



# **ANTTI-HEATERS**

**(Positive pressure heaters)**

**A170, A190, A250, A330 and A400**

## **Instructions for Installation and Use**

**408020(en)**

### **ANTTI-TEOLLISUUS OY**

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# Anti-heaters



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**Read carefully the Installation and Instruction Manual before installation and putting the machine into operation**

## **Instruction Manual and the Use of the Machine**

This manual is intended for professional farmers. The use of the machine requires normal skills and general knowledge of farming.

## **Heater Type**

This booklet gives information on the installation and operation of A170 - A400 heaters. Information of the type of your heater is stamped on the name plate on the side of the machine. To get prompt assistance in the case of operational disturbances, and to simplify ordering of spare parts always notify the seller and the service personnel of the data given on the name plate. To make this data available whenever required write it down in the corresponding place in the picture printed on this page.

<b>ANTTI-AUTOMATIC</b>		CE	
<b>KUIVURIUUNI HEATER</b>			
Tyyppi Type	<input type="text"/>	Valm.vuosi Manufacture year	<input type="text"/>
SM paloluokitus No Fire classification Nr	<input type="text"/>	Valm.No Manufacture Nr	<input type="text"/>
Max. öljynkulutus Kg/h Max. oil consumption Kg/h	<input type="text"/>	Polttoaine Fuel	<input type="text"/> Pö No1 Light oil
ANTTI-TEOLLISUUS OY Koskentie 89 FIN-25340 KANUNKI KUUSJOKI		Puh. 02-7744 700 Tel. int +358 2 7744 700	

