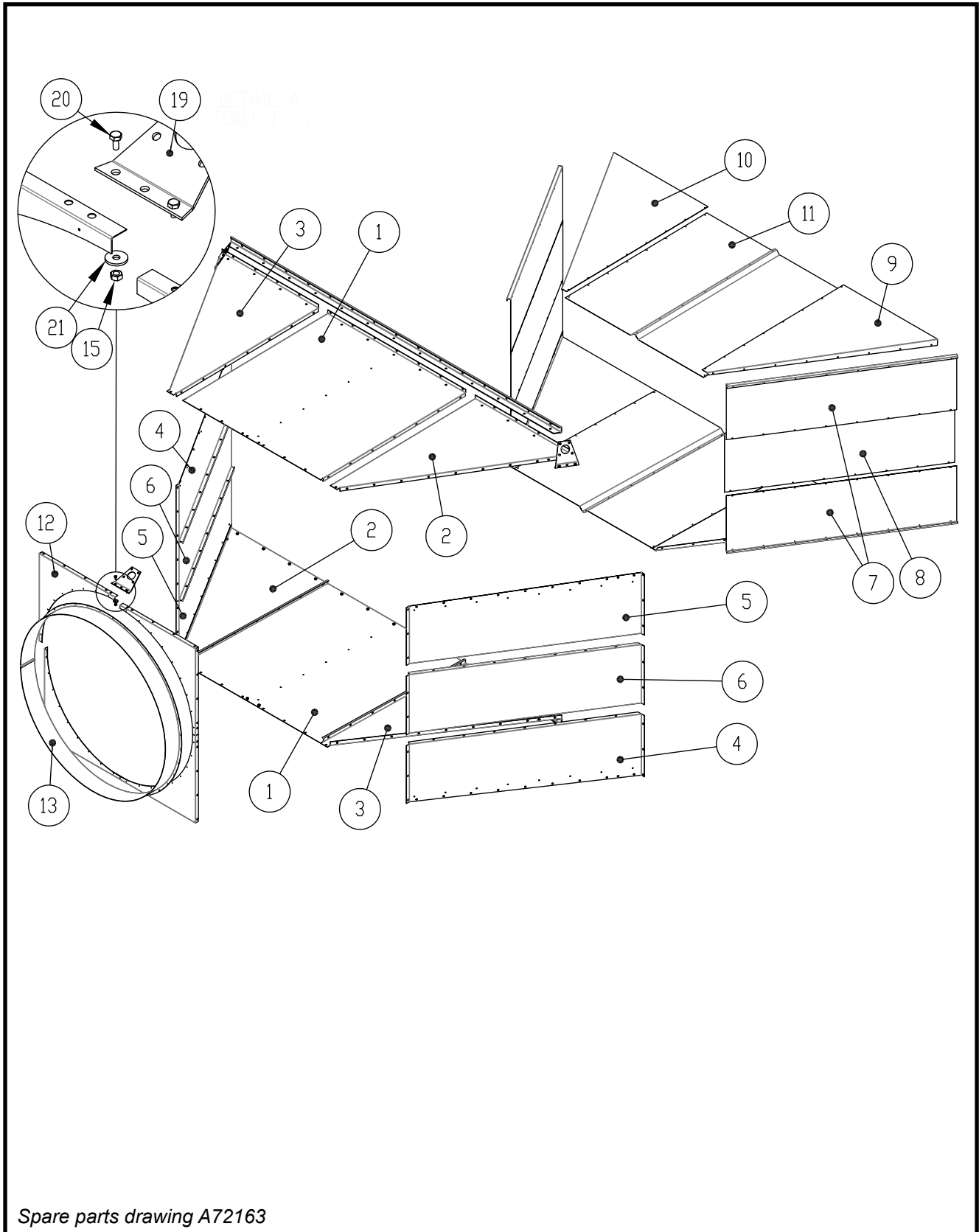




Item	Denomination		Dwg. no	Pcs	Weight
A72867	DRYER HEATER TUBE OUTER JACKET COVER		A72867	1	179
A72865	DRYER HEATER TUBE OUTER JACKET BURNER		A72865	1	35,2
A72866	DRYER HEATER TUBE OUTER JACKET FLUE		A72866	1	71
A73973	DRYER HEATER TUBE HEAT EXCHANGER		A73973	1	518
A72163	DRYER HEATER TUBE CONE		A72163	1	198
A76586	HEATER BLOWER CONE	positive pressure heater	A76586	1	131
403143	RADIALFAN ÅKERSTEDTS 11kW LEFT	positive pressure heater		1	264
403140	RADIALFAN ÅKERSTEDTS 11kW RIGHT	positive pressure heater		1	264
A73989	DRYER HEATER SMOKE BLOCK PRIMARY		A73989	14	2,9
A73990	DRYER HEATER SMOKE BLOCK SECONDARY		A73990	13	2,4
A73984	DRYER HEATER CLEANING DOOR WELDED		A73984	1	22,8
A72864	DRYER HEATER TUBE OUTER JACKET DOO		A72864	1	33,6
A72087	NAMEPLATE HEATER 1000 KW		A72087	2	4,1
41734	DR HEATER 1000 BURNER COVER OIL		41734	1	9,2
A70238	RAIN COVER BURNER ASSEMBLED.		A70238	1	14
A72082	DR HEATER TUBUL OVERPRESSURE HATCH		A72082	1	6,7
42251	GRAIN PIPE BAND 2-PART L/L D250		42251	1	0,4
104243	SOCKET SCREW M6X70 AM			2	
110530	NUT M6 DIN 934			2	
A72543	HEATER EXPLOSION HATCH		A72543	1	3,7
A72140	DR HEATER TUBUL SUCT NET	in vacuum heater	A72140	3	7,7
115550	GLASS FIBRE BAND 6X 15 MM			5,5	
115579	CERAMIC BAND KERABAND 3x9			41	
A72179	TUBE BRUSH 40X240 L=2300		A72179	1	4,4

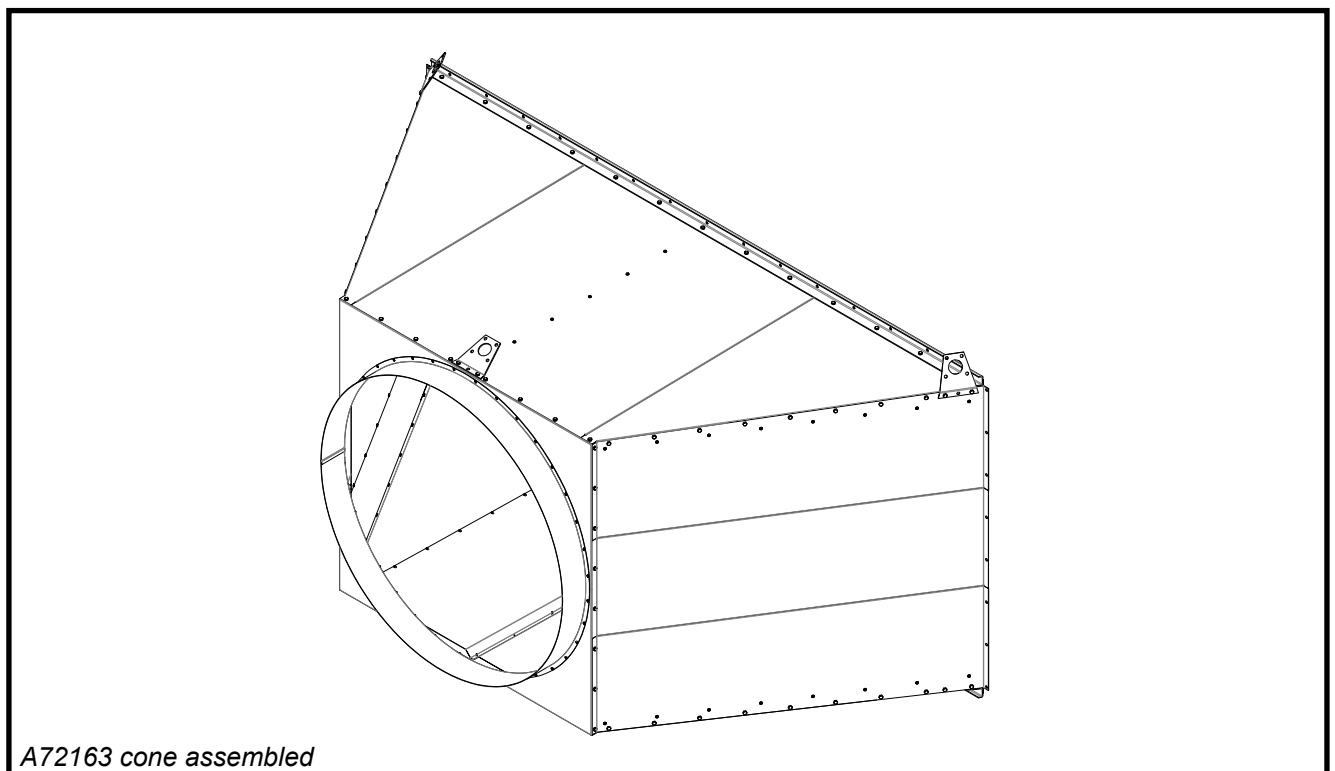


Spare part drawing, outlet cone 700/1000 A72163



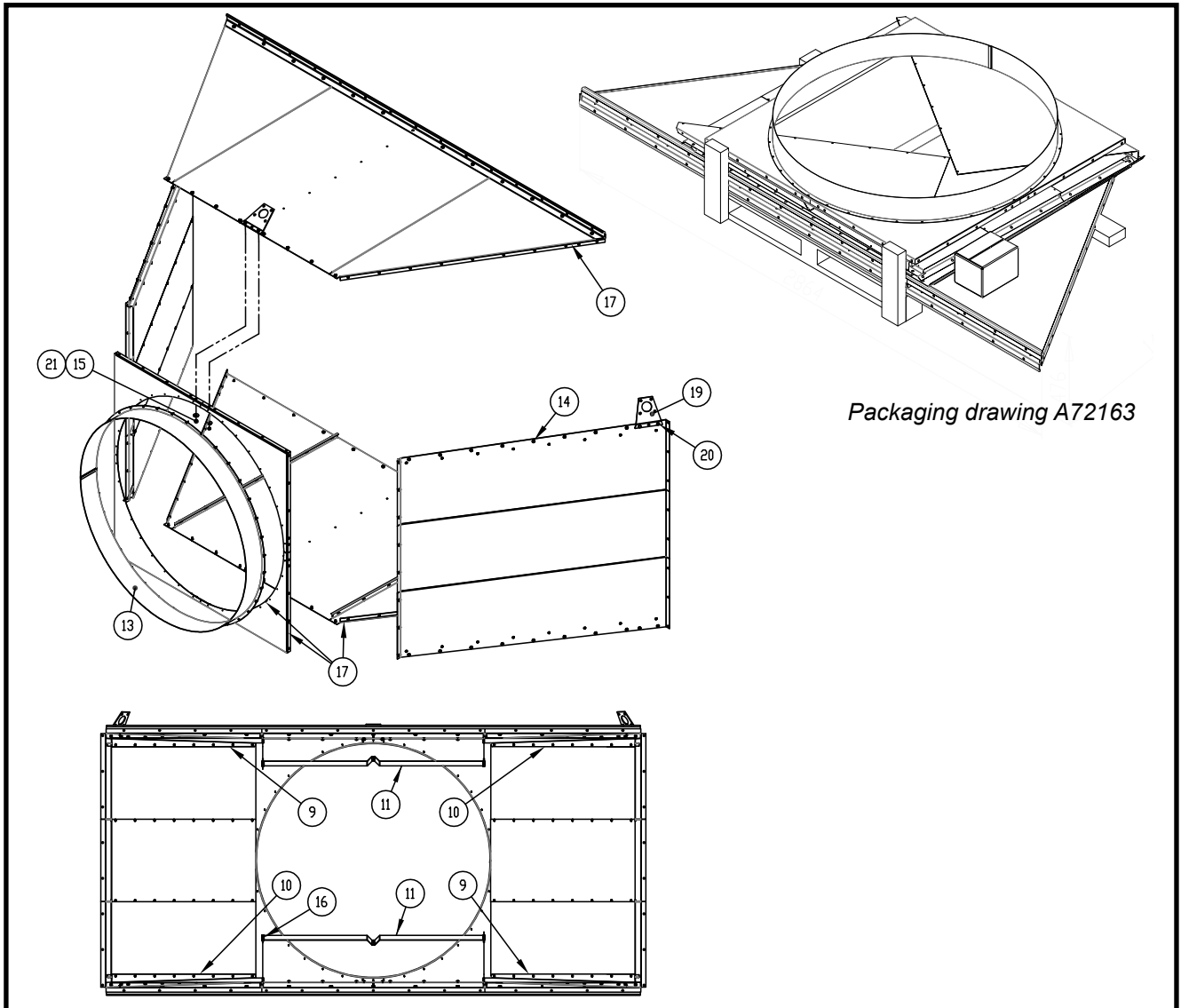


Part	Item	Denomination	Dwg. no.	Pcs.	Weight
1	A72171	DRYER HEATER TUBEL CONE UPPER/LOWER PLATE A1000	A72171-A	2	15.6
2	A72172	DRYER HEATER TUBEL CONE UPPER/LOWER SIDE-PLATE A1000	A72172-A	2	6.19
3	A72173	DRYER HEATER TUBEL CONE UPPER/LOWER SIDE-PLATE2 A1000	A72173-A	2	6.19
4	A72174	DRYER HEATER TUBEL CONE LEFT/RIGHT SIDE-PLATE2 A1000	A72174-A	2	6.84
5	A72175	DRYER HEATER TUBEL CONE LEFT/RIGHT SIDE-PLATE2 A1000	A72175-A	2	6.84
6	A72176	DRYER HEATER TUBEL CONE SIDE-PLATE3 A1000	A72176-A	2	7.33
7	A72132	DRYER HEATER TUBEL RADIATING SHIELD1 A1000	A72132-A	4	5.1
8	A72133	DRYER HEATER TUBEL RADIATING SHIELD2 A1000	A72133-0	2	4.97
9	A72134	DRYER HEATER TUBEL RADIATING SHIELD3 A1000	A72134-0	2	4.45
10	A72135	DRYER HEATER TUBEL RADIATING SHIELD4 A1000	A72135-0	2	4.45
11	A72136	DRYER HEATER TUBEL RADIATING SHIELD5 A1000	A72136-A	2	11.58
12	A72111	DRYER HEATER TUBEL CONE CONNECTOR FLANGE A1000	A72111-A	4	1.43
13	A71201	AIR PIPE SLEEVE D1250x120	A71201-0	1	6.48
14	101800	HEX BOLT ZN 8X12 DIN933	0	152	0.01
15	110540	NUT M8 DIN 934	0	158	0
16	107720	SCREW SELF-TAP 6K 4,8X13 ZN	0	178	0
17	115579	CERAMIC BAND KERABAND 3x9	0	26	0.01
18	A73083	DRYER HEATER TUBE CONE SUPPORT STRIP 1000/700 M10	A73083-0	2	6.09
19	503017	DRYER HEATER LIFTING LUG PL4X150X160 30DEG	41170-D	3	0.48
20	101810	HEX BOLT ZN 8X16 DIN933	0	6	0.01
21	111562	WASHER ZN 9/28X3 DIN440R	0	2	0.01





