



AMBI RAD

Nor-Ray-Vac

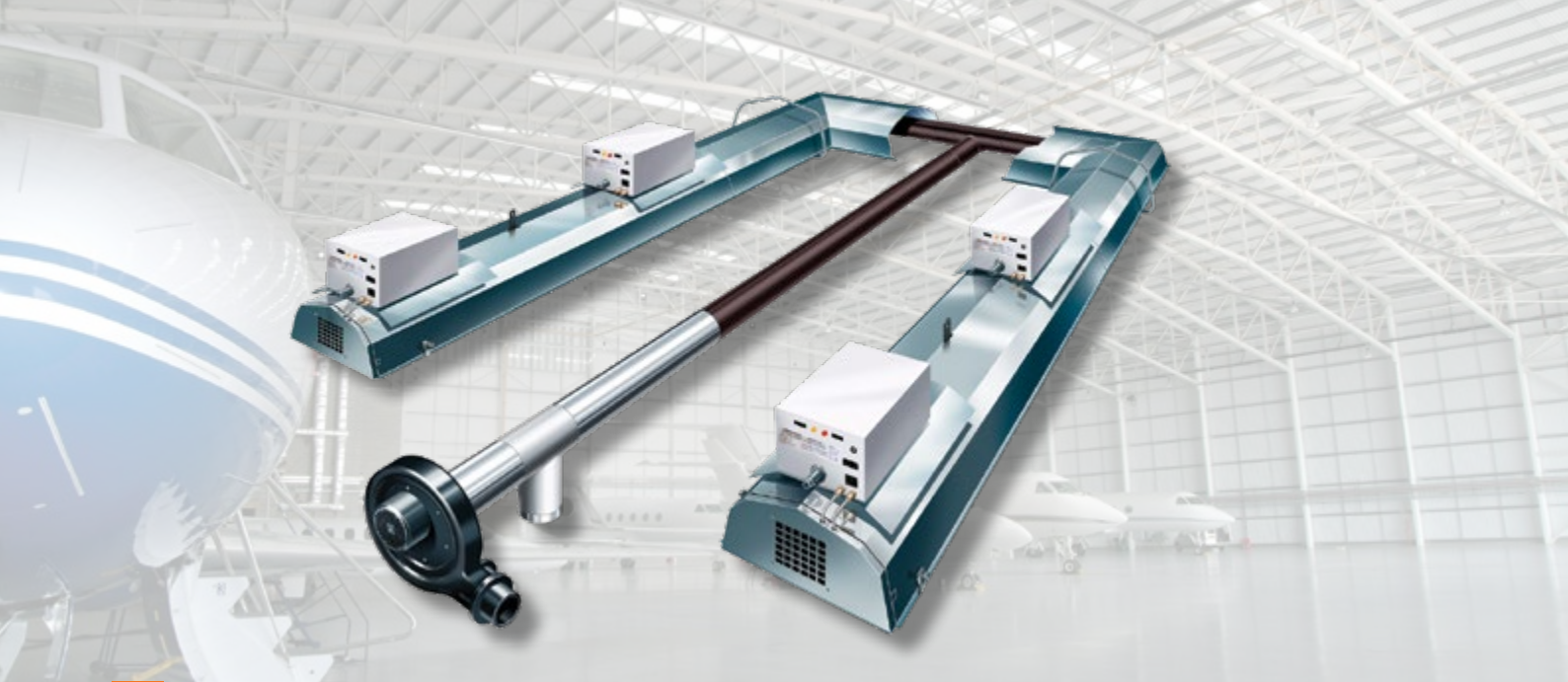
Continuous Radiant Tube Heating Systems



ErP Lot 20
Seasonal Efficiency and
NOx compliant

 **NORTEK**TM
GLOBAL HVAC





Nor-Ray-Vac



Continuous Radiant Tube Heating Systems

Nor-Ray-Vac is a gas fired continuous radiant tube heating system, designed specially for the building it is required to heat. The following criteria form the basis of each particular system design:

- > **Heat loss of the building for the required thermal environment**
- > **Local climate conditions**
- > **Type of activity in the building**
- > **Specific architectural features relating to the structure**

The Nor-Ray-Vac system is designed to provide uniform heat coverage over the entire floor area. Alternatively, the system can also cater for distinct zones providing a varied degree of comfort level within the overall layout of the building.

