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HEATING - AIR CONDITIONING - VENTILATION

MTM®

PRODUCER OF WASTE OIL HEATERS AND BURNERS

MTM DARIUSZ SEFERYŃSKI UL. MŁODNICKA 52C, 04-239 WARSAW, POLAND

SOLID FUEL HEATING UNIT
TYPES NPS 35 AND NPS 70

ORIGINAL INSTRUCTION MANUAL

MTM Dariusz Seferyński
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v. 08/2015

EC DECLARATION OF CONFORMITY

MTM Dariusz Seferyński
HEATING, VENTILATION, AIR CONDITIONING
04-239 Warszawa, Młodnicka 52 c
Poland

I hereby declare that the oil heating unit, for the heating of industrial premises not covered by a central heating system,

model no. MTM NPS35 and NPS70, **manufacture no.** ....., **construction year** 20....,

according to its design and structure, fulfils the basic requirements concerning safety and health of the EU Machinery Directive, 2006/42/EC, and is manufactured according to directives:

- no. 2006/42/EC - Machinery Directive
- no. 2006/95/EC - Low Voltage Directive
- no. 2004/108/EC - Electromagnetic Compatibility
- no. 89/106/EC - Construction Product Directive

as well as in accordance with the following norms

- EN 1:1998+A1:2007 - Flued oil stoves with vaporising burners
- EN 303-5:1999 - Heating boilers. Heating boilers with forced draught burners. Heating boilers for solid fuels, hand and automatically fired, nominal heat output of up to 300 kW. Terminology, requirements, testing and marking
- EN 953:1997+A1:2009 - Safety of machinery. Guards. General requirements for the design and construction of fixed and movable guards
- EN 60204-1:2006+A1:2009+AC:2010 - Safety of machinery. Electrical equipment of machines. General requirements
- EN ISO 12100:2010 - Safety of machinery. General principles for design. Risk assessment and risk reduction
- EN ISO 13732-1:2008 - Ergonomics of the thermal environment. Methods for the assessment of human responses to contact with surfaces. Hot surfaces.
- EN ISO 13857:2008 - Safety of machinery. Safety distances to prevent hazard zones being reached by upper and lower limbs
- EN ISO 14159:2008 - Safety of machinery. Hygiene requirements for the design of machinery
- EN 60335-1:2002+A14:2010 - Household and similar electrical appliances. Safety. General requirements
- EN 55014-1:2006+A1:2009 - Electromagnetic compatibility. Requirements for household appliances, electric tools and similar apparatus. Emission
- EN 55014-2:1997+A2:2008 - Electromagnetic compatibility. Requirements for household appliances, electric tools and similar apparatus. Immunity. Product family standard
- EN 61000-6-1:2007 - Electromagnetic compatibility (EMC). Generic standards. Immunity for residential, commercial and light-industrial environments
- EN 61000-6-3:2007 - Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments.

Manufacturer representative authorised for the drawing up of machine technical documentation:
MTM Dariusz Seferyński
HEATING, VENTILATION, AIR CONDITIONING
04-239 Warszawa, Młodnicka 52 c, Poland
Contact person: ***Dariusz Seferyński***

This declaration applies exclusively to the machine in the condition, in which it was introduced into trade circulation, and does not cover components added by the end user or any later actions they may have undertaken. In case unauthorised changes are made to the machine, the declaration becomes void.

Dariusz Seferyński
Właściciel

Warsaw, on ..... 20.....

(full name and signature of the person authorised to make the declaration)

1. General information

The Original Instruction Manual constitutes an integral and material part of the product, and is to be transferred to the user with the transfer of ownership. It needs to be studied thoroughly and retained for future reference, as all remarks included in it provide important hints on safety during installation, use and maintenance of the appliance.

The heating unit needs to be assembled and installed with adherence to the standards in force in the country of operation, according to indications of the manufacturer, and operated by trained professionals. Improper device installation might be the cause of injury to people and animals and of material damage, for which the manufacturer is not liable.

The air heating unit may be used exclusively for the purpose for which it was clearly designed. Any other use shall be considered improper, and, consequentially, hazardous.

In case of errors during installation, use or maintenance that were caused by negligence in terms of the law in force, of provisions in force or the Original Instruction Manual (or any different manual supplied by the manufacturer), the manufacturer is not liable for any contract or other responsibility for the arising damages, and the equipment warranty becomes void.