Assembly drawing, outlet cone 700/1000 A72163



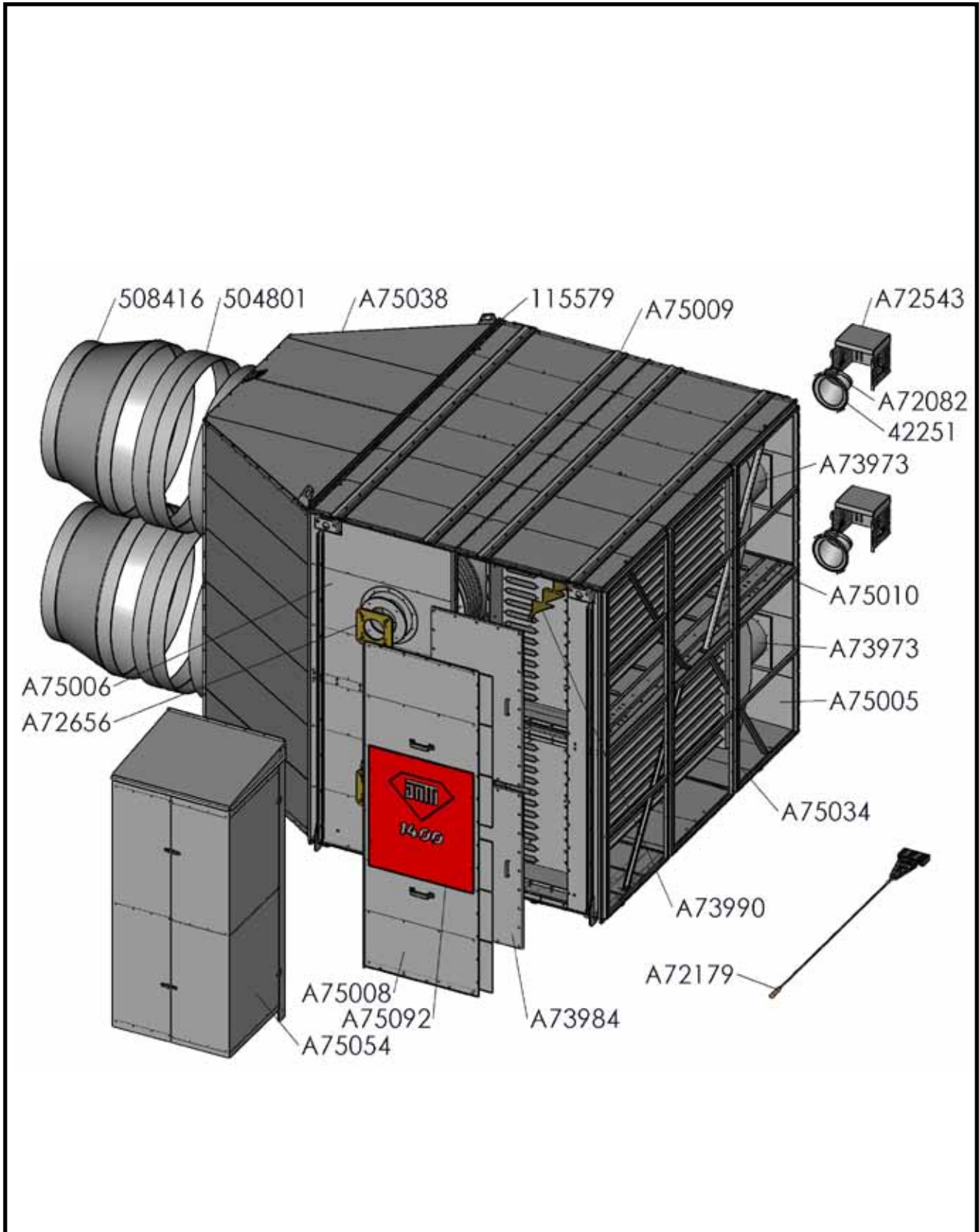
Each seam of the outer jacket shall be provided with a ceramic sealing band. The side-plates shall be attached to the bottom plate, supporting them temporarily by, for example, boards. Install the connecting flanges (Part 12) to the side-plates and bottom plates. Provide the ends of the flanges with sealing tape. Now you can lift the upper plate in its place, and attach it by its corners. Attach also to the upper edges of the connecting flanges. Remember the lifting lugs. For fixing the single lug in the middle shall be used M8 fender washers (see drawing).

The sleeve (part 13) shall be fixed into place using self-tapping screws. As soon as you have tightened the bolts of the outer jacket, and checked the cross-measure of the rectangular opening, you can install the radiation shields. Install first the radiation shields in the corners (parts 9 and 10) and last the shield in the middle (part 11). The self-tapping screws for the shield in the middle shall be screwed in from the outside of the cone.

Glue the ceramic sealing band onto the connecting flange of the heater before installing the cone into place.



Spare part drawing 1400

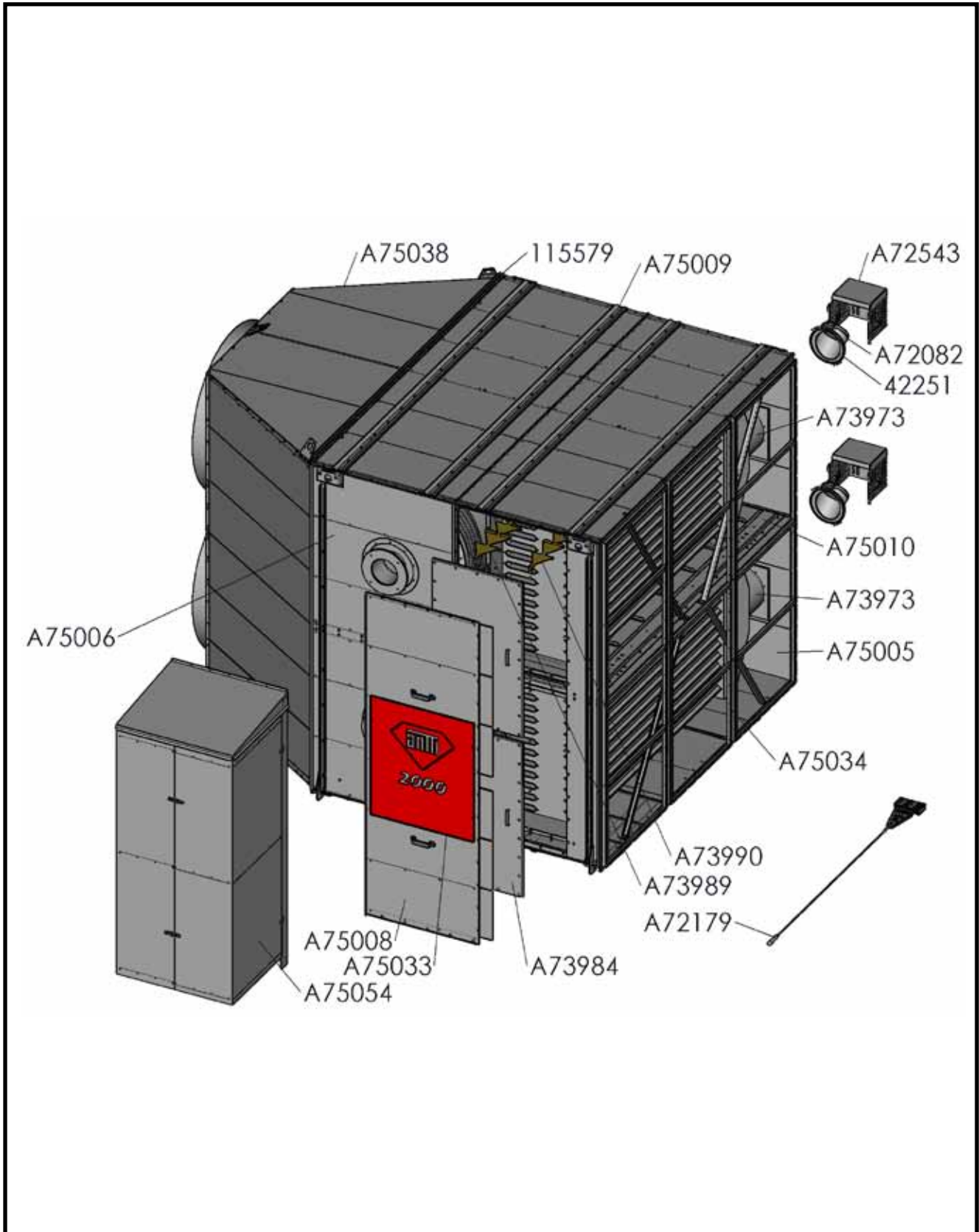




Item	Denomination	Dwg. no.	Pcs.	Weight
A75009	DRYER HEATER TUBE OUTER JACKET COVER 1400 M14	A75009	1	189,6
A75006	DRYER HEATER TUBE OUTER JACKET BURNER 1400 M14	A75006	1	74,7
A75005	DRYER HEATER TUBE OUTER JACKET FLUE 1400 M14	A75005	1	158,5
A75010	DRYER HEATER TUBE INTERMEDIATE BOTTOM 1400 M14	A75010	1	207,5
A75007	DRYER HEATER TUBE SIDE FRAME ASSEMBLY 1400 M14	A75007	1	17,2
A73973	DRYER HEATER TUBE HEAT EXCHANGER	A73973	2	518
504801	AIR PIPE SLEEVE FOR PARTS MF 1250		2	8
508416	AIR PIPE ADAPTER RCLU D1250/1000		2	18
A75038	DRYER HEATER TUBE CONE 1400 M14	A75038	1	315,6
A73984	DRYER HEATER CLEANING DOOR WELDED	A73984	2	22,8
A75008	DRYER HEATER TUBE OUTER JACKET DOOR 1400 M14	A75008	1	52,4
A75092	NAMEPLATE HEATER 1400 KW M14	A75092	2	6,4
A72656	HEATER BURNER ADPATER A1000 A700 KP-50	A72656	2	2,4
A75054	HEATER RAIN COVER 1400 M14	A75054	1	86
A73990	DRYER HEATER SMOKE BLOCK SECONDARY	A73990	26	2,3
A72082	DR HEATER TUBUL OVERPRESSURE HATCH	A72082	2	6,7
42251	GRAIN PIPE BAND 2-PART L/L D250	42251	2	0,4
104243	SOCKET SCREW M6X70 AM	104243	4	
110530	NUT M6 DIN 934	110530	4	
A72543	HEATER EXPLOSION HATCH	A72543	2	3,7
A75034	DR HEATER TUBUL SUCT NET 1400 M14	A75034	3	12,5
115550	GLASS FIBRE BAND 6X 15 MM	115550	10	
115579	CERAMIC BAND KERABAND 3x9	115579	41	
A72179	TUBE BRUSH 40X240 L=2300	A72179	1	4,4



Spare part drawing 2000

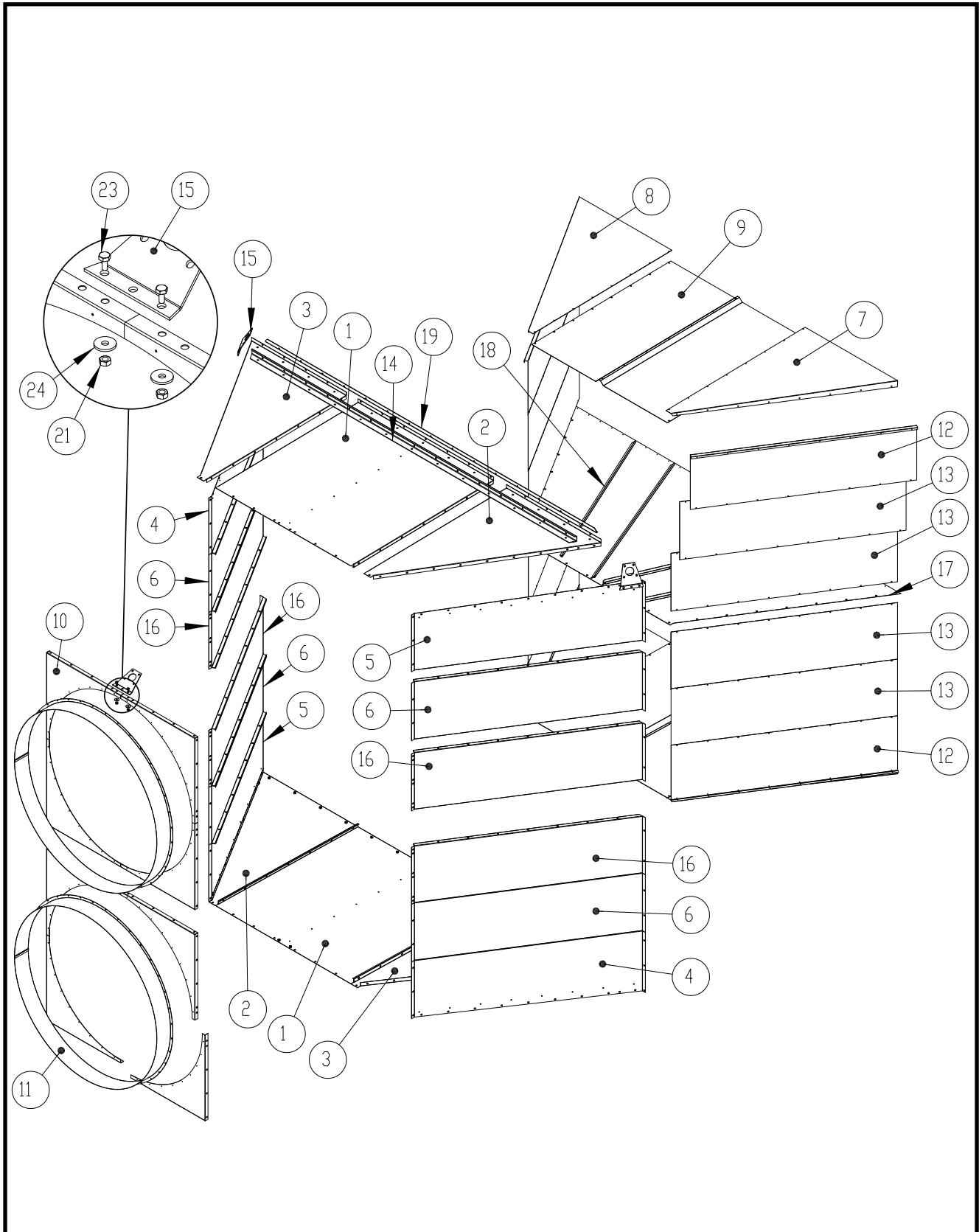




Item	Denomination	Dwg. no.	Pcs.	Weight
A75009	DRYER HEATER TUBE OUTER JACKET COVER 2000 M14	A75009	1	189,6
A75006	DRYER HEATER TUBE OUTER JACKET BURNER 2000 M14	A75006	1	74,7
A75005	DRYER HEATER TUBE OUTER JACKET FLUE 2000 M14	A75005	1	158,5
A75010	DRYER HEATER TUBE INTERMEDIATE BOTTOM 2000 M14	A75010	1	207,5
A75007	DRYER HEATER TUBE SIDE FRAME ASSEMBLYK 2000 M14	A75007	1	17,2
A73973	DRYER HEATER TUBE HEAT EXCHANGER	A73973	2	518
A75038	DRYER HEATER TUBE CONE 2000 M14	A75038	1	315,6
A73984	DRYER HEATER CLEANING DOOR WELDED	A73984	2	22,8
A75008	DRYER HEATER TUBE OUTER JACKET DOOR 2000 M14	A75008	1	52,4
A75033	NAMEPLATE HEATER 2000 KW M14	A75033	2	6,4
A75054	HEATER RAIN COVER 2000 M14	A75054	1	86
A73989	DRYER HEATER SMOKE BLOCK PRIMARY	A73989	28	2,9
A73990	DRYER HEATER SMOKE BLOCK SECONDARY	A73990	26	2,3
A72082	DR HEATER TUBUL OVERPRESSURE HATCH A1000	A72082	2	6,7
42251	GRAIN PIPE BAND 2-PART L/L D250	42251	2	0,4
104243	SOCKET SCREW M6X70 AM	104243	4	
110530	NUT M6 DIN 934	110530	4	
A72543	HEATER EXPLOSION HATCH 200-500 KW 10	A72543	2	3,7
A75034	DR HEATER TUBUL SUCT NET 2000 M14	A75034	3	12,5
115550	GLASS FIBRE BAND 6X 15 MM	115550	10	
115579	CERAMIC BAND KERABAND 3x9	115579	41	
A72179	TUBE BRUSH 40X240 L=2300	A72179	1	4,4