AmbiRad strives to become part of the 'design team', working closely with engineers or end users to determine the specific design parameters for the Nor-Ray-Vac scheme layout. This contact between the company's engineers and the system designer or client will give the most effective Nor-Ray-Vac system.

The result is a heating system designed specifically for the needs of the building and the way that the premises are managed.

Model Range

The Nor-Ray-Vac Series continuous radiant tube heating system includes six natural gas or propane burner models from 12 to 46kW, for maximum radiant tube lengths from 5.2 to 27 metres. Maximum tube temperatures range from 450°C to 480°C.

The modulating burners are available in models 24, 32, 38 and 46. The model numbers are suffixed with 'M' for modulating.

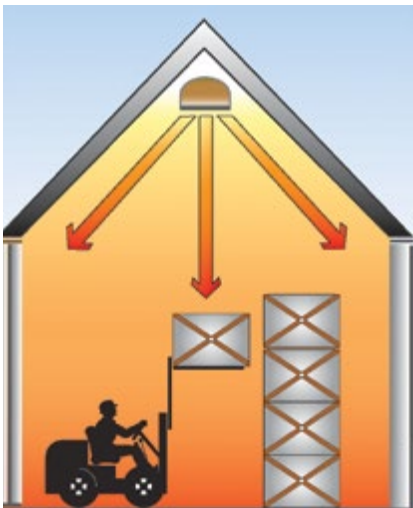
Features & Benefits

- > Reduces overall costs, with savings of up to 60% being achieved over conventional heating systems
- > In-line fuel efficient burners with inputs ranging from 12 to 46kW
- > Common vacuum fan operation
- > Stoichiometric or 'perfect' combustion
- > Can be designed 92% combustion efficiency
- > Rapid heat-up times
- > Good aesthetic integration with building
- > Minimal vent penetrations
- > Capable of running three 46kW burners in a radiant branch
- > Widest range of burner inputs for any continuous system
- > Uniform distribution of heat
- > Reliability and safety of operation to the latest European standard for multi-burner systems (EN 777)
- > Radiant tube systems such as the Nor-Ray-Vac can be designed to a thermal efficiency of >92%. At this thermal efficiency such systems are eligible for the Enhanced Capital Allowance (ECA) scheme.



Radiant Heating

Radiant heat warms all solid objects and surfaces in its path through electromagnetic waves. Mounted overhead, AmbiRad radiant heaters produce infrared heat that is directed downwards to low level by a reflector. Infrared energy passes through the air dissipating as heat upon contact with people and surfaces thus creating a comfortable, all-round radiant warmth at lower air temperatures. This reduces wasteful heating of empty space and makes substantial energy savings over conventional boiler and air systems.



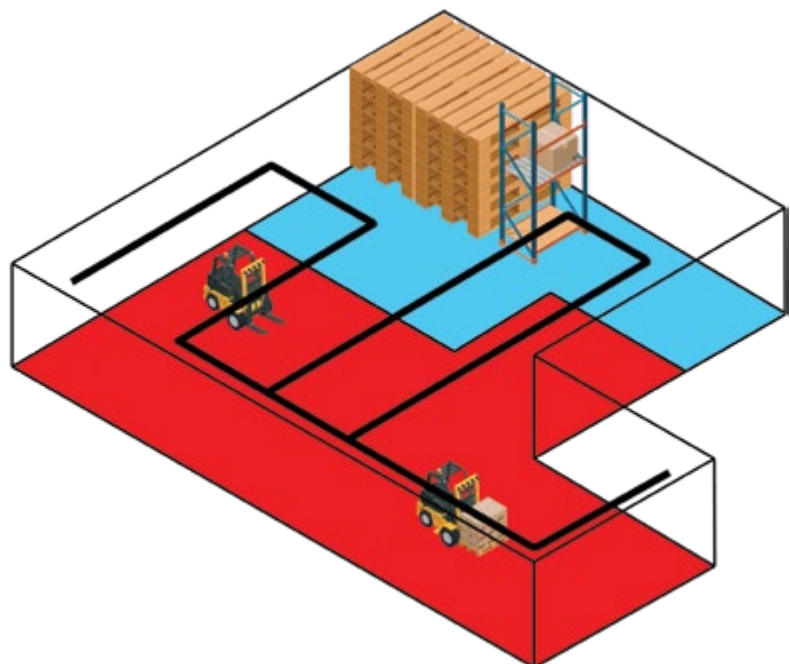
Comfortable Warmth

The Nor-Ray-Vac system exploits the concept of radiant heat. As radiant heat can be targeted effectively, energy savings can be achieved by heating only those areas which are occupied.

