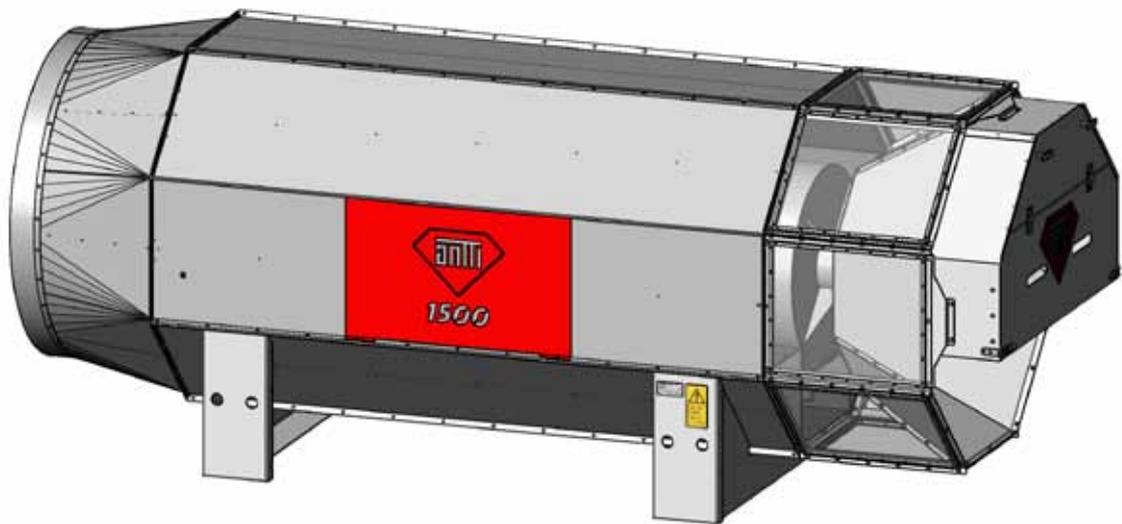


Installation and Operating Instructions

ANTTI DRYER HEATER
(Gas-fuelled heater, direct driven)
VACBOOST 800, 1500, 2200, 3000

408102 (en) 02-2023



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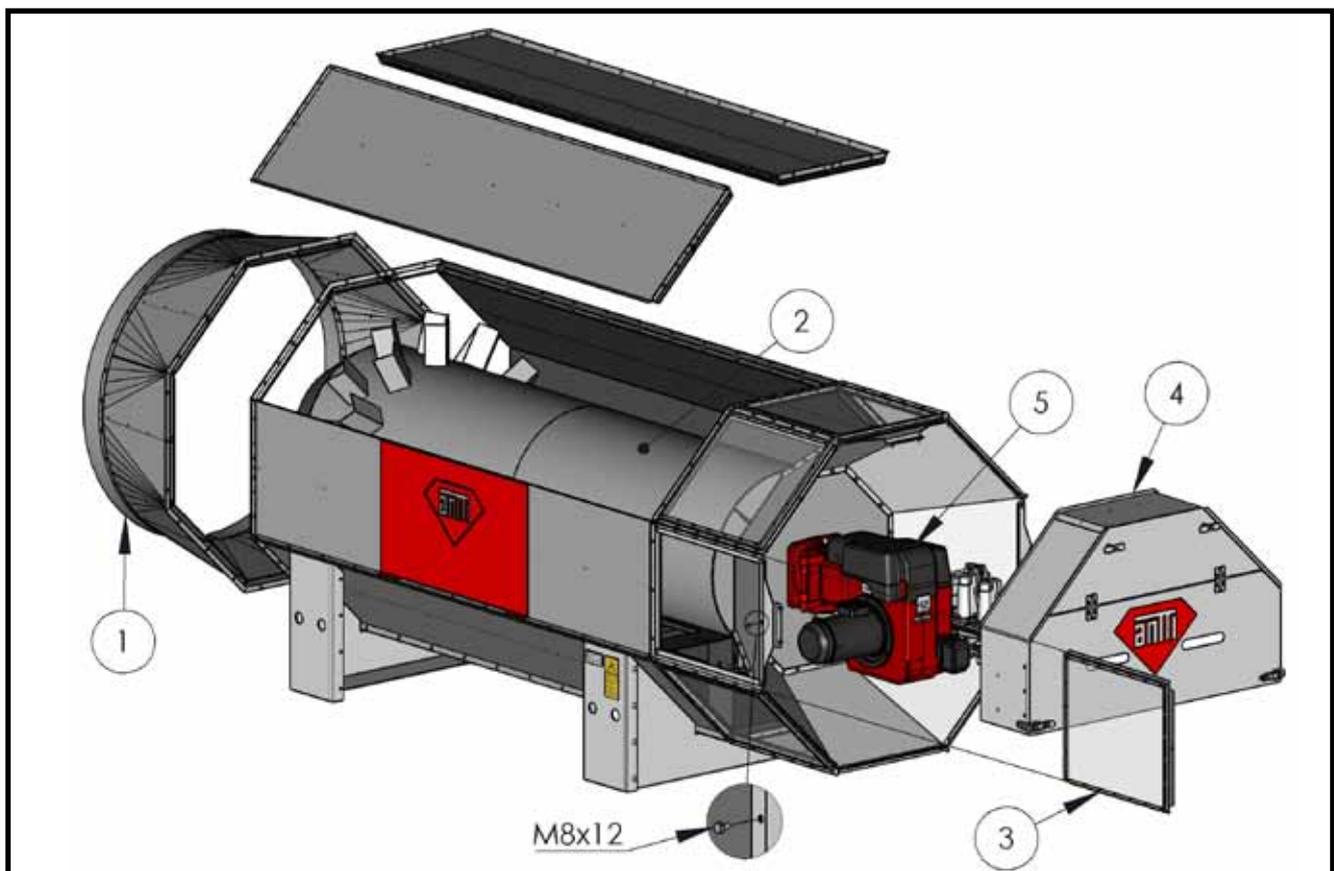
Dryer heater type

