



X-HEAT[®]
Space Heating Technology



TECHNICAL DATA

Nano-Heat[®]

WWW.XHEAT.CO.UK

ABOUT YOUR NANO-HEATER

The Nano-Heat concept is based on providing a reliable source of heat, using natural gas, propane or liquified petroleum gas (LPG) as a fuel-source. It uses catalytic heating as a very efficient method to release heat through the controlled, flameless oxidation of these fuels on a catalytic surface. The heat is absorbed by the catalyst support, causing its temperature to rise. As the support temperature rises, heat is emitted as radiation and convection.

The Nano-Heat unit operates at a much lower temperature than conventional heaters. The radiated heat is emitted as infrared radiation, which is absorbed by “organic” objects that are within a suitable range from the heater.

All heaters are designed to provide a safe source of “flameless heat” and undergo quality control testing prior to dispatch.

STRAIGHT-FORWARD INSTALLATION

Each Nano-Heater unit is supplied pre-wired and requires a 240V, 5 Amp fused spur electrical supply. The live, neutral and earth wires simply need to be connected prior to use. The gas supply is connected through a standard ½” gas connector, which is supplied with the heater.

A VERSATILE UNIT WITH A WIDE RANGE OF APPLICATIONS:



Warehousing



Train Stations



Livestock Sheds



Assembly Areas



Welding Bays



Machine Shops



Sports Halls



Museums

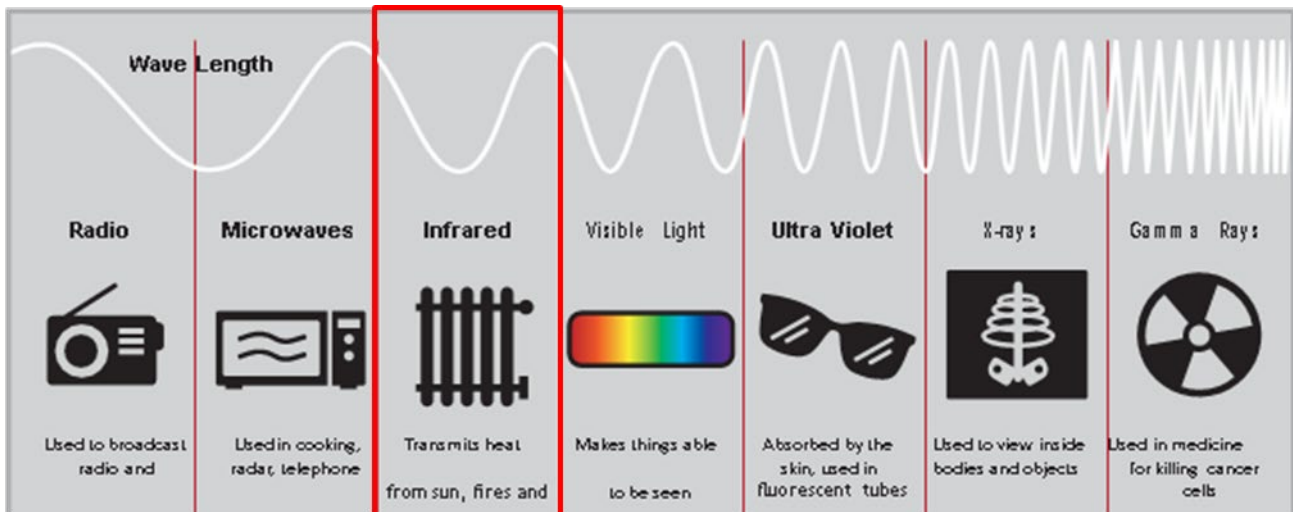
THE ELECTROMAGNETIC SPECTRUM

There is a lot of interest in the use of infrared energy in “real-world” industrial systems. Infrared heat is a form of energy that is transmitted as an electromagnetic wave, travelling outwards from a source at the speed of light. It has the same properties as visible light: it can be transmitted, absorbed or reflected..