The choice of heating units for heating buildings is conducted based on a building thermal heat balance sheet, with particular consideration of losses stemming from the transfer of heat to buildings.

2. Foreseen use of the heating unit

The NPS series heating units are foreseen for heating air in small to medium-sized rooms, in buildings without a water-based central heating system.

Thermal heat is generated as a result of combustion, and the thermal energy is transferred through the combustion chamber walls and the heat exchanger.

The air heaters are devices ideally suited for:

- industrial halls, workshops
- warehouses, shops, megastores, wholesalers
- swimming pools, tennis courts, sports halls
- exhibition tents, trade fair stands
- religious sites.

The NPS series heater is a device generating thermal heat through combustion of solid fuel (wood, coal, following the installation of an additional burner - pellets) directly from the heat exchanger tube to the outside environment, without any intermediate liquid. During combustion, smoke and other gases are generated, which are ventilated by the chimney line.

NOTE!
Due to the specifics of operation of the solid fuel-fired air heater, operation supervision in the form of operation parameter control is necessary.

3. Heater description

The NPS series air heated is composed of the following parts:

- combustion chamber with thermal heat exchanger (body)
- covers
- ash tray
- cast iron grid
- ventilator system
- electric switch box with thermostat
- air blower.

Thermal heat is generated as a result of combustion in the combustion chamber, which is equipped with a cast iron grid. The thermal energy is transferred from the combustion gases to the ambient fresh air by means of natural and forced convection.

The air and combustion gases are passed through different ducts, which are welded and properly insulated. The emerging combustion gases, after cooling, are led out through a duct that must be connected to a chimney or gas duct. The chimney or gas duct diameter must be sufficiently large to guarantee effective combustion gas removal. The air used in the combustion process is taken directly from the room or building being heated. For this reason, it is of paramount importance to provide appropriate ventilation for the heated room or building that will guarantee the provision of an appropriate volume of fresh air. The ash emerging in the combustion process falls to the ash tray, from which it can be removed without difficulty. The heated air is distributed around the room through a rotating blower, which is mounted in the top area of the air heater.

The electric switch box with thermostat is responsible for the assurance of electric energy to the heater fan. When the heater outer casing reaches the set temperature (35 °C), the fan is switched on and warm air is distributed around the room, in which the heater was installed.

The ventilator is automatically shut down if the heater casing cools down to less than 35 °C.

4. Fuel parameters

The basic fuel for NPS heaters is fuel wood in chunks. It should be seasoned under a roof for a period of at least two years at a humidity level of 15-20%.

HINT!
The wood should be seasoned for at least a year. Wood humidity exceeding 25% can cause energy losses and damage to the heater body.

It is permitted to use replacement fuels with different quality parameters and of a different granularity as additions to the basic fuel (up to 10% with respect to the wood chunk volume), such as waste wood. When burning small pieces of fire wood note that they should be separated by large fuel wood chunks.

NOTE!
The NPS series heater is not a furnace for burning waste, and fuel that is forbidden may not be burned in it.

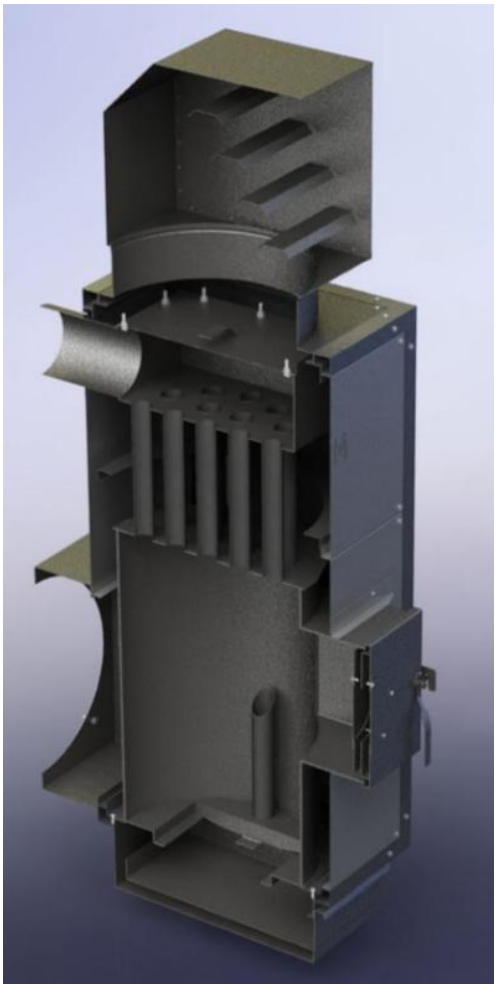
NOTE!
The manufacturer of the NPS series heater, MTM Dariusz Seferdyński, is not liable for damage or improper combustion as a result of use of wrong or inappropriate fuel.