The Nor-Ray-Vac system has a rapid response to operating temperature and burns fuel at the point of use. This has significant advantages compared with large heating plant which suffer from distribution losses and slow response times.

Nor-Ray-Vac Applications

- > Aircraft hangars
- > Garages and showrooms
- > Greenhouses
- > Museums
- > New low energy factories / warehouses
- > Non-food distribution centres
- > Train maintenance depots
- > Sports halls / tennis centres
- > Superstore retail outlets
- > Vehicle distribution centres
- > Warehouses



Specification

Burner Control Housing

Consists of chassis with detachable pivoting lid.

Burner Head Assembly

A lightweight aluminium construction with a ceramic burner head insert. The aerodynamic shape reduces the pressure drop across the burner head and promotes a greater volume flame at the bottom of the tube where maximum heat release is desirable.

End Vent Module

At the start of each radiant branch an end vent module (EVM) is connected to the rear of the first combustion chamber. The EVM/ burner incorporates a vacuum pressure switch to prove flow at the start of the radiant branch to comply with European gas appliance standards.

Vacuum Fans

Cast aluminium or robust steel plate fabricated centrifugal fan coated with heat and corrosion resistant paint, capable of a static minimum pressure of 29mbar at 20°C.

System Tube

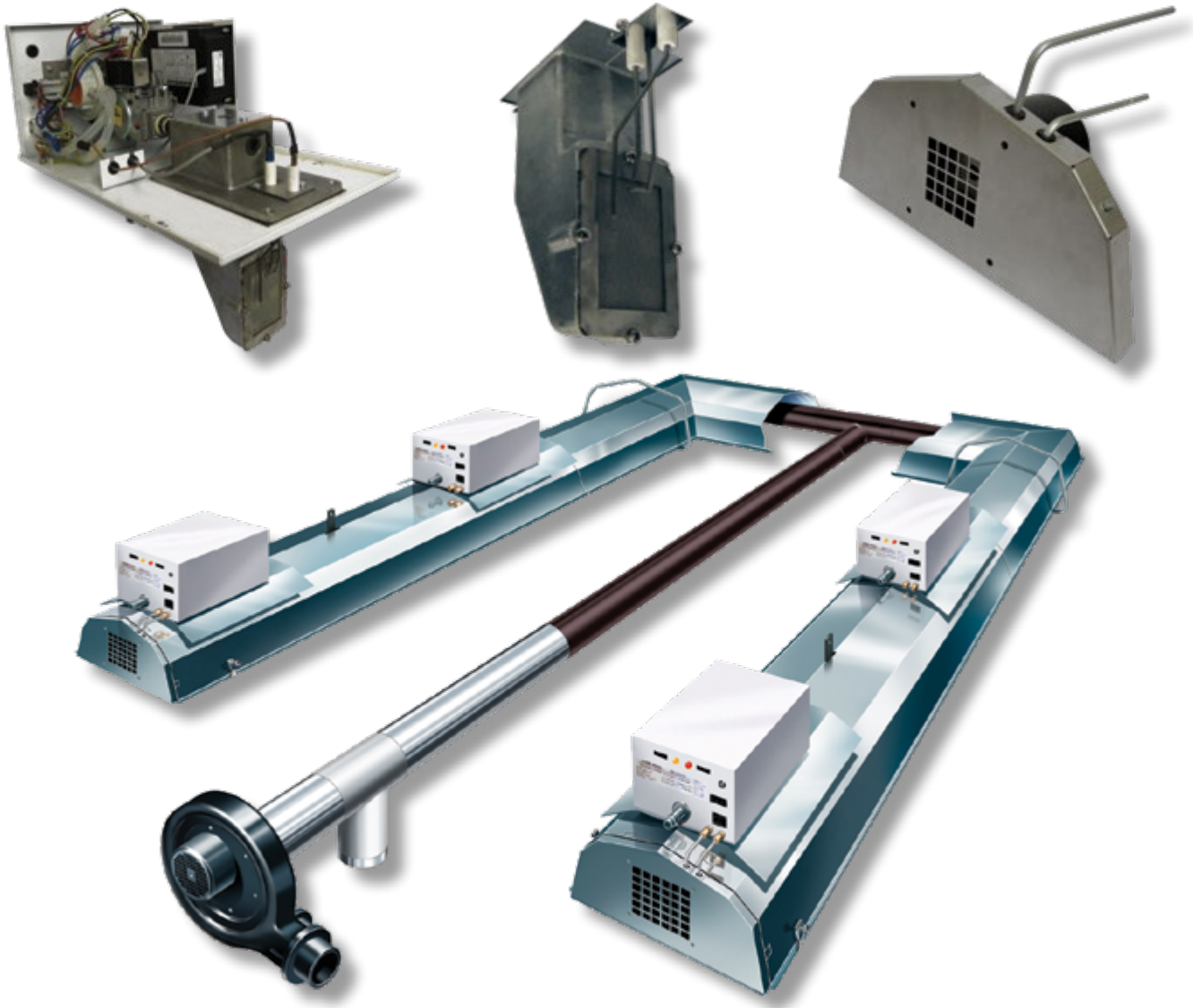
Calcoat radiant tube, hot coated internally and externally with aluminium, then heat treated, fusing the aluminium into the surface of the steel, ensuring the seam weld is coated with aluminium. The tube fittings are connected together using specially designed stainless steel wrap-around couplings.