This book focuses on the ANTTI model series of direct-fired gas-fuelled dryer-heaters. 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		CE
MODEL:		MAX. NESTEKAASU (LPG): m ³ /h
YEAR OF MANUFAC.:	.20	MAX. MAAKAASU (NG): m ³ /h
TOTAL OUTPUT:	00 kW	VOLUME FLOW Tmax=120°C: 000 m ³ /h

PRESENTATION OF THE MACHINE

- The Vacuum Heater 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 assembled, the gas burner is attached to the heater. In addition, the air pipe must be fixed. 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.
- The suction cone includes eight net elements, which may be removed for cleaning of the net. Loosen first the M12x12 screw on the net element (1 screw/element), and after that, remove the element by sliding it in the direction shown by the arrow.





Part		Heater			
		800	1500	2200	3000
1	Outlet cone, item and pipe size	A77244 D1000	A70244 D1250	A75429 D1250	A75429 D1600
2	Furnace, item	A77227	A70240	A75411	A75411
3	Suction net, removable, item	A76463	A76463	-	-
4	Rain cover				
5	Burner				

Suitable gases:

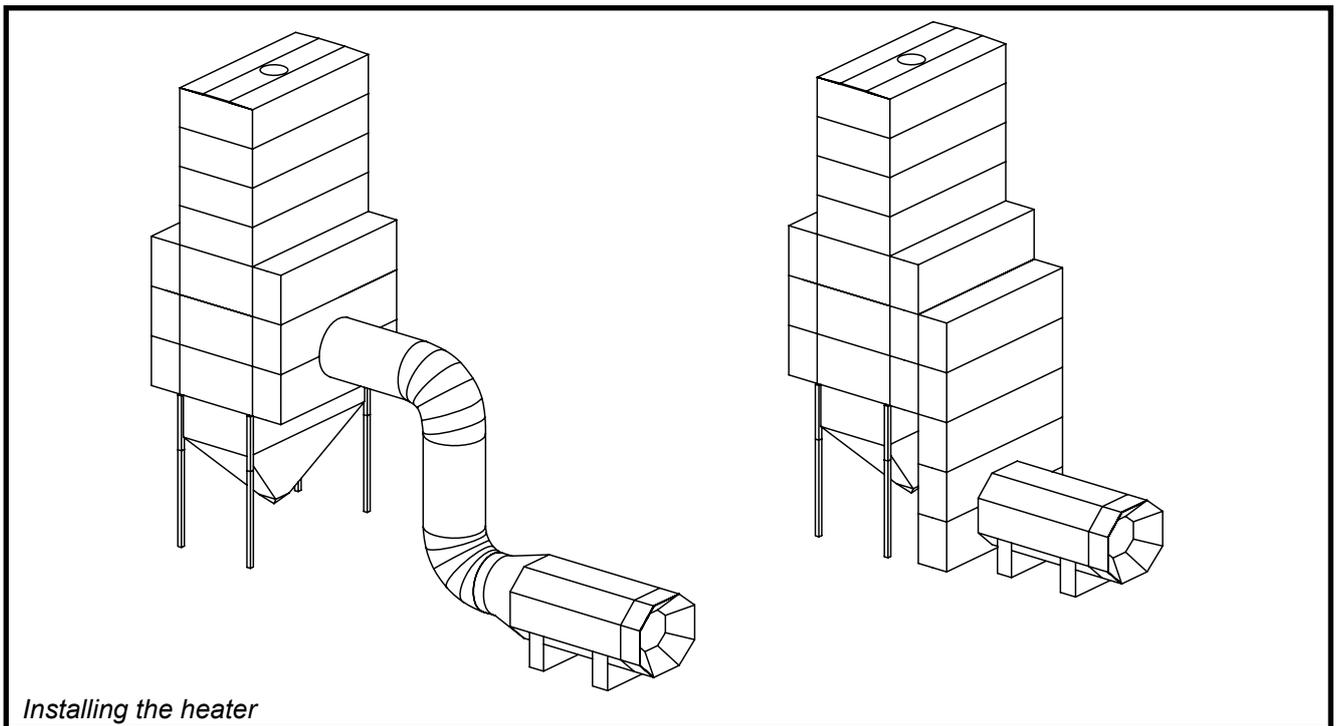
Check the applicable gases and pressure levels in the burner manual.



