REZNOR®

INSTALLATION/COMMISSIONING/SERVICE/USER MANUAL
RHC+ GAS FIRED HEAT MODULE

These appliances meet the following directives:-

Machinery Directive (2006/42/EC)
Low Voltage Directive (2014/35/EU)
Electromagnetic Compatibility Directive: (2014/30/EU) Regulation (EU) 2016/2281
Gas Appliance Regulations (EU) 2016/426

Please read this document carefully before commencing installation, commissioning and/or servicing.
Leave it with the end user/site agent to be placed in their premises technical file after installation.

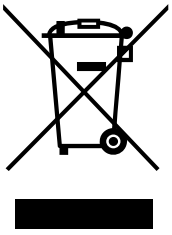
WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death.
All work must be carried out by appropriately qualified persons.
The manufacturer does not take any responsibility in the event of non-observance of the regulations concerning the connection of the apparatus causing a dangerous operation possibly resulting in damage to the apparatus and/or environment in which the unit is installed.

CE UK CA

Manual Part Number D301694 Issue 0

Contents



The meaning of the symbol on the material, its accessory or packaging indicates that this product shall not be treated as regular waste. Please, dispose of this equipment at your applicable collection point for the recycling of electrical and electronic equipments waste. In the European Union and Other European countries which there are separate collection systems for used electrical and electronic product. By ensuring the correct disposal of this product, you will help prevent potentially hazardous to the environment and to human health, which could otherwise be caused by unsuitable waste handling of this product. The recycling of materials will help conserve natural resources. Please do not therefore dispose of your old electrical and electronic equipment with your regular waste.

1. General

The RHC+ range meets the following European directives:

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1.1 Introduction

These instructions refer to appliances designed to operate in the UK and Ireland. Appliances designed for other countries can be provided upon request.

This appliance must be installed in accordance with the local and national codes in force and used only in a sufficiently ventilated space, as specified in these instructions.

Before installation, check that the local gas distribution systems, nature of gas and pressure, and adjustment of the appliance are compatible.

RHC+ is the latest generation of heat module, combining innovative design with proven heat exchanger technology to provide a high efficiency cost effective and durable range.

The heaters are CE and UKCA certified to EN17082 for use in non-domestic installations.

Gas and oil-fired options are available. Gas fired heaters are suitable for use with natural gas (G20), LPG (G31). Oil fired heaters are suitable for use with Class D gas oil (35 sec), being supplied complete with a loose fire valve and oil filter.

The type of fuel, the input rate and the electrical supply requirement is shown on the heater rating plate. Check the rating plate to determine if the heater is appropriate for the intended installation.

This installation manual is shipped with the unit. Verify that the literature is correct for the model being installed. If the manual is incorrect for the heater, contact the supplier before beginning installation. The instructions in this manual apply only to the models listed. Installation should be carried out by a suitably qualified installer in accordance with these instructions and the current rules and regulations in force. The installer is responsible for the safe installation of the heater.

1.2 General Health and Safety

Symbols used in this document.

WARNING is used when failure to heed or implement the instruction(s) can lead to not only component damage, but also to a hazardous situation being created where there is a risk of personal injury.

CAUTION is used when failure to follow or implement the instruction(s) can lead to premature failure or damage to the heater or its component parts.

1.2.1 GAS LEAK EMERGENCY

If you can smell gas from or near the heater:

- Do not try to light any appliance
- Do not smoke or light matches
- Do not turn electrical switches on or off
- Open doors and windows, to air the room
- Close the fuel control to the device
- If you still smell gas turn off the supply at the meter
- Raise the alarm and evacuate all personnel to a safe place
- Promptly Call your Gas Emergency number

Enter your gas emergency number below:

- Do not store or use petrol or other flammable vapours and liquids in the vicinity of the appliance.
- In case of persisting problems, contact your distributor Improper installation, adjustment, alteration, service, or
- maintenance can cause property damage, injury, or death.

Read the installation, operation, and maintenance instructions thoroughly before installing or servicing this equipment.

Do not use this appliance if any part has been immersed in water. Immediately call a qualified service technician to inspect the appliance and replace any gas control that has been immersed in water.

Gas-fired appliances are not designed for use in hazardous atmospheres containing flammable vapours

or combustible dust, in atmospheres containing chlorinated or halogenated hydrocarbons or in applications with airborne silicone substances.

Should overheating occur, or the gas supply fail to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.

This appliance is not intended for use by persons (including children) with reduced sensory or mental capabilities or lack of experience and knowledge unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

Carry out a risk assessment for the task to be carried out and ensure the correct use of any Personal Protective Equipment.

This manual should be kept in a safe place for future reference.

1.2.2 Before using this appliance:

- Carefully read these instructions and follow the processes explained by the manufacturer. These instructions are only valid for appliances designed to operate in Europe.

- Check that the voltage indicated on the type plate corresponds to the mains supply voltage. If the country code and gas category on the appliance data label does not match the country of installation or the country codes and gas categories as shown in this instruction manual, it will be necessary to contact the distributor or manufacturer to provide the necessary information for the modification of the appliance to the conditions of use for the country of installation

- Ensure that the heater has been securely fastened in its final mounting position.

- Installing, commissioning, testing, programming, and maintenance of these products must only be carried out by suitably qualified and trained technicians and in full compliance with all applicable regulations and current best practices.

- Check if the appliance as described on the packaging label is in accordance with the correct type and model as specified on the data plate and complies with your customer order.

- Check that the temperature ranges given and those of the location match. The appliance must be powered with a voltage corresponding to the value shown on the rating plate.

- These units must be installed in accordance with the rules in force and local regulations / legislation as appropriate plus all local building codes.

- Installers should satisfy themselves that the gas or oil pipework installation is carried out in accordance with all current legislation, Codes of Practice and recommendations.

1.3 Indirect Fired

The term 'Indirect Fired' indicates that the products of combustion are kept isolated from the main supply air stream. The burner fires into a combustion chamber, the resultant products of combustion are directed into a heat exchanger and from there to an external flue, which discharges into the atmosphere.

1.4 Factory Test

All heaters produced will be subjected to various tests before they are dispatched. Each heater is individual so the data will differ between each unit. The relevant data can be found on the data plate attached to the heater.

1.5 Construction

The construction of a RHC+ inline heating module consists of double skin panels all around, except modules for AHU applications will have a double skin front panel with all other panels being single skin.

External units will be fully waterproof; the burner compartment will be adequately ventilated via two combustion air grilles situated high & low.

1.6 Burner and Fuel

The RHC+ heating module will be fitted with either a Force Induced Natural Gas & LPG Burner.

1.7 Burner Type

RHC+ uses Burner Tech for fully modulating natural gas and models.

1.8 Applications

The RHC+ unit can be made to suit the customers requirements and used for all types of applications, commercial or industrial.

Some common uses:

- Inline ductwork
- Air Handling unit Application
- High Temperature application
- Drying
- Comfort Heating.