NOTE!
Permanent use of certain wet fuel types, with simultaneous maintenance of low combustion gas temperature (less than 160 °C) will cause faster wear of the heater body, corrosion of the convection ducts, the flue and tar deposits in the combustion chamber. This is caused by condensation of the combustion products: water, nitrogen oxides and sulphur oxides, which together form a very aggressive environment facilitating faster corrosion.

As replacement fuel for NPS type air heaters, energy coal may be used, nut type, classes 24/12, type 31-2, according to standard PN-91/G-04510. The indicated designation of 24/12 concerning fuel characteristics determines the calorific value to be approx. 24000 kJ/kg with an ash content of 12%. This type of fuel guarantees the maintenance of the declared power values.

As replacement fuel there may also be used a mix of nut coal of class 24/12 at 70% with coal dust of class 21/15 at 30% according to the standards indicated above.

5. Heater technical data



Air heater	NPS 35	NPS 70
Rated power	35 kW	70 kW
Power supply	230 V 50 Hz	400 V 50 Hz
Energy consumption	1.2 A	1.6 A
Fan air flow	5500 m3/h	12500 m3/h
Width	600 mm	780 mm
Length	1000 mm	1250 mm
Height with head	1400+500 mm	1720+550 mm
Combustion rack chamber dia.	450 mm	620-mm
Combustion rack chamber height	680 mm	860 mm
Smoke stack diameter	150 mm	180 mm
Weight	200 kg	280 kg
Ventilation head rotation	Yes	Yes
Fuel	Wood/coal	Wood/coal
Burner installation option	Yes	Yes

6. Heater transport and assembly

6.1. Transport and storage

The heater units are delivered assembled on pallets, packed in film.

Use appropriate lifting equipment to raise and lower the heater. Before transporting the heater, it should be protected against shifting and tilting on the vehicle platform by means of belts, chocks or wooden blocks

HINT!
The heater should be transported in a vertical position!

NPS series heaters may be stored in unheated rooms that are necessarily covered with a roof and provided with ventilation.

Before installation, the completeness of the scope of delivery and its technical condition need to be inspected.

6.2. Assembly requirements

Before installation of the heater, one needs to acquaint themselves with the requirements of this manual and the requirements of the relevant national provisions.

Adherence to requirements included in the manual during assembly and use of the heater shall enable long-term and trouble-free operation of the heater, and shall allow one to achieve optimum thermal parameters.

It is suggested for the heating system to be designed, the individual devices to be chosen and assembled by a specialised plumbing company having appropriate permits. The installation of the device should be preceded by consultation with a chimney specialist and a fire safety specialist.

It is recommended, before assembly begins, to hold a written expert opinion on the building insulation and ventilation and a chimney opinion concerning the ventilation of fumes (of the chimney).

NOTE!
The heater should be installed by a professional plumbing company according to the standards in force!

NOTE!
It is forbidden to install the heater outside of the building (in the open).

Fuel

The fuel should be stored in a separate technical storage room, close to the heater or in the room, where the heater is located, however, not closer than 0.5 m (two feet) from the heater.

NOTE!
It is forbidden to install a forced ventilation system in the heater room.

Ventilation

It is forbidden to use forced ventilation in the installation room of the heater, taking in air for combustion from its room, and with a gravitational combustion gas removal, and in the room in which the intake ducts for the combustion gas lines are located.

The use of individual forced ventilation units in rooms directly adjacent to the room of installation of the heater may also cause the emergence of underpressure and uncontrolled outflow of combustion gases from the heater into the room.

In the installation room of the heater, there must be ensured a gravitational air supply and exhaust system. This system may not cause the emergence of underpressure in the room.

The air supply system should ensure an inflow or combustion air in a volume not less than 10 cu m per hour for each kW of installed nominal burner power and not less than 20 cu m per hour for each person foreseen to permanently remain in the room.

The air supply and ventilation ducts should be protected by steel mesh and constructed in such a way that they cannot be clogged. The placement of the mesh units should not cause draughts to emerge.

NOTE!
The supply of a sufficient volume of fresh air to the heater room needs to be ensured. Lack of sufficient fresh air supply produces the risk of incomplete combustion and the formation of carbon monoxide.