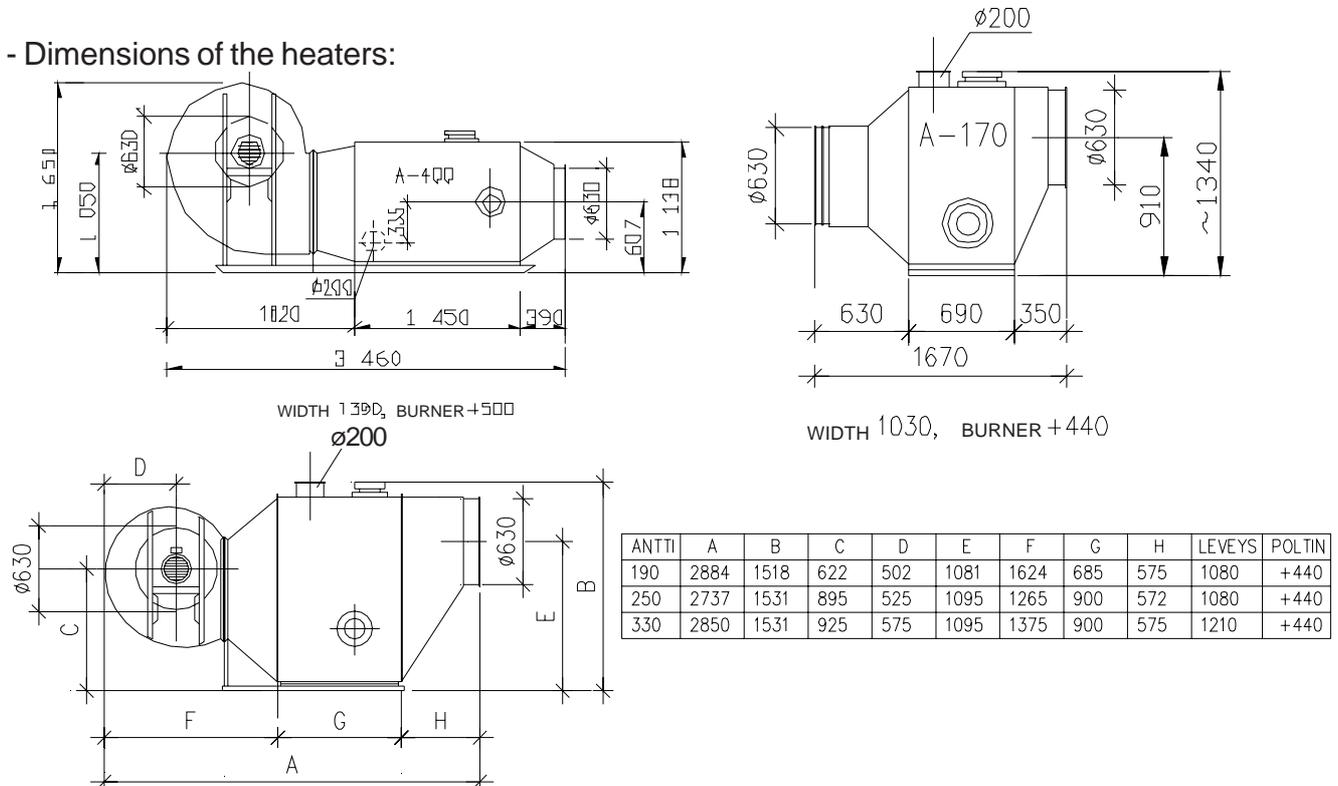
## INTRODUCTION

- The heater is designed for heating the drying air and blowing it under pressure through the hot air dryer.
- The delivery of the heater includes the fan with electric motor, the combustion chamber, the heat exchanger and the frame structure. In connection with the installation the heater is equipped with the oil burner, thermostats and piping. The required electric cabling is connected in the electric centre. In addition to this is required a tank for light-oil and a pipeline from the oil tank to the burner, which fulfils the valid regulations.
- The noise emission by heater type in the heater room is:

A170	86 dB		
A190	85 dB	A250	91 dB
A330	91 dB	A400	92 dB

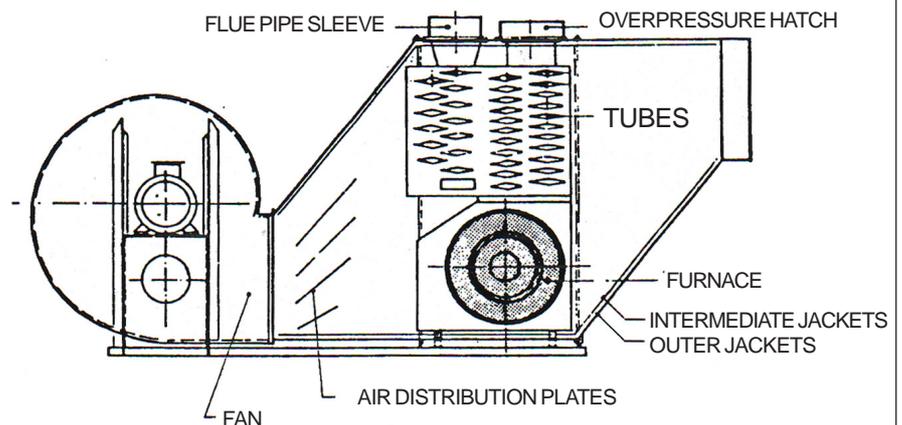
**NOTE!** Always use hearing protectors when entering the heater room when the heater is in operation!

- Dimensions of the heaters:



**Note!** The heaters are available for both right and left-handed fan and burner installations.

- Structure of the heater:



# Antti-heaters

## INSTALLATION

The installation of the heater requires an authorised professional electrician and an oil burner expert, as well as a person who is familiar with the installation of dryer machinery.

The heater must be placed in a room which meets the regulations A:47 issued by the Rescue Department of the Ministry of Internal Affairs; or, covered from the rain, at a distance of at least four (4) metres from the dryer building and other buildings.

When choosing the location for the heater has to be taken into account that the intake air for the heater and the burner has to be clean. The air intake of the heater and the outlet air pipes of the drying machinery must be placed on the opposite sides of the building.

### **Note! Waste in suction air is a fire hazard!**

The suction air for the heater must not be taken from inside the heater room but through a special pipe which is led from the suction opening of the heater fan to the outside air.

Two (2) openings of at least 600 cm<sup>2</sup> in size both fitted with a safety net must be furnished for the combustion air and the ventilation of the burner. One of the openings must be located in the upper part of the heater room and the other one in the lower part of the heater room.

The heater room of a heater which burns more than 30 kg/h of oil must be equipped with forced ventilation working on the overpressure principle (the prefabricated, steel element heater rooms does not require a ventilation fan).

### Oil Tank

It is advisable to install the standard oil tank on a concrete slab. A tank with maximum volume of 15 mm<sup>3</sup> may be located at a distance of 1 m from the building. The tank can also be located in a separate bunker. Consult the local municipal authorities for valid regulations.

The oil tank must be installed approximately on the same level with the heater (maximum permissible height difference is ±3.5 m).

Consult the municipal authorities for regulations concerning larger oil tanks.

### 1. Lifting the Heater in place

#### - Note when lifting the heater:

- That all lugs in the heater are in use.
- Make sure that the lifting gear will remain in position in the lugs.
- Only use lifting machines with sufficient power.
- Never go under or too near the heater to be lifted.