Technical Data	30	45	60	90	120	150	180	210	260	300	350	450	600	700	800	900	1000
Nominal Heat Output (kW)	30	45	60	90	120	150	180	210	260	300	350	450	600	700	800	900	1000
Heat Input (kW)	32	48	64	96	128	160	193	225	278	321	374	481	642	749	856	963	1070
Temperature Rise (°C)	33	41	41	41	41	41	41	41	39	41	41	41	41	41	41	41	41
Thermal Efficiencies (Nett CV) %					MIN 93.5%												
Nox Seasonal (mg/kW)	59.3	58.2	62.3	65.3	62.1	65.9	61	63.5	65.3	66.2	61	65.2	60.2	62.2	63.2	63	60.3
Gas fired																	
Gas Consumption Nat Gas (G20) (m3/hr)	3.00	4.50	6.00	9.00	11.99	14.99	17.99	20.99	25.99	29.99	34.98	44.98	59.97	69.97	79.96	89.96	99.95
Gas Consumption Nat Gas (G31) (m3/hr)	1.24	1.86	2.48	3.72	4.96	6.20	7.44	8.67	10.74	12.39	14.46	18.59	24.79	28.92	33.05	37.18	41.31
Minimum Dynamic Inlet Pressure Nat Gas (G20)	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Minimum Dynamic Inlet Pressure LPG (G31)	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Gas Connection (Rc)	1/2"	3/4"	3/4"	3/4"	3/4"	3/4"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/2"	2"	2"	2"	2"	2 1/2"	2 1/2"
Oil Fired																	
Oil Consumption (35 sec)	2.96	4.44	5.91	8.87	11.83	14.79	17.74	20.70	25.63	29.57	34.50	44.36	59.14	69.00	78.86	88.71	98.57
Oil Connection Rc	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"	1/2"	1/2"
Air Handling Data																	
Airflow m3/hr	2700	3276	4392	6552	8712	10944	13104	15264	19656	21816	25452	32724	43596	50868	59436	65412	72684
Airflow m3/sec	0.75	0.91	1.22	1.82	2.42	3.04	3.64	4.24	5.46	6.06	7.07	9.09	12.11	14.13	16.51	18.17	20.19
General Data																	
Electrical Supply (V)	240v	240	240	240	240	240	240	240	240	240	240	240	415v	415v	415v	415v	415v
Nominal Flue Diameter (mm)	100	130	130	130	130	130	200	200	200	250	250	300	300	350	400	400	400
Noise Level @ 5m db(A)	58	58	62	65	66	68	69	69	69	69	71	72	72	73	75	75	75

Gross CV = 10.7 kw/m3 Nett CV = 9.64 kW/m3

Section 4: General Technical Table 2 – Supercell

Each appliance has been range rated: burner pressures can be found on data plate and the burner pressure once commissioned must be entered in the actual burner pressure setting

3. Installation

3.1 Positioning

RHC+ is a heating module designed for insertion into an Air Handling Unit (AHU) or into ductwork, where a supply air fan already exists. The AHU compartment or duct connections must be sized in accordance with the air channel dimensions for the model selected, failure to do so will result in the appliance operating incorrectly and the appliance warranty being rendered null & void.

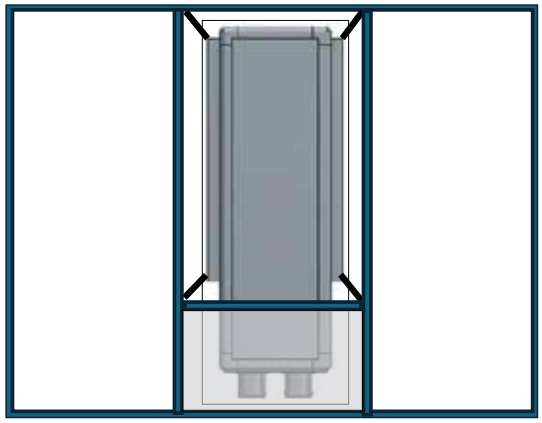


Fig. 1 Within an AHU

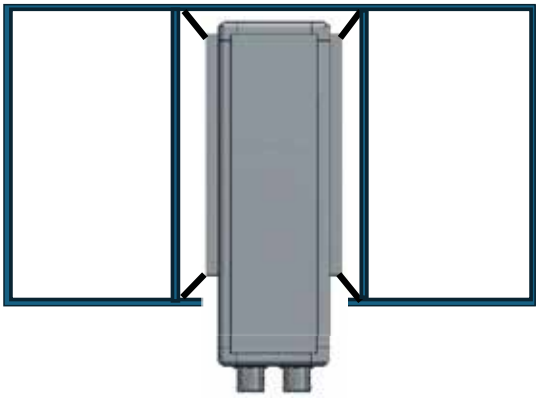


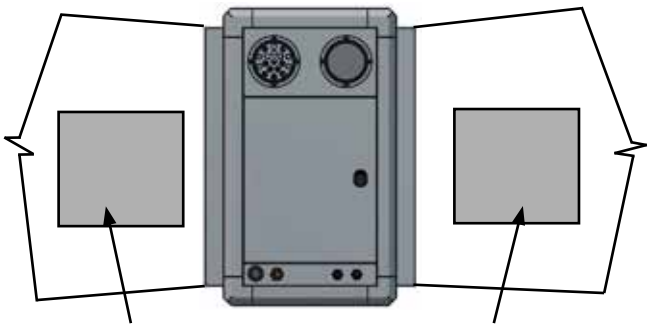
Fig. 1 Only air channel within an AHU

The air channel connections MUST be air tight. When inserting the heating module totally inside an AHU there MUST be a compartment totally isolated from the AHU internal airway(s) as indicated by the grey highlighted section in Fig 1. This will allow commissioning & servicing of the gas burner without impacting the operation of the AHU, as well as the operation of the AHU impacting the burner operation.

Note Within the access door ventilation grilles at high and low level must be fitted.

If there is insufficient space within the AHU to accomodate the whole heating module, then the module can be used as per Fig. 2 where only the the airway is incorporated, with the remainder protruding from the AHU. Again, the airways MUST be totally airtight.

If the RHC+ heating module is inserted into a ductwork system utilising an existing supply air fan, then ensure that access panels are fitted in the ductwork adjacent to both the air inlet & outlet duct connections to allow access to high temperature safety devices fitted to the heating module. See Fig. 3.



Duct access doors fitted both upstream & downstream of the heater for servicing and inspection

Fig.3 Ductwork mounted

All basic criteria must be satisfied prior to commencing the installation and commissioning process.

The heater must be positioned and installed to comply with all relevant standards and guidelines and should also meet the local and national fire regulations and insurance criteria, this is critical if the heater is to be installed within a special risk area (e.g. being; within close proximity to where petrol engine vehicles are stored or parked, where cellulose spraying takes place, where woodworking machinery is being operated, etc,).

CAUTION The heater must not be installed within an area with unsuitable conditions, e.g. where the atmosphere is highly corrosive, has a high degree of salinity, or where high wind velocities may affect burner operation.

Suitable protection should be provided for the appliance if it is located in a position where it may be susceptible to external mechanical damage; for example, fork lift trucks, overhead cranes etc.