At the operating temperature of a Nano-Heat unit, infrared energy is transmitted as radiative heat at a wavelength of 3 - 10 microns. This lends itself to efficient absorption by “organic” surfaces, such as skin and clothing.¹.

This is a very efficient way of warming up people, at a at a much lower cost than conventional combustion applications.

TYPES OF ELECTROMAGNETIC RADIATION



Typical operating range of a
Nano Heat unit (3 – 10 microns)

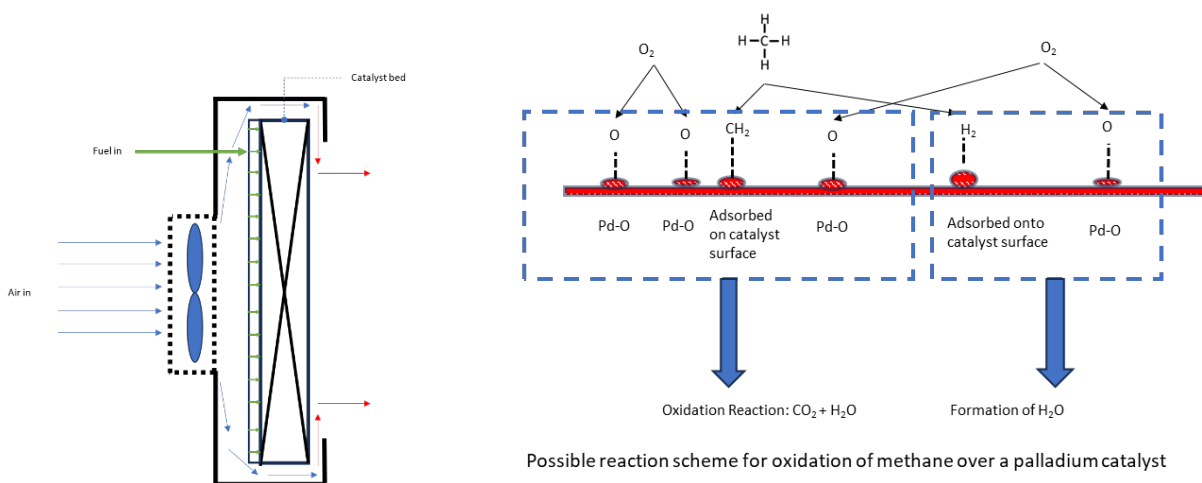
¹ Qin et al, Thermal comfort characteristics of a catalytic combustion heater under wind-chilled exposure, Journal of Cleaner Production 436 (2024) 140701

OPERATING PRINCIPLE

The catalyst bed acts as a heat source, which allows heat to be transferred by convection and radiation into a given area. This heat can then be absorbed by suitable surfaces.