- Weights of the heaters:

Type	Weight kg	Type	Weight kg
		A250	530
A170	380	A330	575
A190	465	A400	690

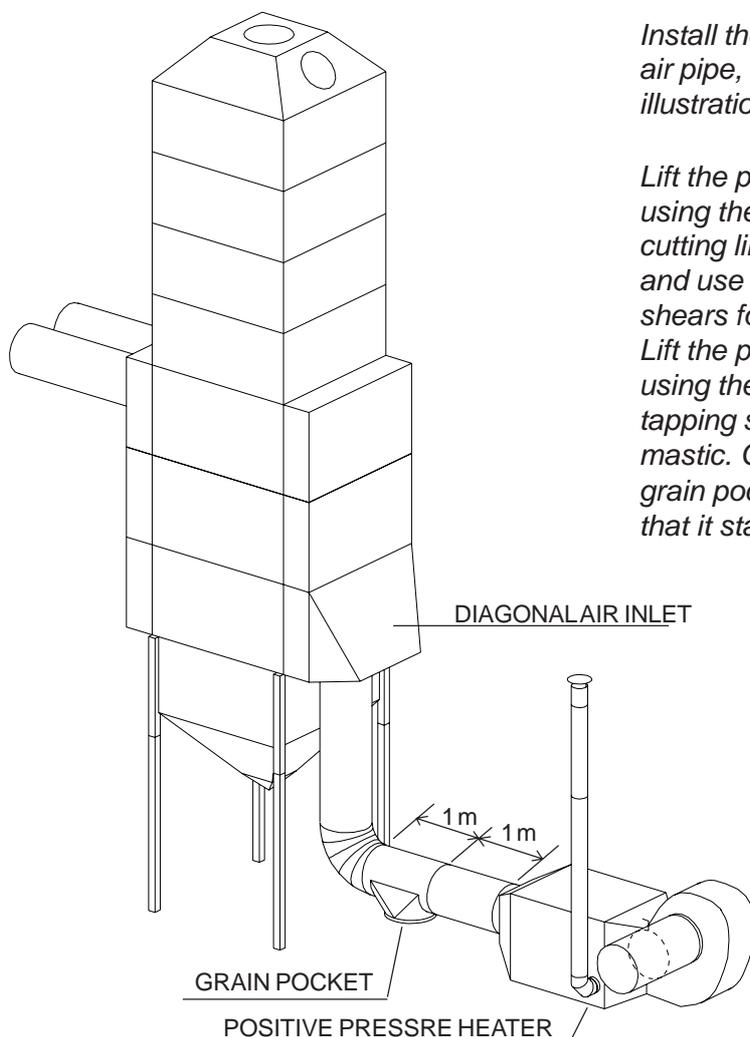
- The heater without the burner is lifted in place in accordance with the installation drawing or plan. Because the foundation has to be level and steady, there is no need to attach the heater to its bed.

## 2. Installation of Air and Flue Pipes

- The air piping between the heater and the dryer is installed by using Antti air pipe parts (D630 mm). Note!: The airflow regulator is not installed in these pipes - it belongs to the suction piping of the heater. The air channel has to be installed so that loose grain and waste will not slide directly into the heater from the end of the drying section. This concerns dryers with diagonal, conical air inlet ends. Particularly when filling an empty dryer, some grains may first fly into the air piping and further into the heater. To avoid this, the air piping must not be inclined all the way to the heater but it must have a sufficiently long horizontal part. The horizontal part should be slightly inclined towards the dryer.. If the pipeline is short, it is possible to use protection nets at the ends of the inlet air channels. See Installation and Operation Manual for Antti-dryers
- Make sure before installation of the pipes that there are no foreign particles inside the heater!
- Antti-teollisuus supplies as standard a grain pocket for dryers with more than three top sections and a diagonal (*conical*) air inlet. The grain pocket shall be installed in the connecting pipe between the dryer and the heater. As necessary the grain pocket must be emptied of gathered grains. So its filling grade must be observed. See *illustration "Installation of the grain pocket to the air piping" for the correct installation practise.*

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

*Installation of the grain pocket to the piping:*



*Install the grain pocket to the horizontal part of the air pipe, where it operates efficiently, See illustration*

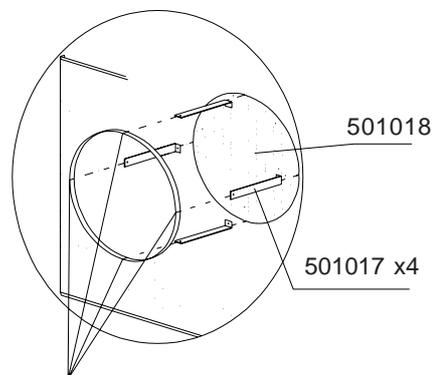
*Lift the part close to the pipe and attach it properly using the ties. Working inside the part, draw a cutting line using a felt-tip pen, take away the part and use a handheld profiling machine or plate shears for cutting the opening.*

*Lift the part back in place and tie it to the pipe using the ties. Attach the part to the pipe with self-tapping screws or rivets. Finish with sealing mastic. Close the outlet sleeve of the pipe of the grain pocket with a plug and, as required, secure that it stays in position using self-tapping screws*