Indirect heaters must not be located in hazardous areas, however, it is permissible for the heater to supply air to such areas.

The heater must not be installed within an environment where there is a high concentration of chlorides, fluorides, salts, or other aggressive or volatile chemicals/ compounds. Nor should the heater be positioned where the burner could be adversely affected by high winds or draughts.

The location chosen for the heater must allow for the fitting of an effective flue system. The location must also allow for adequate clearance for the air supply, gas supply and electrical supply, whilst also providing good and safe

working access. The heater must be installed on a flat and level surface made from non-combustible material, which is sufficiently robust to withstand the weight of the heater.

3.2 General requirements

WARNING Unauthorised modifications to the appliance, or departure from the manufacturers guidance on intended use, on recommended practices may constitute a hazard.

To ignore the warning and caution notices, and advice from the manufacturer on installation, commissioning, servicing, or use, will jeopardise any applicable warranty.

Moreover, such a situation could also compromise the safe and efficient running of the appliance itself, and thereby constitute a hazard All heaters must be earthed. The installation of the appliance must meet all the relevant European, national, and local criteria.

Prior to installation the following points should be considered;

- The position of the heater relative to the route of the flue.
- The position of the heater relative to the electrical services, and if appropriate, any additional controls.
- The position of the heater relative to the supply of fresh combustion air.
- The position of the heater relative to service and maintenance requirements.
- The appliance is designed to work in a maximum ambient temperature of 40°c.

3.2.1 Electrical supply

CAUTION Ensure the supply is in accordance with the manufacturer's recommendations and is as stated on the appliance data plate.

The main electrical supply must not be switched off or disconnected as a method for stopping the heater, the exception to this is in an emergency, or during servicing, where the heat exchanger has been given sufficient cooling time to prevent damage from occurring. Claims for damage will not be considered if they resulted from incorrect wiring or incorrect use of the heater Wiring external to the heater must be installed in accordance with any local, national, and European regulations.

The means of connection to the main electrical supply must allow for complete electrical isolation of the heater.

The position of the isolation switch must be such that it is adjacent to the heater and easily accessible at all times. In addition, the isolator itself must have a contact separation of not less than 3mm.

The Control fuse ratings are detailed on the appliance data plate.

WARNING Ensure that the electric and gas supplies are turned off before any electrical work is carried out on the heater.

Ensure that wiring cannot make contact with any surfaces liable to be subject to high temperatures or where the insulation of the wiring could be impaired as a result of such contact.

3.3 Installers Responsibilities

- To install the heater, as well as the gas and electrical supplies, in accordance with applicable specifications and codes.
- To use the information given in the manual together with the local and national codes to perform the installation.
- To plan for the installation of supports, flues and air intakes.
- To provide access to burners for servicing.
- To provide the owner with a copy of this installation, commissioning, operation and service manual.
- To never use heater as support for ladder.
- To ensure that there is sufficient ventilation in the area to comply with the requirements of all relevant local and national codes.

Ignoring the warning and caution notices and the advice from the manufacturer on installation, commissioning, servicing, or use, will jeopardise any applicable warranty. This could also compromise the safe and efficient running of the appliance itself and thereby constitute a hazard.

3.4 Heater installation

Before installation, check that the local distribution conditions, nature of gas pressure and adjustment of the appliance are compatible.

The air heater must be installed in accordance with the rules in force and the relevant requirements of any fire regulations or insurance company's requirements appertaining to the area in which the heater is located, particularly where special risks are involved, such as areas where petrol vehicles are housed, where cellulose spraying is carried out, in wood working departments etc.

3.4.1 Clearances and Positioning
A minimum of 500mm upstream and downstream must be allowed for, due to the radiant heat. Filters must be fireproof, if fitted and a motor shield is required over the main supply fan motor if directly in front of the heater.

To correctly install the heater, bear in mind that the heaters should:

- Be installed on a level noncombustible surface capable of supporting the weight of the heater and any ancillary equipment.
- Be supported over the entire perimeter of the lower base.
- Be placed on a surface whose deflection and strength is such that it can prevent vibrations from reaching underneath.
- Be easily and safely accessible without the need for special equipment (ladders, mobile platforms, etc.).
- Maintain the safety distances from flammable material;
- Be placed close to a flue exit point.
- Be able to be connected to the fuel source.
- Allow for easy maintenance and inspections;
- Be fitted with the ventilation openings required by the relevant regulations.

Do Not Install the Unit:

- In places where there are aggressive atmospheres.
- In pressurised environments.
- In negative pressure environments.
- Outdoors, if not provided with protection against bad weather conditions.

The appliance is designed to work in a maximum ambient temperature of 40°C.
Any combustible material adjacent to the heater and the flue system must be placed or shielded as to ensure that its temperature does not exceed 65ºC.

WARNING No air heater shall be installed where there is a foreseeable risk of flammable particles, gases, vapours, or corrosion inducing gases or vapours being drawn into either the heated air stream or the air for combustion. In such cases installation may only proceed if the air to be heated and the air for combustion are ducted to the heater from an uncontaminated source, preferably outside the building.

3.4.2 Supply air ductwork
All delivery and return air ducts, including air filters, jointing and any insulation or lining must be constructed entirely of materials, which will not contribute to a fire, are of adequate strength and dimensionally stable for the maximum internal and external temperatures to which they are to be exposed during commissioning and normal operation. In the selection of materials, account must be taken of the working environment and the air temperatures which will result when the overheat limit thermostat is being commissioned. Where inter-joint spaces are used as duct routes, they should be suitably lined with fire-resisting material.

A full and unobstructed return air path to the air heater must be provided.

If the air heater is to be installed in a plant room, the return air and warm air discharge arrangements must be such as to avoid interference with the operation of the flue by the air circulation fan. The return air intake and the warm air outlet(s) should therefore be fully ducted, in the plant room, to and from the heater, respectively. The openings in the structure of the plant room through which the ducting passes must be fire stopped.

3.4.3 Airflow
It is essential that the correct amount of air is provided through the heater and should be evenly distributed when entering the heater.

3.4.4 Air distribution
All pressure calculations/resistances for air are ambient with the Heater in the 'off' position.

The materials selected must be of low heat capacity, and it is preferable that all warm air ductwork is thermally insulated.

Where ducting may be subject to deterioration from exposure to moisture or high humidity, material selection and insulation are prime considerations. Joints and seams must be airtight and fastened securely and designed to remain so, even when operating at high temperatures.

Adequate support must be designed into the layout of the ductwork to ensure that the integrity of the seams and joints is maintained. The support must be independent and separate from the heater and the ducting, to allow for free movement during expansion and contraction.

Where ducting passes through walls or partitions sufficient clearance must be left, irrespective of any fire stop requirement, to allow for expansion and contraction. Fail-

ure to adhere to these latter two points can result in the generation and transmission of excess noise.

Where ducting is installed in concrete flooring a permanent membrane must be used to isolate the ducting from the corrosive effect of the alkaline salts within the concrete.

Care should be taken to ensure that soft insulation material does not become compressed and thereby lose its insulation effectiveness.