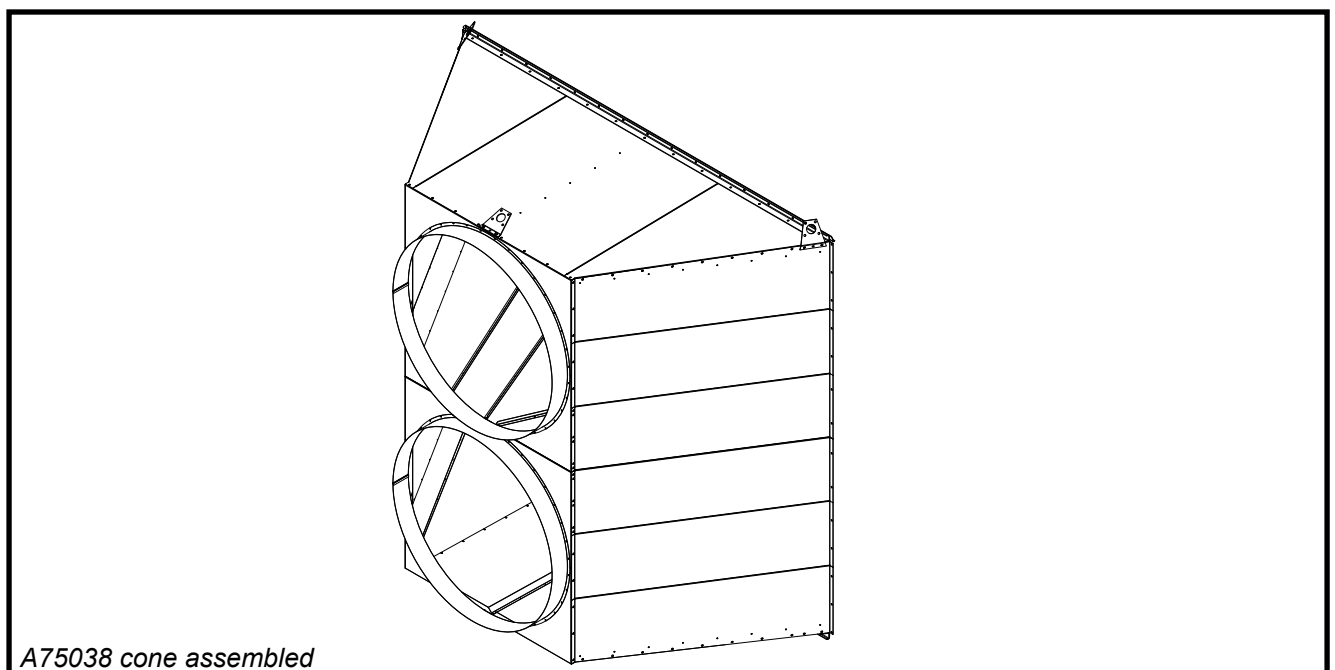


Spare part drawing, outlet cone 1400/2000 A75038



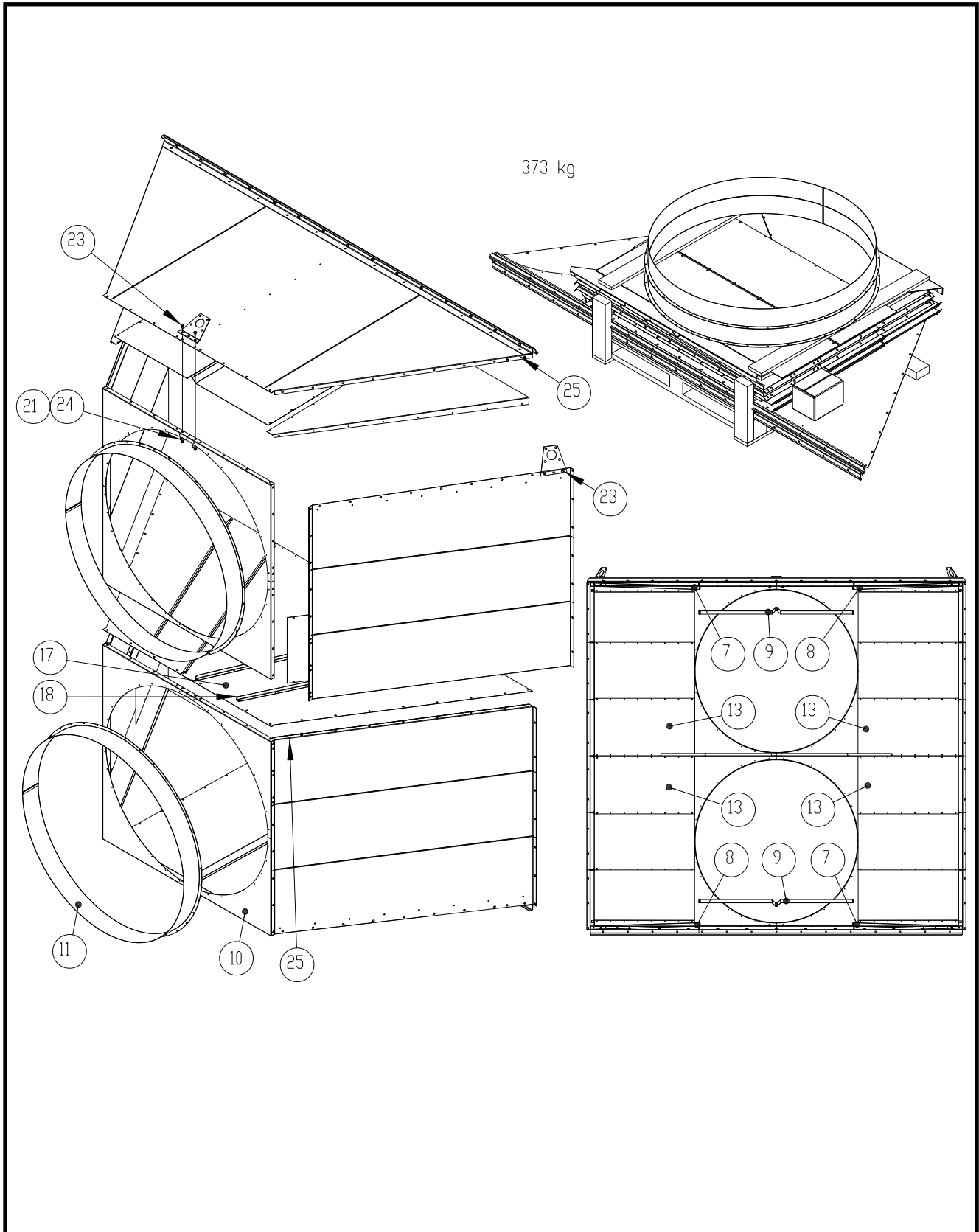


Part	Item	Denomination	Dwg. no.	Pcs.	Weight
1	A72171	DRYER HEATER TUBEL CONE UPPER/LOWER PLATE A1000	A72171	2	15.6
2	A72172	DRYER HEATER TUBEL CONE UPPER/LOWER SIDE-PLATE A1000	A72172	2	6.19
3	A72173	DRYER HEATER TUBEL CONE UPPER/LOWER SIDE-PLATE2 A1000	A72173	2	6.19
4	A72174	DRYER HEATER TUBEL CONE LEFT/RIGHT SIDE-PLATE2 A1000	A72174	2	6.84
5	A72175	DRYER HEATER TUBEL CONE LEFT/RIGHT SIDE-PLATE2 A1000	A72175	2	6.84
6	A72176	DRYER HEATER TUBEL CONE SIDE-PLATE3 A1000	A72176	4	7.33
7	A72134	DRYER HEATER TUBEL RADIATING SHIELD3 A1000	A72134	2	4.45
8	A72135	DRYER HEATER TUBEL RADIATING SHIELD4 A1000	A72135	2	4.45
9	A72136	DRYER HEATER TUBEL RADIATING SHIELD5 A1000	A72136	2	11.58
10	A72111	DRYER HEATER TUBEL CONE CONNECTOR FLANGE A1000	A72111	8	1.43
11	A71201	AIR PIPE SLEEVE D1250X120	A71201	2	6.48
12	A72132	DRYER HEATER TUBEL RADIATING SHIELD A1000	A72132	4	5.1
13	A72133	DRYER HEATER TUBEL RADIATING SHIELD2 A1000	A72133	8	4.97
14	A73083	DRYER HEATER TUBE CONE SUPPORT STRIP 1000/700 M10	A73083	2	6.09
15	503017	DRYER HEATER LIFTING LUG PL4X150X160 30DEG	41170	3	0.48
16	A75039	DRYER HEATER TUBE CONE SIDEPLATE4 2000 KW M14	A75039	4	7.23
17	A75040	DRYER HEATER TUBE CONE INTERMEDIATE PLATE 2000 KW M14	A75040	1	25.25
18	A75031	DRYER HEATER TUBE INTERMEDIATE BOTTOM STIFFENER 2000 M14	A75031	4	0.48
19	A75041	DRYER HEATER TUBE CONE ATTACHMENT STRIP 2000 M14	A75041	1	2.63
20	101800	HEX BOLT ZN 8X12 DIN933		242	0.01
21	110540	NUT M8 DIN 934		265	0
22	107720	SCREW SELF-TAP 6K 4,8X13 ZN		314	0
23	101810	HEX BOLT ZN 8X16 DIN933	101810	23	0.01
24	111562	WASHER M10 D34/D11X3 DIN440R ZN		2	0.01
25	115579	CERAMIC BAND KERABAND 3x9		40	0.01





Assembly drawing, outlet cone 1400/2000 A75038





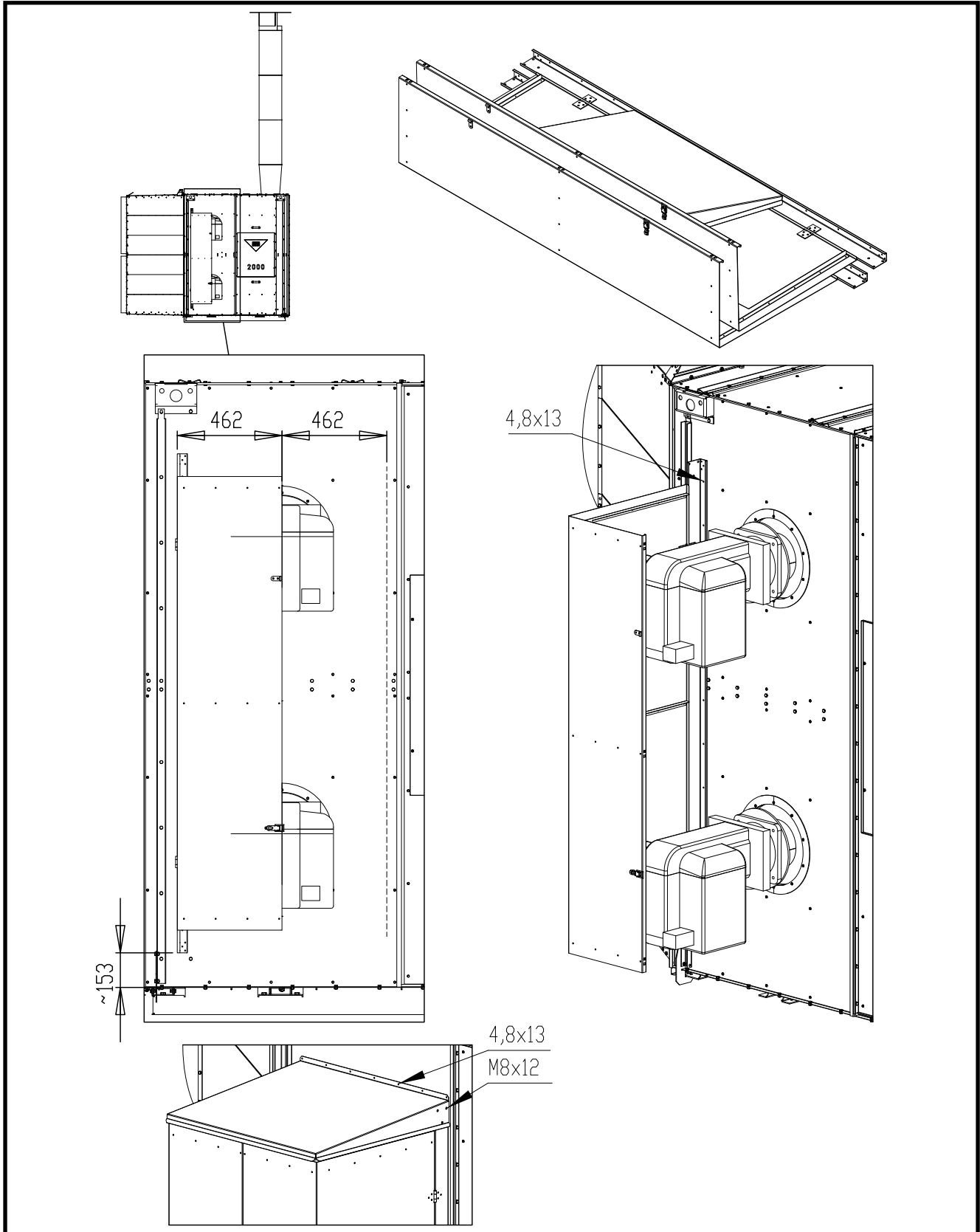
Each joint of the outer jacket shall be fitted with a ceramic seal strip. The side plates shall be joined by their corners to the lower plate, and supported temporarily with, for example, boards. The connecting flanges (part 10) shall be installed in the side and lower plates – a seal band shall be fixed to the ends of the flanges. Stiffener strips shall be attached to the intermediate plates on the platform/floor, using self-tapping screws. The intermediate plate shall be installed on the upright side-plates of the lower part, by supporting its long side by means of, for example, a board. The side-plates of the upper part shall be lifted on top of the lower part and the intermediate plate and supported temporarily in the upright position. The connecting flanges (part 10) shall be installed in the side and lower plates – a seal band shall be fixed to the ends of the flanges. The upper plates shall be lifted in position and fixed both by the corners and the upper edges of the connecting flanges. Remember the lifting lugs. The single lifting lug, to be installed in the middle, shall be attached using M8 fender washers (see picture).

The stud (part 11) shall be fixed in place, using self-tapping screws. When the screws of the outer jacket have been tightened, and the cross-measure of the rectangular opening has been checked, the radiation shields can be installed. The corners of the lower and the upper plates shall be provided with radiation shields (parts 7 and 8) first, and the midmost shield (part 9) shall be installed in them last. The midmost row of self-tapping screws shall be wrenched from outside the cone. The sides shall be provided with midmost radiation shields (part 13).

A ceramic seal strip shall be affixed to the attachment flange of the heater before installing the cone in place.