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.





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.

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.

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



For a gas heater, the heater room must be provided with an opening of at least 2 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.

To ensure unobstructed flow of inlet air, you must provide sufficient free space at the sides and above the suction nets of the heater. (see picture on the page11)

The burner shall be provided with an unobstructed supply of combustion air at all times. The distance from the burner's rear part to the doorway must be less than 0.5 m.

The area of the suction air openings for the gas-fuelled heater for dimensioning the opening in the heater room:

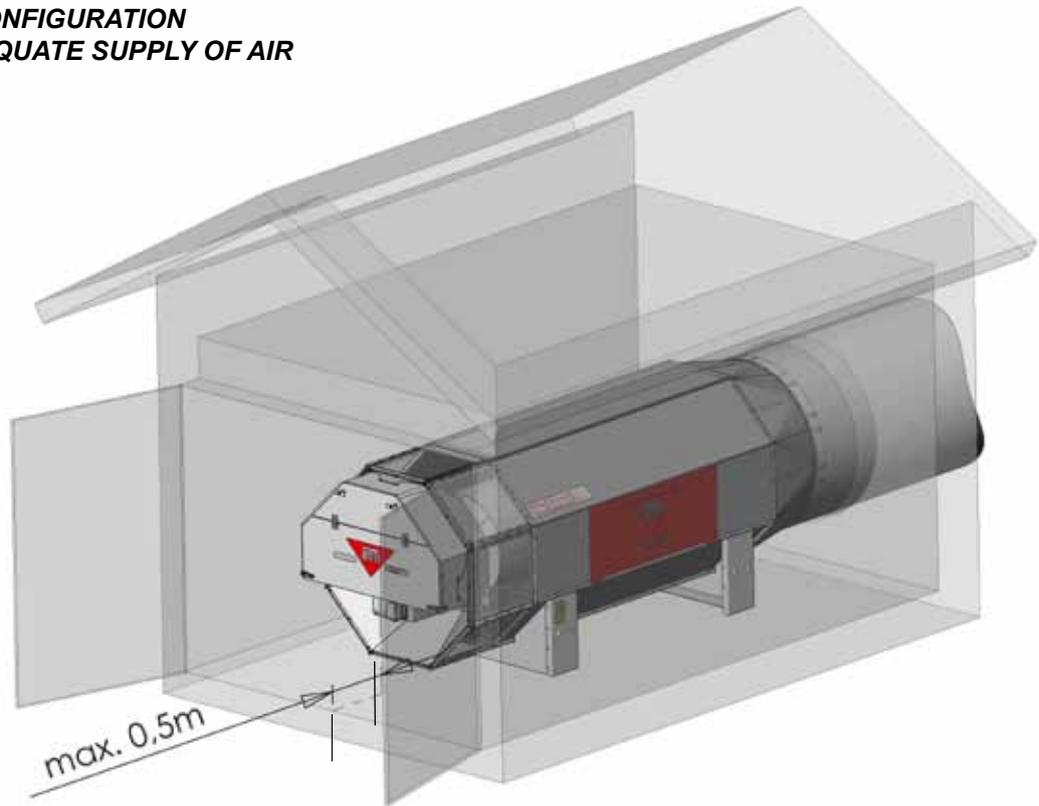
The heater 400-1500 kW:

