

RCHLN



**Installation
Commissioning
Servicing**



**These appliances meet the following EC Directives
DIR CE 2009/142/EC:GAD
DIR CE 2014/30/EU: EMC
DIR 2014/35/EU: LVD**

WARNING

Please read this document carefully before commencing installation commissioning and/or servicing. Leave it with the user or attached to the appliance or gas service meter after installation

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 harmful operation possibly resulting in damage to the apparatus and/or environment in which the unit is installed.

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HAZARD INTENSITY LEVELS



Failure to comply could result in minor personal injury and/or property damage.

CAUTION



Failure to comply could result in severe personal injury or death and/or property damage.

WARNING



Failure to comply will result in severe personal injury or death and/or property damage.

DANGER



Must NOT be performed under any circumstances.

WARNINGS



WARNING

- For your safety, if you smell gas:
 - Do not try to light any appliance
 - Do not touch any electrical switch, do not use any phone in your building.
 - Evacuate all personnel & contact your gas supplier immediately.
- Do not store or use petrol or other flammable vapours and liquids in the vicinity of the appliance.
- 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.
- This appliance is not intended for use by persons (including children) with reduced sensory or mental capacities or lack of experience and knowledge unless they have been given supervision or instructions 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.
- Should overheating occur or the gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.
- 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 appliances with airborne silicone substances.
- The manual should be kept in a safe place for future reference.
- Unauthorised modification of this appliance or departure from use in the manner, for which it was intended by the manufacturer or installed in a manner contrary to these instructions, may constitute a hazard and jeopardize all warranties. Deviations should only be carried out after formal consent has been obtained from the manufacturer.
- The electrical isolator should only be used in an emergency and should not be used for closing down the main burner, as it switches off the remote supply air fan prematurely and may damage the heat exchanger, invalidating the warranty.
- Use only factory authorized parts when replacement is required.
- In case of persisting problems, contact your distributor.
- This appliance is supplied without an air moving fan. The ducting system or air handling unit into which the RHCLN is installed MUST have a suitably sized air movement fan that is inter-linked with the gas heater module.

1

INTRODUCTION

1.1 Basic Information

The instructions within this manual apply to RHCLN gas fired heater modules. These models are designed for use within air handling units (AHU) or ducting systems where an air moving fan is present.

The appliances must be installed in accordance with the rules in force. Before installation, check that the local distribution conditions, nature of gas and pressure and adjustment of the appliance are compatible. A permanent electricity supply of 230 volts, 50 Hz, single phase is required.

When installed in Great Britain the total installation must comply with the requirements and recommendations of British Standard BS 6230 "Installation of Gas Fired Forced Convection Air Heaters for Commercial and Industrial

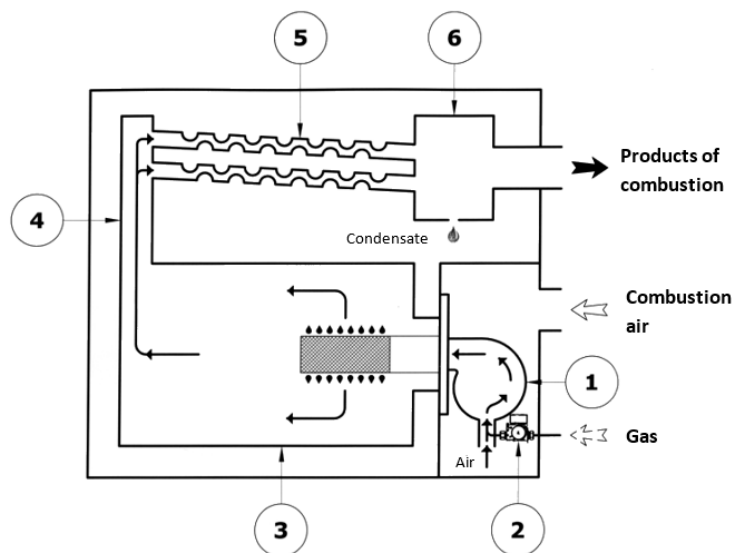
Space Heating". The installation must also be in accordance with the relevant requirements of "The Gas Safety (Installation and Use Regulations) and "Amendment regulations 1990" and "Electrical Regulations" (in GB the IEE Regulations). The requirements of the "Local Building Standards Office", the premise "Insurance" undertaking and the "Fire Office" must also be observed.

The modulating pre-mix burner has a modulating range from 100% to 30% full fire rate. The gas valve delivers the fuel in proportion to the combustion air flow rate in line with the default factory settings. The concentration of carbon dioxide (CO₂), unlike atmospheric burners, is more or less constant throughout the firing range. This will result in a higher thermal efficiency as the heat output decreases. Perfect mixing of the gas with combustion air combined with a semi-radiant flame, contributes to a combustion with very low emissions of carbon monoxide (CO) and nitrogen oxides (NO_x).

In the event of reduced combustion air (e.g. obstructions and/or flue or combustion air runs that are too long), the solenoid valve automatically reduces the gas, keeping the combustion parameters at optimal levels. In the case of poor combustion air, the solenoid valve closes and no more gas is supplied.

When the external control calls for heat, an electronic control begins the ignition sequence to provide for a safe start. Under normal conditions the supply air fan motor (by others) runs constantly and after a call for heat it switches the heater on through a room or duct stat. However, in some applications, about 30 seconds after the call for heat, the fan control relay will activate the fan motor of the air handler. The normal operation of RHCLN will then operate as follows: upon call for heat the pre-mix gas burner fan (1) introduces the optimal combustion air/gas mixture - dependent upon the modulating valve firing rate (2). Additional combustion air/gas mixing can occur inside the fan of the pre-mix burner (1), prior to being fed into the burner firing tube. On the external surface of the burner tube, a radial flame develops once the gas/air mixture is ignited. Combustion products, prior to being exhausted via the flue, heat up the combustion chamber (3), the rear flue manifold (4), the heat exchanger tubes (5) and the heat exchanger manifold (6). The electronic control within the RHCLN will supervise the flame during the entire heating cycle to ensure safe operation. When the required room temperature is reached, the main burner will shut down leaving the fan (supply air/AHU) running to cool down the heat exchanger

The temperature of the combustion products, whilst passing through the heat exchanger (5) falls below dew point, and retrieves the latent energy contained in the water vapour normally generated during the combustion process. The condensate produced is collected in the heat exchanger manifold (6) and in turn leaves the appliance via the condensate connection to an external drain system (by others).