4. Overheat Protection Device

Overheat protection is fitted in case the air flow falls below the minimum necessary for safe operation of the heater, which may be caused by failure of the supply fan motor or belt failure, dirty filters or inlet damper failure. If the air flow falls too low, the high limit will trip out and will require manually resetting. If this happens on a regular basis it must be investigated by a competent registered engineer as this could cause serious damage to the heater.

WARNING If the heater has a Honeywell combined thermostat installed, then the jumper link must be removed from the replacement thermostat.

Heat exchanger damage may be the result.

Failure to follow these instructions can result in death, injury, property damage or product damage.

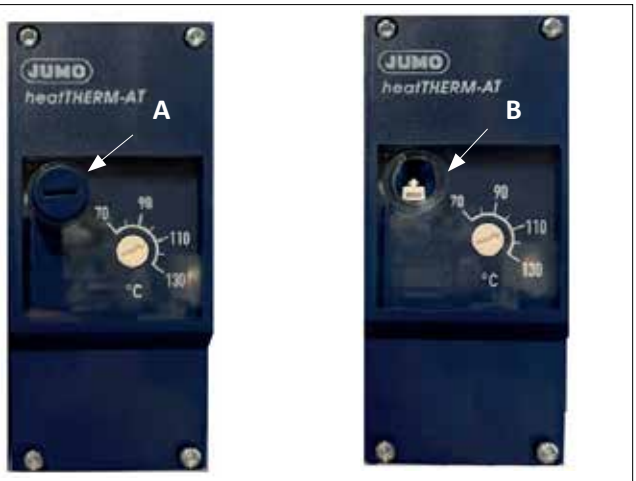


Fig. 4 Overheat device

To reset the Jumo overheat stat shown in Fig 4, remove the plastic cap (A) with a screw driver and lift the white lever (B).

Ensure that the limit settings are as follows:-

Limit 20$_{o}$C above normal running temperature no greater than 100$_{o}$C

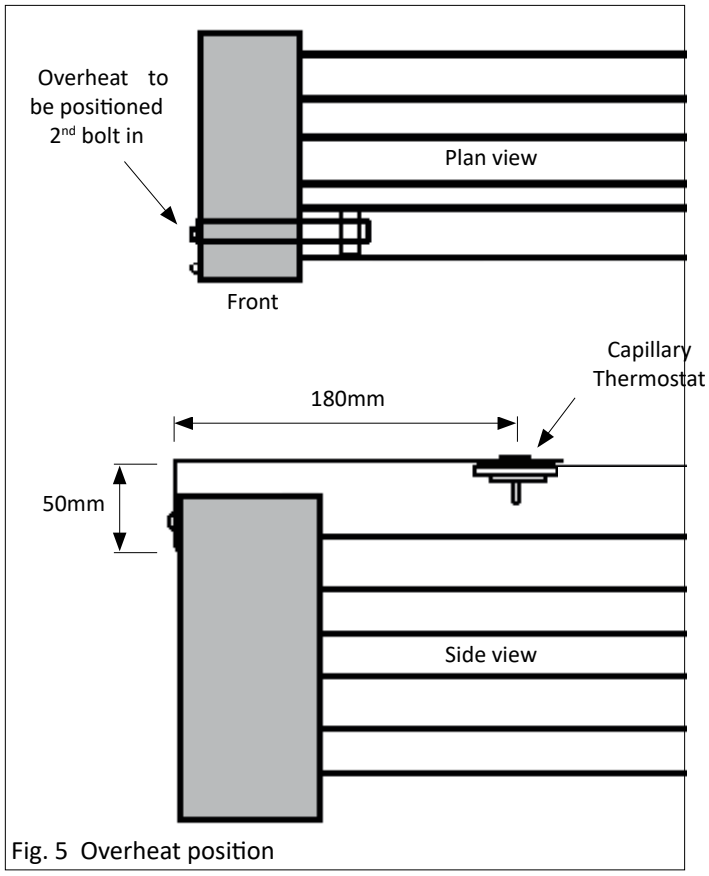


Fig. 5 Overheat position

5. Flue System

The flue system must be constructed to the following specifications:

1. Mechanically robust.
2. Resistant to internal and external corrosion.
3. Non-combustible and durable under the conditions to which they are to be subjected.
4. Dinak or M & G flue is recommended

5.1 Design

When designing a flue system for the appliance the designer must consider the following points:

1. The flue gases exiting the appliance can be as great as 250°C and as low as 60°C on modulating burners.
2. Prevention of condensation within the flue and the management of drainage from the flue; for example, the use of twin wall flue will minimise the condensation.
3. Flue must be a type acceptable to current standards.
4. Facilities should be made for the disconnection of the flue from the heater to aid servicing and inspection.
5. This appliance does not require a draught diverter.
6. The flue should terminate in a freely exposed position and must be situated as to prevent the products of combustion entering the building via any opening.
7. A Flue terminal must be fitted.
8. The flue installation must be designed to the latest gas regulations and any local environmental stand-

ards.

9. Where a flue passes through a combustible roof, ceiling or floor, the flue pipe should be surrounded with a metal sleeve, the size of which should be sufficient to provide a space not less than 25mm between the flue pipe and the sleeve when positioned.

Flue connection sizes can be found in table 1

5.2 Flue arrangement

The RHC+ heaters can be operated as:

Type B forced draught heater were the combustion air is taken from the room space the heater is installed in and requires only a flue pipe exhausting to outdoors. All products of combustion must be flued to outdoor atmosphere.

or a **Type C** forced draught heater where the combustion air is taken from outside (fresh air). All products of combustion must be flued to outdoor atmosphere. Both connections can be run as individual pipes, or in a concentric arrangement using the appropriate concentric terminal from Dinak or M & G.

The heaters are designed to operate safely and efficiently with either a horizontal or vertical flue system when installed according to the specific requirements and instructions.

If the heater is replacing an existing heater, be sure that the flue is of the correct size and that the existing flue is in good condition. A correctly sized flue system is required for safe operation of the heater. For testing, the flue pipe should include a sealable test point. Ideally the test point should be at least 450mm away from the air heater flue connection socket. However if a concentric flue is attached directly to the connection sockets then the combustion should be tested through the flue outlet collar via a drilled test point which must be securely plugged on completion.

Follow the flue pipe manufacturer's installation instructions for making joints, including connections to the air heater, for passing through a building element and for support requirements.

Gasket sealed single wall seamless stainless steel or aluminimum flue pipes are required. All joints must be sealed to prevent the products of combustion from leaking into the building.

WARNING The products of combustion from the unit heater must be flued to the outside of the building. A properly sized flue system is required for safe operation of the unit heater.

An improperly sized flue system can cause unsafe conditions and/or create condensation.

Failure to provide proper flueing arrangements could result in death, serious injury and/or damage to property.

Where air for combustion is being taken from within the space the heater is installed, it is important to ensure that there is an adequate air supply at all times to meet the combustion air requirements.

Modern buildings involve greater use of insulation, improved vapour barriers and weather proofing. These practices mean that buildings are sealed much tighter than in the past.