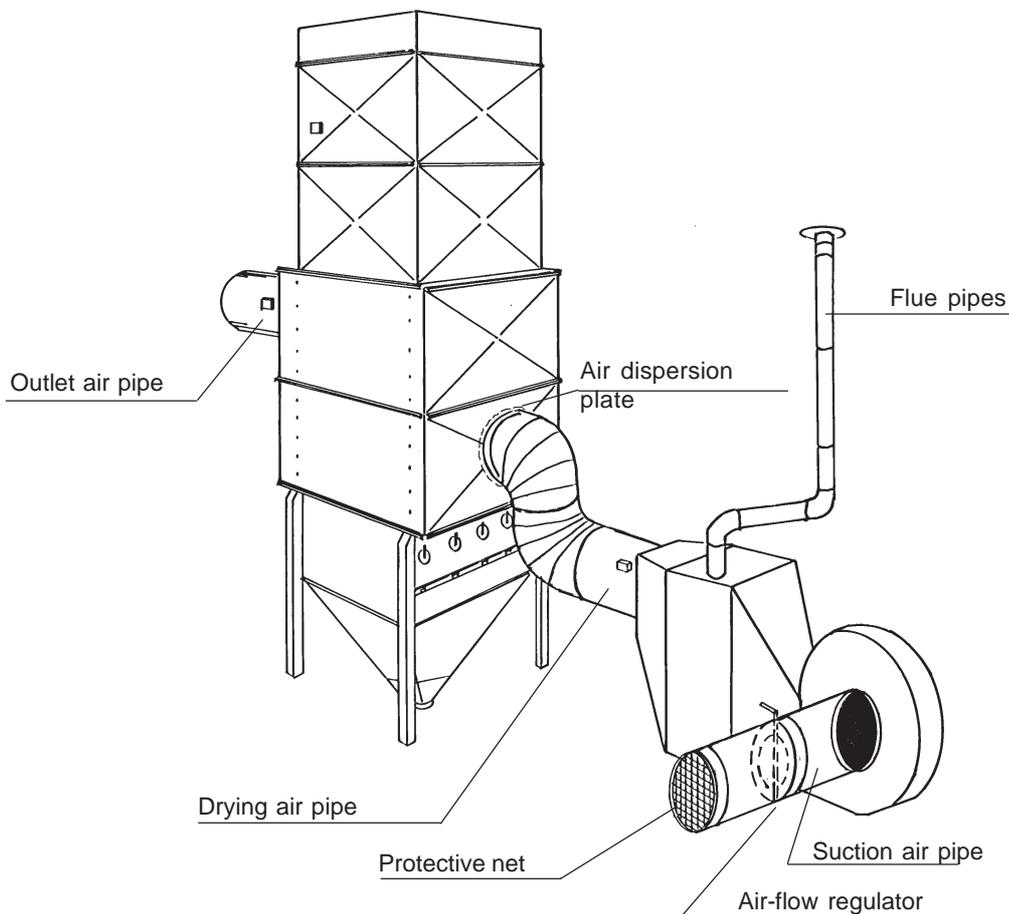
# Antti-heaters

- Lead the inlet air pipe from the suction opening of the fan to the outside air. The air pipe (L= 0.23 m) with the airflow regulator, is installed in the inlet pipe in a place where it is easy to use. The protective net is installed in the end of the pipe (to be disconnected from the heater).
- The minimum height from the ground to the inlet air opening in the wall of the heater room is one (1) metre.
- When it is raining the efficiency of the heater is better if the inlet opening is equipped with a rain cover.
- The inlet pipe from the heater can normally be led to the lowermost drying section. If the air channel ends are straight, we recommend to use in front of the outlet air pipe sleeve dispersion plates, which spread the inlet air flow across the whole surface of the end. (see *illustration*).

AIR DISPERSION PLATE (not used in dyers with diagonal end)



## - Piping of the heater



- A 4.0 m long flue piping and rain cap are included in the delivery. In most cases this is enough for vertical pipe installations.
- Often the flue pipe must also be led horizontally through the heater room wall and the parts of the vertical pipe are installed in vertical position outside the heater room. In this case, additional flue pipe elbows and parts of straight pipe are needed for installation. Note the condensation of sulphur in a clay pipe. It is advisable to install the first part of the flue pipe in a vertical position so that the condensed liquid will not flow back into the heater. From this point on the flue pipe can be directed straight upwards.
- Pay special attention to sufficient supporting and staying of the pipe. At maximum 4.0 m tall vertical pipes are allowed to be supported only by the heater. The longer pipes and elbows require a separate supporting structure. A vertical pipe must also be supported sideways either with stay wires or supporting bars.
- If the heater is installed outdoors, the burner must be covered completely against rain and snow. The electric motor and oil burner are not covered against rain.