1.2 Warranty

Warranty is void if:

- RHCLN heaters are installed in atmospheres containing flammable vapours or atmospheres containing chlorinated or halogenated hydrocarbons or atmospheres containing any silicone, aluminium oxide, etc., that adheres to spark ignition flame sensing probes.
- The installation is not in accordance with these instructions.
- The maximum air flow through the heat module exceeds that stated in this document.
- The required minimum air delivery is not respected.
- The inlet temperature exceed/are lower than the working parameters shown in the technical data table.

1.3 Disposal Instructions



For disposal methods, refer to the local laws in force relating to special waste. The unit contains electronic components, therefore cannot be treated as household waste. For disposal methods, refer to local laws in force relating to special waste.

2 TECHNICAL DATA

RHCLN			30	40	50	60	90	120
Gas category		Cat						
Appliance Type			B23, B23P, C13, C33, C63					
Heat input	Hs	kW	32.3	42.74	55.27	65.49	100.79	128.76
	Hi	kW	29.1	38.5	49.8	59.0	90.8	116.0
Max heat output		kW	28	37	48	57	89	115
Min heat output		kW	10	14	19	21	35	43
Max thermal eff at max input (G20)		net %	96.1	96.1	96.4	96.6	98.0	99.1
Max thermal eff at min input (G20)		net %	106.5	105.1	103.2	105.1	105.2	106.0
Gas consumption ¹	G20	m ³ /h	3.1	4.1	5.3	6.2	9.6	12.3
	G31	kg/h	2.28	3.02	3.9	4.57	7.07	9.06
Max condensate produced		l/h	1.1	1.3	1.5	1.9	3.3	4.3
Max airflow		m ³ /h	8,300	11,000	14,000	17,000	26,000	34,000
Min airflow		m ³ /h	2,100	2,750	3,500	4,250	6,500	8,500
Maximum pressure drop		pa	600					
Maximum flue run		m	9	9	9	9	9	9
Nox Class ²			5					
Flue connection size		mm	80	80	80	80	100	100
Gas connection size			3/4"					
Condensate connection size		mm	20	20	20	20	20	20
Electrical supply			230V ~ 50Hz 1Ph+N					
Weight		kg	48	51	62	66	122	129
Max/Min air on temperature		°C	-15/+40					
Max relative humidity (non condensing)		%	75					

1) Natural gas (G20) calorific value 10.48kWh/m³ GCV. LPG (G31) calorific value 14.0kWh/kg GCV G20 methane gas

2) Based upon EN 1020 standard, operating on natural gas (G20).

2.1 Identification

The appliances can be identified by means of:

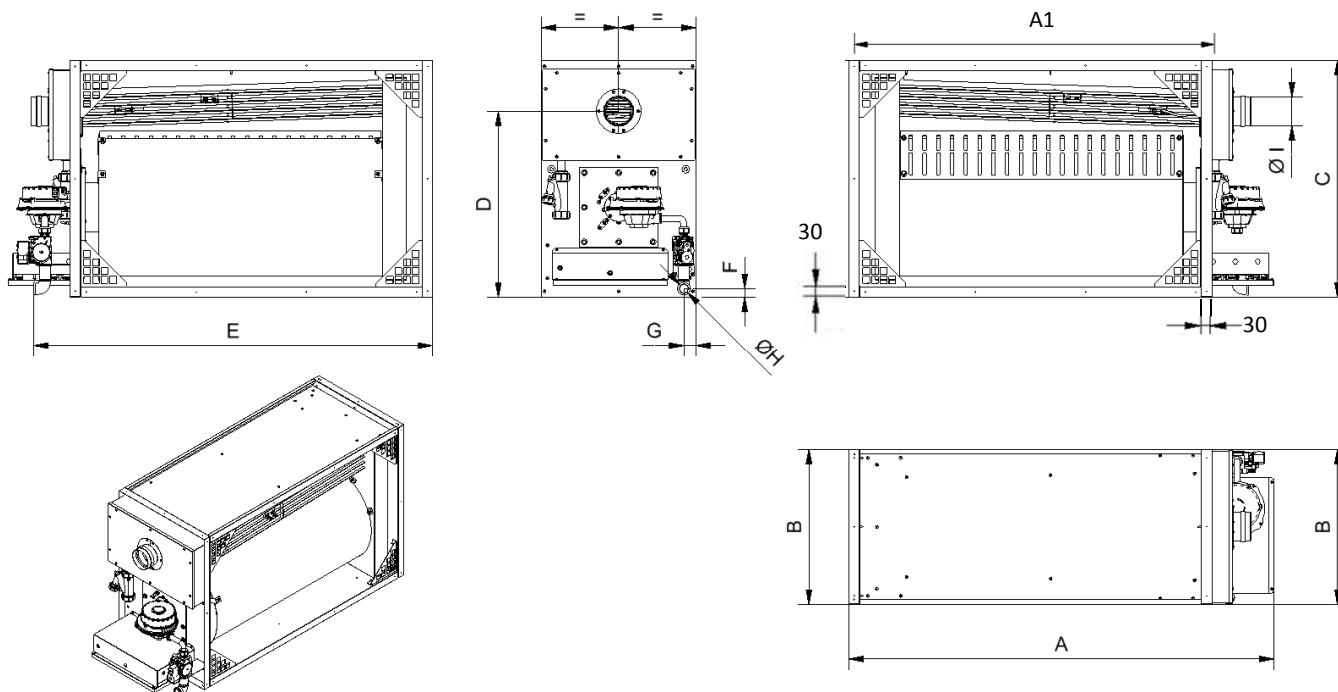
- The **technical plate**, affixed to the heater, specifying the main technical & performance data
- The **packaging label**, affixed to the outside.



WARNING

If the **technical plate** is damaged or lost, request a duplicate to the Technical Assistance Service.