Proper combustion air supply for a power vented Type B installation requires ventilation of the heated space. Natural infiltration of air may not be adequate. Use of exhaust fans aggravates this situation.

It is important to ensure that there is adequate combustion air supply at all times. Reliance on doors and windows is not permitted.

Always ensure that an adequate inlet for fresh air for combustion is provided sized to suit the total installation of any combustion apparatus.

The flue MUST be installed in accordance with national and local regulations.

Single wall flue pipe exposed to cold air or run through unheated areas should be insulated. Where condensation is unavoidable, provision must be made for the condensation to flow freely to a point to which it can be released, i.e. a drain or gully.

The condensation drain from the flue must be constructed from non-corrodible material not less than 20 mm diameter. Copper or copper based alloys must not be used for condensate drains.

Vertical flue runs greater than 3m long will require a condensate tee c/w drain fitting between the flue outlet of the heater and the vertical flue pipe. Alternatively, insulated flue pipe should be considered.

Ensure that the air combustion inlet opening at the appliance cannot be obstructed.

An approved flue terminal must be installed to provide an extraction effect under virtually all wind conditions. The free area of outlet openings should be at least twice the nominal area of the flue. Outlet openings should be provided preferably all round, or at least on opposite sides.

It is important for the terminal of an individual open flue system to be located so that it is not likely to be subjected to wind pressures which could restrict or reverse flow of combustion products through the flue.

The ideal position is above the highest point on the roof. It is essential that the terminal is positioned outside the building so that it is freely exposed to any wind and is not shielded by any roof structure or object to such a degree that they create undesirable pressure regions around the terminal.

The table below details the minimum flue heights for internally and externally mounted units.

The maximum flue height is 25m; if this is to be exceeded please contact the manufacturer/distributor.

Type of Roof		Location not within 1.5m of a vertical surface* on the roof		Location within 1.5m of a vertical surface* on the roof
		On ridge	Not on ridge	
Pitched	**Pitch Exceeding 45°**	At or above roof level	1m above flue/roof intersection	The base of the terminal to be 600mm above the level of the top of the structure
	Pitch not exceeding 45°		600mm above flue/roof intersection	
Flat	**With Parapet**	Not applicable	600mm above flue/roof intersection	
	Without Parapet		250mm above flue/roof intersection	

Table 2 Recommended flue roof terminal locations

* For example: a chimney stack; dormer window; tank room; lift motor room; parapet; etc.

+When the flue outlet is at a horizontal distance greater than 10 times the height of the parapet or structure, the terminal outlet height need be only 250mm above the roof.

WARNING Do not restrict the combustion air intake. Ensure that for type B installations that an adequate clean air supply for combustion and ventilation is provided within the building in accordance with the relevant rules and regulations in force.

5.3 Flue terminal

A flue terminal (must be approved) needs to provide an extraction effect under virtually all wind conditions, the free area of outlet openings should be at least twice the nominal area of the flue. Outlet openings should be provided preferably all round, or at least on opposite sides.

It is important for the terminal of an individual open flue system to be located so that it is not likely to be subjected to wind pressures which could restrict or reverse the flow of combustion products through the flue.

The ideal position is above the highest point on the roof. It is essential that the terminal is positioned outside the building so that it is freely exposed to any wind and is not shielded by any roof structure or object to such a degree that they create undesirable pressure regions around the terminal.

Single wall flue and internal twin wall flue to EN18561:2009-06, flues can be purchase from flue specialists.

6. Gas Installation

The installation **must** be purged and tested for soundness prior to commissioning.

Always ensure that appropriate personal protective equipment is used.

The minimum inlet gas pressure should be 20mbar for natural gas.

A competent and/or qualified engineer is required to either install a new gas meter to the service pipe or to check that the existing meter is adequate to deal with the rate of gas supply required.

Installation pipes should be fitted in accordance with national standards so that the supply pressure, as stated in the technical data section will be achieved.

It is the responsibility of the competent engineer to ensure that other relevant standards and codes of practice are complied with in the country of installation. Pipes of smaller size than the heater inlet gas connection must not be used. The complete installation must be tested for soundness as described in the country of installation. Support as piping with pipe hangers, metal strapping, or other suitable material.

Service pipework must terminate at an approved isolating valve and be adjacent to the position of the heater. The connection to the heater can be made by way of either an approved flexible coupling, or rigid connection. Threaded connections must comply with ISO288/1 of ISO 7/1, further information concerning the accepted practice in European countries is detailed in EN1020. The diameter of the pipework from the isolating valve to the burner connection must not be less than the diameter of the burner connection inlet.

As far as gas burners are concerned, we suggest placing a leak detector near them, which will operate an electro valve that will stop the gas supply in case of any accidental leakage.

The gas supply line should be installed by a qualified person, in compliance with all the relevant Laws, Regulations and Rules. Refer to the designer of the system.

7. Gas Supply

All Gas Pipework to the appliance should be installed in accordance with current regulations, local and national codes and must be connected with an acceptable gas isolation valve and union, so that the burner maybe removed to aid servicing and inspection of the burner.

7.1 Size and Connection

The following considerations are to be considered:
Pipework smaller than the inlet gas connection should not be used.

1. The gas supply pipe is adequately sized to carry correct volume of gas from the gas meter to the heater(s).
2. The heat input and gas consumption for each heater can be found in table 1 to aid in the design of gas supply pipework.
3. All gas pipework and electrical connections must be adequately supported and must not support any of the heaters weight or rely on the strength of the burner gas pipe work.
4. Unless the heater is suspended or movement is apparent, the heater must be connected with medium, heavy or copper pipe; otherwise the use of an approved flexible connection between the isolating valve and the heater can be used. We recommend that the flexible gas connector is one size bigger than the heater connection to reduce any pressure loss.

The minimum dynamic inlet gas pressure for natural gas is 17.5 mbar.

Note Maximum inlet pressure is 50mbar. if this is exceeded then an external regulator (by others) must be fitted.

IMPORTANT The complete installation must be purged and tested for gas soundness in accordance with local, national codes and a registered engineer. is used.

8. Condensate drains

RHC+ models are fitted with a condense drain point, this **MUST** have a trap fitted along with a drain both by others.

The condensate pipework must not be installed below 1" BSP.

Do not use plastic condensate pipe and connections as the temperature of the condensate may be high at the outlet to the drain. Plastic pipework can only be used, at least 1500mm, after the trap.

Condensate trap MUST be pre-filled.

Check local and national regulations regarding the discharge of condensate.

