



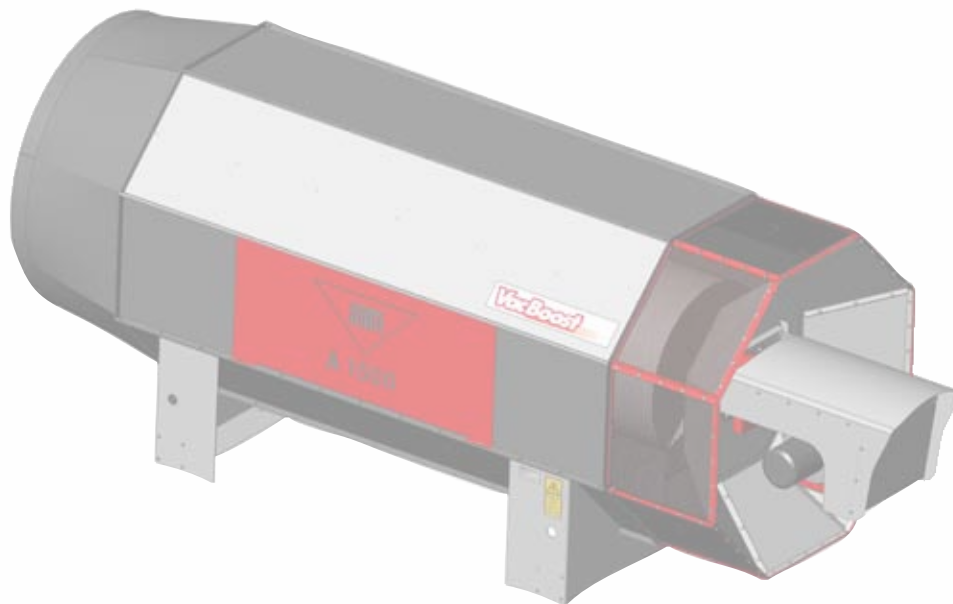
Installation and Operating Instructions

ANTTI DRYER HEATER
(Gas-fuelled heater, direct driven)
VACBOOST M09 A1500

408102 (en)

Agrosec

Grain Handling



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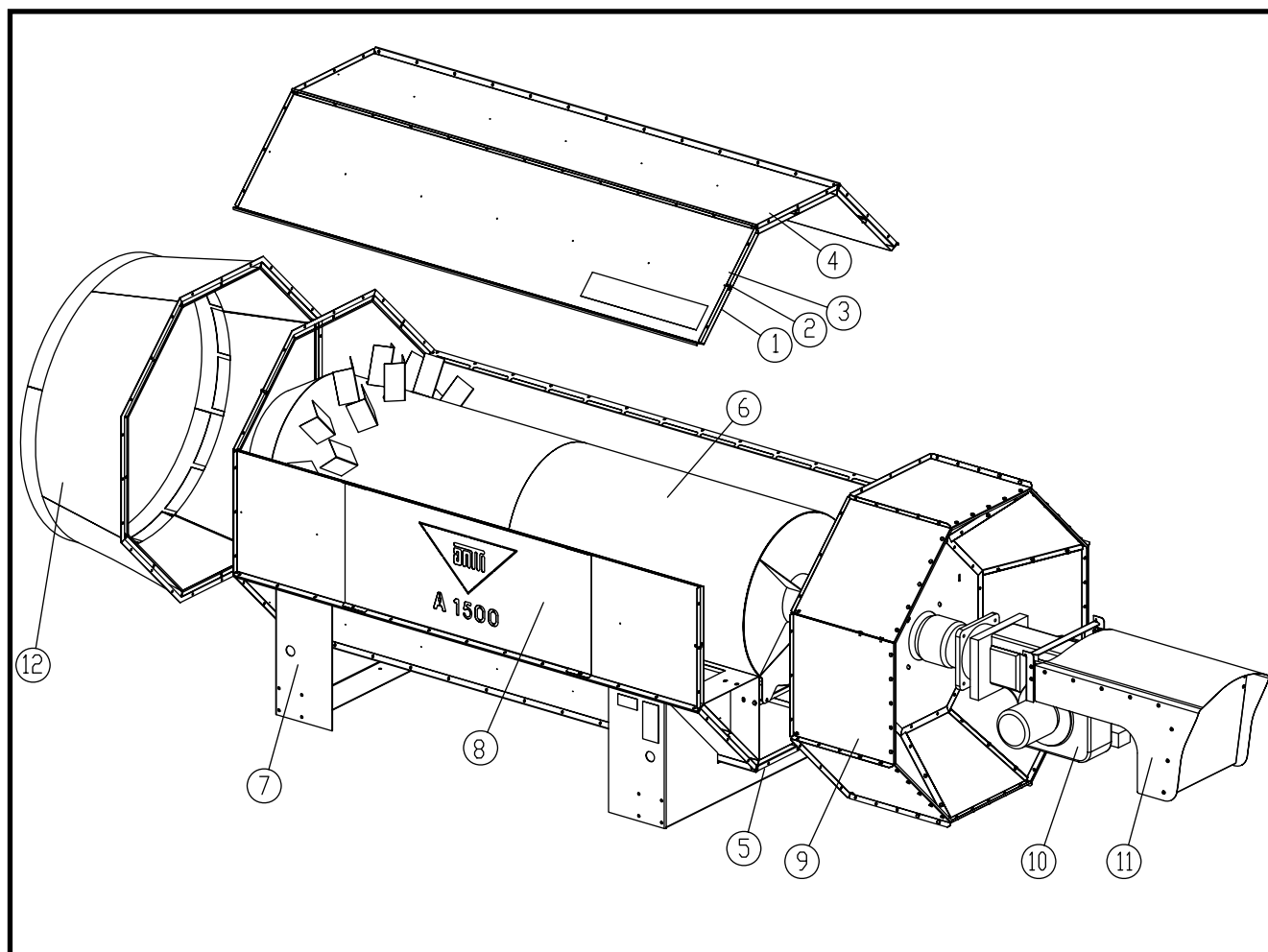
Dryer heater type