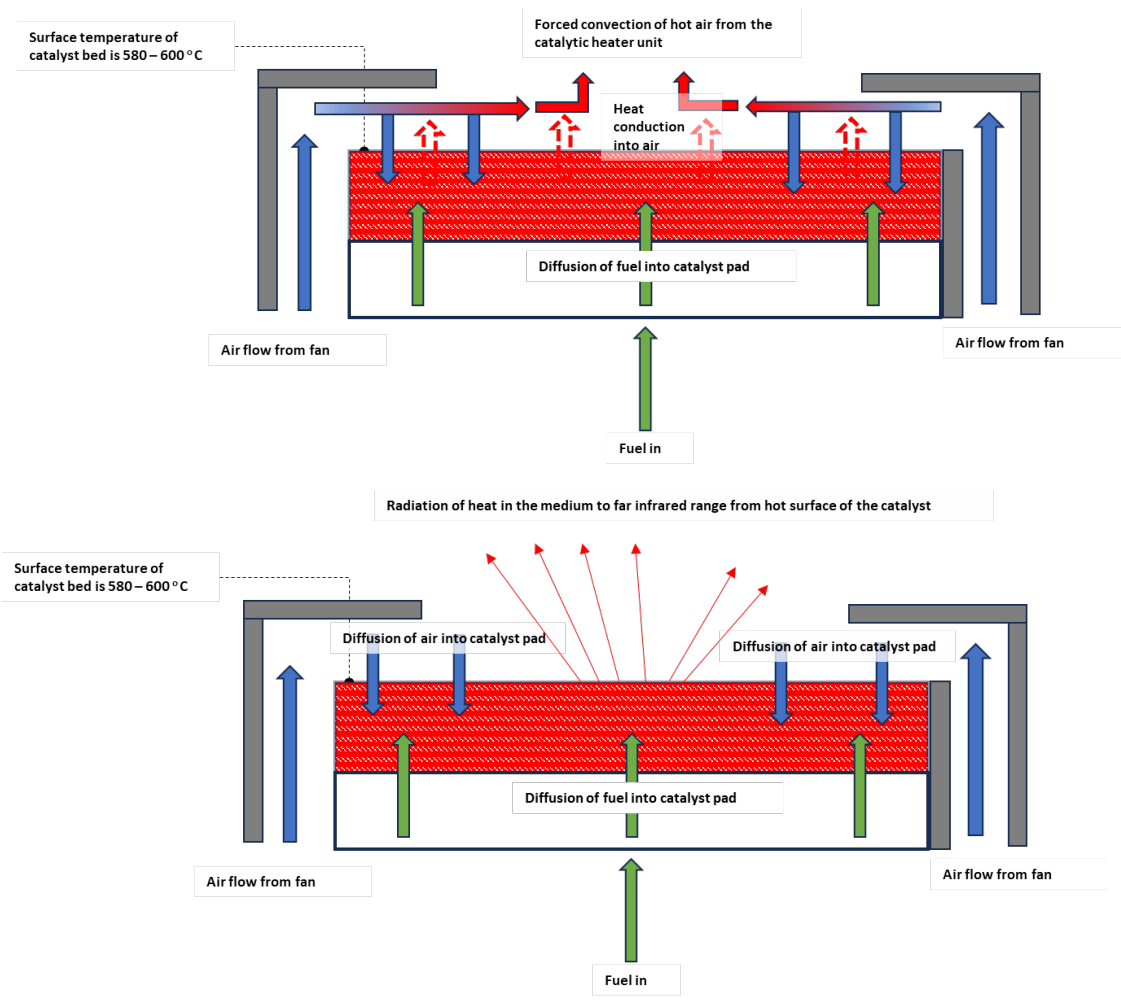
In very broad terms, the operating principle is as follows:

- Prior to operation, the catalyst bed is pre-heated using an internal heating element, to ensure we have an efficient reaction.
- Fuel enters the rear of the catalytic heater through a gas tight stainless-steel pan.
- A fan is used to circulate air through the face of the unit.
- The fuel passes through a fabric pad, which disperses it to achieve uniform coverage across the catalyst bed.
- The fuel and air adsorb onto the catalyst bed: oxidation (“combustion”) occurs when the fuel and oxygen from the surrounding air meet.²
- The heat released from the reaction warms the bed to its full operating temperature, so the bed then acts as a heat source.
- Heat is transferred as radiation and convection.



² The Chinese term for catalyst is “marriage broker”