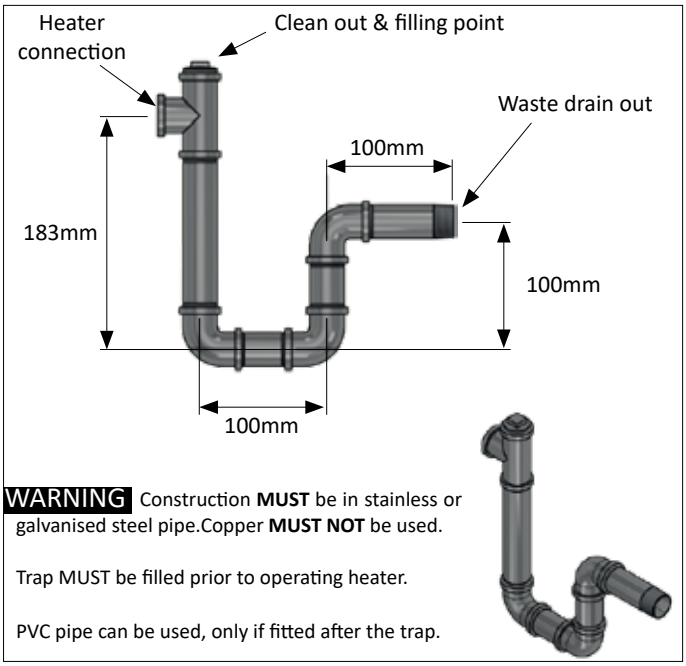


Fig. 6 Condensate trap

9. Electrical installation/ connection

WARNING Always isolate from the mains electrical supply before commencing work on the heater. The electrical installation may only be carried out by an appropriately qualified person in accordance with the current Rules and Regulations in force.

This appliance must be earthed. All wiring must be in accordance with current IEE Regulations and all local regulation that apply.

RHC+ heaters are supplied for use on 230v 50Hz 1PH supplies as standard.

The electrical supply must be as specified and suitable for the heater, and must be run within conduit to a point adjacent to the heater, and be terminated to provide an isolation point that will prevent remote or inadvertent activation. Cables, conduit, and fittings that are used to make the connection between the isolator and the heater must conform to the appropriate local and national regulations.

All heaters are supplied fused and prewired; all must be earthed.

The electric and controls terminations are located within the front panel of the Heater, housed in an interface panel. All heaters are compatible for interfacing with building management systems and 0-10V DC is required as standard on modulating heaters. A minimum of 1.5V is required for the heater to operate.

Check that the air heater is well earthed and that an earth leakage test is carried out. Final connections for any additional external controls must be completed on site, and must be carried out according to local and na-

tional regulations. Separate user information is provided for the burner, and forms part of the product information pack which accompanies every heater when despatched.

Always ensure that the appropriate personal protective equipment is used.

Ensure that all cables and installers wiring are appropriately fixed and that they do not touch the flue or combustion collector box. The electric panel is pre-installed with burner, control and safety thermostat of the overheat limit device connected.

Electrical connection should be carried out in the following order:-

1. General power supply;
2. Connections to the blown burner;
3. Connections to the various external safety systems (fire dampers, fire protection, etc.).

Please note the following:-

- Electrical connections must only be carried out by qualified engineers
- If confused, please contact manufacturer for further clarification.
- Install upstream of the unit a differential magneto thermal circuit breaker suitably sized according to the regulations in force.
- Always connect the earthing system, taking care to leave the earth wire slightly longer than the other wires, in the event that the wires are accidentally pulled, the latter is the last one to be removed.
- Get a qualified engineer to check that the section of the cables and the electrical systems are suitable for the maximum power absorbed by the unit indicated on the information plate.
- Respect polarity in the connection of the power supply (phase - neutral). In any case, make sure that the direction of rotation of the fans is correct.
- The unit must be connected to an efficient earthing system.

10. Ventilation - Type B Installations

Where the heater is to be installed in a plant room, the heater requires the plant room housing to have permanent air vents communicating directly with the outside air, at a high level and at a low level.

Where communication with the outside air is possible only by means of high level air vents, ducting down to floor level for the lower vent(s) should be used. Air vents should have negligible resistance and must not be sited in any position where they are likely to be easily blocked or flooded, or in any position adjacent to an extraction system, which is carrying flammable vapour.

Grilles or louvres should be designed so that high velocity air streams do not occur within the plant room. The ventilation should be installed to in accordance with local and national codes.

10.1 Ventilation Requirements

For type B installations the space in which the heater is situated must be adequately ventilated, see below for the minimum ventilation **free area** at low and high levels.

Low Level: 540cm² plus 4.5cm² per kW after 60kw.

High Level: 270cm² plus 2.25cm² per kW after 60kw

11. Heater Controls

As standard, each heater is supplied without controls although a time and temperature controller is available as an option.

In order to control the burner a 0 to 10V DC signal is required.

Minimum control must be time & temperature.

In addition to the burner, the following functions can be connected-

- Burner run indication
- Burner lock-out indication

Each heater can be used with most Building Management Systems.

If you require any further information or you have any special requirements, please do not hesitate to contact our Technical Department.

WARNING Electrical Shock Hazard

Use extreme caution while working on this appliance. Failure to follow these instructions can result in death or electric shock.

Only competent engineer should carryout work on this appliance.

12. Commissioning

Commissioning MUST be carried out by a competent Gas Safe registered engineer.

This section must be read in conjunction with the commissioning instructions given in the burner manual.

1. Visually check the full system to see if it is in accordance with this manual and to current/GAS SAFE legislation and IEE regulations and to this manual.

2. Check combustion air is adequate in plant room or surrounding area.

3. Check contactors, electrical wiring is correct and terminated tightly and fuse ratings are correct.

4. Ensure that the gas pipework is sized correctly and relative documents for pressure testing, soundness and purging are available. It is the responsibility of the commissioning engineer to check for soundness from the main inlet to the servicing stop tap on the inlet of the valve.

5. Ensure that the inlet gas pressure is no greater than 50mb static and no less than 17.5mb running.

6. Check that there is an interlock with the supply fan and burner so that the burner cannot run without the supply fan The supply fan MUST be set to run for 15 minutes after burner shutdown, on a shutdown condition. Terminals 7 & 10 are used to wire start & stop/time control to switch the burner on and off.

7. Terminals 3 & 4 are used to modulate the burner and requires a 0-10V DC signal in order to do so.

8. Ensure that the terminals 7 & 10 are made (via start-stop/time control) and a 0-10v signal is present. Turn the gas supply on to make the gas pressure switch and turn the commissioning stop tap off.

9. Switch the burner on. The burner should run through its cycle and after the ignition spark goes out, the burner should lockout on flame failure on the control box.

10. Before opening the main gas valve ensure the standing gas pressure is correct (between 20 & 50 mbar), the serivice gas pipe must be purged as per current regulations to the gas burner inlet before the burner is fired. A 0-10vdc signal generator must be connected between terminals 3 & 4, this will allow the burner to be commissioned at minimum and maximum rates during commissioning. At this point, check the start gas rate by firing the burner with 1.5V on the signal generator which should be no greater than 20% of the total output. This is preset in the factory and must be checked.

11. **Burnertech Modulating Burner** - Once the burner ignition rate has been checked and is correct the signal generator can be set to 10 vdc signal, the burner will now operate at 100% output. The burner must run for 20 minuntes before running temperatures and burner emissions checked, Typical flue gas readings are given below:-O_2 4% to 5% CO_2 9.5% to 10% CO Up to 50ppm (Typically, 20 ppm) Maximum flue stack temp - 250°C Please refer to the burner manual for adjustment

12. When satisfied with the gas settings, the CPI switch (if fitted) requires setting on, they are integral, which are factory set. For further information please see the burner manual.