This book deals with the Antti A1500 range of gas fuelled, direct driven dryer heaters. Channel burners are available for two different gases; liquid gas and natural gas. The basic components of the two burners are similar. 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.

	ANTTI-TEOLLISUUS OY Koskentie 89, FIN-25340 KANUNKI Tel.Int +358 2 7744700	
KUIVURIUUNI A 1500 DIRECT		CE
MODEL:	A70283 - 0	MAX. NESTEKAASU (LPG): 58,4 m ³ /h
YEAR OF MANUFAC.:	.20	MAX. MAAKAASU (NG): 150 m ³ /h
TOTAL OUTPUT:	1500 kW	VOLUME FLOW Tmax=120°C: 60 000 m ³ /h

PRESENTATION OF THE MACHINE

- The Vacuum Heater A1500 is intended for heating the drying air in a grain dryer. The blower unit, or units, generate(s) an airflow through the heater and the dryer. The maximum temperature of the drying air can be as high as 120°C.
- In the basic set-up, the grain dryer is placed between the heater and the blower, and an air duct is conducted from the heater to the dryer's inlet air channel end. The air flows through the drying sections and via the suction fan in the outlet air channel end into the air duct and further out of the building.
- The dryer heater is delivered in several parts, which comprise the heat exchanger, the outlet cone (can be bought separately), the oil burner, the rain cover for the oil burner and the accessories required for the assembly. In addition, the air pipe must be fixed/the heater must be connected to the dryer. The electric installations of the grain dryer's control centre must be carried out by an electrician. In addition is required a supply/reservoir of gas, and a pipeline from it to the burner, installed in accordance with the regulations.





Part	Item	Denomination		Dwg. no.	Pcs.	Weight
1	A70232	DR HEATER A1500 RADIATION SHIELD		A70232	8	17.1
2	A70700	STRIP FOR DR HEATER A1500 RADIATION SHIELD		A70700	8	1.5
3	A70233	DR HEATER A1500 OUTER JACKET ZN		A70233	6	17.8
4	A70333	DR HEATER A1500 OUTER JACKET ZN UPPER PL		A70333	1	18.2
5	A70334	DR HEATER A1500 OUTER JACKET ZN LOWER PL		A70334	1	17.3
6	A70240	DR HEATER A1500 FURNACE ASSEMBLY		A70240	1	128.1
7	A70251	DR HEATER A1500 BASE		A70251	2	23
8	A70597	DR HEATER A1500 NAMEPLANTTI		A70597	2	5.4
9	A71290	DR HEATER A1500 SUCTION CONE		A71290	1	66.8
10	800074	GAS BURNER A1500 OILON GP 90H			1	63
11	A70238	RAIN COVER BURNER ASSEMBLED A-500 - A-1500		A70238	1	14
12	A70244	OUTLET CONE A1500 FOR D1250 HEATER	accessory	A70244	1	54.4

Suitable gases:

Natural gas:

- for gases of H and E subgroups in the 2nd family (equipment categories I2H and I2E)
- supply pressure (=inlet pressure) to the burner is 20-150/360 mbar (see table)
- temperature of gas when arriving to the gas valve: -15...+40 °C.

Liquid gas

- for gases of subgroup P in the 3rd family (equipment category I3P)
- supply pressure (=inlet pressure) to the burner is 30-150/360 mbar (see table)
- temperature of gas when arriving to the gas valve: 0...+40 °C.

The suitability of the burner for other gases or supply pressures, than the above-mentioned, must be checked with the manufacturer of the burner.

The influence of the inlet pressure of the gas on the capacity range of the burner							
Burner	Gas valve		Capacity range of the burner, kW *)				Max. supply pressure mbar
			Supply pressure of the gas				
	Size of the connection	Type **)	20 mbar	30 mbar	50 mbar	100 mbar	
GP-90 H	1 ½"	MB-ZRDLE 415 B01 S20	350-600	350-650	350-870	350-1200	360
	2"	MB-ZRDLE 415 B01 S20 tai	350-680	350-780	350-1160	350-1500	360
		ZRDLE 420/5 + GS-2011-6210	350-1000	350-1200	350-1500	350-1500	150