Installing the shield on the 1400/2000 burners

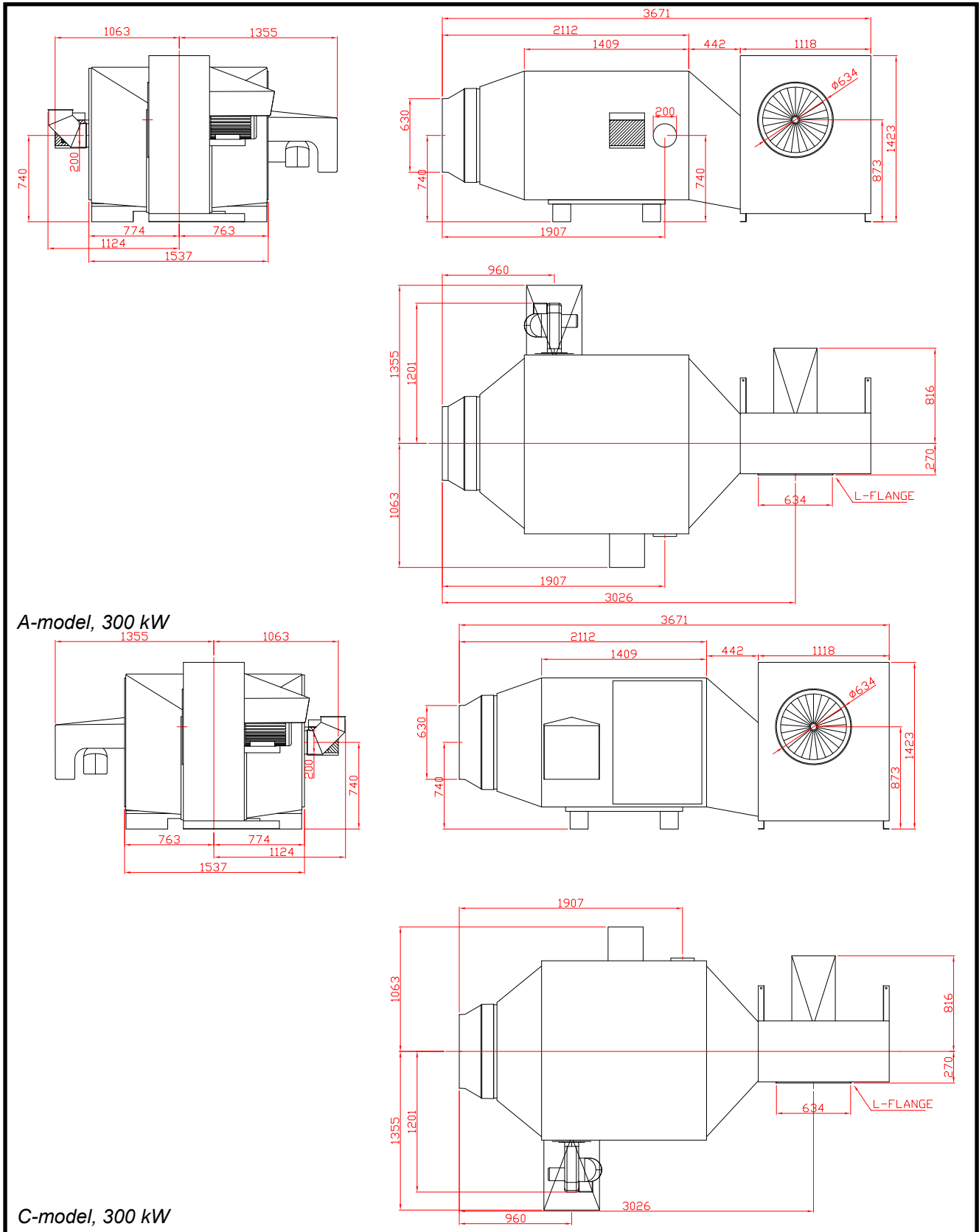




Define the position for the edge of the attachment beam of the door by measuring the distances 462, in accordance with the drawing. At the bottom, the dimension is about 153 mm. Fix both halves of the door, using self-tapping screws 4.8x13. Put the roof in place last, and fix it to the vertical beams by using M8x12 screws. Fix the upper edge, using self-tapping screws 4.8x13.