OPERATING PRINCIPLE

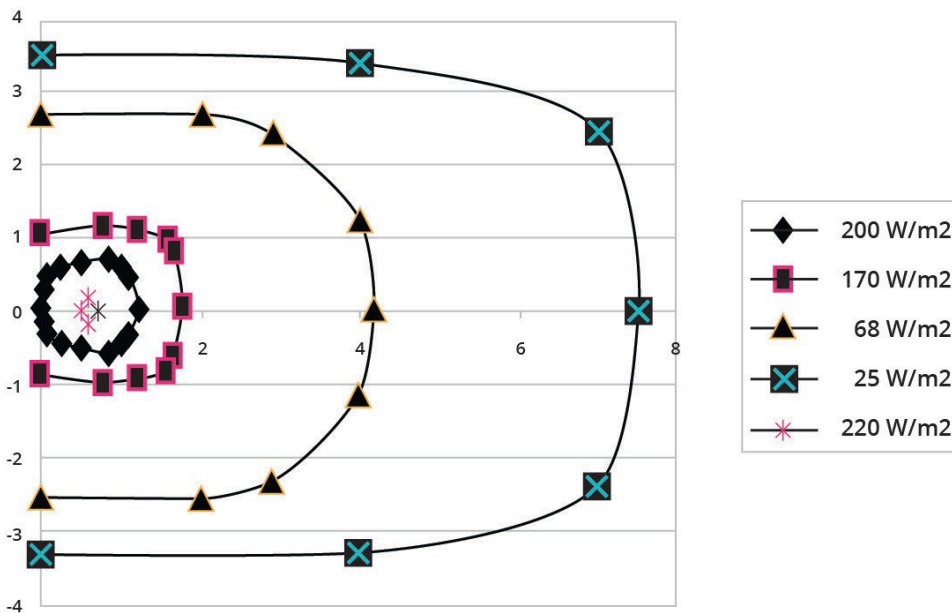


HEAT MAP

Heat distribution as a function of spatial position.
Nano-Heat 10 kW

Position apparatus Pt (0;0)
Installation height = 2.5m
Inclination = 30°

**Measured with flux meter*



HYDROCARBON FUEL CRITERIA

Natural Gas – G20 at 20mbar supply pressure (appliance cat 2H)

Maximum supply pressure (Pmax)	25mbar
Minimum supply pressure (Pmin)	20mbar
Gas connection	½"

Propane – G31 at 37mbar supply pressure (appliance cat 3P)

Maximum supply pressure (Pmax)	34mbar
Minimum supply pressure (Pmin)	18mbar
Gas connection	½"

SAFETY CONTROLS

1. A low temperature sensor will activate if the temperature of the catalyst falls below the minimum operational temperature. This immediately de-energises the gas valve, forcing the system into cool down mode.
2. An over heat sensor will activate if the internal ambient temperature rises above the maximum threshold value, The gas valve and pre heat element will immediately de-energise, putting the system into cool down mode.
3. The fan has a built in thermal overload switch: when activated it will de-energise the gas valve and pre-heat element, indicating a fan failure.

SERVICING TOOLS REQUIRED

- CO₂ Air quality analyser
- TTL-232R-3V3-AJ jack cable
- Thermal imaging camera
- Manometer
- 5mm spanner
- 8mm spanner
- Philips screw driver
- 3 mm flat head screw driver
- 2 x adjustable spanner
- 1" soft brush 1"