2.2 Dimensional Data & Weights

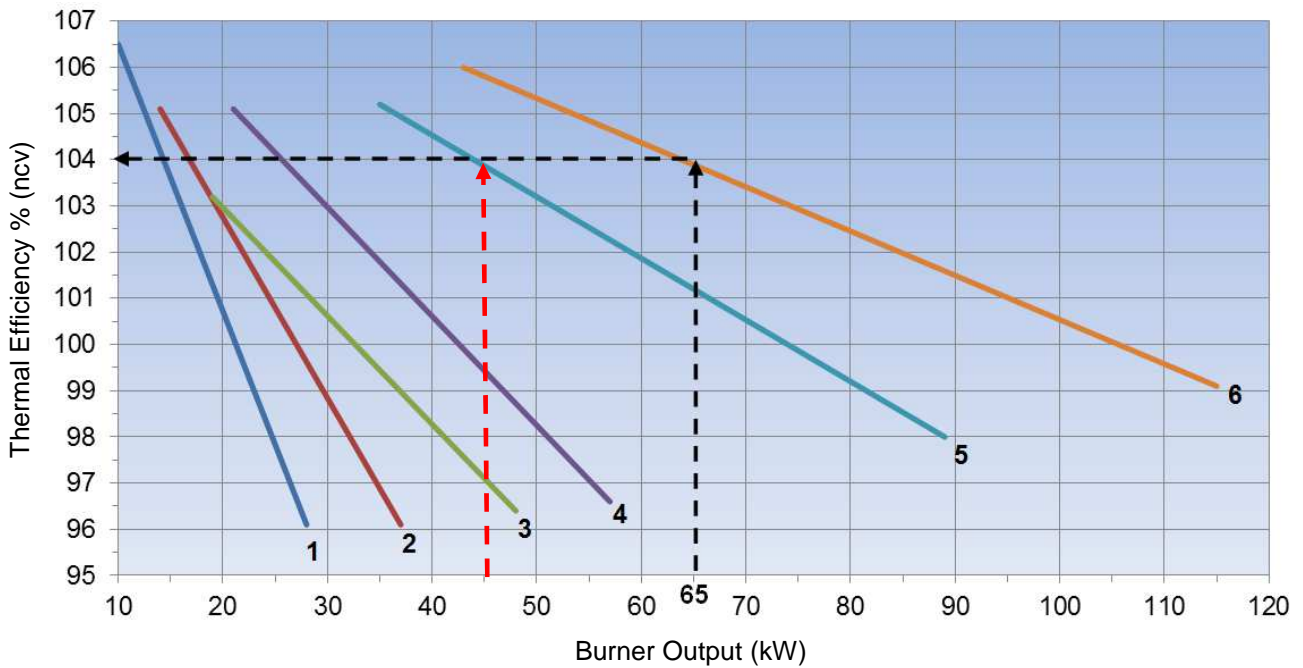


Dimensions & Weight	RHCLN	30	40	50	60	90	120
A	mm	891	891	1.234	1.234	1.755	1.755
A1	mm	711	711	1054	1054	1575	1575
B	mm	450	450	450	450	450	450
C	mm	635	635	685	685	840	840
D	mm	498	498	538	538	623	623
E	mm	818	818	1160	1160	1,680	1,680
F	mm	32	32	25	25	33	33
G	mm	36	36	36	36	32	32
Ø H Gas connection size		3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
Ø I Flue outlet size	mm	80	80	80	80	100	100
NET WEIGHT	kg	48	51	62	66	122	129

2.3 Efficiency vs Output

The RHCLN has been designed for the heating of buildings. It features a variable heat output with constant burner modulation, automatically controlled a 0÷10V signal (by others). This ensures a fast pre-heating of the space as well as maintaining the required temperature without any significant variance. Resulting in good comfort levels for personnel.

Thanks to the continuous modulation of the burner, the demand for heat from the space being heated decreases. At low fire the thermal efficiency can be as high as 106 % (ncv) resulting in lower gas usage. The chart below shows the relationship between efficiency and the burner output for each RHCLN model

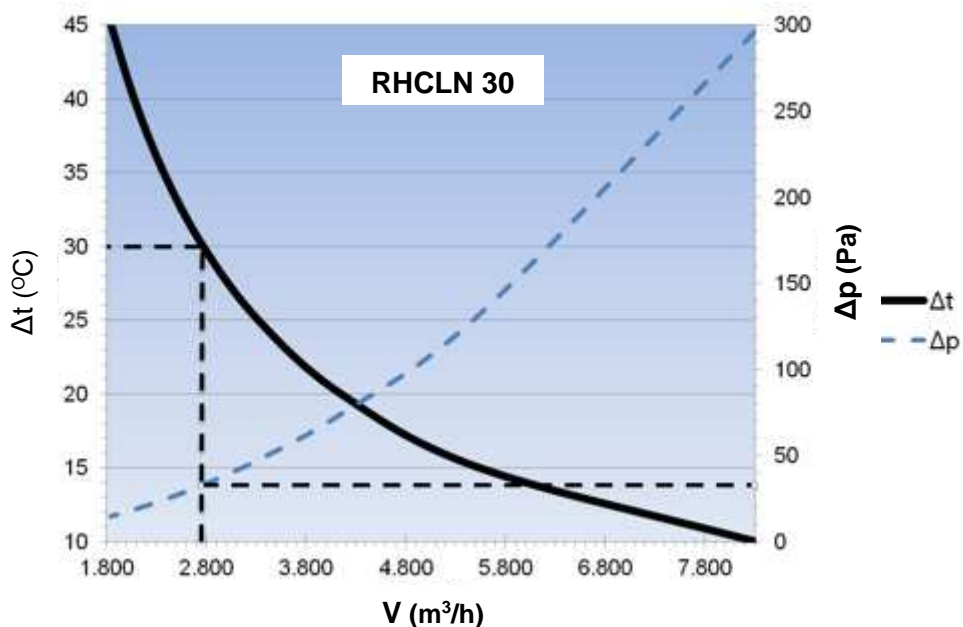


For the purposes of the above chart 1 = RHCLN30, 2 = 40, 3 = 50, 4 = 60, 5 = 90 & 6 = 120

The above example shows that if an RHCLN120 is producing 65kW output (56% full fire rate) the thermal efficiency would be 104%. Likewise if you were to take an RHCLN90 (line 5) operating at 45kW (50%) that also would be 104%