13. Check the strength of the flame sensing device by removing the link on the burner, which connects the flame probe to the control box. Connect a multi-meter in series to give reading in uA. The signal strength should be a least 70uA for U.V. and 6uA on flame rectification.

14. After running the unit for a period of one hour, take a running temperature from the fan limit side of the thermostat. Set the over-heat to 20°C above the running temperature. The supply fans should be shut down once, when the burner is running to try the overheat device and the fans must be switched on as soon as the unit locks out on overheat.

15. All gas nipples must be replaced and checked for tightness and checked with leak detection fluid.

16. A leak detection test is to be carried out with leak detection fluid and an electronic leak detector on the gas train whilst the burner is running to see if there are any leaks in the burner gas train. A soundness test is to be carried our on all gas work.

17. Make a full record of combustion data on the commissioning sheet provided.

The commissioning sheet should include the following:

- Model and Serial Numbers.
- Heater running temperature and overheat settings.
- Full thermal input.
- Governor pressure setting (pilot for start gas and main for full fire).
- Gas flow rates for full fire.
- Burner damper setting and pressure switch settings.
- Flame signal strength on full fire.
- Exhaust gas O_2, CO_2, CO and temperature.

After setting all air pressure switches and valves etc, mark the position or lock off if possible.

Note You must not electrically isolate the heater when in full fire, always wait until the burner stops and the supply fan over runs to dissipate the heat before electrically isolating.

13. Servicing

IMPORTANT! - SERVICING MUST ONLY BE CARRIED OUT BY A COMPETENT REGISTERED ENGINEER (GAS SAFE) BEFORE CARRYING OUT ANY WORK ON THE UNIT SEE THAT THE ISOLATING SWITCH IS IN THE 'OFF' POSITION AND THE GAS SUPPLY IS SHUT OFF.

ONLY PARTS SUPPLIED OR RECOMMENDED BY THE MANUFACTURER SHOULD BE USED.

INFORMATION IS FOR GUIDANCE OF QUALIFIED SERVICE ENGINEERS ONLY

Note: Heater MUST be fully serviced at least once a year and recommissioned. In dirty or dusty environments it may be nessecary to increase the number of times the heater is serviced to maximise performance and efficiency from the heater.

If the flue gas passages in the heat exchanger, the combustion chamber, or in the flue chamber are blocked, the heater can overheat causing the unit to shut down on the overheat thermostat.

13.1 To clean the Heat exchanger

The heat exchanger must be cleaned from the front and rear of the appliance after first removing the following items:

- The burner assembly

Burner Removal (With gas and electrical supply isolated):

1. Disconnect the electrical supply to the burner by removing the multi-pin plug from the socket on the Heater interface panel.

2. Disconnect gas valve plugs.

3. Unscrew gas union assembly at inlet to gas train and at entry into burner mounting flange and remove gas train assembly.

4. Remove four fixing screws holding burner to heater front and lift away burner.

5. Fully service the heat exchanger in the following manner and replace burner electrodes, if required:
   - Remove the fan limit thermostat
   - Remove the front outer case panel
   - Remove and support the flue system
   - Remove Rear panel
   - Remove the heat exchanger cover plate, front and rear.
   - Brush any deposits from all of the flue ways using a brush. Also brush down the heat exchanger tubes.
   - Remove any soot from the bottom of the combustion chamber with a vacuum cleaner.
   - Inspect soundness of combustion chamber/ heat exchanger.
   - Replace all items in reverse order.

NOTE: Fit new gasket or seal to gas exchanger box, cleaning door where necessary.

Note: Service external units as per our standard internal procedures. In extreme weather conditions, always ensure any electrical connections are protected and do not allow water ingress.

13.2 Wet Conditions

If it is found that the area in which the heater is installed has become wet/flooded, the heater must be electrically isolated immediately and an investigation to find out if any water has penetrated into the heater controls. If so, ensure they are dried out properly before reinstalling the electric supply.

13.3 Burner Maintenance

Refer to the Burner Supplement supplied with the heate r.

13.4 Servicing Heat Exchanger

Heat Exchanger is of multi-tube construction with removable access, clean outdoors at either end. Access plates are secured by brass nuts, sandwiching glass wool webbing type gasket material between the heat exchanger flange and the access doors. When removing the doors it is important to inspect the gasket material and replace if necessary.

It is important that the tubes should be inspected and swept out if necessary, replacing Gasket Material – the material is of glass wool webbing 25mm x 3mm thick in strip form. The method of securing it is to have strips overlapping, and to cut through both surfaces with a sharp knife to give an exact join. Self adhesive webbing is easier to secure.

13.5 Recommended intervals

13.5.1 Weekly check

- Check that there are no apparent leaks.

13.5.2 Quarterly check

As weekly check, and also:

- Check the flue for condensation.
- Remove the Burner Inner Assembly – clean and replace.

13.5.3 Annual Inspection

- Clean heat exchanger surface.
- Check all wiring and tube connections.
- Remove the burner inner assembly – clean and replace.
- Start the Heater and check CO readings, stack temperature efficiency and CO level.

- Check the combustion air supply and check the smoke reading.

13.6 Overheat/Limit control

The limit control provides protection for the heater, should the temperature rise above a safe level. If an overheat condition occurs, the limit control will shut down the burner and hold it off until the manual reset button is pressed.

NOTE: If the limit requires re-setting more than once after first re-set, then a competent engineer must be called to investigate further.

High Limit = 20°C above normal running temperature no greater than 100°C.

Important: When integrated with building management system, the fan will be operated via their controls and all interlocks must be fitted to ensure the burner cannot start until the supply fan is running. On burner shutdown the supply fan overrun will continue running for 10 to 15 minutes to dissipate residual heat.

Note: You must not electrically isolate the heater when in full fire, always wait until the burner stops and the supply fan over runs to dissipate the heat before electrically isolating.

For summer ventilation switch on/off switch to off and set fan switch from auto to manual.

13.7 Cleaning the heater

The heater can be cleaned externally using a damp cloth with a light detergent **on the outer panel only**, away from all of the electrics. No substance can be used that will cause harm to the surface of the metal, or remove paint etc.

Note: Water must not be used on unpainted galvanised finished surfaces.

13.8 Gas control valve

No regular maintenance is required on these devices. Please refer to section 16 for removal or replacement of parts.

Replace faulty gas valve with genuine manufacturer recommended replacement parts; failure to do so could result in death, injury and damage to property.

Check all gas pipes and joints to ensure there are no cracks or gas leaks. Any cracks in the pipe work or joint must be repaired.

14. Removal and Replacement Parts

Note! Please refer also to the burner supplement supplied with this Manual.

14.1 Multi-Block gas valve

1. Isolate electric and gas.
2. Remove Din Plugs by using a terminal screwdriver to undo locking screw.
3. Undo valve flanges with 13mm spanner (up to 500 model), 17mm spanner (above 500 model). Lift out valve assembly.
4. Replace and re-assemble in reverse order, taking care that the O rings are in position.
5. Check for gas soundness and recommission heater.