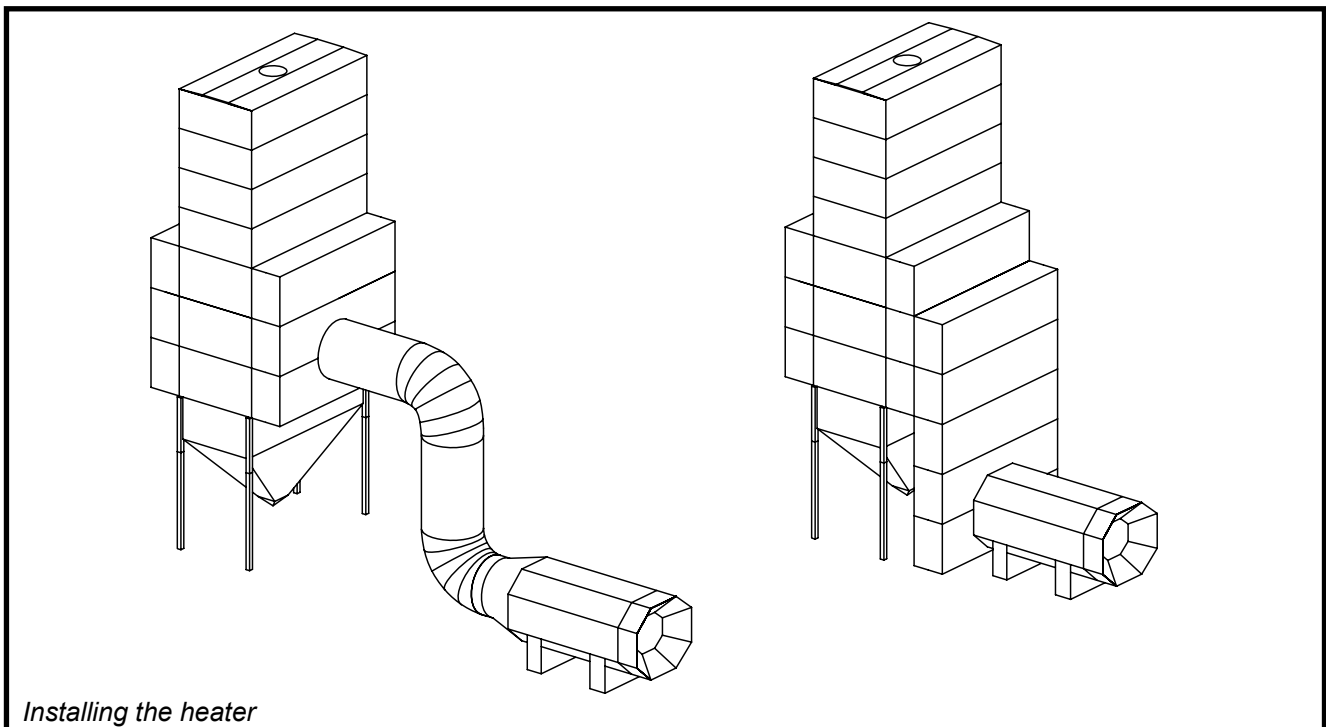
*) The maximum capacities according to the table are achieved, when the counter-pressure of the boiler is 0, and the air pressure is 1013 mbar

**) or equivalent type

PURSUED CONFIGURATION

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

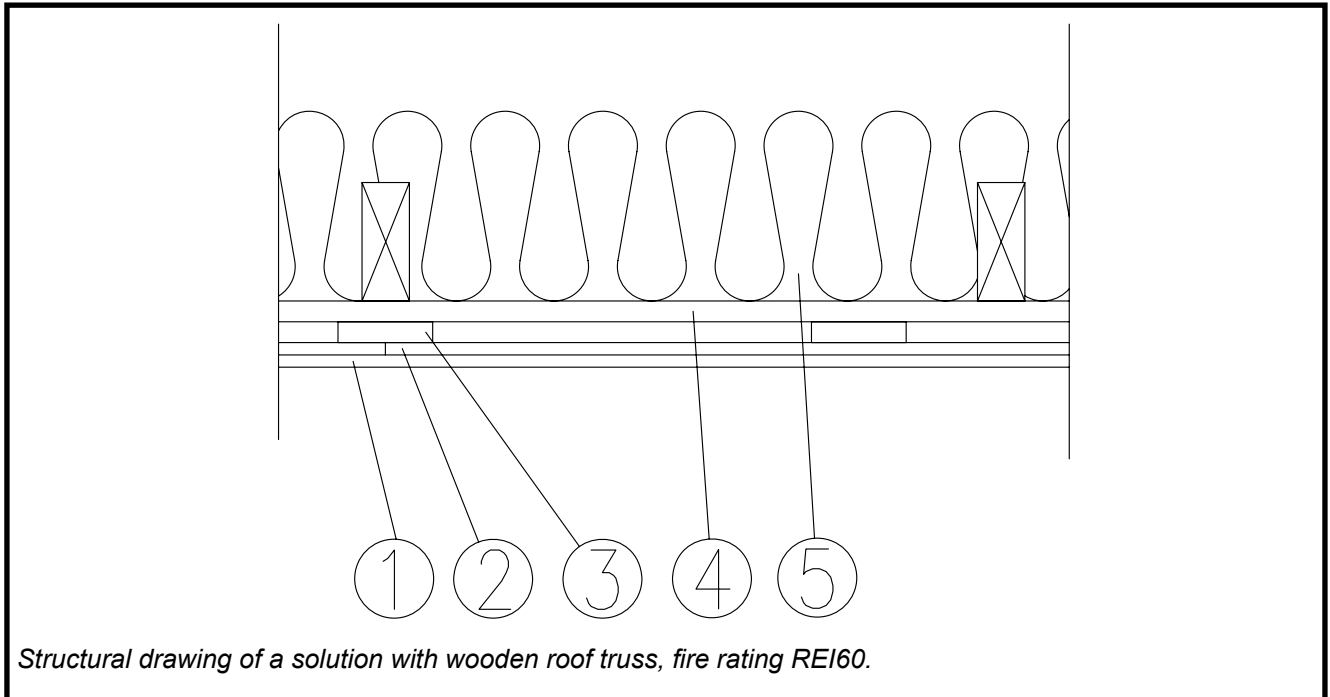
The heater can be placed in such a manner that the air will be conducted through the air duct into the dryer's air channel. Alternatively, the air duct can be extended down to the ground, which makes it possible to connect the heater directly to the dryer.