2.4 Internal Pressure Drop & Temperature Rise Charts

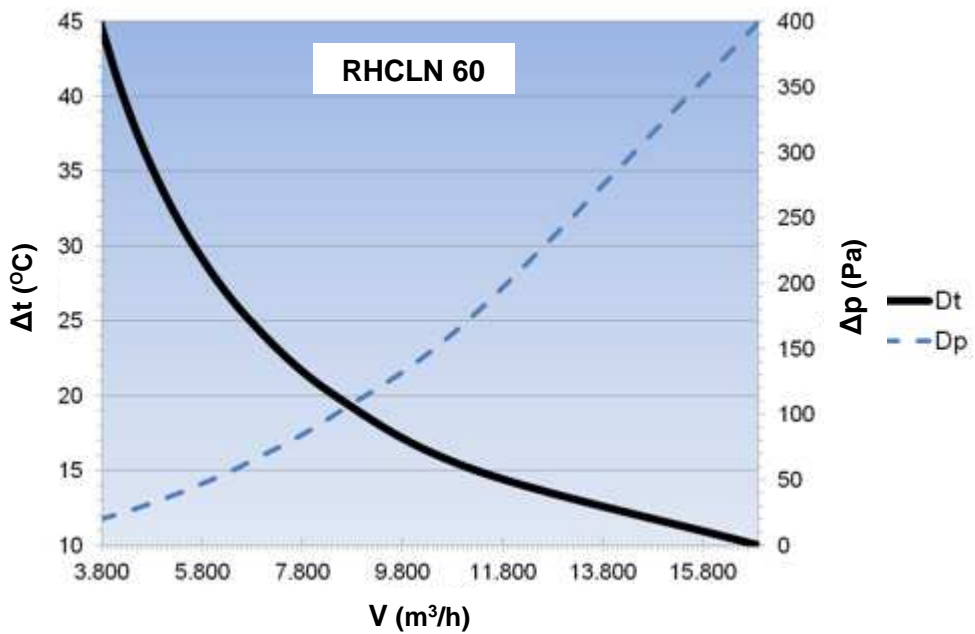
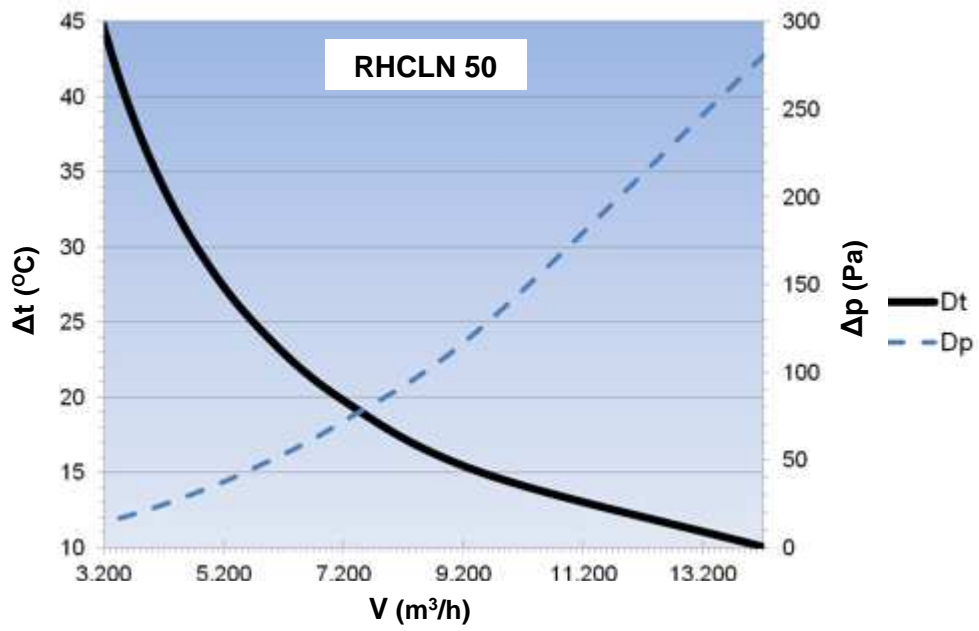
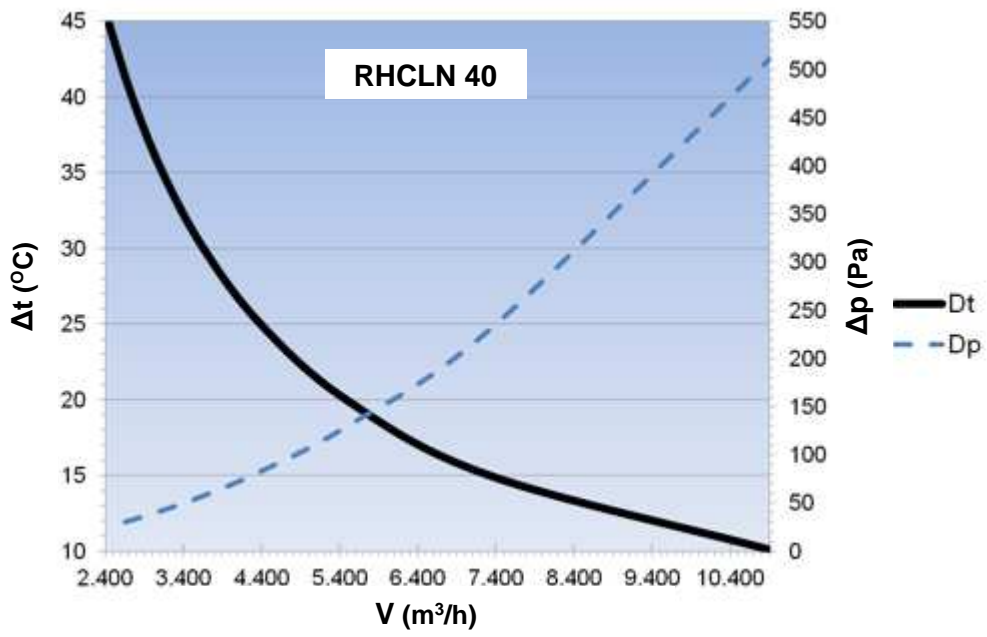
Shown in the charts below are the internal pressure drop (Δp) and temperature rise (Δt) of the appliance when a given air volume (V) is passed through the unit. Please note that temperature rise is based upon maximum heat output.