Reflectors

The radiant tube sections of the system are fitted with reflectors made of Aludip or stainless steel to direct infrared rays downwards. The reflectors are a unique design profile to maximise the reflected radiant heat, minimise convective loss, and maximise rigidity.

Control Panel

SmartCom controlled – single or multi-zoned options available.



System Operation

The system operates on a vacuum principle and utilises a zero governor within a dedicated gas valve ensuring optimum efficiency, reliability and safety.

The zero governor will only allow flow of gas when a vacuum is created by the fan. Therefore as well as the standard failsafe (where the gas valve locks out with ignition or gas supply failure), the zero governor also mechanically prevents gas flow in the event of vacuum shut down. The control of gas flow through the zero governor and the air flow into the mixing chamber while under the influence of the vacuum fan, enables stoichiometric combustion at the burner head.

Stoichiometric combustion permits the inclusion of further burners within the same tubing 'downstream' from the first burner, ensuring evenly distributed heat along the length of radiant tube.

Conforming to the European Gas Appliance regulations (EN 777), the end vent module burner has been developed to 'prove' flow of air at the start of each radiant branch. The end vent module burner is a unique feature to the Nor-Ray-Vac system and instils the principle of 'safety of operation' as a prerequisite of design.





Modulation

Fully Modulating Nor-Ray-Vac System

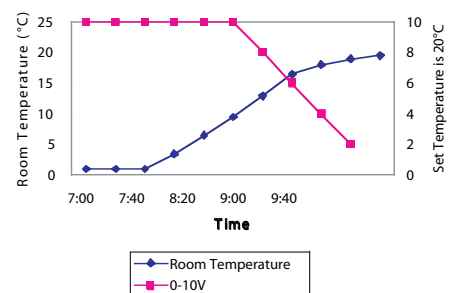
A conventional radiant heating system operates with on/off control. It is now possible to control the AmbiRad NRV system using continuous modulation, by adjusting the vacuum as the building temperature varies. The optimum air/gas ratio is maintained giving maximum comfort & efficiency whilst minimising fuel consumption.

Features & Benefits

- > Fully modulating radiant heating system
- > Complete air fuel ratio control
- > Maximises thermal efficiency
- > Maintains radiant efficiency
- > Maximises comfort
- > Delivers significant energy savings
- > Rapid Response