- Area of the suction air opening for the heater 2.3 m²
- Size of the opening in the heater room: at least 4,6 m²

The heater 1500-3000 kW:

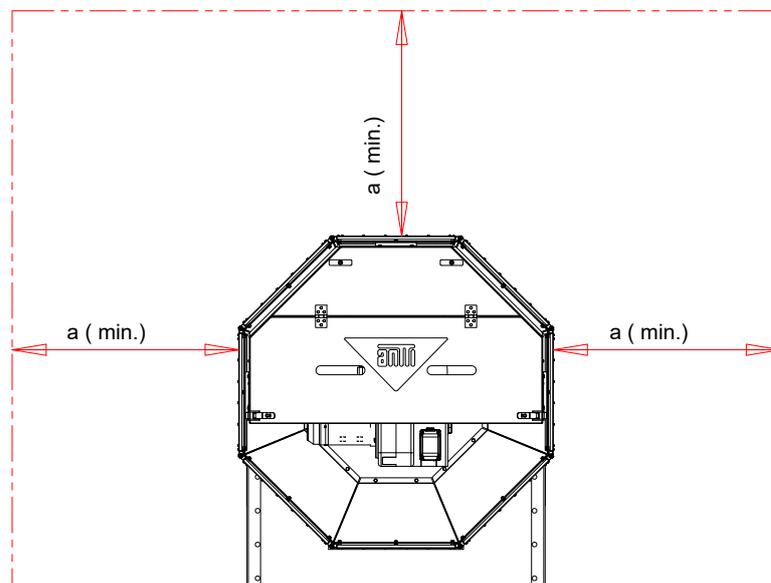
- Area of the suction air opening for the heater 4.9 m²
- Size of the opening in the heater room: at least 9,8 m²

**AN EXAMPLE CONFIGURATION
PROVIDING ADEQUATE SUPPLY OF AIR**



Minimum distance to the structures at the suction nets of the heater

	Output of the heater	
	400-1500 kW	1500-3000 kW
a (min.)	0,5m	1,0m





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.
- 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 power of the heater is indicated on its nameplate. The maximum power of the heater must not be exceeded.