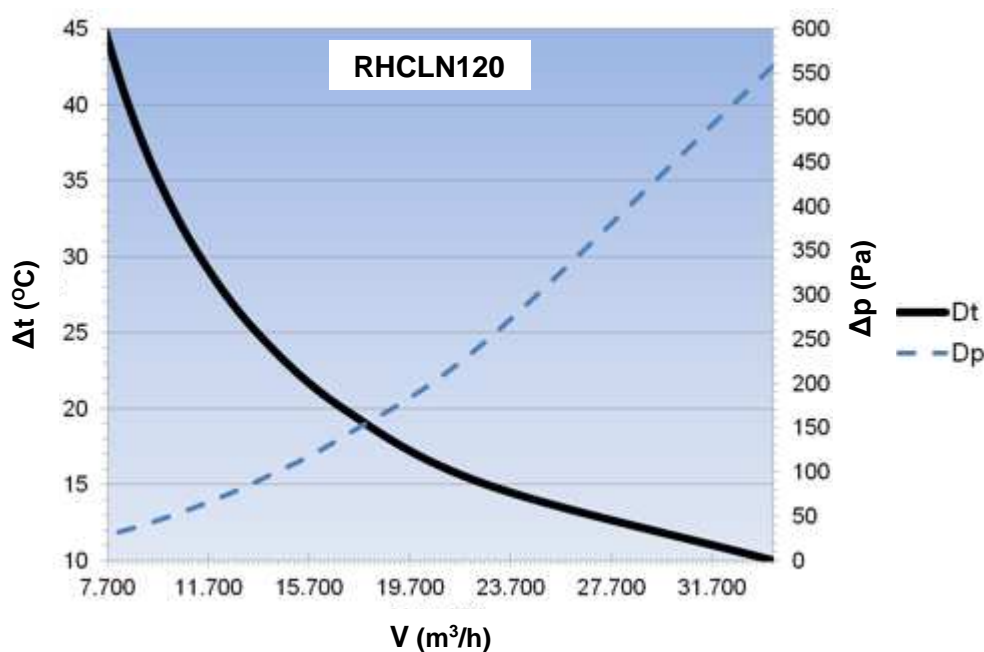
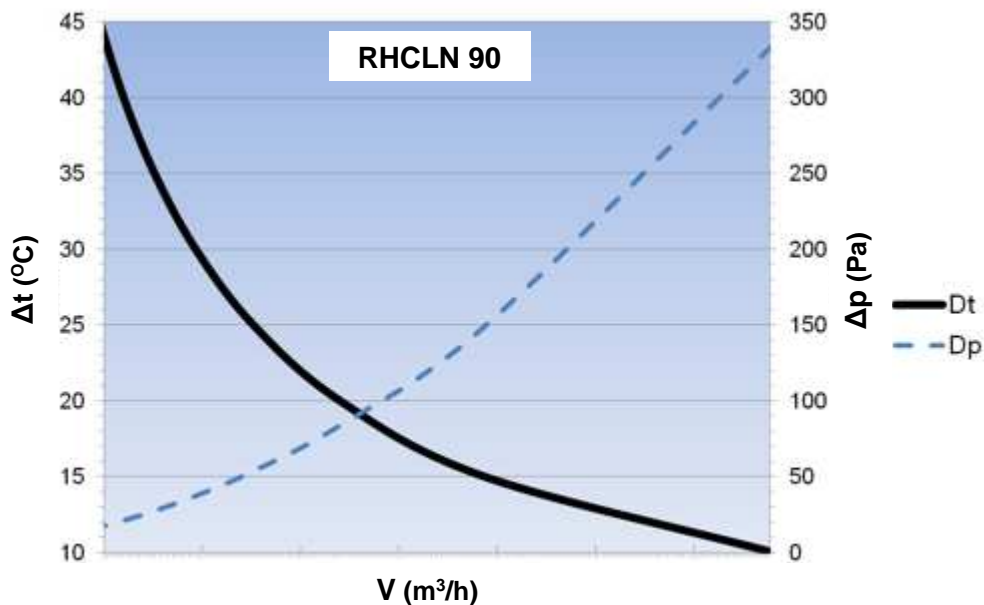


How to use the above chart

Assuming an approximate air volume of 2,750 m³/h, there is:-

- An internal pressure drop of approx. 32 Pa (intersection of the Δp curve)
- A temperature rise of approx. 30 °C (intersection of the Δt curve)





3

GENERAL INFORMATION

3.1 General

It is important that all gas appliances are installed in accordance with the rules in force and by appropriately qualified persons. Failure to install appliances correctly could lead to prosecution. It is in your own interest and that of safety to ensure compliance with the law.

CAUTION: Air heaters should not be installed in corrosive atmospheres, i.e. near plating spray or de-greasing plants or in areas where there is a fire risk. Care should be exercised when designing ducting systems, especially with regard to the application of restriction and direction turning fittings, i.e. elbows directly on to the air heater, doing so can cause an uneven and turbulent air flow across the heat exchanger resulting in heat exchanger spots and nuisance shut down of the gas burner due to localized overheating, thus activating thermal over-heat controls.

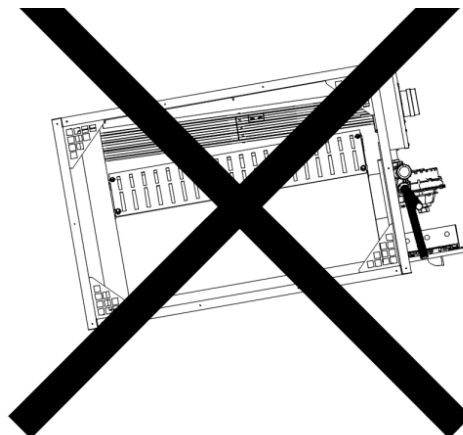
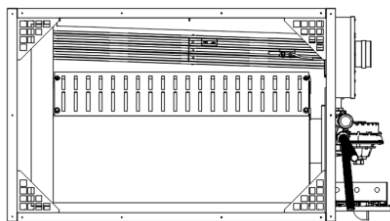
The location must also provide sufficient space to allow the heater to be serviced. Ensure that the surface onto which the heater is to be installed is vibration free.

The location chosen for the air heater must permit the provision of a satisfactory flue system venting to outdoor atmosphere and adequately ventilated to provide for combustion air.



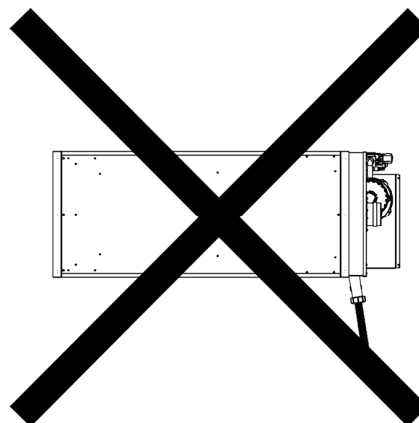
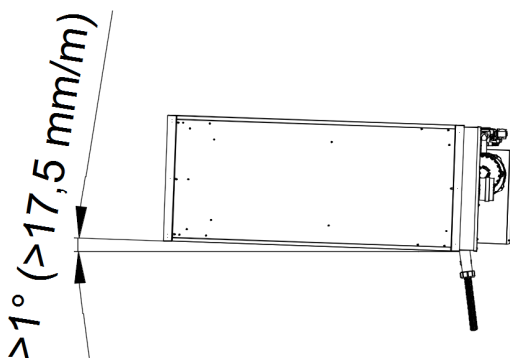
WARNING

If the heater is installed in the horizontal plane (i.e with airflow passing right to left or left to right) **IT IS MANDATORY** to place the appliance in a level or slightly tilted position towards the



WARNING

If the installation is with a vertical air flow (up to down) **IT IS MANDATORY** to install the appliance slightly tilted towards the condensate outlet (see below).