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 with the outlet air duct or entering of dust or debris into the suction opening of the heater must be prevented by some other means.

The inlet air is heated by means of 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 being met:

- Where a wall of the heater room abuts on the dryer building, this wall must meet the requirements according to class EI60. Structural details that face outward can be of class EI130, and the roof can be of class EI160.
- If the wall of the heater room, that faces the dryer building, is at a distance of at least one (1) metre from this building, the wall can be of class EI30. Note! Also clarify the prerequisites for the door opening, and the sufficient length for the air duct.
- If the heater is protected against rain, it can be installed at a distance of at least three (3) metres from the grain dryer and other buildings. The length of the air duct between the glowing parts of the heater and the air channel end must be 6 metres.



1.	Plasterboard (min 12.5 mm), the seams of the boards must be lapped
2.	Plasterboard (min 12.5 mm), the seams of the boards must be lapped
3.	Studding > 22x45
4.	Studding > 22x45
5.	Rockwool, at least 200 mm

- To ensure sufficient air supply, the front wall of the heater room must be provided with a door or doors. In addition, the front wall must be located in a dust-free area. There must be an even, dust-free area in front of the heater room's air intake door; this area should preferably be concreted and be as wide as the heater room.
- The doors to the heater room must be open during operation.
- The heater room's door opening must be located at a distance of at least 3 metres from any flammable wall of the dryer, and at least 1,5 metres from any non-flammable wall of the dryer.

The above-mentioned distances also apply if an existing dryer is converted to a vacuum dryer. Primarily, the same regulations apply to insulated and sheet-metal-clad StandAlone dryers that are installed out of doors than to silo element dryers that are constructed of steel.



INSTALLATION

Safety instructions and regulations

The installation of the dryer heater must be carried out by a skilled electrician and a gas appliance fitter with relevant authorisations, in the presence of a person, who is familiar with the installation procedure of the dryer machinery. The permissions required for the building work and connecting the gas appliances need to be applied from, for example, the gas supplier. Contact the local building authorities for additional information.

Selecting the installation location

The distance to the other buildings, and location of the debris pipe in the dryer, restrict the selection of the location. The outlet air pipe must be located on the opposite side of the burner, and access of any debris or dust into the suction net must be prevented.

Components to be installed in front of the gas burner

Depending on the requirements and conditions, either all or only part of the following components will be needed:

- pressure gauge before the pressure reducer
- gas meter

The electric and gas installations shall be exclusively assigned to persons with sufficient skills and valid authorisation. The permissions required for the building work and connecting the gas appliances need to be obtained, for example, from the gas supplier. Contact the local building authorities for additional information.

A diagram for connecting the actuators of the burner is delivered with the gas burner. The instructions for connecting them to the control centre of the dryer are delivered with the centre.

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

THE HEATER MUST BE LOCATED IN A PLACE WHERE ENTERING OF DEBRIS IS PREVENTED.

THE BURNER OF THE HEATER MUST ABSOLUTELY BE PROTECTED AGAINST THE RAIN. IF THE BURNER IS NOT PROTECTED, ANTTI-TEOLLISUUS OY WILL NOT ASSUME ANY LIABILITY FOR THE CONSEQUENCES.

Inlet air for the dryer heater must not be routed from inside the heater room, but the room must be equipped with openable doors for this purpose. These doors shall be locked in the open-position during the operation. This is ensured by a limit switch in the door.

Gas reservoir/connection

Consult the local municipal authorities for valid regulations for the gas reservoir and the gas connection. Turn to the supplier of gas for more information.



Lifting the dryer heater in place

- When lifting the heater, observe the following:
 - use all the lifting lugs provided
 - 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 unit to be lifted
- Lift the heater without the burner in the place presented in the installation drawing or plan. Because the foundation must be level and steady by default, there is no need to attach the heater specifically to its bed.

Installing the air ducts

- The air ducts between the dryer heater and the dryer shall be assembled of air duct parts D1250 or the heater shall be connected to the dryer as shown in the picture above.
- Normally, the inlet air duct from the heater will be routed to the lowermost drying sections. The blower unit, or units, shall be installed so that even small batches can be dried.
- The air ducts 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 ducts, make sure that no foreign objects have ended up inside the heater.

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

The maximum effect allowed for the heater is 1,500 kW, which must not be exceeded. The given maximum gas volumes are indicative only. The required volume is affected by the energy content of the gas. Turn to your gas supplier for more detailed information:

Liquid gas	58.4 m ³ /h
Natural gas	150.0 m ³ /h

If you know the energy content of the gas, you will be able to calculate exactly the maximum allowed gas volume.