14.2 Overheat limit stat

1. Isolate electric supply.
2. Remove outer casing and disconnect wires. The wires are held in by spring terminals which will release by pushing a small screwdriver into the slot next to the wiring termination.
3. Remove fixing screws, which secure stat to front of panel, carefully withdraw stat from heater and remove casing.
4. Re-assemble in reverse order and check settings, adjust if required to high limit 90°.

14.3 Recommend Tools to be used.

- Spanner 10mm, 13mm and 17mm
- Screwdriver – Terminal, medium flat blade and philips medium
- Stillsons – 14” and 18”
- Allen keys – standard metric set, 1.5mm – 10mm
- Side cutters/pliers
- Multi-meter
- Manometer
- Flue brush 3” head for exchanger tubes. Please refer to gas burner supplement supplied with this manual.

15. Troubleshooting

Note! Please refer to burner supplement supplied with this manual where more specific troubleshooting will be found.

Fault	Cause	Check
Burner Lockout	Burner fault, checl sector lockout occured on control box	Refer to burner supplement fault finding chart
Overheat trip	Dirty filters in AHU Low AHU supply air	Filters Fan belts (if fitted) Damper operation
Burner held off	No control signal	Check on/off voltage is present from control device. Is a 0-10V signal present?

16. User Instructions

WARNING If you smell gas:

1. Open all windows and door.
2. DO NOT try to light any appliance.
3. DO NOT use electrical switches.
4. DO NOT use any telephone in your building.
5. Leave the building.
6. Immediately call your local gas supplier after leaving the building; follow the gas suppliers instructions
7. If you cannot reach your gas supplier, call the fire brigade.

Once the controls have been fully installed and proved with the Heater (all interlocks proved etc), the supply air has been balanced and only when the Heater has been fully commissioned by a qualified registered engineer (Gas Safe), you are now able to use your Heater safely.

Easy Lighting and Shutting Off Instructions

Burner Start up

- Ensure start-stop/time control is on.
- The AHU supply air fan should be running before the burner can start.
- Make sure the thermostat is calling for heat.

Burner Shut down

- Ensure start-stop/time control is off.
- The AHU fans should run on for at least 10 min to cool heat exchanger.
- Make sure the thermostat is not calling for heat.

WARNING In Emergency only! Use electrical isolator and the gas isolation valve to isolate the appliance.

Do not use the AHU electrical isolator to switch this appliance off in normal use, as the AHU fan is required to run on to cool the heat exchanger, failure to do so will cause damage to this appliance.

Simple Fault Finding

- Some possible reasons for the heater not operating are:
- Gas supply not turned ON.
- Electrical Supply not turned ON.
- The time and/or Thermostats may not be ON.
- The Limit stat may have operated due to an interruption of electrical supply or fault with the distribution fan.

WARNING If the limit thermostats persistently operate, there is a fault which must be investigated by a qualified engineer registered with Gas Safe.

This Heater should not be electrically isolated during normal operation; doing so without a fan run on for 10 min will cause serious damage to the heater.

Simple Fault Finding (burner faults)

If the burner fails to ignition for any reason, it will go to lockout. This will be indicated by the red light on the burner or digitally shown on a display screen. Press in and release the lockout reset button; call a registered engineer if this does not rectify the problem. Lockout should not occur during normal operation of the heater and indicates there is a fault condition which must be corrected.

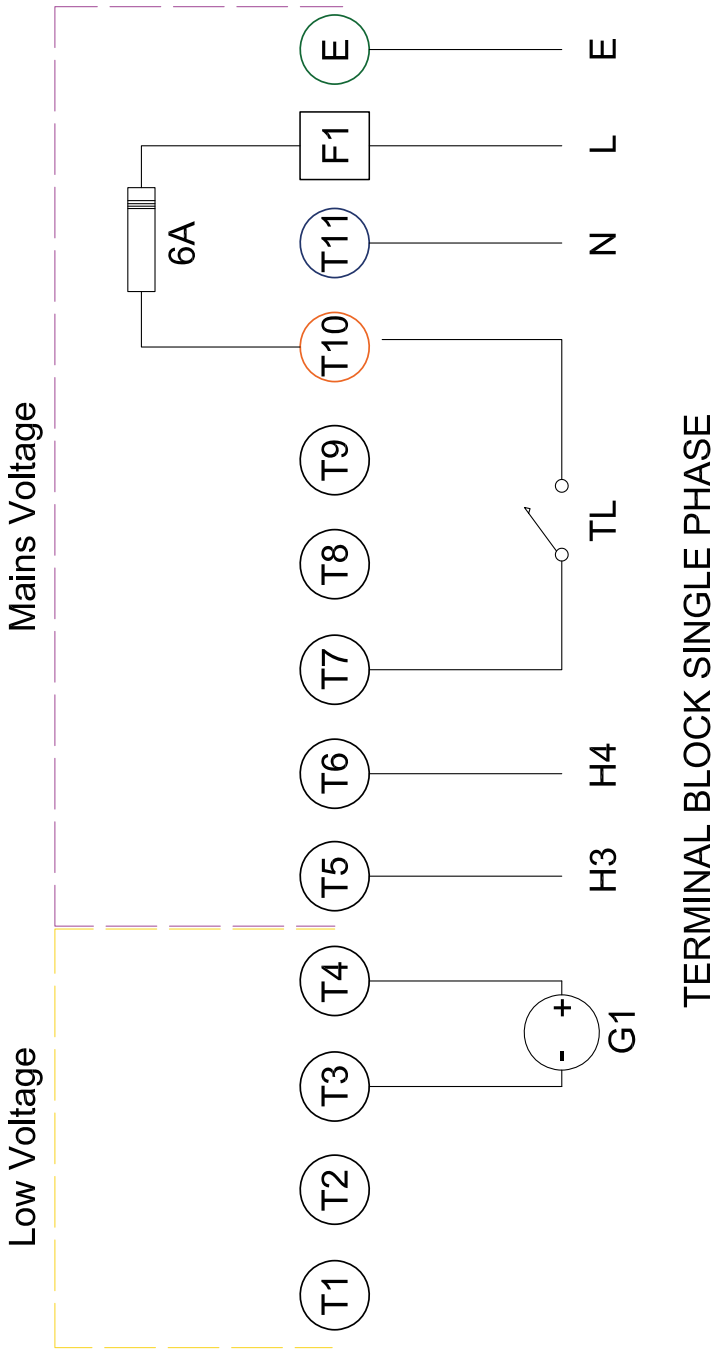
WARNING Do not store or use petrol or other flammable vapours and liquids in the vicinity of this or any other appliance.

Some objects will catch fire or explode when placed close to the heater.

Failure to follow these instructions can result in death, injury or property damage.

17. Wiring Diagram

Single Phase



Key Information	
TL	Interlock & Burner Enable
E	Earth
L	Live
N	Neutral
H4	Remote Burner Run
H3	Remote Burner Lockout
G1	0-10vdc Modulating

Notes

Current full Part No. **Reznor, RHC+ Installation Manual, EN 2025-03, D301694 Issue 0**

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