Control Method

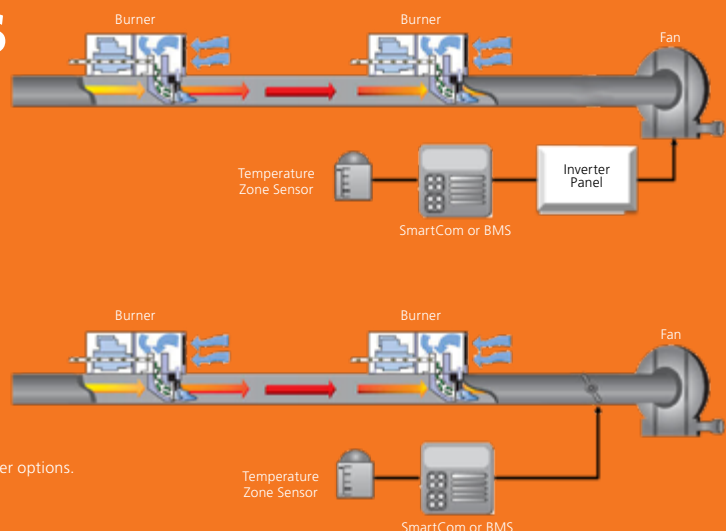
Room temperature controller produces a 0-10V output, this output is related to the room temperature as shown in the diagram below:



How it Works

The 0-10V output modulates a damper situated in front of the vacuum fan, or alternatively the 0-10V modulates by varying the speed of the fan under the control of the inverter. This then adjusts the vacuum pressure and so varies the air flow rate.

As the gas flow rate is controlled by a zero governor, the gas rate is adjusted in conjunction with the airflow rate. This gives the system a constant air fuel ratio.



A simple schematic of the fully modulating NRV system utilising the damper or inverter options.

Specification											
Model		NRV12LR	NRV18LR	NRV24LR	NRV32LR	NRV38LR	NRV46LR	NRV24M	NRV32M	NRV38M	NRV46M
Nominal gross heat input	kW	12	18	24	32	38	46	-	-	-	-
Nominal gross heat input range	kW	-	-	-	-	-	-	24/12	32/16	38/19	46/23
Gas Consumption											
Natural Gas G20	m ³ /h	1.14	1.72	2.29	3.05	3.62	4.38	2.29	3.05	3.62	4.38
Propane G31	m ³ /h	0.45	0.68	0.90	1.21	1.43	1.73	0.90	1.21	1.43	1.73
Inlet Gas Pressure (mbar)	Max	50	50	50	50	50	50	50	50	50	50
	Min	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Radiant Tube Length (Distance between burners)	m Max	7.2	10.2	13.1	18	23	27	13.1	18	23	27
	m Min	5.2	7.4	9.4	14	18	23	9.4	14	18	23
Maximum Tube Temperature	°C	450	450	450	480	480	480	450	480	480	480

Max Burners Per Branch						
Model	NRV12LR	NRV18LR	NRV24LR	NRV32LR	NRV38LR	NRV46LR
		-	-	NRV24M	NRV32M	NRV38M
Max burners per branch	5	4	3	3	3	3

Electrical Details						
Model	NRV12LR	NRV18LR	NRV24LR	NRV32LR	NRV38LR	NRV46LR
		-	-	NRV24M	NRV32M	NRV38M
Electrical supply	230 volts 1 phase 50Hz					
Current rating	0.05 amps max (inductive)					

Distance From Combustibles						
Model	NRV12LR	NRV18LR	NRV24LR	NRV32LR	NRV38LR	NRV46LR
		-	-	NRV24M	NRV32M	NRV38M
Below Tube						
End vent/inline						
Without undershield	1120/1250	1120/1250	1120/1250	1440/1700	1570/2100	1700/2100
With undershield	760/850	760/850	760/850	760/850	785/1050	850/1050
Above Tube	250	250	250	250	250	250
Horizontally						
Standard Reflector	600/770	600/770	600/770	700/850	700/1000	700/1000
Perimeter Reflector	305/450	305/450	305/450	305/510	305/600	305/600

Minimum Mounting Height							
Model	NRV12LR	NRV18LR	NRV24LR	NRV32LR	NRV38LR	NRV46LR	
		-	-	NRV24M	NRV32M	NRV38M	NRV46M
Minimum mounting height	m	3.0	3.6	4.0	4.7	5.3	6.0

System Weight						
Model	NRV12LR	NRV18LR	NRV24LR	NRV32LR	NRV38LR	NRV46LR
		-	-	NRV24M	NRV32M	NRV38M
Average weight	kg/m	10	10	10	10	10

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NORTEK GLOBAL HVAC (UK) LTD

Fens Pool Avenue
Brierley Hill
West Midlands DY5 1QA
United Kingdom

Tel: **01384 489 700**
Fax: **01384 489 707**

ambiradsales@nortek.com
www.ambirad.co.uk