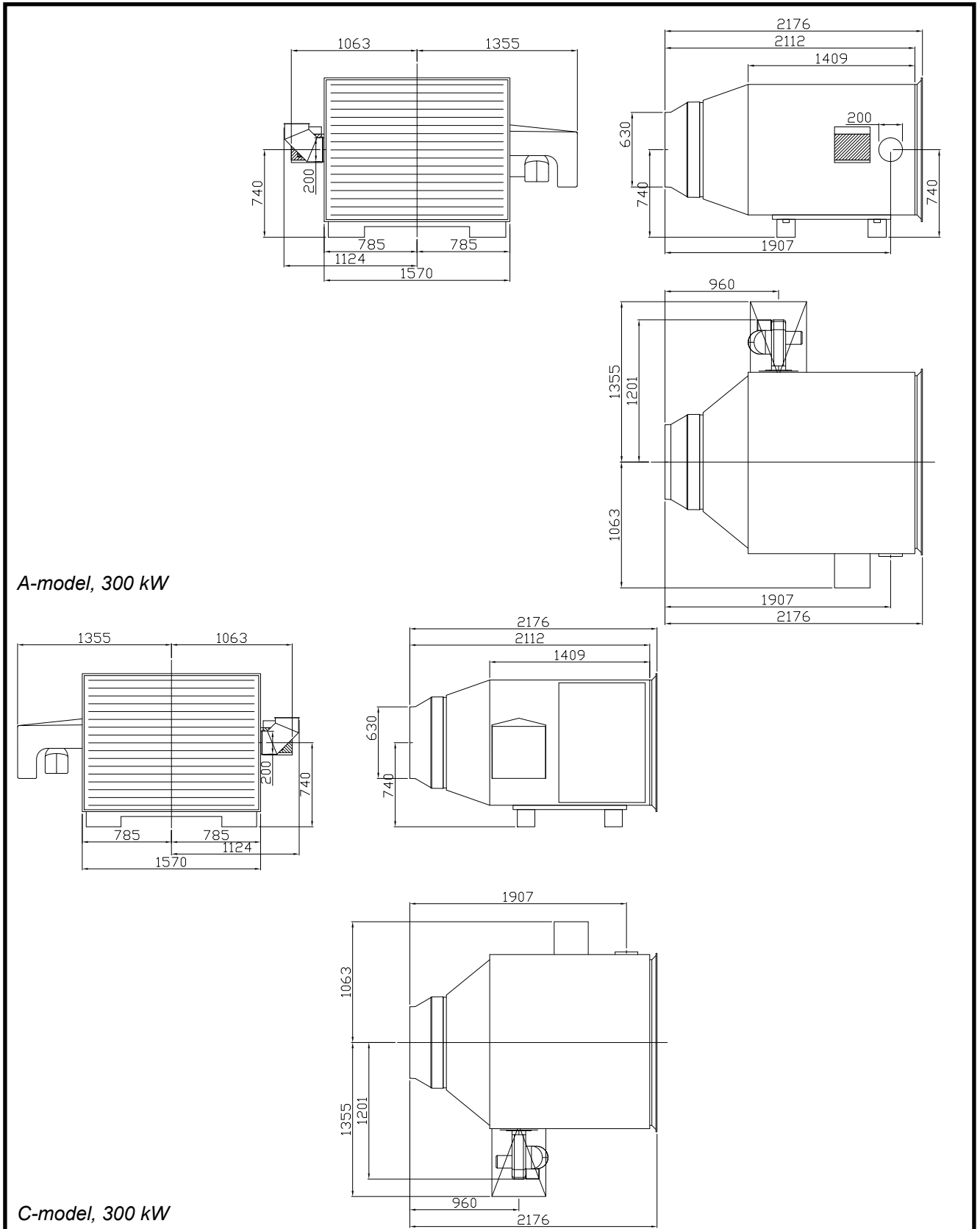


Vulcan 300 kW dimension drawing, Positive pressure



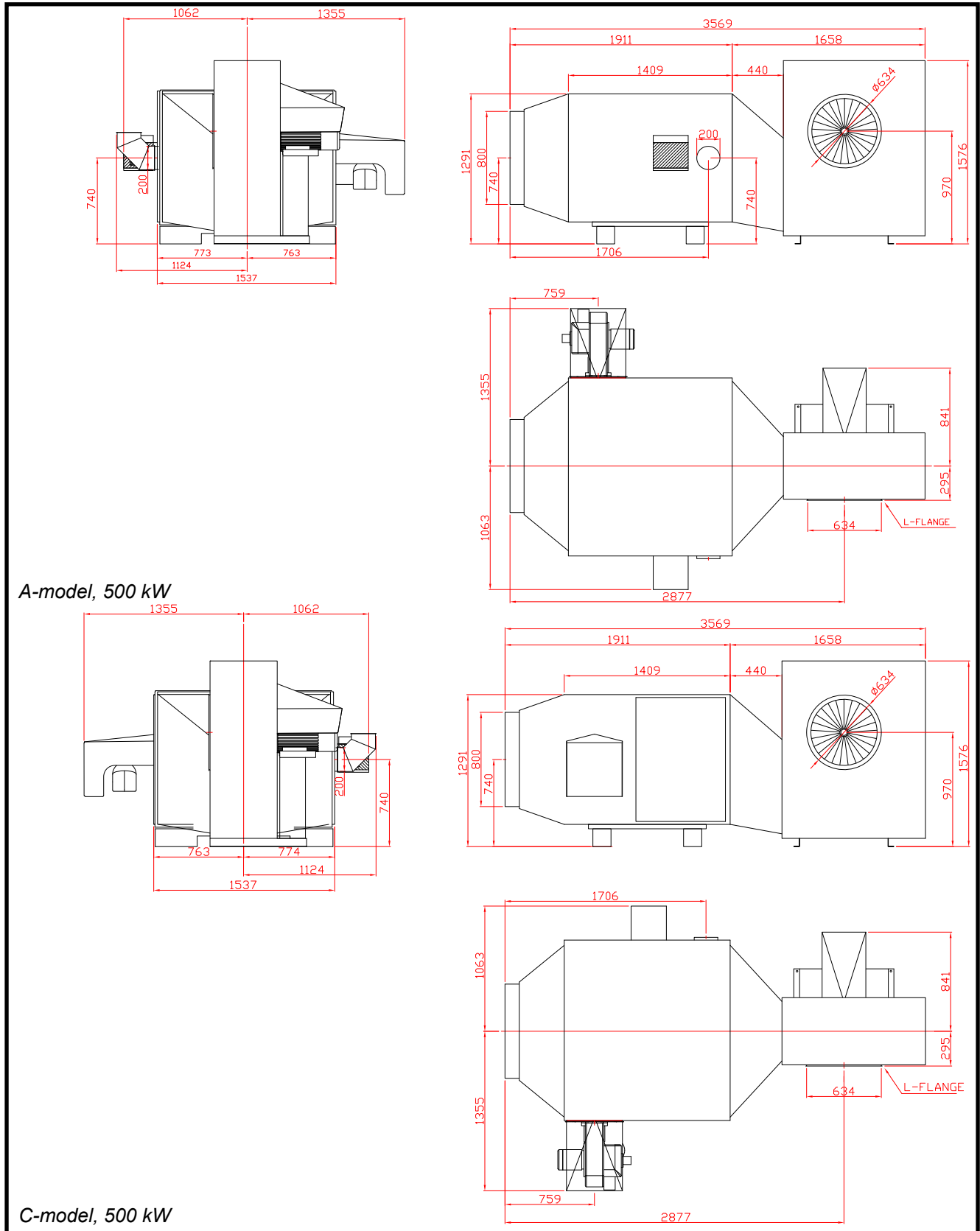


Vulcan 300 kW dimension drawing, Vacuum



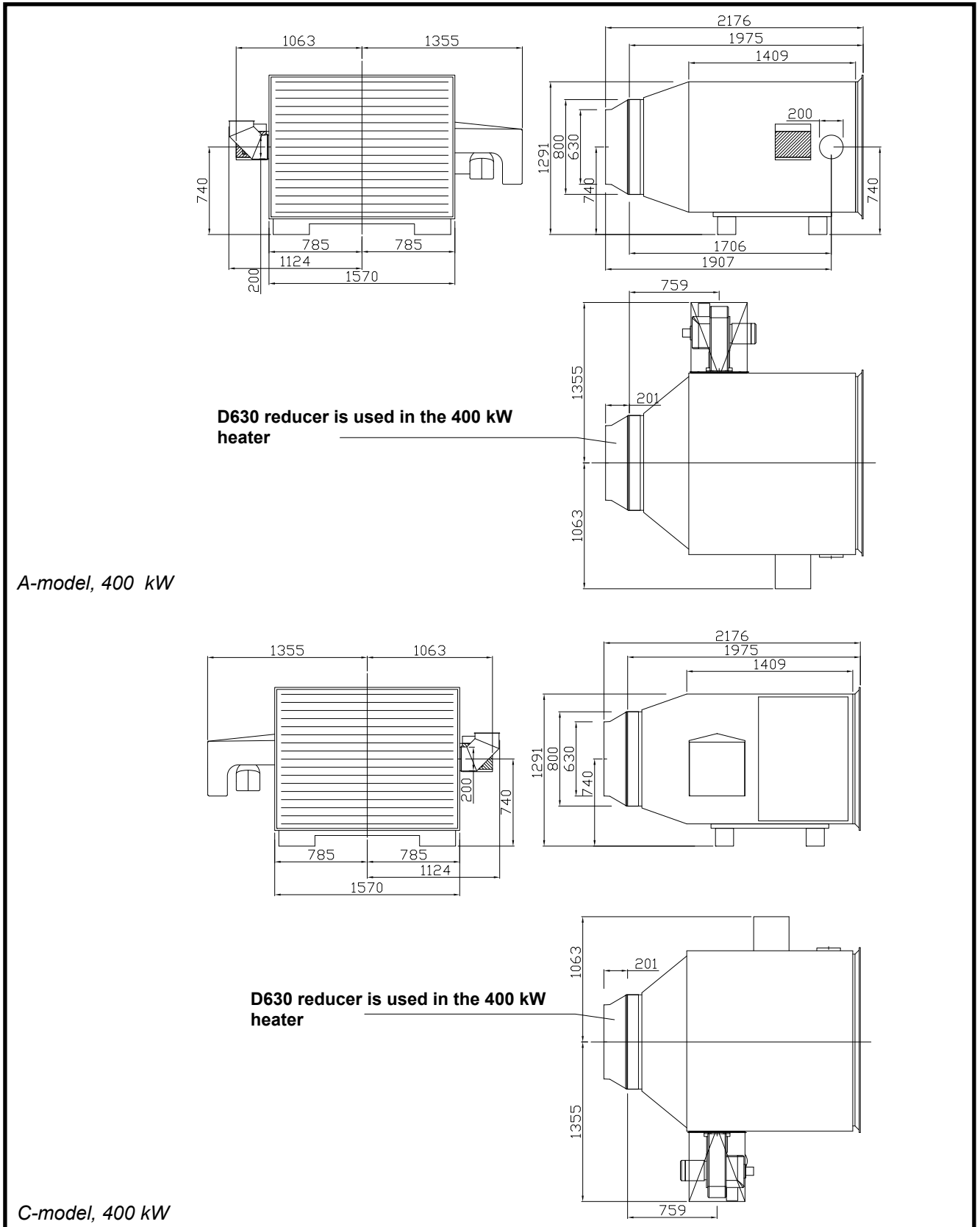


Vulcan 500 kW dimension drawing, Positive pressure





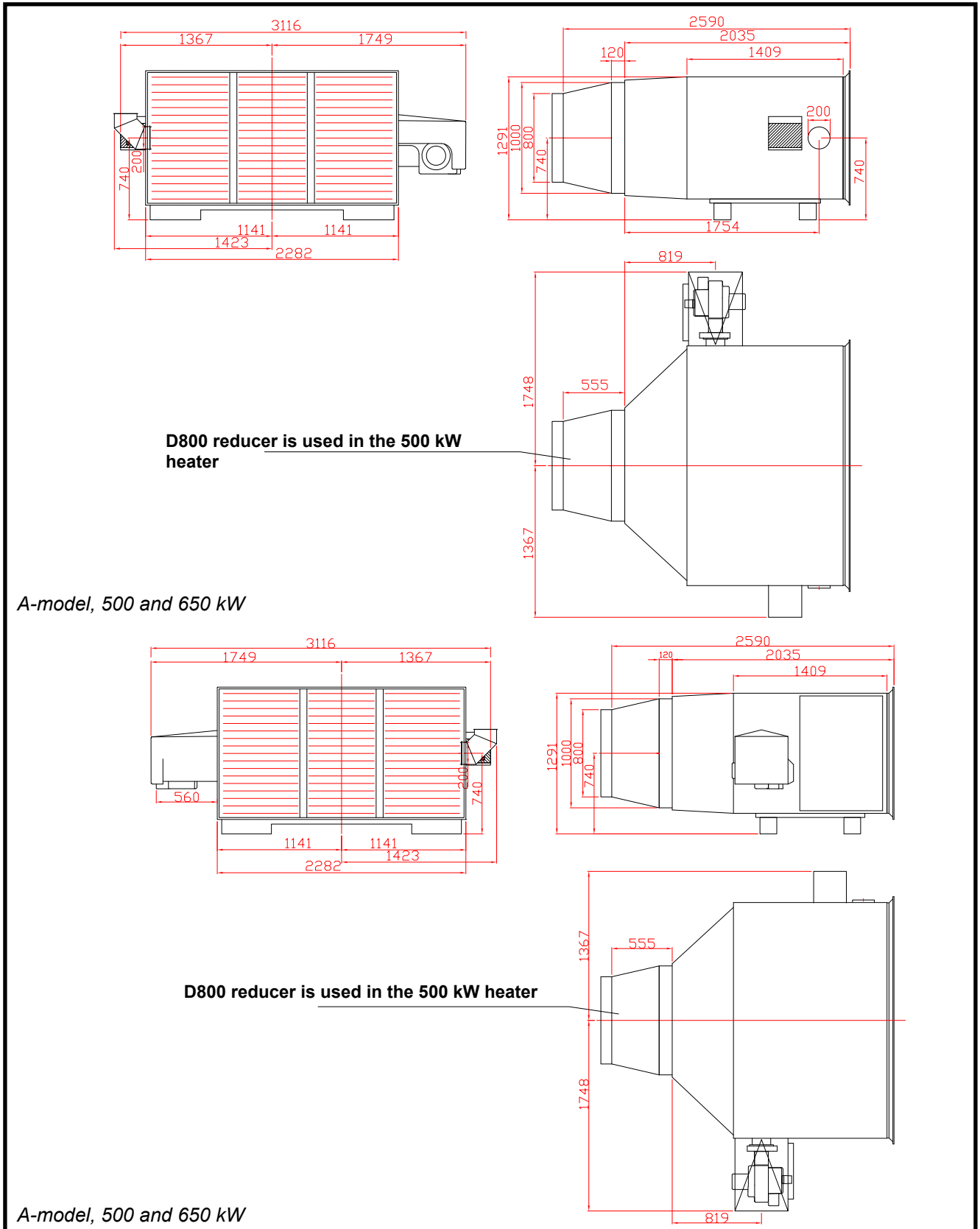
Vulcan 400 kW dimension drawing, Vacuum





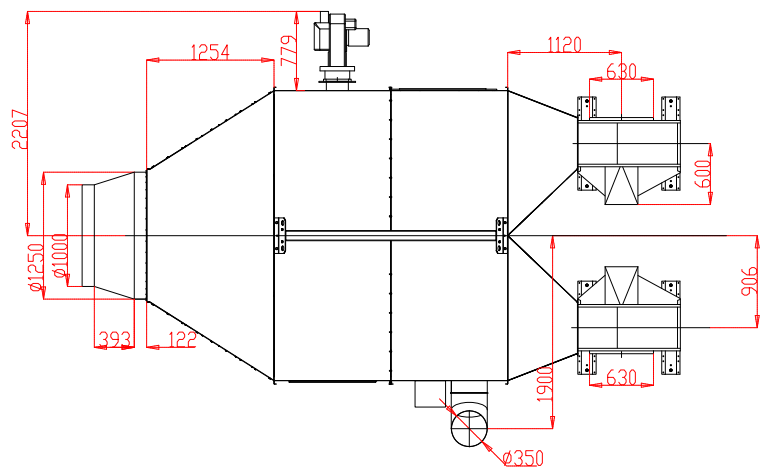
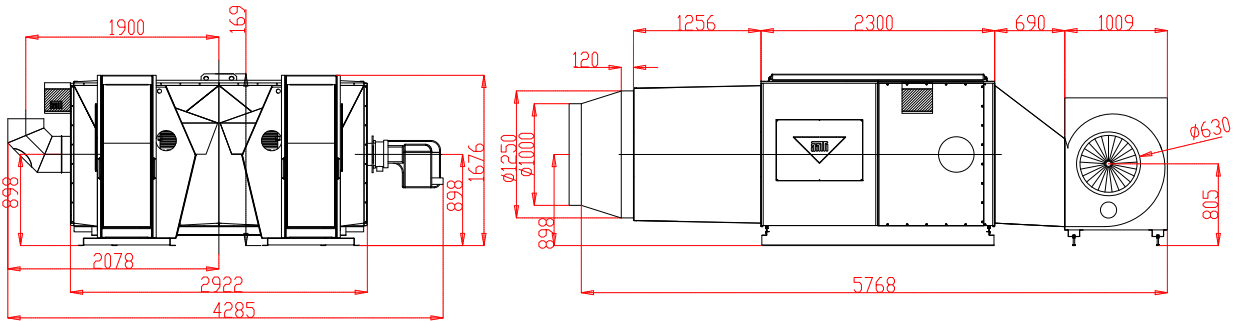


Vulcan 500-650 kW dimension drawing, Vacuum

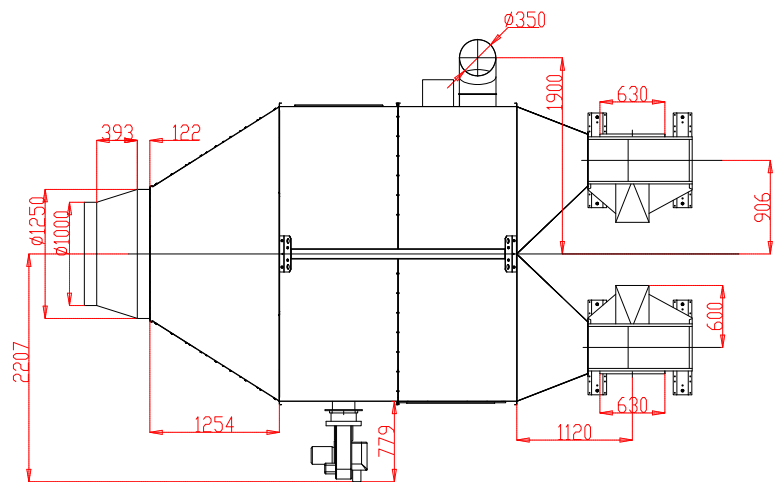
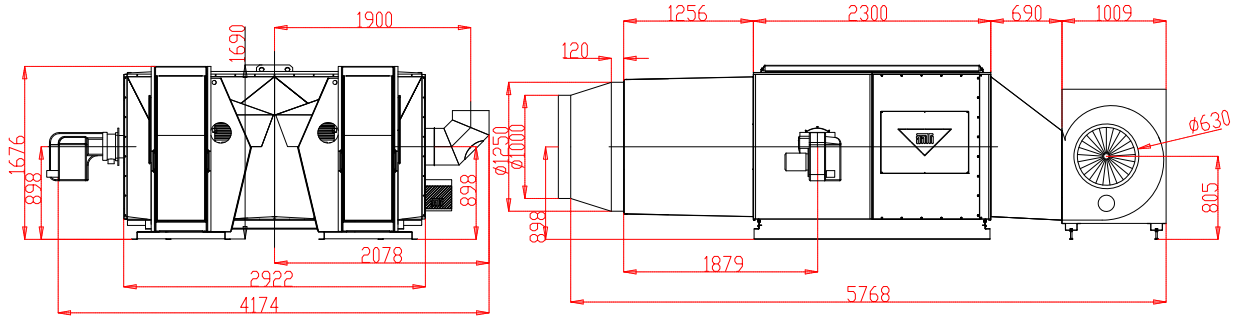