6.3. Arrangement of heater in the room

NPS series heaters require no special foundations, however, care must be taken for them to be precisely levelled. The heater should stand on an even, stable surface with sufficient load bearing capacity. In case of insufficient load bearing capacity, measures need to be undertaken for the required load bearing capacity to be achieved.

The floor in the heater installation room should be made of non-combustible materials. Should the floor be made out of combustible materials, it should be covered with a steel sheet with a thickness of at least 1 mm, up to a distance of at least one metre (three feet) from the heater outline.

When arranging the heater setup, consider fire safety conditions. It is recommended that

- a safe distance of at least 1.5 metres (five feet) be maintained from combustible materials during installation and operation of the heater,

- for combustible materials with a flammability rating of C3, which burn away quickly and easily even after the flame source is removed, this distance increases twofold, i. e. to at least three metres (ten feet),

- if the combustibility level is not known, the safety distance also needs to be doubled.

Combustibility of construction materials and related products	Construction materials and products
A - non-combustible	Sandstone, concrete, bricks, fire-safe plaster, masonry mortar, ceramic tiles, granite
B - difficult to combust	Wood-cement planks, fibreglass, mineral insulation
C1 - difficult to combust	Beechwood, oak wood, plywood
C2 - combustible with medium difficulty	Pine, larch, spruce, cork, sawn timber, rubber floor covering
C3 - easily combusting	Asphalt-plywood, cellulose masses, polyurethane, polystyrene, polyethylene, plastic, PVC

The placement of the heater should take into account the possibility of unimpeded cleaning and direct access from all sides.

The distance of the heater front face from the opposing wall should not be less than two metres (seven feet), and the sides of the boiler to the walls - not less than half a metre (two feet).

6.4. Selecting the right heater

The heating system at an industrial plant should provide appropriate thermal comfort. According to relevant provisions, in the working rooms a temperature level must be secured appropriate for the type of work being executed (according to the work methods and the physical effort required to carry it out), however, not being lower than 14 °C. In working rooms, in turn, in which light physical work is carried out, and in office rooms, the temperature may not be lower than 18 °C. In order to choose the heating unit correctly, the heat requirement must be determined.

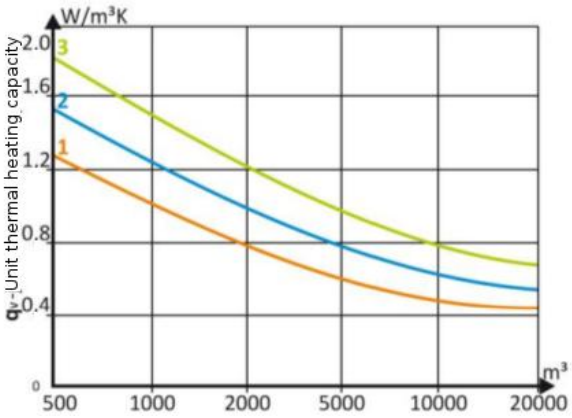
The first step is to determine the building's thermal balance, meaning, to determine the heat losses through walls, doors, windows, entry gates, etc., considering the thermal gains that may arise due to the machinery operating inside the building, the people or animals (i. e. in a stall) residing inside. This procedure is quite complicated, therefore, a formula was devised that enables one to choose a heater properly.

$$P = [qv\ W\ (tw - tz)]\ 0.001$$

Where:

P - thermal heat requirement [kW]
qv - unit thermal heat power dependent on the building's volume and estimated insulation capacity of walls (W/m³K)
W - building volume (m³)
tw - temperature required inside the building (°C)
tz - calculated external temperature for the individual region of the country, for Poland in line with standard PN-82/B-02403 (°C)

Care must be taken to properly determine the unit thermal capacity for a building. It is dependent on the building's volume and insulation capacity.



1 - increased thermal insulation capacity
2 - small total window and door surface
3 - large total window and door surface

Fig. 1. Unit thermal capacity depending on the building volume and the insulation capacity of construction divisions.