TECHNICAL ENERGY SPECIFICATION

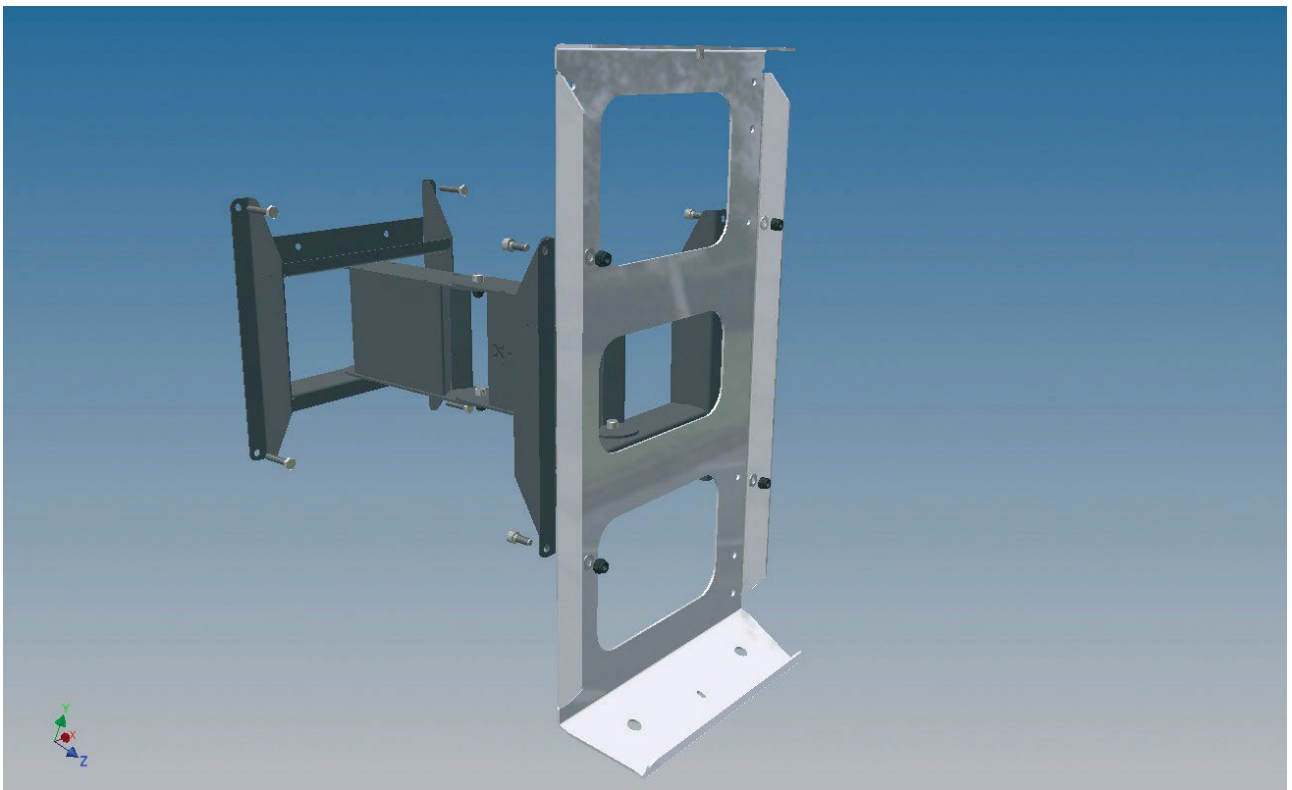
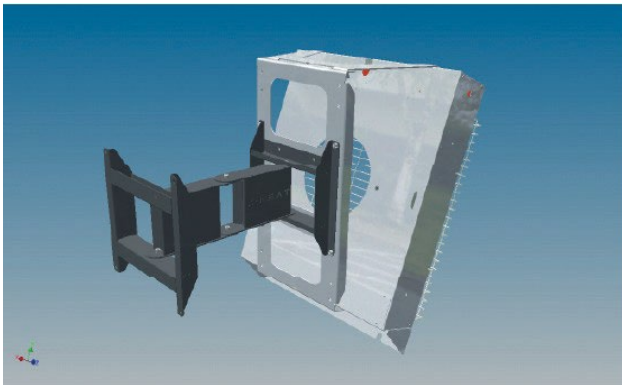
	Natural gas (NG)	Liquified petroleum gas (LPG)
Heat Input	7.5 - 10.5 kW	7.5 - 10.5 kW
Appliance Type	A3	A3
Appliance Cat.	I2H G20	I3P G31
Dimensions	620 x 720 x 140	620 x 720 x 140
Weight	18 kg	18 kg
Gas Ps mbar	Max 13mbar / Min 7mbar	Max 27mbar / Min 15.5 mbar
Gas Connection	½"	½"
Power consumption	125 W	125 W
Voltage	240 V	240 V
Typical gas usage	0.69 - 0.95 kg / hr	0.45 - 0.76 kg/hr
CO ₂ %	0.5% - 2%	0.5% - 2%
NO _x	Class 5	Class 5
CO	0 ppm	0 ppm