### 3. Oil Burner and Pipes

The installation and adjustment of the oil burner and the installation of the oil pipes must be left to an authorised oil burner mechanic.

Instructions for the oil burner mechanic:

- Use exclusively 2-pipe system with 10/12 mm copper pipes.
- Always check the size of the nozzles before putting the heater into service.

Please refer to the lower part of the table on the last page for recommended oil flow for the heaters. The values in the table for the heater air adjustment are only indicative. Assign a specialized mechanic for more accurate adjustment.

Nozzles:

- Danfoss 80°, spray pattern S or B
- Monarch 80°, spray pattern R or PLP

If you want maximum output from the heater, see the oil pressure table (on the last page of this manual) to find out how the oil pressure affects the amount of burning oil when different nozzles, and pairs of nozzles, are used

**NOTE!** Do not install over-sized nozzles or adjust the oil pressure setting so high that the maximum permissible oil amount for the burner will be exceeded

## 4. Electric installation

All electrical installations and the installation and connection of the thermostats in the separate electric centre shall be left to an authorised electrician!

Instructions for installation of the thermostats intended for the electrician:

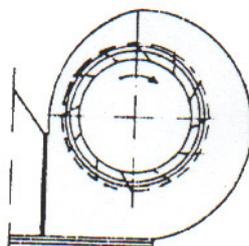
- The temperature regulator (LTM thermostat) is installed in the air pipe at maximum at 2.0 m distance from the heater in an opening which is made at the average height of pipe or above it. The electric conductors shall be at at least 50 mm distance from the surface of the heating pipe to avoid risk of overheating.
- Make sure that the LTM-thermostat is adjusted so that the drying temperature (limit) cannot exceed 80°C. The thermostat in question also prevents the stopping of the fans until the drying air temperature has dropped to 45°C.
- The temperature limiter LTS-thermostat with manual reset button (not compulsory in Finland) is installed in the same way as LTM.
- The LTS-thermostat is adjusted to (limit) 100°C. It switches off the heater as soon as the drying air temperature rises to 100°C. The thermostat requires manual resetting before the operations of the heater can be restored.
- Due to the thermal radiation emitted by the heater, the LTM and LTS thermostats may trip at a lower temperature which does not correspond the actual temperature in the pipe. Because of this verify the real temperature of the drying air in the pipe and readjust the settings of the thermostats accordingly. (In practice this can mean that the limit at 80°C must be readjusted to 95°C although the real air temperature in the pipe is 80°C ).

Initial settings:

LTM fan 45°C and limit 80°C

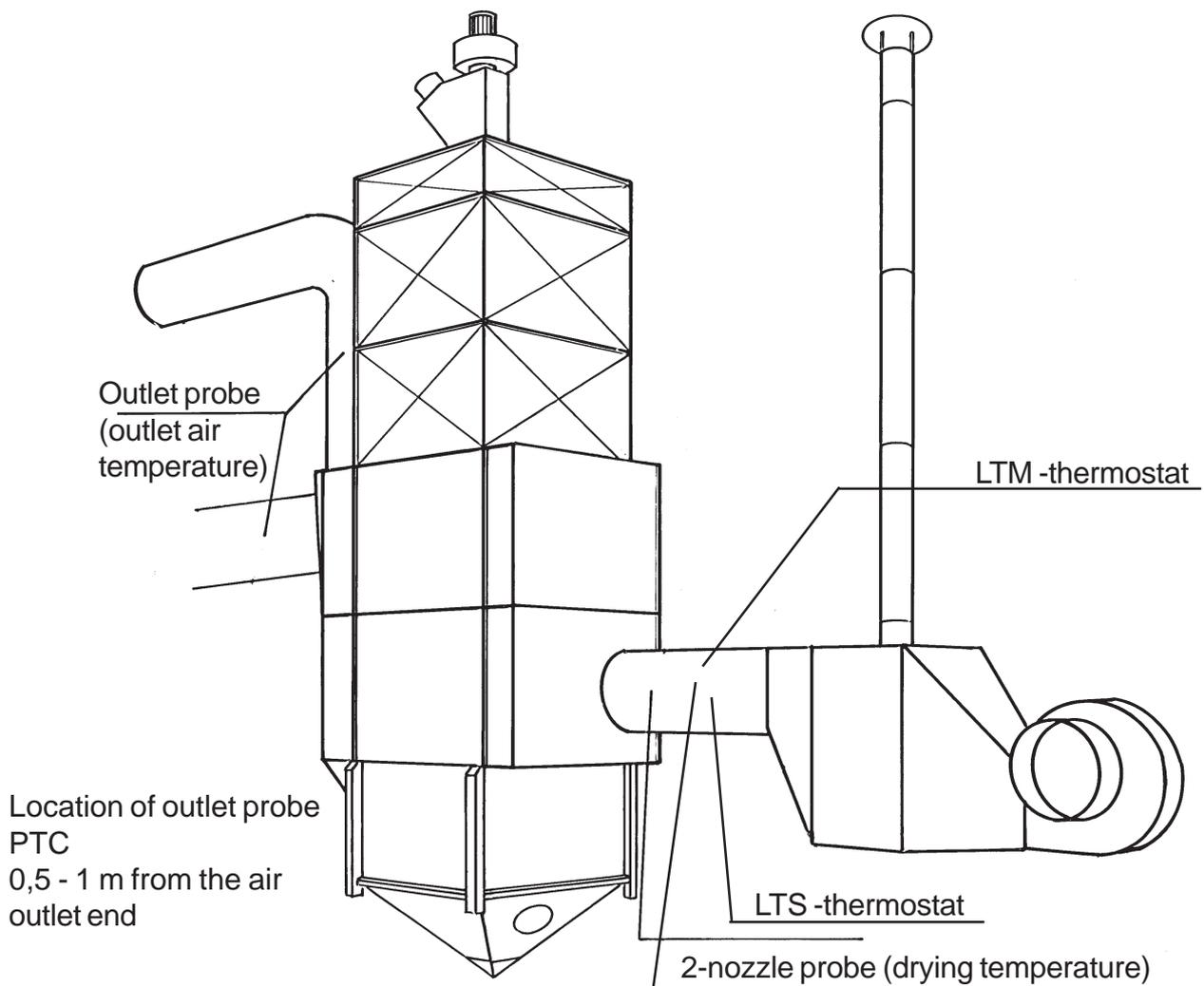
LTS fan - no connection and limit 100°C (this thermostat is not required in Finland)