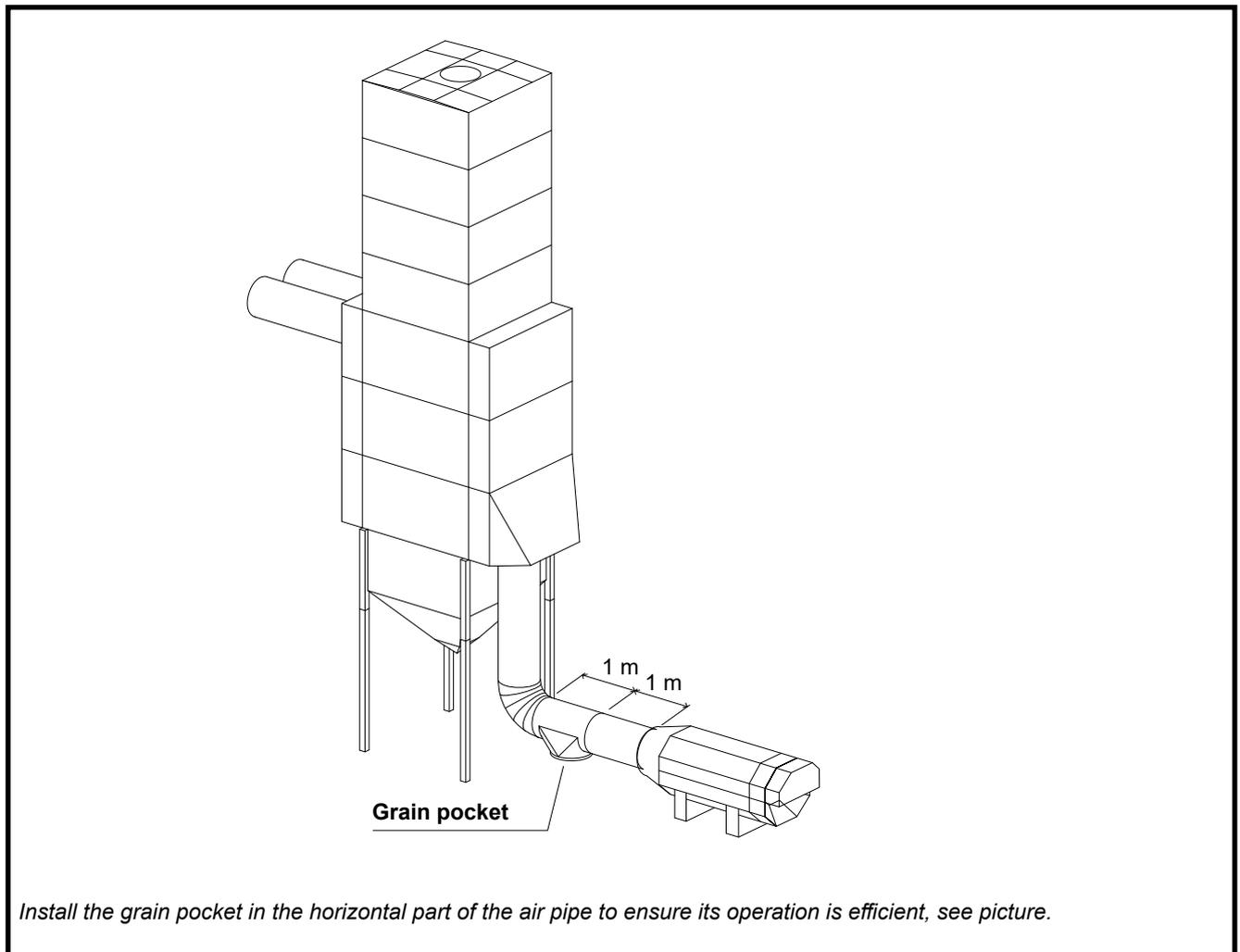
The given maximum gas volumes are indicative only. The required volume is affected by the energy content of the gas. Turn to your gas supplier for more detailed information:

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!

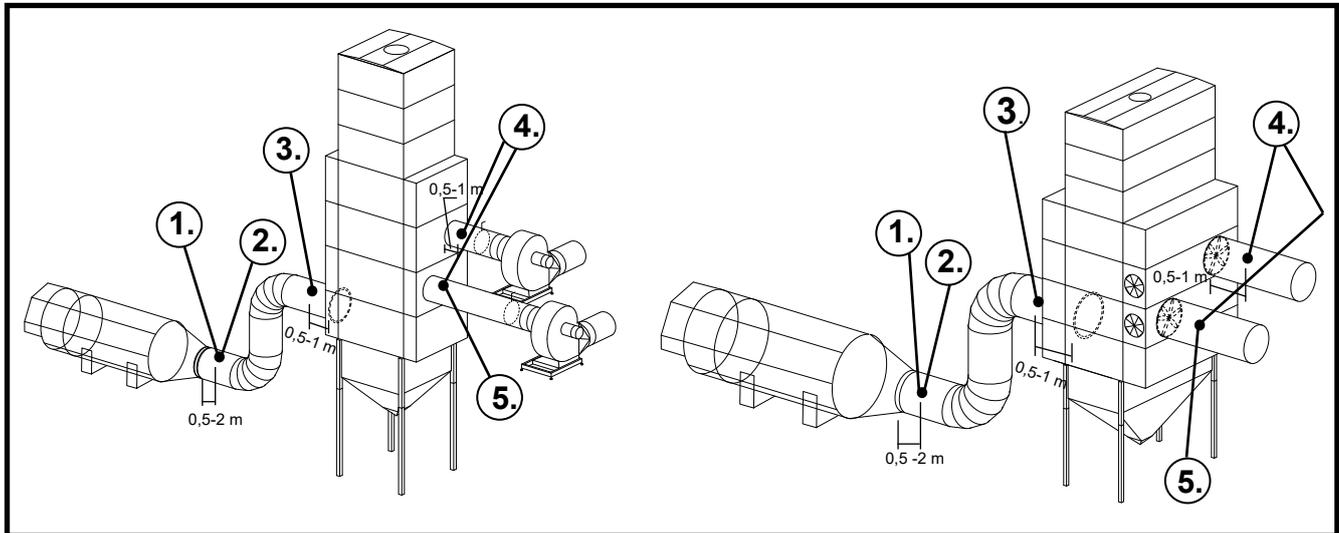
Grain pocket in the air pipe

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.