Fig. Climatic map of Poland

Design outside temperature and mean annual outside temperature value depending on the climate zone		
Climate zone	**Design outside temperature in °C**	**Mean annual outside temperature in °C**
I	-16	7.7
II	-18	7.9
III	-20	7.6
IV	-22	6.9
V	-24	5.5

Example: A manufacturing hall from the 1970s in Gdańsk (north Poland), weak insulation capacity (large total door and window surface), building volume 1200 cu m. Required internal temperature is 16 °C.
We read from the curve the value for qv = 1.5 W/m³K from the map we read out that Gdańsk is located in climate zone I, so the design outside temperature is -16 °C. We calculate:

Q = 1.5 x 1200 x [16 -(-16)] x 0.001 = 57,6 [kW]

Accordingly, one can choose either one heater with a capacity of 60 kW or two with a capacity of 30 kW each. Such a solution would permit flexible placement of the heaters and directing the air flow so that better efficiency is achieved.

This information is only general in character. We recommend choosing a professional systems company to select the heater unit with the right capacity.

6.5. Connection to the electric grid

The electric grid, to which the heater shall be connected, should terminate in an earthed socket.

Grid voltage values required by the heaters	
NPS 35	**230 V / 50 Hz**
NPS 70	**400 V / 50 Hz**

NOTE!
Using a socket without an earth connector is risking an electric shock!

The socket should be located at a safe distance from the heat source. It is recommended for a separate electric system circuit to be provided to power the heater.

NOTE!
All electric system connections are to be made by an electrician with the appropriate permits.

NOTE!
The user is forbidden from any interference or making any changes to the electric connections!

6.6. Connecting the heater to the chimney

The mode of execution of the chimney and the connection to it in Poland should be in line with the requirements of the Ordinance of the Polish Minister of Infrastructure of March 12th, 2009, on the technical conditions, to which buildings and their placement should correspond (Journal of laws no. 56 of 2009, item 461). The device may not be connected to a chimney together with other burners.

In case of installation of the heater in a country different than Poland, the heater chimney connection should conform to requirements of standards and legal provisions presently in force in the relevant target country.

The heaters should be connected to chimneys using profiles with an appropriate cross section and shape, made of sheet steel, insulated at the heater exhaust gas exit and at the chimney exit, the length of which should not exceed one metre. The connection should have a fall towards the heater.

The height and cross-section of the chimney, and the precision of its construction, should ensure the maintenance of the required draught value. The usefulness of the chimney should be confirmed by a certified chimney specialist.

Heater	**NPS35**	**NPS70**
Minimum chimney height (m)	**7**	**9**
Dimensions (cm x cm) **Diameter (mm)**	**18x18** **210**	**25x25** **290**

NOTE!
A weak draught shall cause the condensation of water vapour on the exchanger walls, which will bring about quick wear and damage to the heater.
This can also cause the emergence of smoke from behind the door and cleaning openings of the heater.

The formula below permits easy selection of the chimney cross-section.

$F = 0.03 \times Q \times 0.86 / \sqrt{h}$

Where:
F - chimney cross-section (sq m)
Q - heater thermal capacity (kW)
h - height of chimney measured from the burner level to the exit (m)

It is important for the chimney to start at floor level, as the exhaust fumes emerging from the heater should have the option of 'bouncing back'. It is also important for the lower part of the chimney to have an inspection opening that can be sealed tight.

The chimney should stand at least 1.5 metres (five feet) above the roof surface. The walls of the chimney should be smooth, tight, without any narrow passages or turns and free from any other connections. A new chimney needs to be dried and heated sufficiently before the heater is fired. In case of doubt, the technical condition shall be evaluated by a chimney specialist. Steel pipe chimneys should be taller than masonry chimneys by 15-20%.

Maintenance of the chimney duct within its recommended limits is one of the more important factors guaranteeing the achievement of appropriate technical and operational parameters of the heater.

NOTE!
Due to their high effectiveness, it is recommended to use chimney liners made of stainless steel thermal heat-resistant steel for the NPS series heaters.

7. Heater operation and maintenance

7.1. Initial heater start-up

Before start-up of the heater, inspect as follows:

- chimney system tightness
- chimney connection correctness
- tightness of ventilator contact surfaces and inspection openings
- manner of connection to the electric grid

The boiler start-up procedure is as follows:

- switch on the heater
- light up the burner according to this manual
- recheck heater tightness
- acquaint the user with the operation of the unit
- note data in the warranty card

HINT!
The conclusion of installation and the execution of a heating trial need to be noted in the warranty card. The completed warranty card should be sent by the user, as copy, to the address of the manufacturer so the user is registered in the company system.

7.2. Heater start-up and use (User instructions)

Before commencing burner start-up, check:

- that system ducts are free from obstructions
- that the ventilation system works properly.