- The 2-effect thermostat or the PTC-100 probe of the 2-effect thermostat (in digital centres) is installed farther away in the air piping. The electrification of the heater is carried out in accordance with the wiring diagrams of the electric centre. If anything is unclear, please contact the factory.
- If the heater is connected with the automation centre, see also the connection instructions for the automation.



Direction of rotation of the heater fan

- Places for installation of thermostats:



It is recommended that the drying air PTC probe is placed on the opposite side to the burner at about 0,5 m distance from the outlet end of the drying section

## **Points to note before putting the machine into operation:**

- The burner mechanics and electricians have carried out the test run.
- The oil tank is filled with clean light-oil.
- There are no objects in the heater room that do not belong there.
- The air inlet piping of the heater is in place and only clean air comes to the fan.
- The shutter valves in the oil piping are in open position
- Check once more that the main switches and any safety switches are at the ON-position
- There is a manually operated fire extinguisher outside the heater room during the drying procedure.

## **OPERATING INSTRUCTIONS OF THE HEATER**

### **Output adjustment**

- If necessary, the amount of drying air is reduced with the regulator in the suction piping.
- The required drying air temperature is adjusted to desired value by changing the setting of the 2-effect thermostat or the digital thermostat. In the digital centre, the adjustment is made with the buttons of the digital thermostat.
- In the 2-effect burner the amount of burning air is adjusted automatically to correspond with the oil consumption (in accordance with the linear adjustments, which are set during the installation of the burner).
- The change of nozzles and the adjustment in the amount of burning air is carried out in accordance with the instructions given in the operation manual of the burner.

### **WARNING! Make sure that the burner is de-energized before opening it. High tension in the burner Risk of fatal electric shock**

- Before starting the cooling process after drying, the oil burner is either switched off with the switch in the electric centre, or is automatically switched off by the drying automation thermostat (provided that the heater is connected to the automatic control centre).
- The heater fan will not stop - not even from its operating switch - before the heater has cooled down (the heater fan must not be switched off from the main switch before the heater has cooled down).

## SERVICE

### Annual Service

- The heat exchanger and flue pipe of the heater have to be swept once a year immediately after the end of the drying season. Open for sweeping the hatches of the outer jacket and the heat exchanger, which located on side of the heater on top of the burner.
- If the flow of the burning air has not been adjusted correctly, there may be soot on the inner surfaces of the tubes. The tubes can be cleaned with a heater flue brush.
- The soot in the vertical pipe is removed through the square tube situated at the lower edge of the heat exchanger.
- The soot in the pipe with elbows is removed through the openings in the elbows.
- Before closing the hatches, lubricate their attachment screws and nuts with graphite grease.
- Check the operation of the hinge of the overpressure hatch located on top of the heater.
- It is advisable to let an authorised person carry out the service of the oil burner in spring, which is also the best time to remove the condensed water from the oil tank and fuel filters.
- Clean the electric motor cooling ribs and fan impeller.