Install the grain pocket in the horizontal part of the air pipe to ensure its operation is efficient, see picture.

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).

Installing the temperature measuring facility

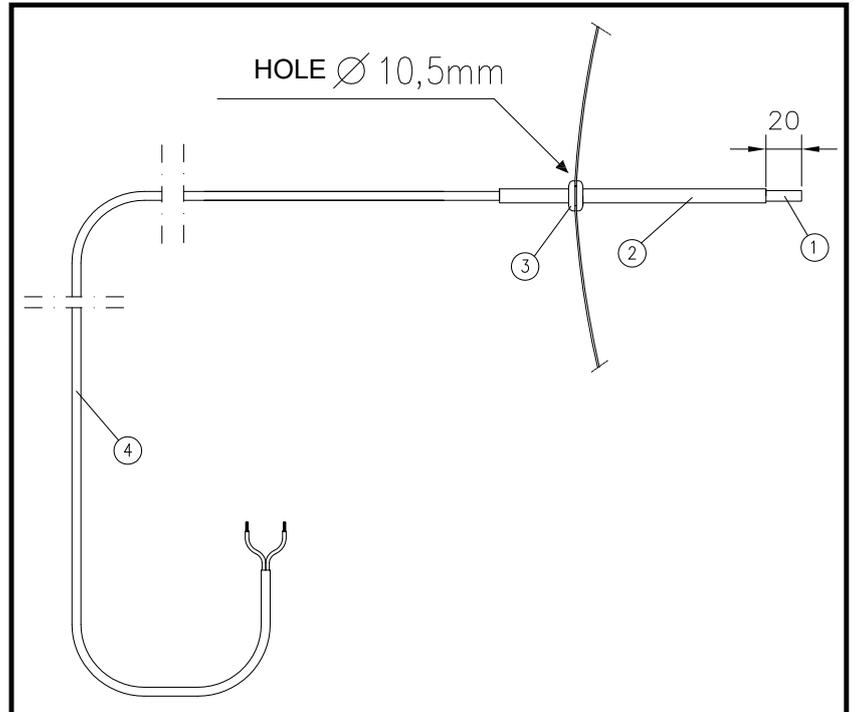
The type of temperature measuring facility depends on the configuration of the machinery. The measuring of the temperature can be realised, either by means of a PTC-sensor or a temperature transmitter.

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.

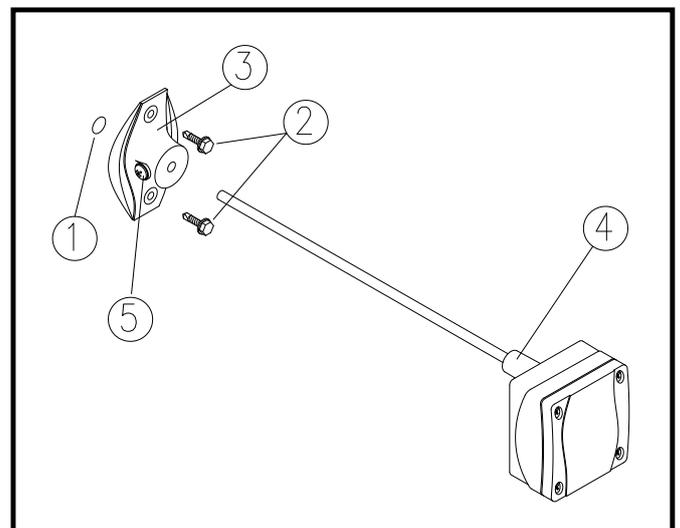
Drill a hole of 10.5 mm in the air pipe, and install the lead-through gasket (3) in it.

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).