NOTE! The maximum allowed output of the heater must not be exceeded!



Electric installation

Assign an authorised electrician to all electrical installation work, including installation of thermostats and connections to the control centre of the dryer! The electrician shall issue a certificate of the installation work in writing. Installation instructions of the thermostats and sensors for the electrician (see also Fig. "Location of the thermostats in the dryer"):

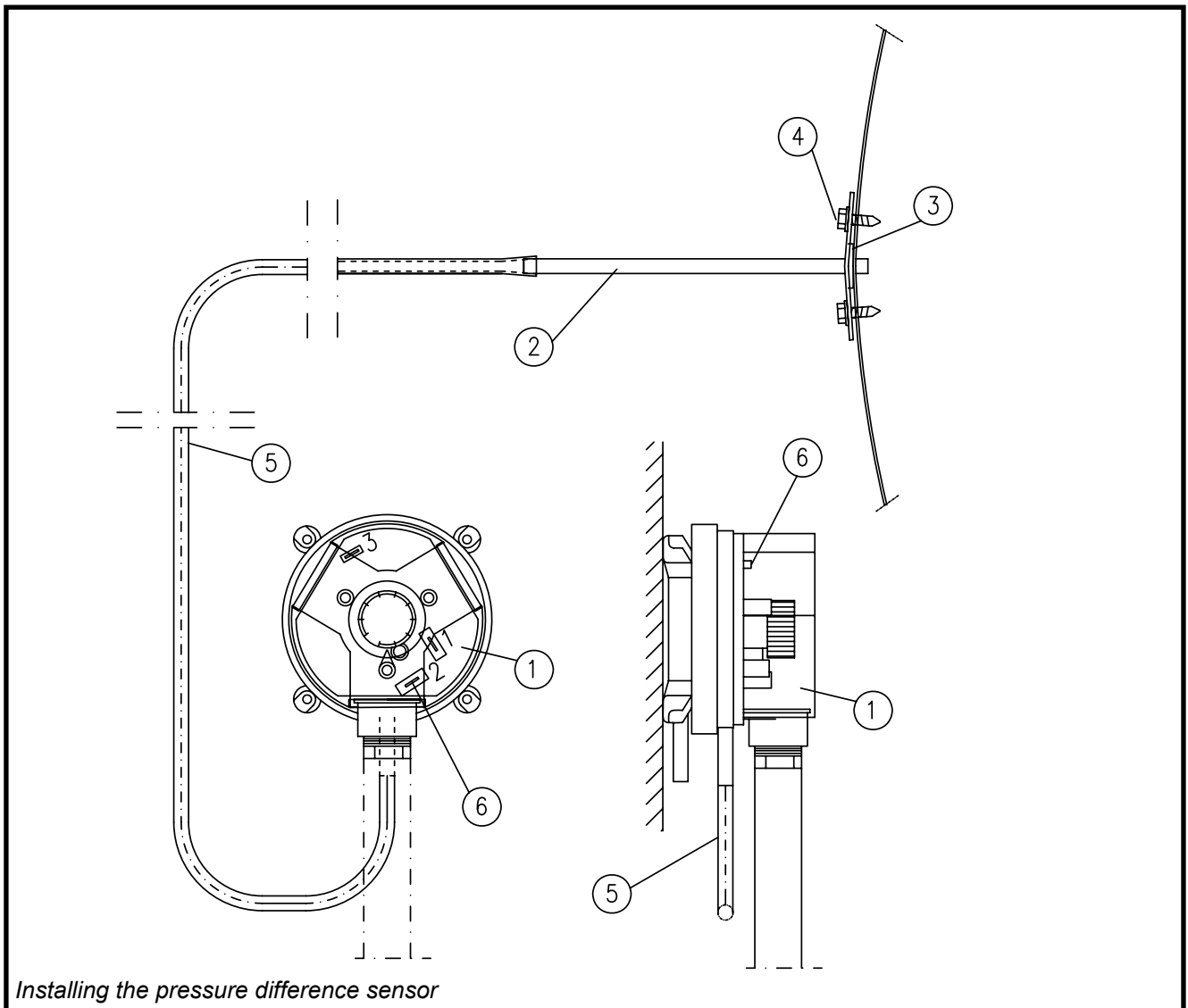
- On the inlet side, the thermostats and the sensor shall be installed in the air duct inside the building (if there is a building) in a straight part of the duct (not near the curves) where the airflow is smooth. Furthermore, there must not be a direct line of vision from the sensors to the rear part of the combustion chamber so that the red glow from the combustion chamber could interfere with the values measured by the thermostats.

If the sensors transmit wrong information, moving one of them to the other side of the duct may help. Hot and cool air have probably not yet mixed completely at this stage. Another option is to measure the true temperature of the drying air and raise the setting of the thermostats from their rated values by the difference between the true and the wrong measurement results (applies to the LTM thermostat).

- If there are more than just one blower, the thermostats and the sensors on the outlet side shall be installed in the lower air duct (as required, the upper blower can be disabled).
- If the heater is located in a heater room, the door to the room must be equipped with a limit switch. The purpose of the limit switch is to ensure sufficient airflow through the heater.
- The electric conductors must be at a distance of at least 50 mm from the surface of the heating pipe so as to avoid risk of overheating.
- Carry out the electric installations of the heater in accordance with the wiring diagrams for the electric centre.