WARNING

For correct installation the unit must:

- Have minimum safety distances around the appliance, to enable unrestricted airflow & to allow normal cleaning, control and maintenance operations.
- Keep minimum clearance distances to flammable materials.
- Allow easy connection and correct run of the flue exhaust system.
- Allow easy connection and correct run of the combustion air inlet system.
- Allow correct connection to the gas supply.
- Provide a suitable route for safe and correct condensate disposal.
- Have a local electrical isolator.
- Provide easy and safe access to undertake all maintenance operations and inspections.
- Have sufficient ventilation to outside air to ensure compliance with local regulations in force
- The gas flow rate, pressure & type (i.e G20, G31 etc) are in accordance with the data plate affixed to the appliance.



FORBIDDEN

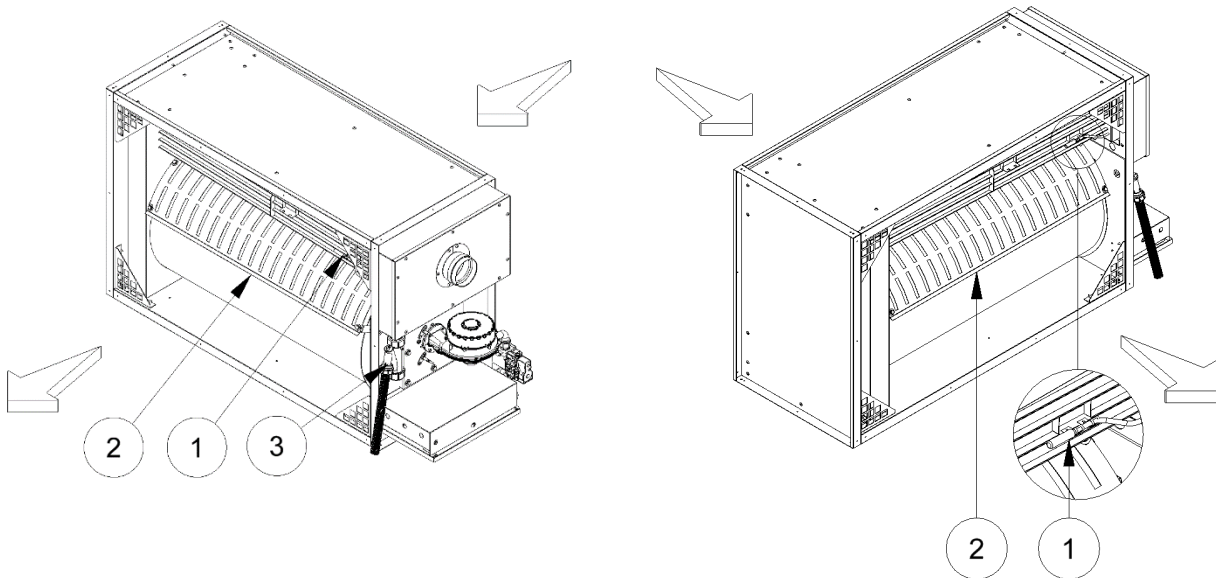
The heater MUST NOT be installed:

- In corrosive atmospheres
- In confined or narrow spaces, where noise created by could be amplified by reverberation etc.
- In corners or areas where dust, leaves etc can congregate. These items will reduce the efficiency/operation of the unit if taken into the supply air stream or into the combustion air pipe.
- Within a pressurized space.
- Within a negative pressure environment
- External of any building, unless incorporated into a suitably weatherproof enclosure.

3.2 Burner Configuration

The appliance is capable of being used in three different configurations. The default configuration for air flow passing from right to left (when looking at the burner). Should you wish an alternative to the default configuration, then please following the instructions against the relevant configuration shown below.

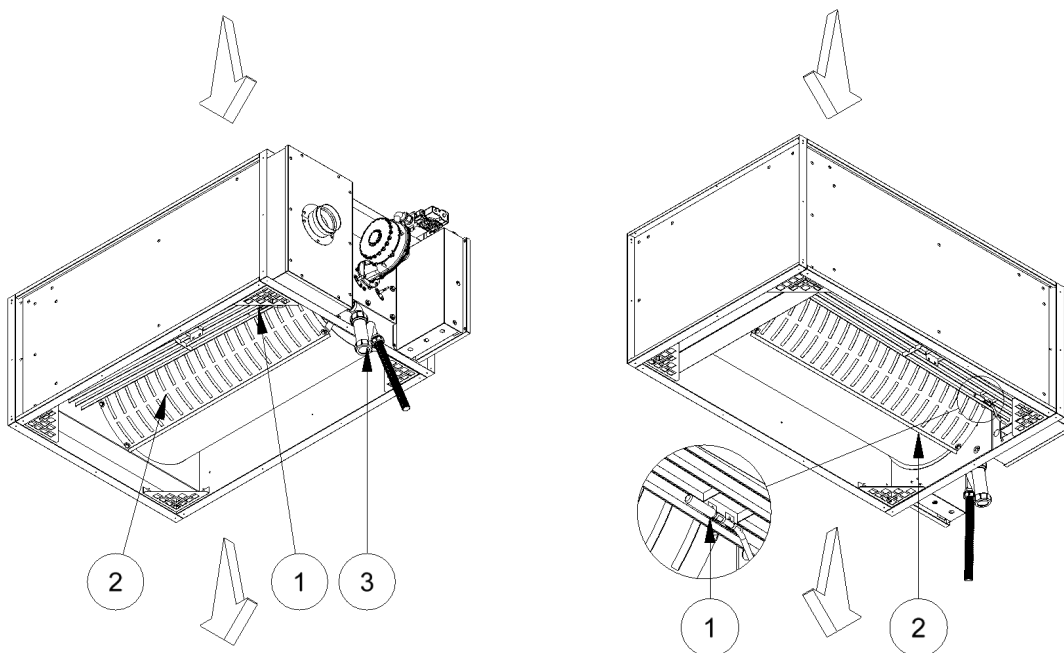
Horizontal airflow from right to left (default configuration)



The temperature probe ① and deflector ② must be placed on the outlet side of the heated air (left side looking at the burner);