VENTILATION

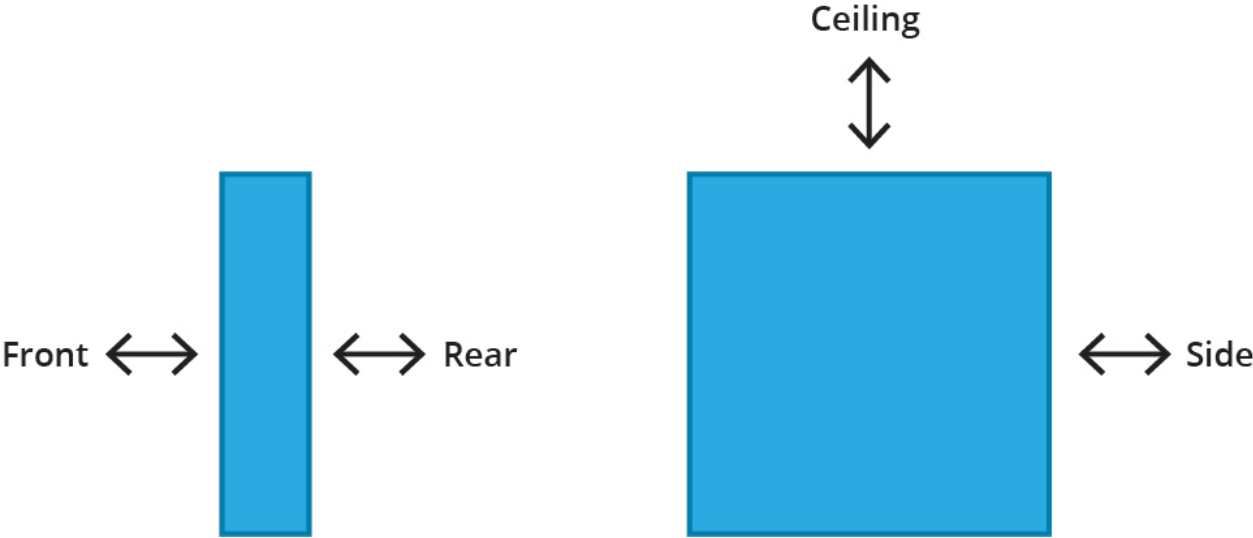
The surface of the catalyst requires at least 10 m³/hr air per kW of energy. If operated correctly, it will produce zero carbon monoxide and nitrogen oxides. The reaction products are heat, water and carbon dioxide. The unit does not require a flue to remove waste gases.

INSTALLATION CRITERIA

Nano-Heat has been designed as a zonal heater to heat people. The unit can be installed on any structurally sound wall, at a heights of 2.5 m - 3.5 m above ground level, angled at 20° - 30° to the vertical. The unit can be wall mounted using the bracket provided as in the diagram below.



INSTALLATION CRITERIA



	Front	Rear	Ceiling	Side
Nano-Heat 10 kW	1500 mm	100 mm	300 mm*	300mm

**Minimum clearance to combustible materials with a stainless-steel reflector fitted.*

USEFUL TECHNICAL INFORMATION

- The Nano-Heat concept is inherently safe, because it uses flameless combustion to convert fuel to heat.
- Nano-Heat emits infrared energy which will directly heat people in the room through its radiative heat component - this a very efficient heating method.
- Nano-Heat operate without leaving the carbon deposits normally associated with combustion equipment meaning lower servicing costs.
- Due to the low energy requirements Nano-Heat provides a significantly shorter payback time
- Nano-Heat operates silently, reducing noise pollution improving the working environment.
- Nano-Heat systems are thermostatically controlled for space heating applications, providing greater energy savings
- Research shows that medium to long wave infrared heat can improve the wellbeing of people increasing blood flow and reducing aches and pains.³
- Our products undergo rigorous inspection to assure safety, quality and performance standards are met.

³ *Biological effects and medical applications of infrared radiation, Journal of Photochemistry and Photobiology B: Biology Volume 170, May 2017, Pages 197-207*

FURTHER INFORMATION

Our development and manufacturing teams are passionate about our innovative and exciting new product and are very willing to answer any technical questions or to showcase our technology.

Please contact them to find out more: they are more than happy to answer any questions you may have or to work collaboratively to find a way of meeting your needs!



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