Thermostats and their initial settings:

- Temperature regulator, LTM -thermostat. If you are using the Logic Control Centre, there is no need for a separate LTM thermostat. If the maximum drying temperature of 120°C is applied, the "limit" value for the thermostat must be raised to 150°C, so that the burner will switch off if this temperature for any reason would be attained (in case of malfunction). The standard setting is 110°C and it is intended for standard positive pressure heaters. The thermostat in question also prevents the blowers from stopping until the drying air temperature has dropped to 45°C, i.e. to the "fan" value of the thermostat. There are two discs inside the thermostat for adjusting the "fan" and "limit" settings. The sticker under the screwed lock shows that the terminal block of system 1 are for setting of "limit" etc. Drill a D19 mm hole in the air inlet pipe for the capillary pipe of the thermostat, and insert this pipe inside the air duct and fix it by its holder on the pipe using, for example, self-tapping screws.
- Sensor for drying air temperature (sensor for the 2nd flame). Drill a 10.5 mm hole in the inlet air pipe. Thread in the thermostat sensor into the D8x1 nylon pipe, L=150 mm, so that about half of the sensor's tip remains visible. Place a lead-through rubber ring on the nylon pipe and fix the assembly to the pipe by means of the lead-through rubber ring. The sensor must be inserted about 100 mm into the air pipe. See picture on the next page.
- The purpose of the pressure difference sensor is to monitor that the air flows through the heater and does not take any other route of lower resistance. Therefore, it must not be installed anywhere else than in the inlet air pipe after the heater.

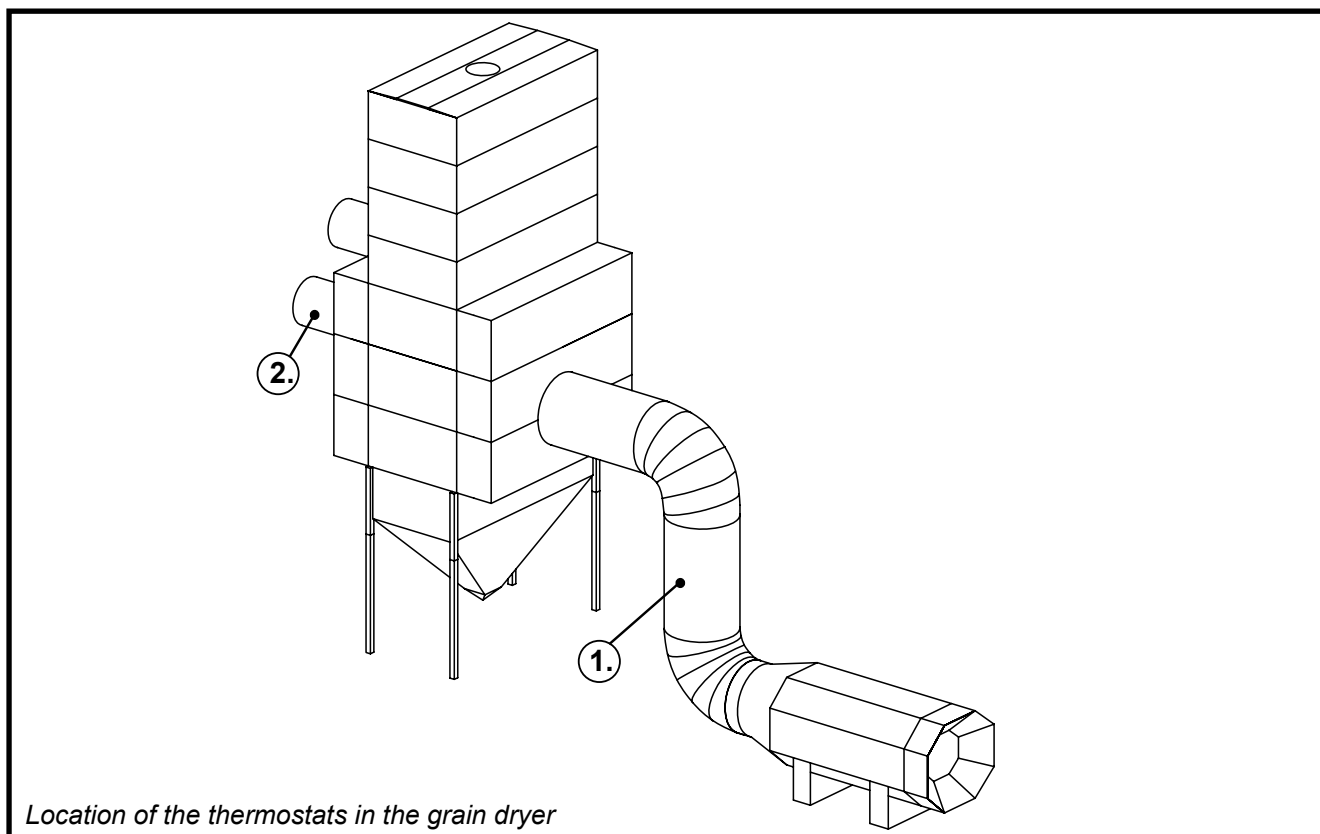


Installing the pressure difference sensor

Fix the pressure difference gauge and the control unit “clock” on the wall. Ensure that the cover plug has been removed from the pipe sleeve closest to the wall. Connect the PVC hose to the outlet sleeve for the pipe farther away from the wall (see picture). You can cut the hose to a suitable length, fix it to the lead-through sleeve and fix the sleeve to the air pipe using self-tapping screws (see the picture below). Do not forget to place a neoprene washer between the pipe and the lead-through sleeve. Insulated Abico connectors for electric connection to the poles 2 and 3 are included in the delivery. Adjust the pressure by turning the disc in the middle of the “clock”. Adjust the pressure to a value where the change-over switch will operate at the smallest possible airflow. If the change-over switch does not operate, the oil burner will not start.