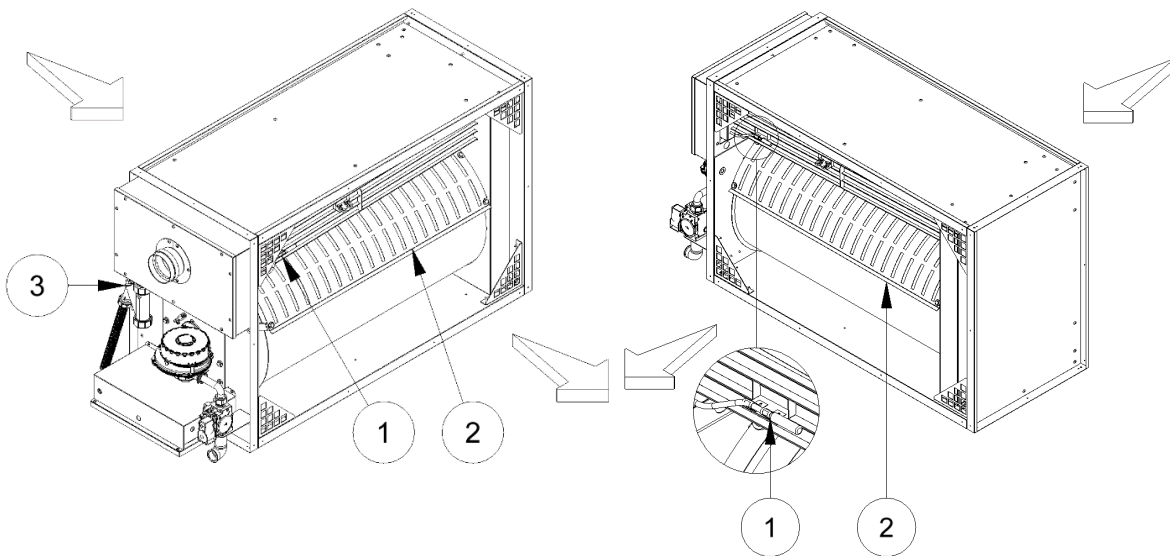
The condensate separation siphon ③ must be placed on the left side of the burner.

Vertical airflow top to bottom



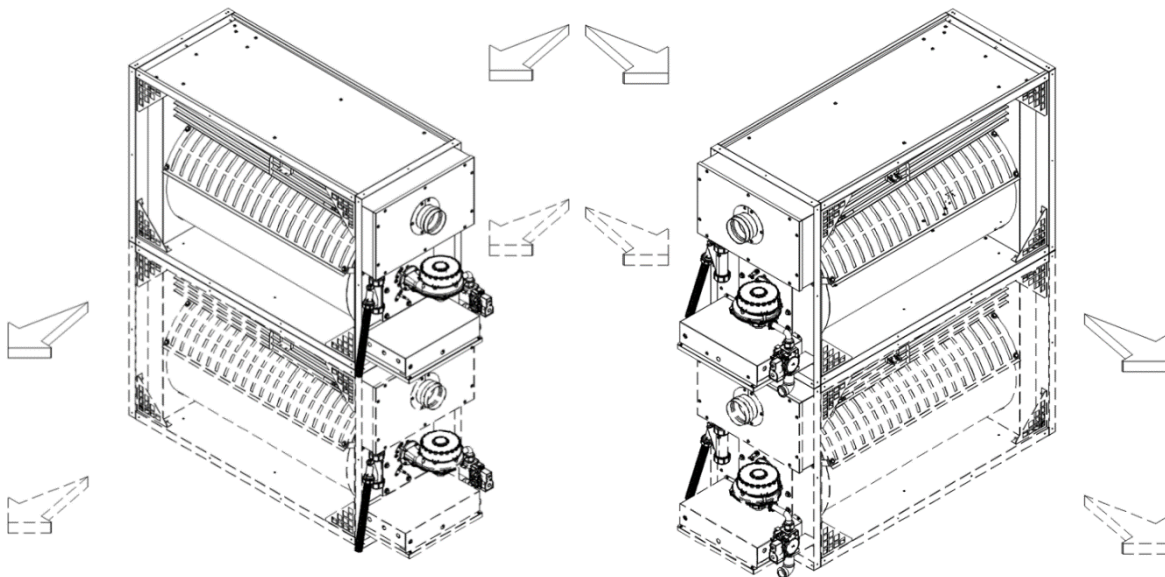
The temperature probe ① and deflector ② must be placed on the outlet side of the heated air. On the condensate exhaust fitting, install a 90° (3/4" M to F elbow - not included), then fit the condensate siphon ③ as shown above.

Horizontal airflow from left to right



The temperature probe ① and deflector ② must be placed on the outlet side of the heated air (right side looking at the burner)
The condensate siphon ③ must be placed on the left side of the burner (as per default set-up).

Two burners stacked

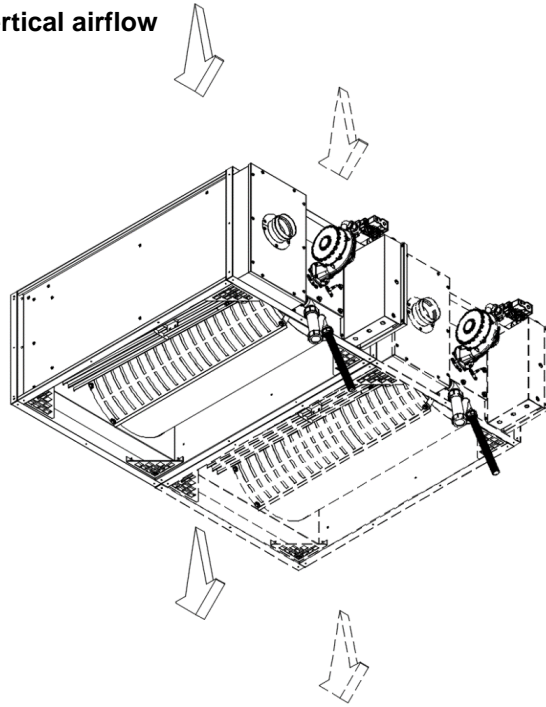


Right to left (default)

Left to right

If changing airflow configuration from the default, please remember to make temperature probe & deflector changes on each burner as detailed in the single burner configuration examples.