Vulcan 800 kW dimension drawing, Positive pressure



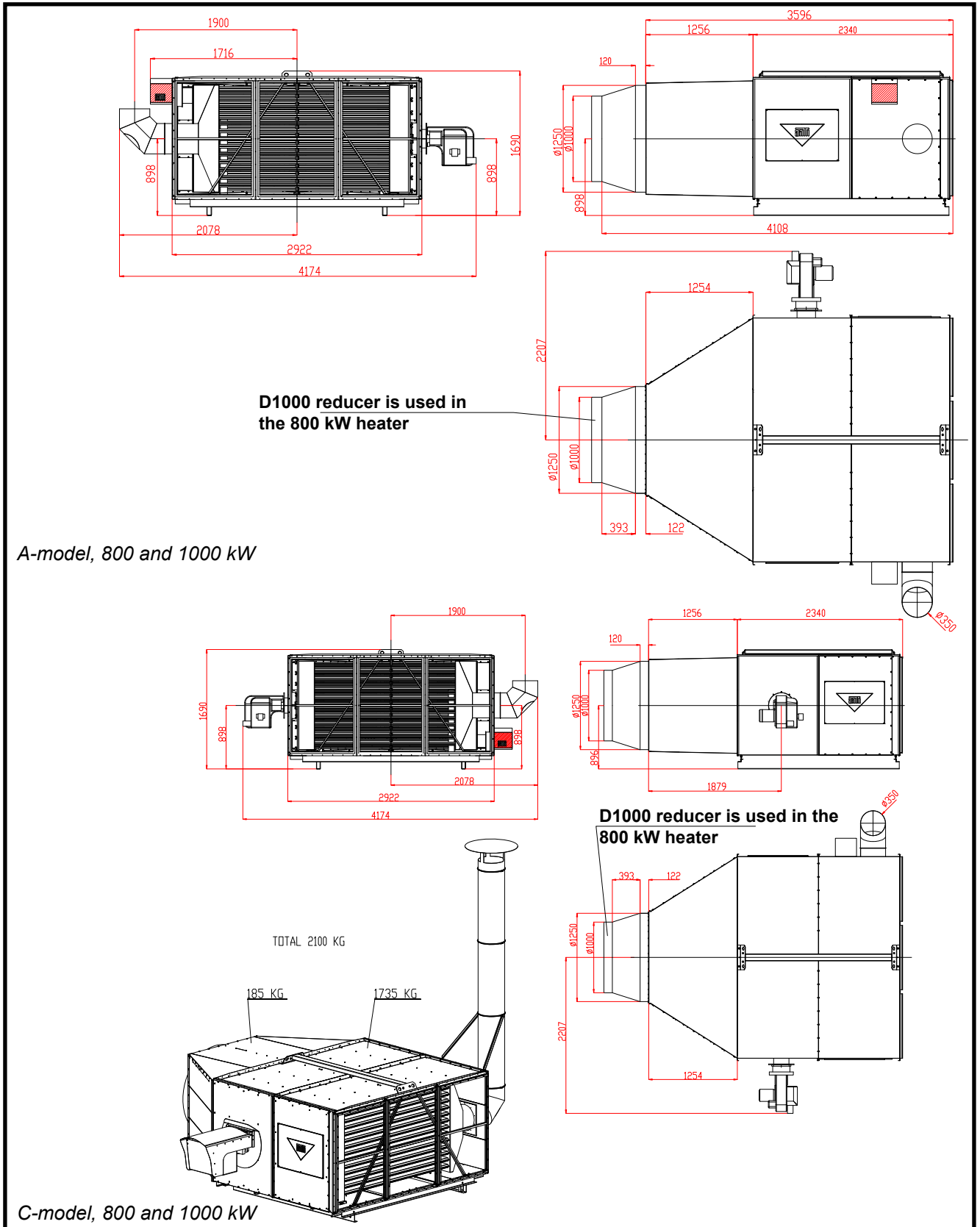
A-model, 800 kW



C-model, 800 kW

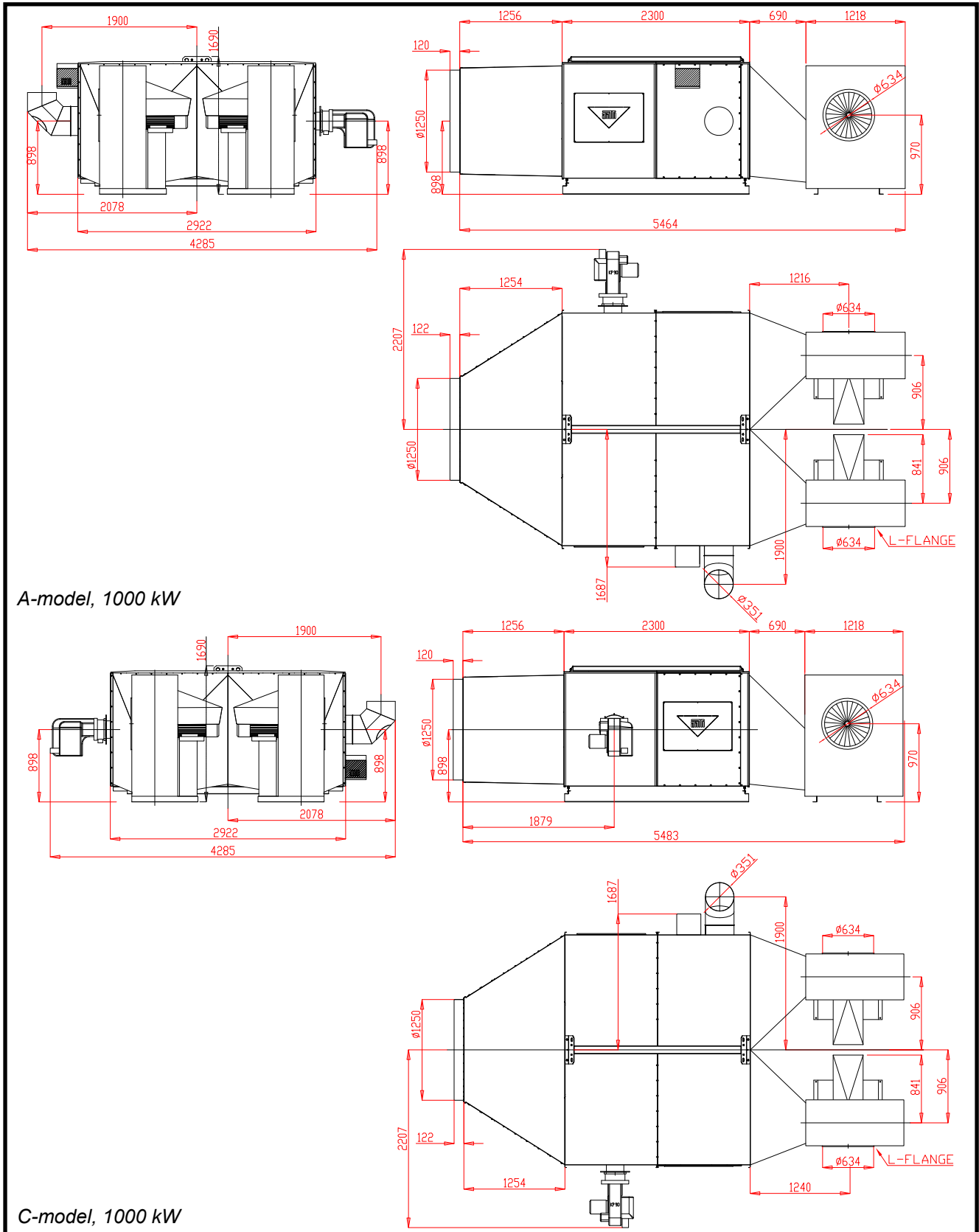


Vulcan 800 and 1000 kW dimension drawing, Vacuum



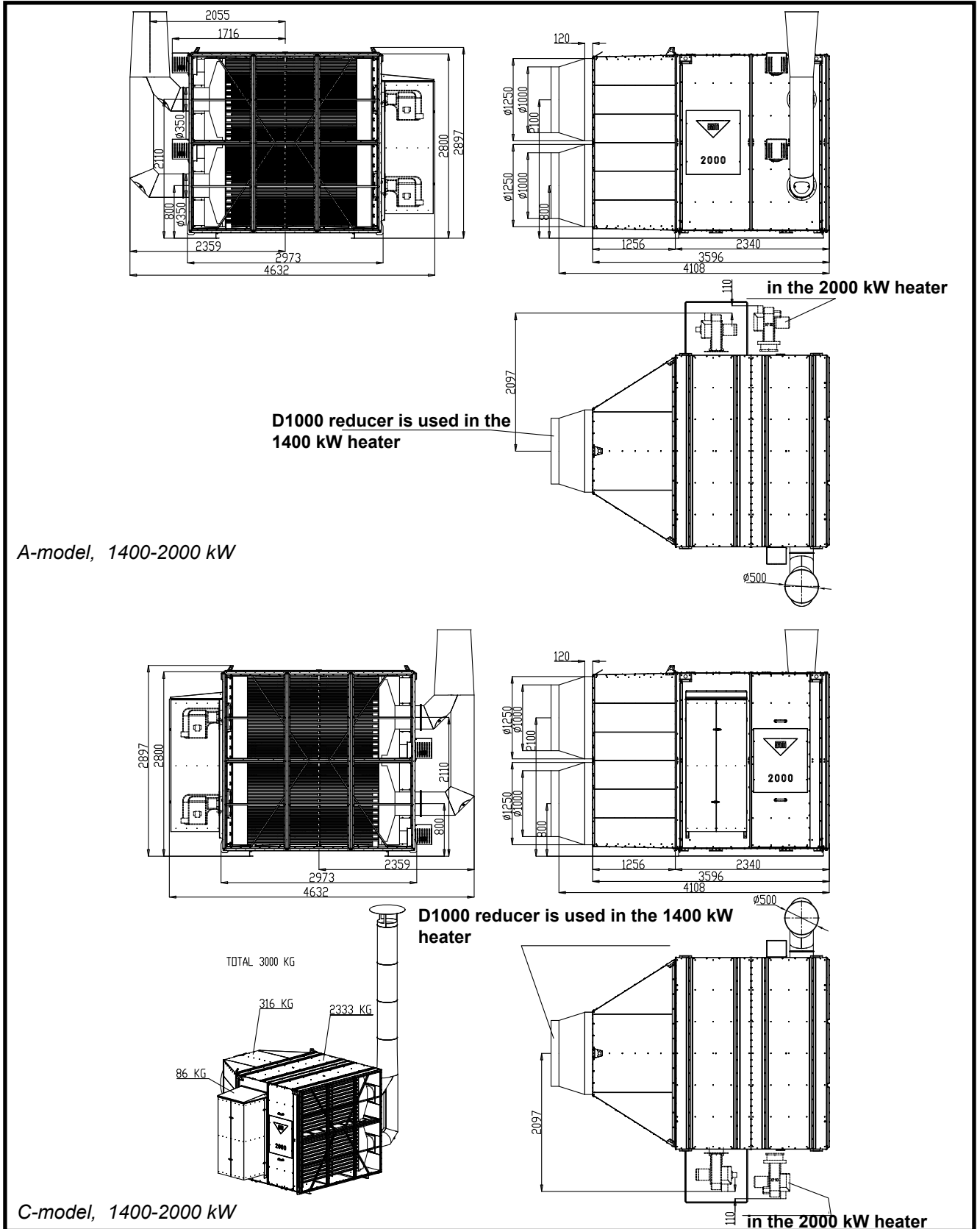


Vulcan 1000 kW dimension drawing, Positive pressure





Vulcan 1400 and 2000 kW dimension drawing, Vacuum





INSTALLATION

Prerequisites for validity of the guarantee are duly executed adjustments carried out by a skilled oil burner fitter and a start-up inspection. A flue gas analyser shall always be used for determination of the combustion gas adjustments. A protocol shall be drawn up of the start-up inspection. Duly executed start-up procedure and properly completed start-up protocol are essential prerequisites for guarantee processing.

The fire surfaces of the dryer heater are guaranteed for five years or 2000 operating hours. The guarantee will end as soon as either of these conditions is fulfilled.

NOTE! DEBRIS IN THE SUCTION AIR OF THE HEATER CONSTITUTES A FIRE HAZARD!

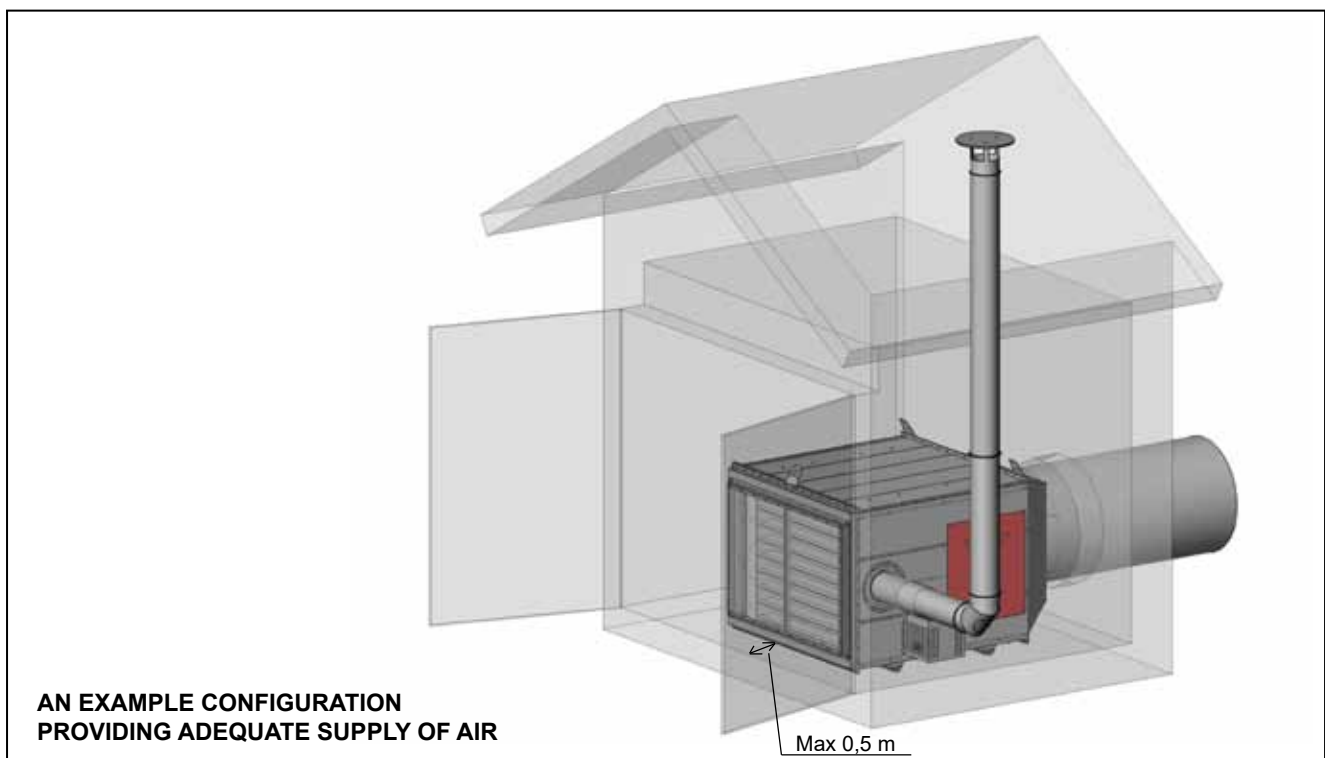
THE HEATER MUST BE LOCATED SO THAT DEBRIS IS PREVENTED FROM ENTERING IT.

THE BURNER MUST BE PROTECTED AGAINST WATER. ANY DAMAGE, CAUSED BY WATER, IS NOT COVERED BY THE GUARANTEE!

For a vacuum heater, the heater room must be provided with an opening of at least 1.5 times the size of the suction air opening. This opening can be provided with doors, which are mechanically secured to remain open during the drying process. The doors can also be provided with an electric limit switch, which enables the burner to be in operation only while the door is in the open-position. The limit switch shall be connected in series with the vacuum switch.

Suction air for the positive pressure heater shall always be routed via a pipe from outside the heater room.

The burner shall be provided with an unobstructed supply of combustion air at all times.





1. Lifting the dryer heater into position

- While lifting the heater, observe the following:
 - use all lifting lugs
 - ensure that the lifting gear stays in position in the lugs
 - only use hoists with sufficient lifting capacity
 - never go under or too near the device to be lifted
- Lift the heater without the burner into the place presented in the installation drawing or plan. Because the foundation must be level and steady, there is no need to attach the heater to its bed. Attach the blowers firmly in place.

2. Installing the air and flue pipes

- The air piping between the dryer heater and the dryer is assembled of air piping parts.

Standard pipes leaving from the heater				
Heater (kW)	Pipe diameter (mm)	Heater (kW)	Pipe diameter (mm)	
300	630	800	1000	
400	630	1000	1250	
500	800	1400	1000	x 2
650	1000	2000	1250	x 2

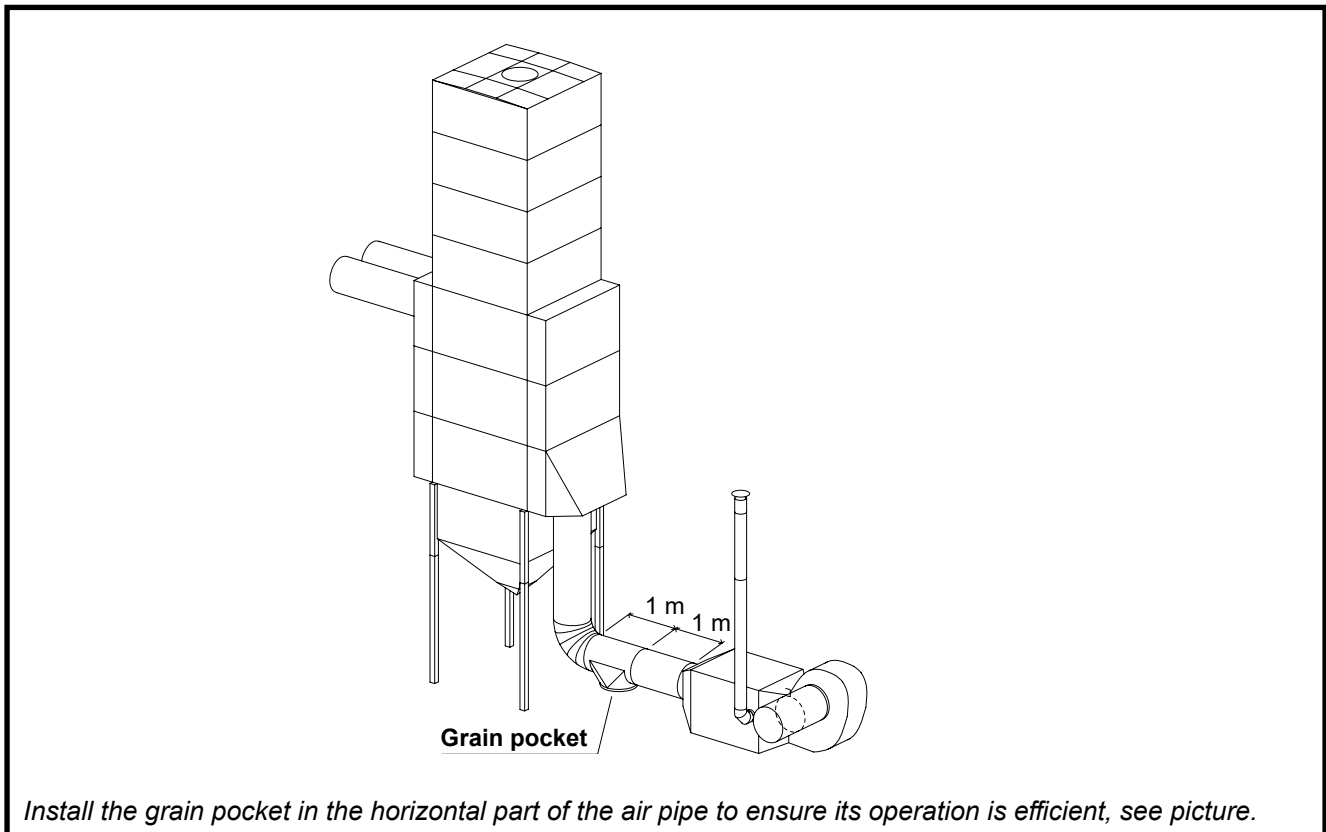


- Normally the inlet air pipe from the heater is conducted into the lowest drying sections. In the vacuum configuration, the blower unit or units are positioned so that even small batches can be dried.
- The air piping shall be installed so that neither loose grain nor debris can slide directly into the heater from the air channel end of the drying section.
- Before installing the pipes, make sure that no foreign particles have entered the heater.

WARNING! Foreign particles inside the heater are a fire hazard!

Grain pocket in the air pipe

Occasionally, some loose grains can fly out of the openings in the air ducts to the air channel end. If the dryer heater is connected to the heater as illustrated in the picture, the air pipe must absolutely be provided with a grain pocket. The purpose of the grain pocket is to catch up the loose grains, and prevent them from ending up in the heater. The grain pocket shall be controlled regularly and emptied, as necessary.



Carry out the installation as follows; lift the part tight against the pipe and tighten it to the pipe using straps. Draw a pattern for cutting through the opening; remove the part and make the opening using a nibbler or plate shears. Lift the part back in place and tighten its against the pipe using straps. Fix the part to the pipe using self-tapping screws and pop-rivets. Finish the work by applying sealing mastic. Provide the outlet sleeve for the pipe at the grain pocket with a plug and, as necessary, ensure that it stays in position using self-tapping screws.



- The dryer heater delivery includes 4.0 metres of flue pipe, a curve, bands and a rain cap for the flue pipe. In most cases these parts are sufficient for vertical installation of the pipe.
- The ceramic seal strip, which is included in the delivery, comes between the flanges of the heater's flue pipe. The strip is squeezed between the flanges under the band.
- Often the flue pipe is led horizontally through the heater room wall and the parts of the vertical pipe are installed in a vertical position outside the heater room. In this case, a straight pipe is required between them. Because the installation practice varies from case to case based on the design of the heater room, it is advisable to submit the installation plan in advance to the municipal fire authorities for approval.
- The flue pipe parts made of thick material are quite heavy. Make sure the pipe is sufficiently supported. A vertical pipe at maximum 3,0 m in length may be supported only by the heater. A separate supporting structure is required under a pipe longer than this and its elbow. A vertical pipe, over 3,0 metres in length, must be supported also laterally either using stay wires or support bars.

3. Oil burner and pipes

Installation and adjustment of the oil burner as well as installation of the oil pipes shall be assigned to an authorised oil burner fitter who shall issue a certificate of installation in writing.

Instructions for the oil burner fitter:

- It is recommended that single-pipe system be applied to the installation. Check the correct dimensioning of the piping in the burner manufacturer's instructions.
- Always check the size of the nozzles before putting the heater into service.
- Refer to the oil volume table for correct nozzle size.

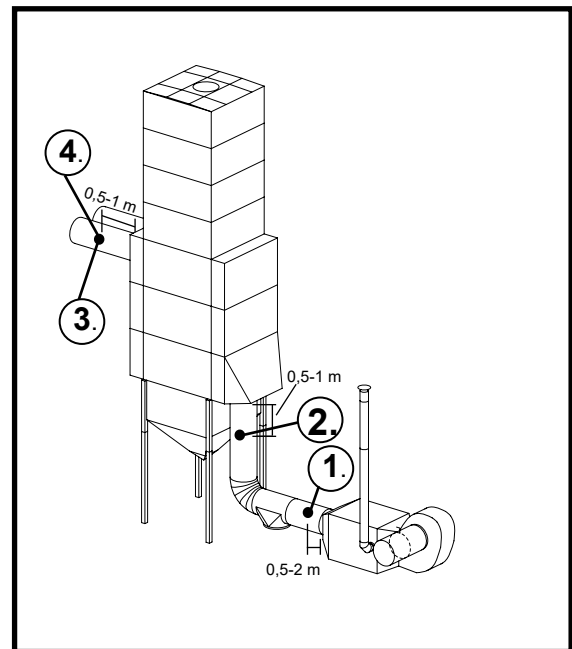
To make your heater work at maximum output, refer to the oil pressure table (on the last page of this booklet) to find out how the oil pressure affects the amount of oil burning in the burner with different nozzles and pairs of nozzles. The settings of the airflow to the burner given in the table are indicative only. Assign an oil burner fitter to more precise adjustment.