- The purpose of the outlet air thermostat is to interrupt the drying process as soon as the outlet air temperature reaches the desired value. The sensor shall be installed in the lower outlet air pipe. Normally 35-50°C; depending on the variety being dried and the drying temperature applied. If you apply drying temperatures higher than normally, the cut-off temperature will also be higher than normally. Install the sensor inside the pipe in the same manner as the drying air sensor, mentioned above in this manual.

- 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 included in the axial blower delivery. A fire thermostat shall be installed in every outlet pipe of the blower. Normally, the thermostat is adjusted to 60°C. The thermostat comes with a 2m-long capillary pipe that makes it possible to install the thermostat box in a location with easy access. The manually operated reset button at the side of the thermostat box must always be reset after the temperature has risen to the switch-off limit. During normal operation the temperature never rises to such a high value. This may occur exceptionally, for example, when the dryer is being test run empty whereupon the temperature may easily rise to its pre-set switch-off value.



- | | |
|--|--|
| <p>1.</p> <ul style="list-style-type: none"> - Sensor PTC for the drying air temperature (sensor for the 2nd flame) - LTM thermostat (not to be installed if the dryer is equipped with Logicontrol) - Pressure difference sensor - Constant temperature sensor (optional) <p>On the inlet side, the sensors shall be installed in the air pipe inside the building, in a straight part of the pipe (not near curves). Also ensure, that there is no direct line of vision from the sensors to the rear part of the combustion chamber. The heat radiation from the chamber transmits wrong measurement results to the thermostats.</p> | <p>2.</p> <ul style="list-style-type: none"> - Outlet air thermostat PTC - Fire thermostat <p>If there are two blowers, the sensors on the outlet side shall be installed in the lower air pipe (if necessary, the upper blower can be disabled).</p> |
|--|--|



To be observed before starting the operation

- 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.
- Gas is being supplied to the burner.
- There are no objects in the heater room that do not belong there.
- That exclusively clean air is sucked through the heater.
- The shut-off valves in the oil pipes are in the open-position.
- 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 the drying process.
- Make sure that the slab in front and at both sides of the suction nets of the heater is clean and, for example, the wind cannot blow debris or withered plants near to the suction cone opening of the heater.

OPERATING INSTRUCTIONS FOR THE DRYER HEATER

Adjusting the output

- In dryers equipped with axial blowers, the drying air flow is restricted, as necessary, by means of the adjuster in the outlet air channel, which provides the blower with replacement air.
In dryers equipped with radial blowers, the drying air flow is restricted, as necessary, by means of the adjustment flap in the outlet air pipes. The flap shall be located between the dryer and the blower.
- Adjust the drying air temperature to the desired value by changing the setting of the 2-stage digital thermostat. In digital control centres, the adjustment is carried out using the set-up buttons for the digital thermostat. In the Logicontrol centres the adjustment is carried out in the "settings" menu using the programming terminal for the logic. NOTE. In the Logicontrol centres the settings of the Eliwell digital displays must not be changed, as they can only be used for reading the temperature prevailing inside the channel.
- In the 2-stage burner, the flow of burning air is automatically adjusted so that it corresponds to the consumption of oil (in accordance with the linear adjustment, carried out during installation of the burner).

WARNING! Before opening the burner, make sure that it is tensionless. High tension inside the burner. Risk of fatal electric shock.

- When passing from the drying stage to the cooling stage after the drying, the 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 via its own operating switch before the heater has cooled down below the "fan" temperature of the LTM thermostat (nor shall the heater blower be switched off from the main switch until the heater has cooled down).



SERVICING

Annual service

- To ensure reliable operation, clean the ignition points and check the adjustment.
- Check the position, condition and cleanliness of the flame detector.
- Clean the filters.
- Check the gas piping/appliances for tightness.
- Remove any dust or damp, and keep the burner clean.
- It is advisable to service the burner once a year, and check its burning characteristics using a flue gas analyser.
- Check using a flash light before every drying season, that there are no nests of mice, rats or birds inside the heater, between the surfaces of the heat exchanger, which might constitute a fire hazard.
- Ensure that the inlet air piping of the dryer is clean. Some runoff of grain may have occurred from the dryer during the filling phase.
- Always test the operation of the limit switch on the heater room door before the start of the drying season.

Maintenance during the operation

- If all the annual services have been carried out carefully, the dryer heater will only require a visual check daily during the operating season. Even if the operation of the heater is controlled via the electric centre of the dryer, it is advisable to go, look and listen a few times a day that the operation of the heater is normal.