Installing the vacuum sensor

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

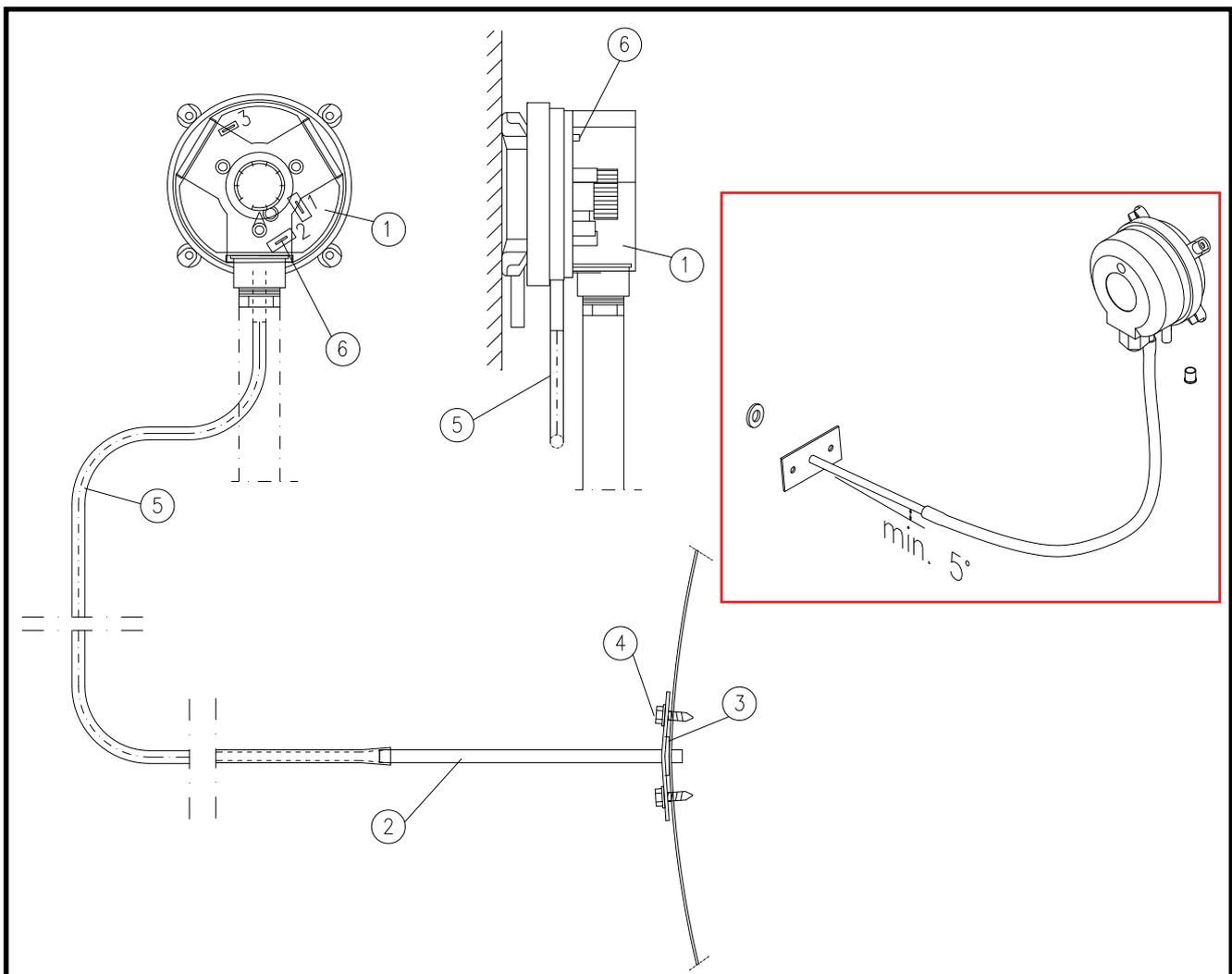
Drill an 8 mm hole in the air pipe for the lead-through sleeve. Fix the lead-through sleeve using self-tapping screws (4). Do not forget to place the rubber washer (3) between the pipe and the lead-through sleeve.

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.



Installing the fire thermostat

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.