NOTE! Do not provide the oil burner with over-sized nozzles or increase the oil pressure so high that the maximum oil amount permissible for the burner will be exceeded!

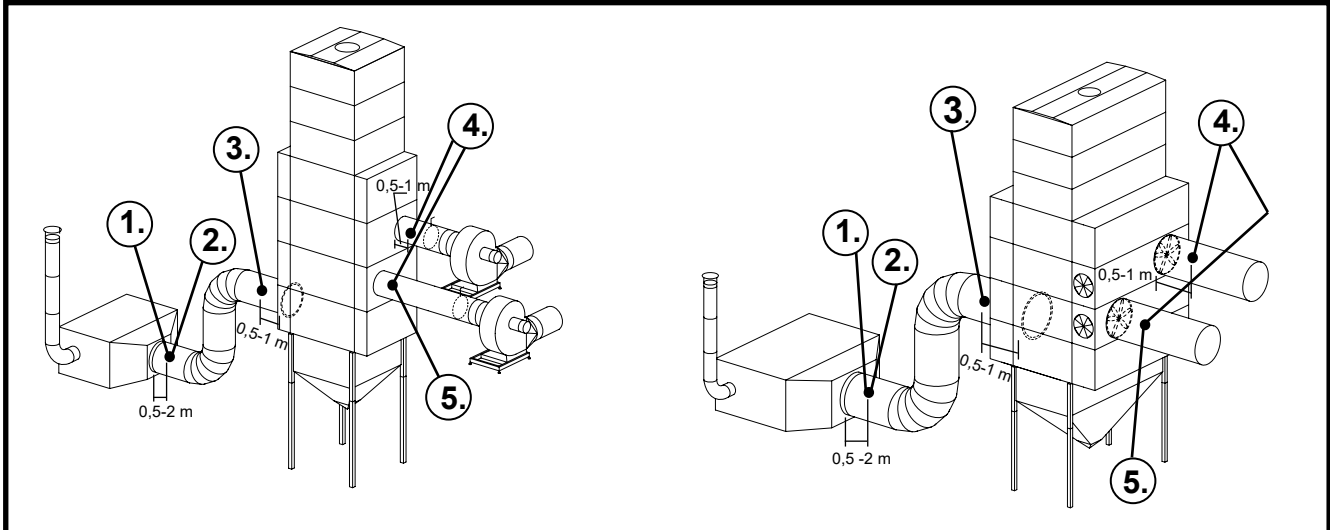
4. Locating the sensors and safety devices on a positive pressure heater

1. LTM-thermostat
2. Temperature sensor for inlet air
3. Fire thermostat
4. Temperature sensor for outlet air

On the inlet side the sensors are installed in the air pipe inside the building in a straight pipe part (not near curves). The sensors must not be in direct line of sight of the rear part of the combustion chamber. The heat radiation from the chamber transmits wrong measurement result to the thermostats.



5. Locating the sensors and safety devices on a vacuum heater



1. LTM-thermostat
2. Vacuum sensor
3. Temperature sensor for inlet air
4. Fire thermostat
5. Temperature sensor for outlet air

In vacuum dryers with two blowers, the sensors on the outlet side shall be installed in the lower air pipe (as required, the upper blower can be taken out of use).

6. Installing the temperature measuring facility

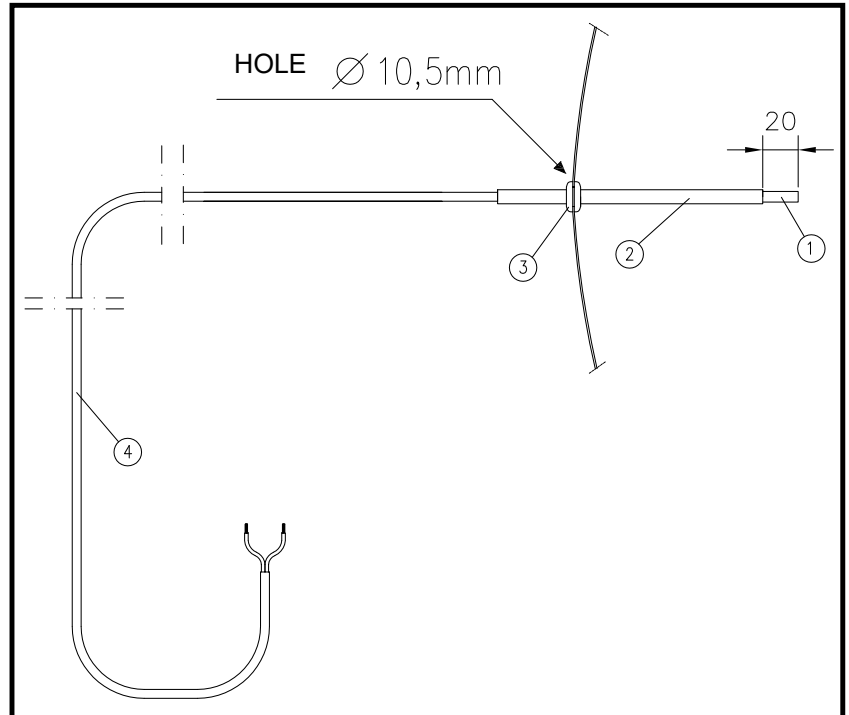
The type of temperature measuring facility depends on the configuration of the machinery. The measuring of the temperature can be realised, either by means of a PTC-sensor or a temperature transmitter.

Pull the PTC sensor (1) with its conductors (4) through the nylon pipe (2) so that the metal part of the sensor sticks out about 20 mm from the nylon pipe.

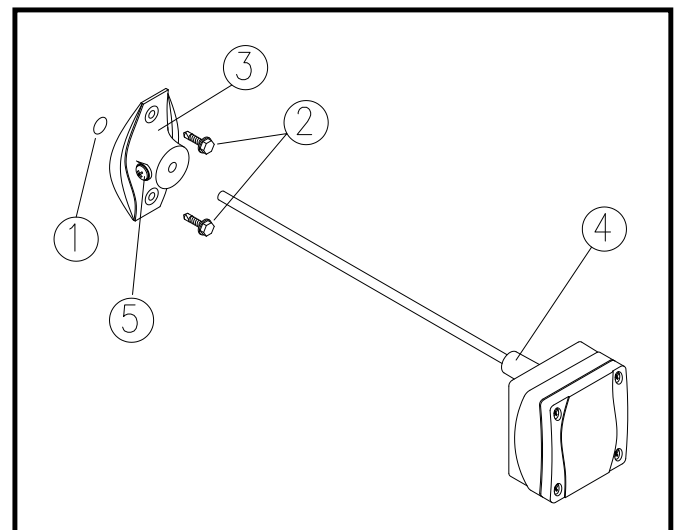
Drill a hole of 10.5 mm in the air pipe, and install the lead-through gasket (3) in it.

Push the nylon pipe with the sensor through the lead-through gasket into the air pipe; about 20 mm of the nylon pipe shall be sticking out.

Connect the sensor to the system in accordance with the wiring diagram. Carry out the connection in a separate connecting box (not included in the delivery).



Install the temperature transmitter (4) in the air pipe using the installation flange (3). Drill an 8 mm hole (1) in the inlet air pipe. Fix the installation flange at the hole in the pipe, using self-tapping screws (2). Insert the sensor of the temperature transmitter into the pipe through the installation flange, and tighten it in place with the lock screw (5).



7. Installing the vacuum sensor

Fix the sensor unit (1) on the wall in an upright position, as shown in the drawing.

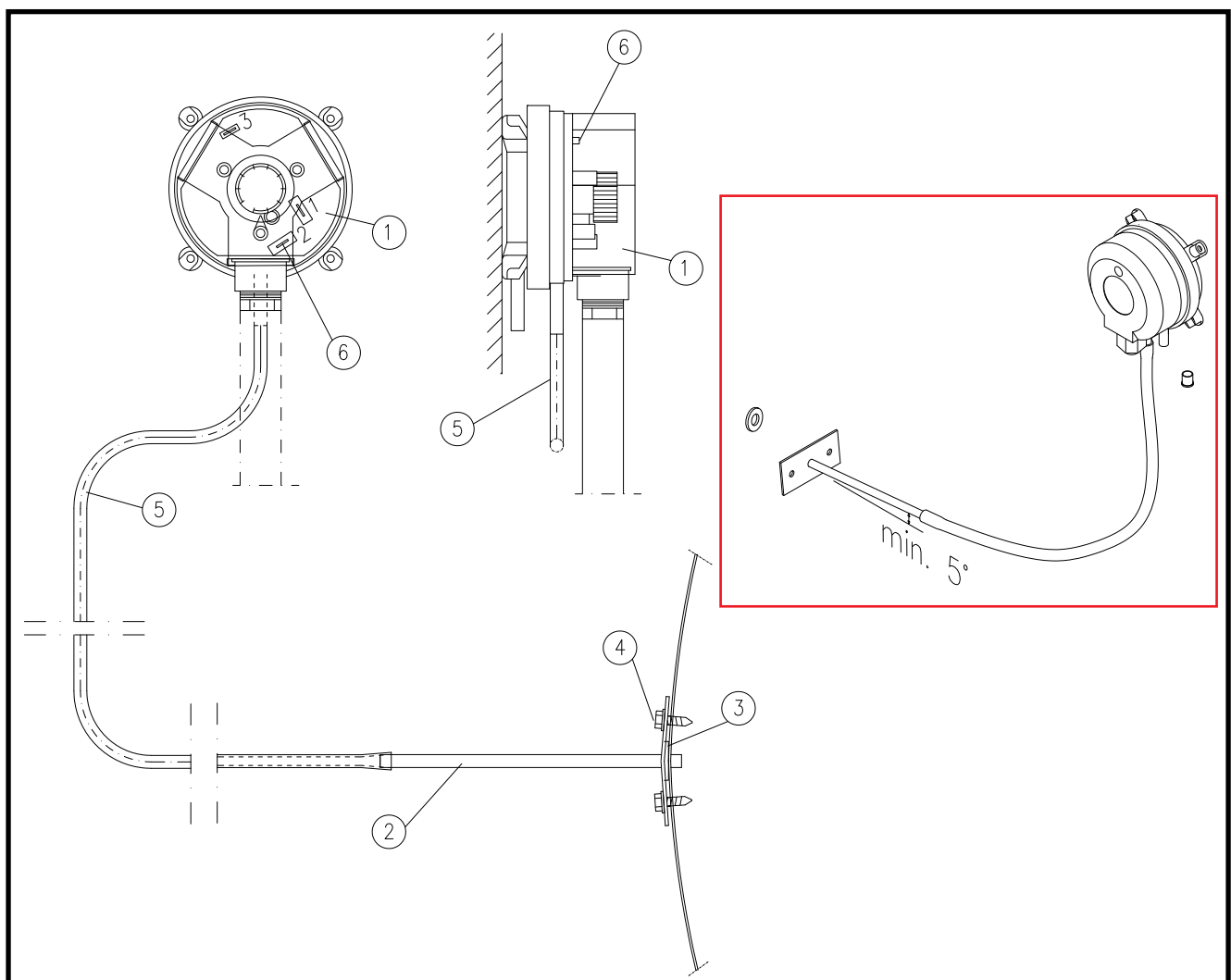
Drill an 8 mm hole in the air pipe for the lead-through sleeve. Fix the lead-through sleeve using self-tapping screws (4). Do not forget to place the rubber washer (3) between the pipe and the lead-through sleeve.

Connect the PVC hose to the "upper" connector (5) of the sensor unit; the cover plug of the connector, closest to the wall, must be removed. Connect the other end of the hose to the lead-through sleeve.

Connect the cable, using the Abico-connectors included in the delivery, to the terminals 2 and 3 (6), as shown in the wiring diagram.

The pressure is adjusted by means of the disc, located in the centre of the sensor unit. Set the sensor to such a pressure value, that the positions 2–3 of the change-over contact will be switched on, even if the air adjuster plate is in its minimum position.

If the change-over switch is not switched on, the oil burner will not start.



8. Installing the fire thermostat

Installation of the fire thermostat in a vacuum dryer, equipped with axial blowers, is explained in instruction manual for blowers 408099.

Attach the thermostat unit (1) to the wall according to the drawing.

Drill in the air pipe a hole of 16 mm for the sensor holder (2). Fix the holder to the air pipe using screws.

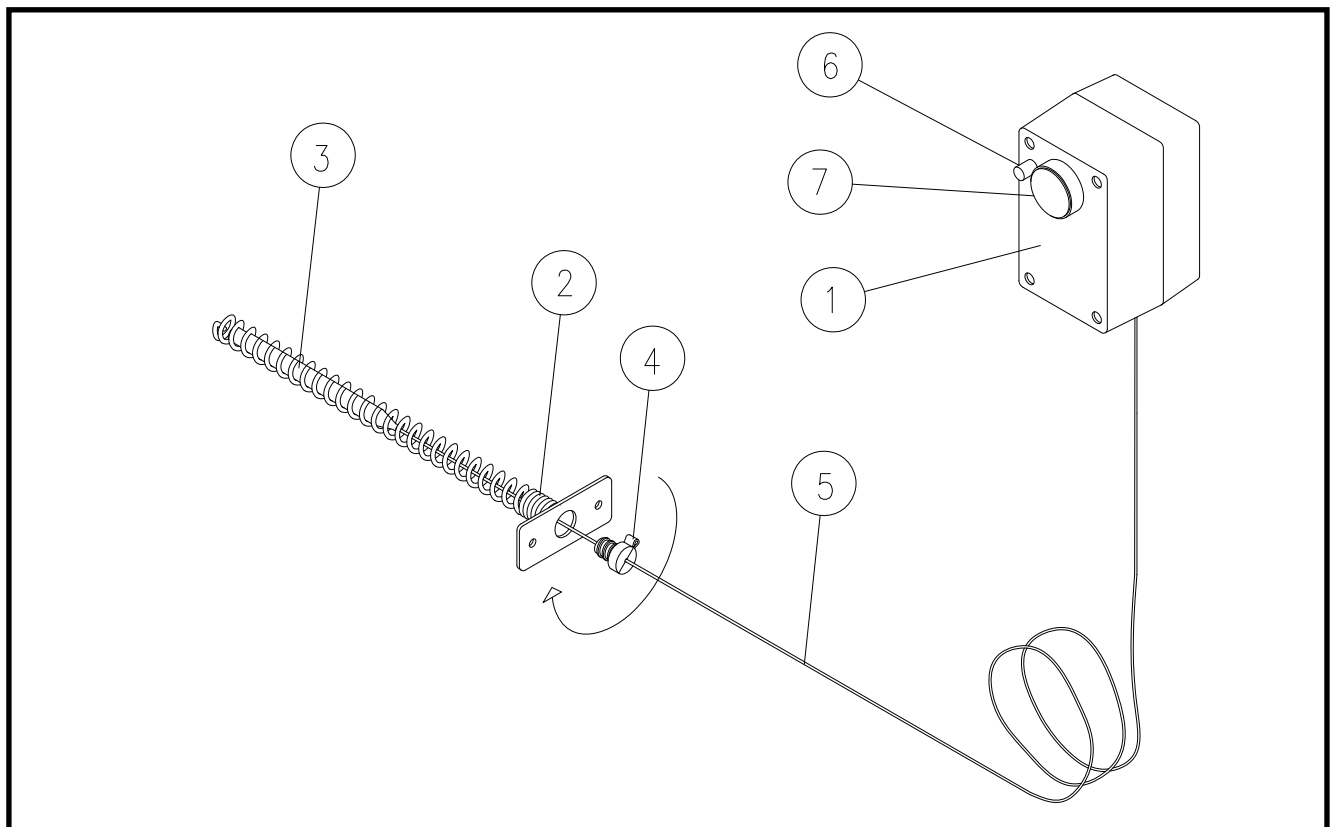
Push the feeler (3) of the thermostat's capillary pipe (5) into the sensor's holder, and lock it by clamping the locking collar (4) on the capillary pipe and twisting it into the holder.