GUARANTEE

The guarantee period for the Antti-heaters runs for one (1) operating season. A five-year guarantee is granted to the fire surfaces of the heater. The guarantee covers defects in material and workmanship. Separate guarantee terms issued by the manufacturer apply to the oil burner.

A prerequisite for validity of the guarantee is that the instructions issued by the manufacturer and the valid regulations have been followed during installation, use and service of the dryer heater.

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



POSSIBLE MALFUNCTIONS IN THE GAS BURNER

In case of malfunction, check first the following:

1. Is the supply of control and mains voltage to the burner OK?
2. Is the possible leak tester in working order (is the yellow signal light illuminated)?
3. Are the settings of the adjustment and operating controls OK?
4. Are the safety devices in normal working mode?
5. Is the fuel supply to the burner OK? Are the valves in the gas pipeline open? Is the pressure in the gas pipeline sufficient?

If the cause of the malfunction is none of the above-mentioned, check the functions related to the burner. If the control unit is locked resulting from a malfunction (the signal light is illuminated), reset the locking. The burner starts as soon as the step switch of the control unit has been turned into its initial position, and all the other prerequisites for a successful start are met ("Burner automation, description of operation"). Follow the operation of the burner. The symbol of the program indicator of the control unit is an indication of the possible fault type (see "Indication of malfunction and control programme"). You can use measuring instruments for fault finding.

Symptoms	Possible cause	Remedy
1. Motor		
The motor of the burner does not start (symbol ◀)	Current circuit broken	Clear up the break
	Thermal relay has tripped or is faulty	Check the setting, reset or replace
	Fuse has tripped	Reset or replace
	Motor contact faulty	Replace
	Motor faulty	Replace the motor
	Break in the motor's control circuit: - faulty control unit - faulty setting of the cam wheel for the adjustment motor's air adjustment plate - faulty adjustment motor	Replace the relay Fix the setting Replace the motor
2. Low air pressure		
The burner motor starts, but stops abruptly during pre-ventilation or after that (symbol P)	Faulty setting of the air differential pressure switch	Check the setting, repair as required
	The impulse hose(s) for the air differential pressure switch dirty	Clean the hose(s)
	Faulty air differential pressure switch	Replace
	Soiled blower	Clean



Symptoms	Possible cause	Remedy
3. Ignition fault		
The burner motor starts, the control voltage supply from the control unit to the ignition transformer has been switched on. No ignition occurs, and after a short while, a rapid shut-off takes place (symbol 1.) The burner motor starts, the control voltage supply from the control unit to the ignition transformer has not been switched on. No ignition occurs, and after a short while, a rapid shut-off takes place (symbol 1.)	Soiled or worn ignition points, damaged insulation	Clean or replace
	Point clearance too high	Adjust according to the instructions
	Damaged ignition cord	Replace
	Faulty ignition transformer	Replace
	Faulty control unit	Replace
	The supply plug of the ignition transformer has come loose or damaged	Connect or replace
4. No flame is formed		
The burner motor starts, ignition spark is formed, after a short while, a rapid shut-off takes place (symbol 2.)	Gas valve does not open: - break in the control circuit - faulty actuator - damaged conductor	Clear up the reason for the break (see Circuit diagram) Replace the damaged part
	Faulty gas flow setting	Adjust
5. A break after the flame has formed		
Flame is formed. A shut-off occurs (gas pressure switch, min.), followed by a restart – or when the burner steps up to the 2nd stage – the operation stops (gas pressure switch, min.), and a restart follows.	Gas pressure too low: - pressure regulator not operational	Repair or replace the regulator
	Clogged filter	Clean the filter
	Setting of the gas pressure switch (min.) faulty	Adjust



Symptoms	Possible cause	Remedy
6. Malfunction caused by the flame detection (=rapid shut-off)		
The burner motor starts, flame is formed, then a rapid shut-off takes place (symbol 1.)	Faulty position of the flame detector	Correct the position
	Soiled flame detector	Clean
	Too vague flame (light)	Check the settings of the burner
	Faulty flame detector	Replace
	Faulty control unit	Replace
Rapid shut-off during pre-ventilation (■)	Faulty flame detector	Replace
	Faulty control unit	Replace
Rapid shut-off during stopping phase (◀)	Faulty or outdated flame detector	Replace
	Faulty control unit	Replace
7. Rapid shut-off during stopping phase		
The flame does not go out	Gas valves are leaking	Replace
8. Burner head		
Flame baffle has burned		Replace flame baffle as required
	Distance between the nozzle and the flame baffle wrong	Readjust
	Faulty combustion air setting	Adjust
	Insufficient air supply into the heater room	Increase the air supply
	Output on 1st stage too low	Adjust Increase the gas flow
	Too low flow rate of combustion air: - faulty adjustment ring position	Adjust
9. Malfunction of leak tester		
Burner does not start.	See point "Leak tester" in the burner manual	
Red signal light is illuminated	Leak tester is faulty	Replace
	Gas valve is leaking	Replace



EU Declaration of Conformity

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declares that

ANTTI VACBOOST M09 A1500 - DRYER HEATER
(Gas-fuelled heater, direct driven)

conforms with the provisions of the following directives:

- Machine Directive 2006/42/EC
- Low Voltage Directive 2006/95/EC
- Electro-Magnetic Compatibility Directive (EMC) 2004/108/EC

Kuusioki 11.05.2009

Kalle Isotalo
Managing Director