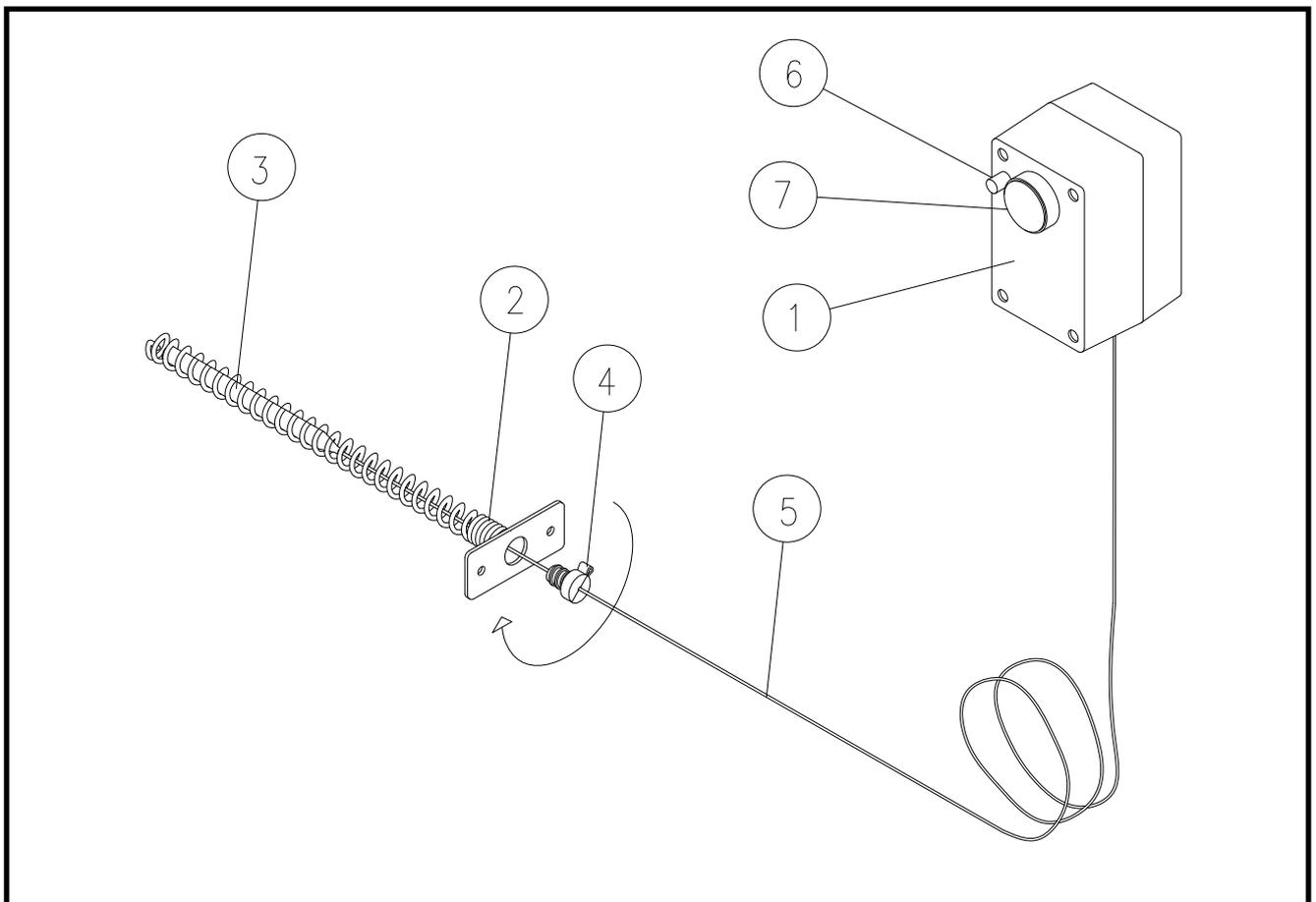
Push the feeler (3) of the thermostat's capillary pipe (5) into the sensor's holder, and lock it by clamping the locking collar (4) on the capillary pipe and twisting it into the holder.

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 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

- In dryers equipped with axial blowers, the drying air flow is restricted, as necessary, by reducing the rotation speed of the blower by means of a frequency converter.
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.

**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.
- Clean the nets of the suction cone of the gas-fuelled heater.

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.
- As required, clean the nets of the suction cone of the gas-fuelled heater (see page 4)

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 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. 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.



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.)	Soiled or worn ignition points, damaged insulation	Clean or replace
	Point clearance too high	Adjust according to the instructions
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.)	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
Rapid shut-off during pre-ventilation (■)	Faulty control unit	Replace
	Faulty flame detector	Replace
Rapid shut-off during stopping phase (◀)	Faulty control unit	Replace
	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. Red signal light is illuminated	See point "Leak tester" in the burner manual	
	Leak tester is faulty	Replace
	Gas valve is leaking	Replace



EU Declaration of Conformity

ANTTI-TEOLLISUUS OY
Koskentie 89
FI-25340 KANUNKI
Tel.: +358 (0)2 7744700

declares that

ANTTI VACBOOST- HEATERS 800, 1500, 2200, 3000
(Gas-fuelled heater, direct driven)

conforms with the provisions of the following directives:

- Machine Directive 2006/42/EC

Salo 10.02.2023

Kalle Isotalo
Managing Director