Set the operating temperature via the adjustment wheel (7). Set the operating temperature of the fire thermostat 10°C higher than the maximum temperature of the outlet air, however, to at least 50°C.

Ensure that the fire thermostat is active by depressing the reset button (6).

Connect the fire thermostat to the system in accordance with the wiring diagram.

The fire thermostat shuts down all the operations of the dryer immediately after the pre-set temperature has been reached, for example, as a result of fire inside the dryer. The fire thermostat is delivered with the blowers. A fire thermostat is installed in every outlet pipe from the blower.





To be observed before start-up

- The oil burner fitter and the electrician have completed the test run.
- The operation of the safety devices needs to be tested in practice to ensure their proper operation.
- The oil-tank is filled with clean light-oil.
- The direction of rotation of the blowers must be checked.
- There are no objects in the heater room that do not belong there.
- No foreign objects allowed in the heater or in the air pipes.
- That only clean air is blown or sucked through the heater.
- Check once more that the main switches and possible safety switches are in the operating position.
- That there is a fire extinguisher outside the heater room during drying.
- Make sure that the slab in the front and at both sides of the suction nets is clean and, for example, the wind cannot blow debris or withered plants near the suction cone opening of the heater or the blower.

OPERATING INSTRUCTIONS FOR THE DRYER HEATER

Adjusting the output

- The drying air flow into a vacuum dryer, equipped with axial blowers, is adjusted by means of a frequency converter. In positive-pressure dryers, the suction air flow into the heaters is restricted by means of an adjuster.
- The temperature of the drying air is adjusted in accordance with the instructions for the control centre.

If you apply a great volume of air at a low output, there is a risk that water condenses inside the heater. You can, however, run the unit quite normally at a low output, if you at the same time reduce the air volume.

Minimum amounts of oil at the **maximum** output of the blower.

Heater model	300	400	500	650	800	1000	1400	2000
Min. oil volume kg/h	18	24	27	39	48	50	45 x2	50 x2



- The flow of the burning air must be adjusted every time the nozzle is replaced or modified.

WARNING! Before opening the burner, make sure the voltage supply has been switched off. High tension inside the burner. Risk of fatal electric shock!

- When moving from the drying stage to the cooling stage after the drying, the outlet air thermostat of the drying automation stops the burner automatically as soon as the pre-set outlet temperature, i.e. the cut-off point, has been reached (if the heater is connected to an automatic centre).
- The heater fan cannot be switched off even from its operating switch before the heater has cooled down below the "fan" temperature in the LTM thermostat (nor shall the heater fan be switched off from the mains switch before the heater has cooled down).

SERVICING

Annual service

- The heat exchanger and the flue pipe of the heater must be swept yearly immediately after the drying season. Open the doors in the outer jacket and the heat exchanger at the sides of the heater for sweeping. You can remove the debris loosened during sweeping from the end of the furnace, from the overpressure hatch or through the lower tubes at one side of the heater. An aspirator with ash separator is an excellent aid for this work. Leave the overpressure hatch in the open position after the operating season to allow the airflow to keep the inner parts dry.
- If the adjustment of the burning air flow has not been correct, soot may have accumulated on the inner surfaces of the tubes. The tubes can be cleaned using the sweeping brush.
- Before closing the sweeping door, ensure that the glass fibre string (at the edge of the sweeping door) is in order and intact. If the glass fibre string is damaged, replace it with a new.
- Before closing the sweeping hatches, lubricate their attachment nuts and bolts with graphite lubricant to prevent them from seizing up.
- Check the operation of the over-pressure hatch on the same side as the flue pipe and lubricate its hinges, if necessary.
- A professional oil burner fitter shall be assigned to the service of the oil burner in spring, which also is the best time to remove the condensed water from the oil tank and fuel filters.
- Using a flashlight, check before the start of the drying season that there are no mouse, rat or bird nests between the heat exchanger surfaces inside the heater, which might constitute a fire hazard. Also accumulated dust can be a fire hazard if it starts to drift.
- Ensure that the inlet air piping to the dryer is clean. Some runoff of grain from the dryer may have occurred in connection with filling. Empty the grain pocket
- Always test the operation of the limit switch for the heater room door before the drying season.



Service during the operation

- If all annual services have been performed with care, the dryer heater only requires daily visual checking during the operating season. Even when the operation of the heater is controlled from the electric centre of the dryer, it is advisable to go and look at and listen to the heater a few times a day to ensure its normal operation.
- It is advisable to look at the upper end of the flue pipe always when passing by: the exhaust gases should be colourless and invisible. Visible water vapour may come out with the flue gases when a cold heater is started. Dark, visible smoke indicates incomplete burning of the fuel. Then the flowrate of burning air must be checked immediately to prevent the heat exchanger from getting sooted.
- The net in front of the suction opening must be clean. Observe the fire risk. If you have to clean the net on a regular basis, you have to do something about the surroundings, otherwise the risk of fire will be too high.

GUARANTEE

Prerequisites for validity of the guarantee are duly executed adjustments carried out by a skilled oil burner fitter and a start-up inspection. A flue gas analyser shall always be used for determination of the combustion gas adjustments. A protocol shall be drawn up of the start-up inspection. Duly executed start-up procedure and properly completed start-up protocol are essential prerequisites for guarantee processing.

The fire surfaces of the dryer heater are guaranteed for five years or 2000 operating hours. The guarantee will end as soon as either of these conditions is fulfilled. A prerequisite for validity of the product guarantee is that the control system and the components used are approved by Antti-Teollisuus.

All matters related to the guarantee shall be agreed upon with the manufacturer before any action is taken.



MALFUNCTIONS DURING OPERATION:

POSSIBLE MALFUNCTIONS IN THE OIL BURNER

Symptoms	Possible cause	Remedy
Motor starts ▼ Burner is pre-ventilating ▼ Flame is formed ▼ Malfunction of the burner, signal light illuminates	Photocell does not see light Photocell damaged Relay damaged	Check that the photocell is clean and sees the flame Check using a new photocell Check using a new relay (if the relay is replaced, the photocell should be replaced too)
Motor starts ▼ Burner is pre-ventilating ▼ Flame is formed, but it is unsteady ▼ Malfunction of the burner, signal light illuminates	Excess amount of air Low oil pressure Wrong adjustment of the burner head	Adjust the burning air settings (according to the burner manual) Check the oil pressure Ensure correct adjustment of the nozzle and the burner head
Motor starts ▼ Burner is pre-ventilating ▼ No flame is formed ▼ Malfunction of the burner, signal light illuminates	No oil supply Foreign light (sun) No spark Fuse has tripped	Check the access of oil into the burner and that there are no air bubbles in the pump Check that the photocell does not see the ambient light Check the ignition wires and tips (transformer) Check and reset the fuse, if necessary. Find out the fault



Symptoms	Possible cause	Remedy
<p>Burner does not start</p> <p>▼</p> <p>Signal light does not illuminate</p>	<p>Engine safety switch has gone off</p> <p>Fire thermostat has gone off</p> <p>LTS thermostat (overheating protection) has gone off (not a compulsory piece of equipment in Finland)</p> <p>Relay or photocell is damaged</p> <p>Tip of change-over switch for vacuum sensor does not connect</p>	<p>Reset the engine safety switch</p> <p>Reset the fire thermostat using the button and find out why it tripped</p> <p>Reset the LTS thermostat and find out why it tripped</p> <p>Check by replacing the damaged part</p> <p>Set to switch on at a lower pressure</p>
<p>Burner is pre-ventilating</p> <p>▼</p> <p>Malfunction of the burner, signal light illuminates</p>	<p>No oil supply</p> <p>Excess amount of air prevents the flame from lighting up</p> <p>No spark</p>	<p>Check that tank, oil pipes, magnet valve, drive shaft of pump and nozzle are in order</p> <p>Adjust the airflow</p> <p>Check ignition transformer, wires and porcelain in the tips</p>
<p>Flame pulsates during start-up</p>	<p>Excess amount of air</p> <p>Nozzle partly blocked</p> <p>Low oil pressure</p> <p>Flue pipe blocked or damaged</p> <p>Burner blower impeller slips on the shaft</p> <p>Coupling ends of oil pump worn</p>	<p>Adjust the burner</p> <p>Change nozzle</p> <p>Check and adjust the oil pressure</p> <p>Check the pipe</p> <p>Check and tighten</p> <p>Change coupling ends of the shaft</p>



Symptoms	Possible cause	Remedy
Burner gets hot after switching off	Heater leaks	Make a tightness test to locate the leak point. Replace gaskets, if necessary.
	Vacuum in the heater room. Openings for burning air missing	Make the necessary holes in the heater room
	Vacuum in the heater room. Suction air for the heater blower taken from inside the heater room	Intake air pipe to the heater must be routed to the outside
Flame pulsates Overpressure hatch of the heater is vibrating	Rating of nozzles does not correspond to the output of the heater Nozzles blocked	Change nozzles
	Burner impeller covered with dust	Clean the impeller
	Burner head incorrectly adjusted	Adjust the burner head according to the Burner Manual
Blower unit is trembling Motor of the blower unit overheats Blower unit does not start	Rotor of the blower is dirty/out of balance	Clean/replace the rotor
	Attachment base improper	Check the attachment
	Net for cooler fan of the engine blocked	Clean off dust
	Cooling ribs blocked	Clean off dust
	Engine safety switch has gone off	Reset engine safety switch



Oil flow table kg/h

		Pressure [bar]								
		9	10	11	12	13	14	15	16	17
Combined nozzle size [gal/h]	2,5	9,1	9,6	10,0	10,5	10,9	11,3	11,7	12,1	12,5
	3,0	10,9	11,5	12,0	12,6	13,1	13,6	14,1	14,5	15,0
	3,5	12,7	13,4	14,0	14,7	15,3	15,8	16,4	16,9	17,5
	4,0	14,5	15,3	16,0	16,8	17,4	18,1	18,7	19,4	19,9
	4,5	16,3	17,2	18,1	18,9	19,6	20,4	21,1	21,8	22,4
	5,0	18,1	19,1	20,1	20,9	21,8	22,6	23,4	24,2	24,9
	5,5	20,0	21,0	22,1	23,0	24,0	24,9	25,8	26,6	27,4
	6,0	21,8	22,9	24,1	25,1	26,2	27,2	28,1	29,0	29,9
	6,5	23,6	24,9	26,1	27,2	28,3	29,4	30,4	31,4	32,4
	7,0	25,4	26,8	28,1	29,3	30,5	31,7	32,8	33,9	34,9
	7,5	27,2	28,7	30,1	31,4	32,7	33,9	35,1	36,3	37,4
	8,0	29,0	30,6	32,1	33,5	34,9	36,2	37,5	38,7	39,9
	8,5	30,8	32,5	34,1	35,6	37,1	38,5	39,8	41,1	42,4
	9,0	32,7	34,4	36,1	37,7	39,2	40,7	42,2	43,5	44,9
	9,5	34,5	36,3	38,1	39,8	41,4	43,0	44,5	46,0	47,4
	10,0	36,3	38,2	40,1	41,9	43,6	45,3	46,8	48,4	49,9
	10,5	38,1	40,2	42,1	44,0	45,8	47,5	49,2	50,8	52,4
	11,0	39,9	42,1	44,1	46,1	48,0	49,8	51,5	53,2	54,9
	11,5	41,7	44,0	46,1	48,2	50,1	52,0	53,9	55,6	57,3
	12,0	43,5	45,9	48,1	50,3	52,3	54,3	56,2	58,1	59,8
	12,5	45,4	47,8	50,1	52,4	54,5	56,6	58,6	60,5	62,3
	13,0	47,2	49,7	52,1	54,5	56,7	58,8	60,9	62,9	64,8
13,5	49,0	51,6	54,2	56,6	58,9	61,1	63,2	65,3	67,3	
14,0	50,8	53,5	56,2	58,7	61,1	63,4	65,6	67,7	69,8	
14,5	52,6	55,5	58,2	60,8	63,2	65,6	67,9	70,2	72,3	
15,0	54,4	57,4	60,2	62,8	65,4	67,9	70,3	72,6	74,8	
15,5	56,2	59,3	62,2	64,9	67,6	70,1	72,6	75,0	77,3	
16,0	58,1	61,2	64,2	67,0	69,8	72,4	74,9	77,4	79,8	
16,5	59,9	63,1	66,2	69,1	72,0	74,7	77,3	79,8	82,3	
17,0	61,7	65,0	68,2	71,2	74,1	76,9	79,6	82,2	84,8	
17,5	63,5	66,9	70,2	73,3	76,3	79,2	82,0	84,7	87,3	
18,0	65,3	68,8	72,2	75,4	78,5	81,5	84,3	87,1	89,8	
18,5	67,1	70,8	74,2	77,5	80,7	83,7	86,7	89,5	92,3	
19,0	68,9	72,7	76,2	79,6	82,9	86,0	89,0	91,9	94,7	
19,5	70,8	74,6	78,2	81,7	85,0	88,2	91,3	94,3	97,2	
20,0	72,6	76,5	80,2	83,8	87,2	90,5	93,7	96,8	99,7	
20,5	74,4	78,4	82,2	85,9	89,4	92,8	96,0	99,2	102,2	
21,0	76,2	80,3	84,2	88,0	91,6	95,0	98,4	101,6	104,7	
21,5	78,0	82,2	86,2	90,1	93,8	97,3	100,7	104,0	107,2	
22,0	79,8	84,1	88,3	92,2	95,9	99,6	103,1	106,4	109,7	

Heater model	Burner	Max. oil volume	Nozzle 1	Nozzle 2	Nozzle
		kg / h	(Danfoss)	(Danfoss)	pressure bar
300	KP-50H	27,8	4,5 gal 80°	2 gal 80°	12,5
400	KP-50H	37,1	5,5 gal 80°	3 gal 80°	13
500	KP-50H	46,4	6,5 gal 80°	4 gal 80°	13,5
650	KP-50H	62,8	10 gal 80°	5,5 gal 80°	12
800	KP-90H	79,8	13,5 gal 80°	8,5 gal 60°	9
1000	KP-90H	96,0	13,5 gal 80°	8,5 gal 60°	13

PTo reset the malfunction in the burner, press the burner relay button with the malfunction light at the side of the burner.
1 kg of fuel oil equals to 1.18 litres



EU Declaration of Conformity

ANTTI-TEOLLISUUS OY
Koskentie 89
FI-25340 KANUNKI
Tel.: +358 2 7744700

declares that

VULCAN M23 – DRYER HEATERS
300, 400, 500, 650, 800, 1000, 1400 and 2000

conform with the provisions of the following directives:

- Machine Directive 2006/42/EU

Salo 13.02.2023

Kalle Isotalo
Managing Director



Dryer Heater

Vulcan M10

Customer name	MT-number	Heater model
Heater serial number	Burner serial number	

Oil pipe line Metal Composite

Other

Leakage check OK Leakage

Electric installations OK

Nozzles and pressure

Nozzle 1 gal °	Oil pressure bar
Nozzle 2 gal °	Calculated consumption / power kg/h kW

Analyzer values			Burner settings			
Parameter (target value)	O ² (3,5.. 4,0)	CO _{ppm} (<10)	Temperature diff. $T_{\text{flue gas}} - T_{\text{ambient}}$	Air damper	Stage 2 valve	Dryer inlet temperature
Stage 1						
Stage 2						

Operationality after adjustments OK

Notes

Company	Installer
Date	Signature



Customer name	MT-number	Heater model
Heater serial number	Burner serial number	

Gas pipe line Diameter _____
 Leakage check OK Leakage

Electric installations OK
 Inlet gas pressure (after pressure reducer) _____ mBar

Analyzer values			Burner settings			
Parameter (target value)	O ² (3,0.. 3,5)	CO _{ppm} (<10)	Nozzle pressure	Gas valve	Air damper	Dryer inlet temperature
Ignition						
200						
250						
300						
400						
500						
600						
700						
800						
900						
999						

Operationality after adjustments OK

Notes _____

Company	Installer
Date	Signature