### Maintenance during the operating season

- If the heater is properly serviced every year, the only thing required during the drying season is a daily look-over. Even if the operation of the heater is to be controlled from the electric centre of the dryer, it is advisable to visit the heater room a few times a day to see and hear that the heater is operating normally.
- 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. In this case, the adjustment of the burning air must be checked immediately to prevent the heat exchanger from becoming sooty.

## GUARANTEE

The guarantee period of Antti heaters is 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. As far as the electric motors are concerned, separate guarantee terms issued by the importer apply.

A prerequisite for validity of the guarantee is that the instructions, given by the manufacturer, and the valid regulations, are followed during the installation, operation and maintenance work of the heater.

All matters in connection with the guarantee shall be agreed with the manufacturer before any action is taken.

# Antti-heaters

## DISTURBANCES

Possible faults in the oil burner

Signs	Possible cause	Measures to be taken
Engine starts	Photocell does not see light	Check that photocell is clean and sees the light of the flame
Burner pre-ventilates	Photocell faulty	Check using a new photocell
Flame is formed		
Disturbance of burner function	Faulty relay	Check using a new relay. (If the relay is replaced, the photocell should be replaced too)
Engine starts	Excess amount of air	Readjust the amount of burning air (according to the burner manual)
Burner pre-ventilates	Low oil pressure	Check the oil pressure
Flame is formed, but is unsteady		
Disturbance of burner function	Burner head adjusted in a wrong way	Check the correct setting of nozzle and burner head
Engine starts	No oil	Check that oil can go into the burner and that there are no air bubbles in the pump
Burner pre-ventilates	Foreign light (sun)	Check that the photocell does not see ambient light
No flame is formed		
Disturbance of burner function	No spark	Check the ignition wires and tips (transformer)
Burner does not start	Fuse has gone off	Check and, if necessary, reset fuse. Find out the reason
Signal light does not light up	Engine safety switch has gone off	Reset engine safety switch
	Check that the LTM thermostat is in the AUTO-position	Turn LTM thermostat to AUTO-position
	LTS thermostat (overheating protection) has gone off	Reset LTS thermostat and find out the cause

	Relay or photocell is broken	Check by replacing the parts in question
Disturbance of burner function		
Signs	Possible cause	Measures to be taken
Burner pre-ventilates  Disturbance of burner function	No oil	Check that tank, oil pipes, magnet valve, drive shaft of pump and nozzle are in order
	Excess amount of air prevents the flame from lighting up	Readjust the air flow
	No spark	Check ignition transformer and wires and porcelain in tip
Burner pulsates during starting	Excess amount of air	Readjust burner
	Nozzle partly blocked	Replace nozzle
	Oil pressure too low	Check and readjust oil pressure
	Flue pipe blocked or broken	Check flue pipe
	Burner fan impeller slips on shaft	Check and tighten
	Clutch ends of oil pump worn	Replace clutch ends
Burner gets hot after switching off	Heater leaks	Find the leak point with tightness test. Replace gasket if necessary
	Vacuum in heater room Burning air openings missing	Make necessary holes in the heater room
	Vacuum in heater room Suction air intake of heater fan from inside the heater room.	Intake air pipe of heater has to be led to outside