1. If this is a repeated start-up, remove the ash collected in the loading chamber. The charcoal remaining in the chamber can form the first start-up layer.

2. Lay out on the remains of the charcoal a layer of wood, not filling more than 50% of the grid.

3. From the topside, lay out a layer of minute pieces of wood with some bunched-up paper. Afterwards add a layer of wood chippings and some pieces of soft wood.

4. The heater should be started up by switching the control unit on.

5. Light the paper, and after it catches fire, close the loading door, leaving it slightly open for a few seconds.

6. In order to ease distribution of a higher volume of air during start-up, set the volume of primary air by extracting and pushing in the ash tray.

7. When the wood catches fire well (after about 20-30 minutes), fill the chamber with an appropriate amount of wood so that the loading chamber is approx. 60% full, and close the loading door.

8. The next steps in the burning process entail continued supply of fuel and controlling the burning process by adjusting the primary air volume by extracting and pushing in the ash tray.

9. Never leave the heater unattended!

NOTE!
It is forbidden to disconnect the power supply from the device when it is hot, because the collected energy can damage the ventilator and heat exchanger!

NOTE!
Components of the heater - in particular outer covers - are hot during operation. Appropriate caution is advised!

NOTE!
Never stand straight before the boiler when opening doors. Risk of burns!

NOTE!
The grid chamber should always be closed, save for a start-up period, for loading and the removal of grid contaminants.

7.3. Periodic heater maintenance - cleaning and upkeep

HINT!
In order to maintain appropriate combustion efficiency, keep the convection ducts and sheet metal inside the grid chamber appropriately clean. Soot, dust and ash from combustion shall reduce effectiveness and capacity of the combustion process.

NOTE!
The operating temperature of the individual heater units can reach up to 600 °C.
In order to clean the heater, shut it down and wait out the time necessary for the heat exchanger to cool down.

NOTE!
Before commencement of maintenance procedures, disconnect the heater power supply!

NOTE!
All activities need to be carried out with particular care. They can only be executed by adults. Ensure for children to stay clear and away from the heater during its cleaning procedure. Use gloves, safety goggles and head protection when servicing the heater.

In the grid chamber of the heater, pay particular attention to the precise removal of ash and slag from the grid grooves and chamber walls. Such cleaning should be carried out each time the heater is started up. Before cleaning, shut off the heater with its main switch, and wait out the period necessary for the heat exchanger to cool down.

The exhaust ducts, in which volatile ashes gather, should be carried out through the inspection openings every seven to fourteen days, depending on the fuel quality and humidity.

8.1. Name plate templates - located on the unit back covers:

MTM

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ul. Młodnicka 52 C
tel. +48 22 353 11 11

SERIAL NO. / YEAR OF PRODUCTION
NUMER FABRYCZNY / ROK PRODUKCJI

UNIVERSAL OIL HEATER
NAGRZEWNICA NA OLEJE UNIWERSALNE

CE

TYPE TYP	NPS 35
MAX CAPACITY MAKSYMALNA WYDAJNOŚĆ	35 kW
DIMENSIONS WYMIARY	0,6m x 1m x 1,9m
AIR FLOW PRZEPŁYW POWIETRZA	5500 m^3 / h
FUEL PALIWO	WOOD / COAL DREWNO / WĘGIEL
FLUE EXHAUST WYLOT SPALIN	fi 150 mm
ELECTRICAL SUPPLY ZASILANIE ELEKTRYCZNE	230 V / 50 Hz
ELECTRICAL POWER MOC ELEKTRYCZNA	276 W
WEIGHT WAGA	200 kg

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SERIAL NO. / YEAR OF PRODUCTION
NUMER FABRYCZNY / ROK PRODUKCJI

UNIVERSAL OIL HEATER
NAGRZEWNICA NA OLEJE UNIWERSALNE

CE

TYPE TYP	NPS 70
MAX CAPACITY MAKSYMALNA WYDAJNOŚĆ	70 kW
DIMENSIONS WYMIARY	0,78m x 1,25m x 2,27m
AIR FLOW PRZEPŁYW POWIETRZA	12500 m^3 /
FUEL PALIWO	WOOD / COAL DREWNO / WĘGIEL
FLUE EXHAUST WYLOT SPALIN	fi 180 mm
ELECTRICAL SUPPLY ZASILANIE ELEKTRYCZNE	400 V / 50 Hz
ELECTRICAL POWER MOC ELEKTRYCZNA	368 W
WEIGHT WAGA	280 kg