# Antti-heaters

## Disturbance of burner function

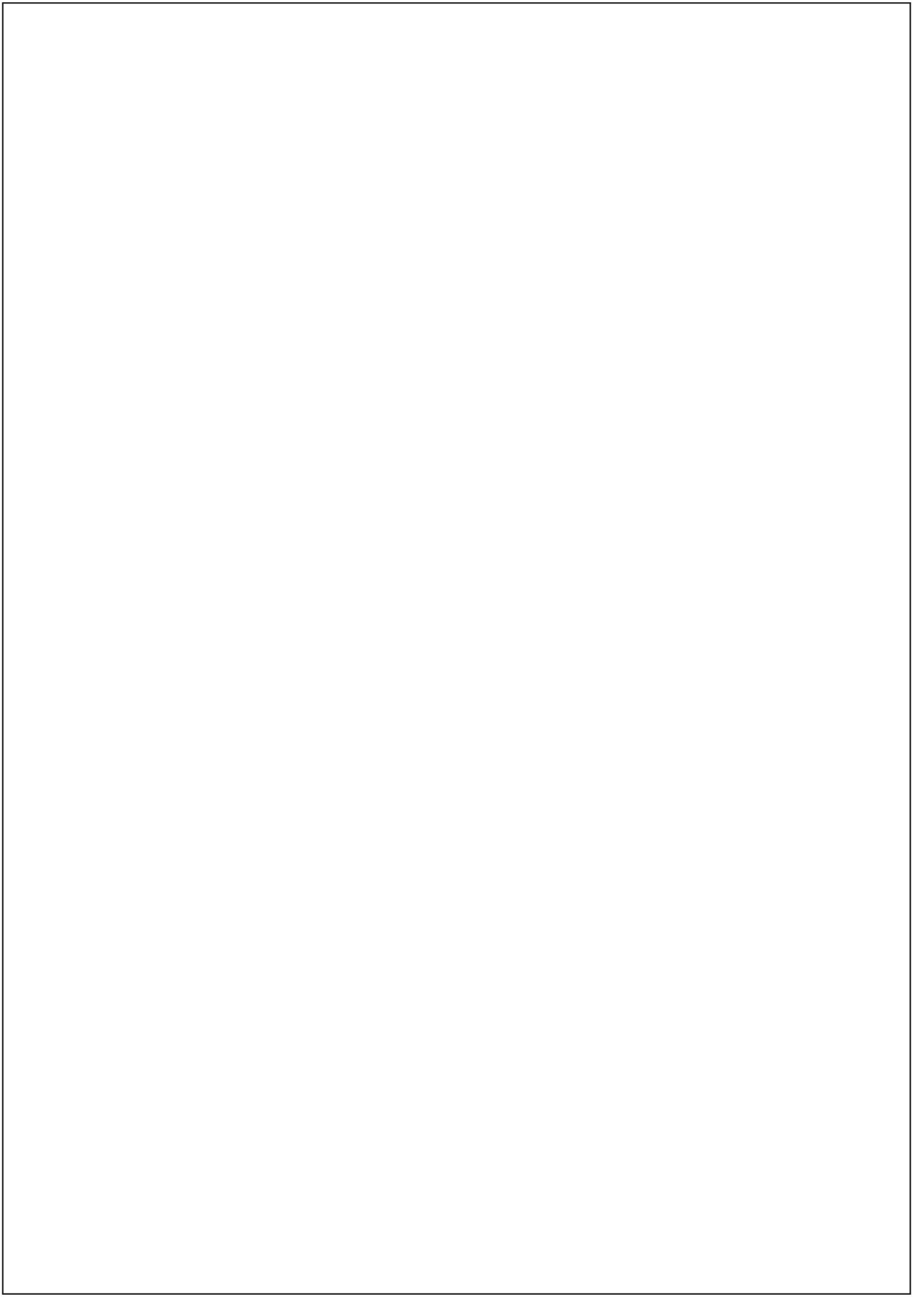
Burner pulsates	Nozzle outputs do not correspond to heater output Nozzles clogged	Replace nozzles
Overpressure plate rattles	Impeller of burner fan dusty	Clean impeller
	False adjustment of burning head	Adjust burning head according to Burner Manual
Heater shakes	Rotor of heater fan is dirty/ unbalanced	Clean/replace rotor

## Oil consumption table kg/h

Nozzle gal	pressure bar								
	9	10	11	12	13	14	15	16	17
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

Heater	Burner	Max oil flow kg / h	Nozzle 1	Nozzle 2	1- air feed tip wheel III	2- air feed tip wheel I	2- solenoid valve tip wheel V	Adjustment ring
A-170	kp-26H	16,8	2,5 gal 80°	1 gal 80°	20°	32°	26°	37mm
A-190	kp-26H	18,0	3 gal 80°	1 gal 80°	25°	35°	30°	40mm
A-250	kp-26H	23,4	13.25 l 80°	5.68 l 80°	30°	42°	36°	44mm
A-330	kp-26H2	30,0	17.03 l 80°	2 gal 80°	38°	49°	43°	51mm
A-400	kp-50H	41,5	20.82 l 80°	3 gal 80°	20°	40°	30°	2,5 scale
A-500	kp-50H	48,0	24.61 l 80°	4 gal 80°	22°	42°	30°	2,5 scale
A-1000	kp-90H	90,0	10 gal 80°	28.39 l 60°				

In case of failure reset the burner by pushing the button with light at the side of the burner  
 1 kg light heating oil = 1,18 litres light heating oil



## EC Declaration of Conformity

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declares that the following machinery which is placed on the market

### **A170, A190, A330 and A400 heater**

conform with the provisions of the Machine Directive 98/37/EY with its amendments and to national decrees (VNp 1314/94) through which they have been brought into force. The machine also conforms to the provisions of the following EC directives and the corresponding national decrees.

-

in the design of the machine the following harmonized standards have been applied

SFS-EN 292-1, SFS-EN 292-2.

in the design of the machine the following national standards and specifications have been applied

-

Kuusjoki 10.03.2000



**Kalle Isotalo**  
**Toimitusjohtaja**