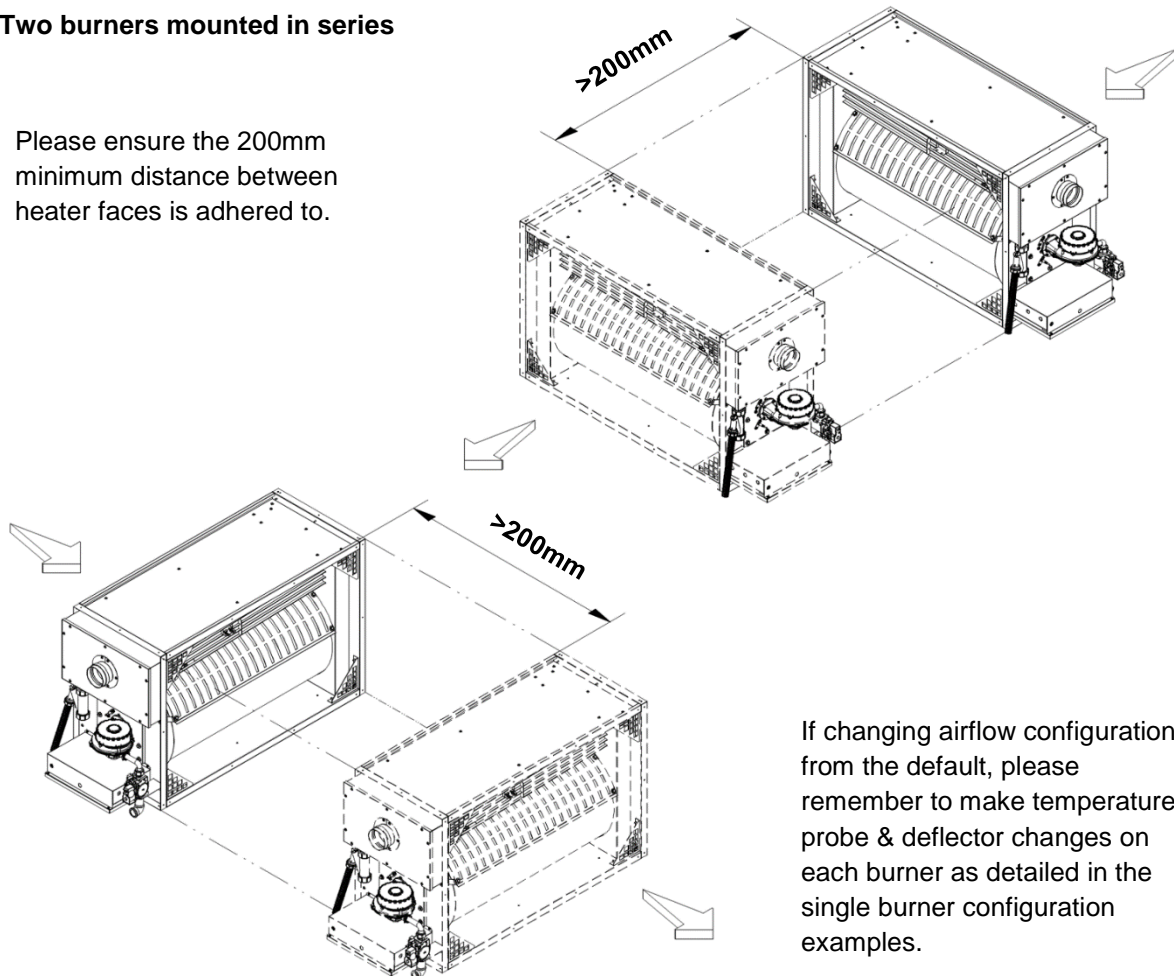
Two burners stacked – vertical airflow



If changing airflow configuration from the default, please remember to make temperature probe & deflector changes on each burner as detailed in the single burner configuration examples.
CONDENSATE siphon **MUST** be modified when using vertical configuration. See single burner configuration for details

Two burners mounted in series

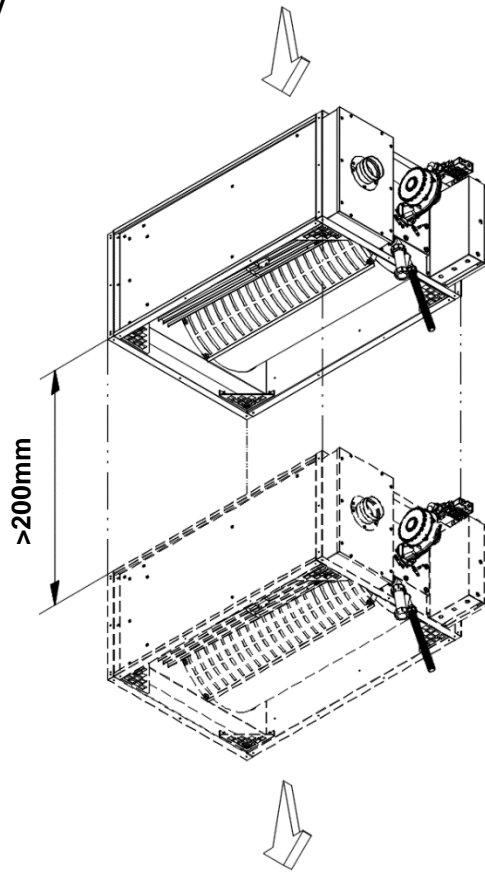
Please ensure the 200mm minimum distance between heater faces is adhered to.



If changing airflow configuration from the default, please remember to make temperature probe & deflector changes on each burner as detailed in the single burner configuration examples.

Two burners mounted in series vertically

- Please ensure the 200mm minimum distance between heaters is adhered to.
- If changing airflow configuration from the default, please remember to make temperature probe & deflector changes on each burner as detailed in the single burner configuration examples.
- **CONDENSATE** siphon **MUST** be modified when using vertical configuration. See single burner configuration for details

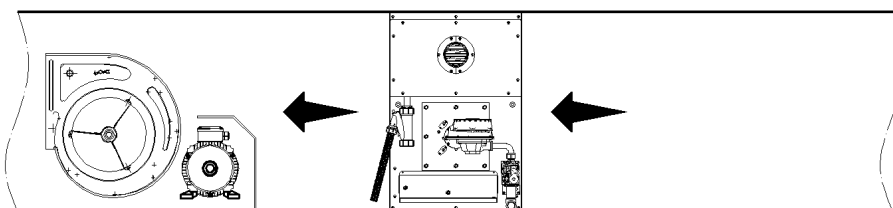
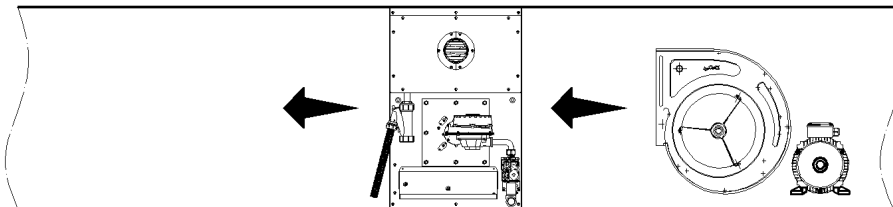


For applications requiring any burner configuration not shown on the previous pages, please contact your supplier for further details.

3.3 Supply Air Fan Position

The fan may be placed upstream or downstream of the heating section. The position of the fan must be such as to assure an even flow across the whole heat exchanger.

Should the fan be installed downstream (pull through) of the heating section, then the installation of a metal shield in front of the motor is recommended to provide protection from excessive temperatures.



Clearance for nearby components

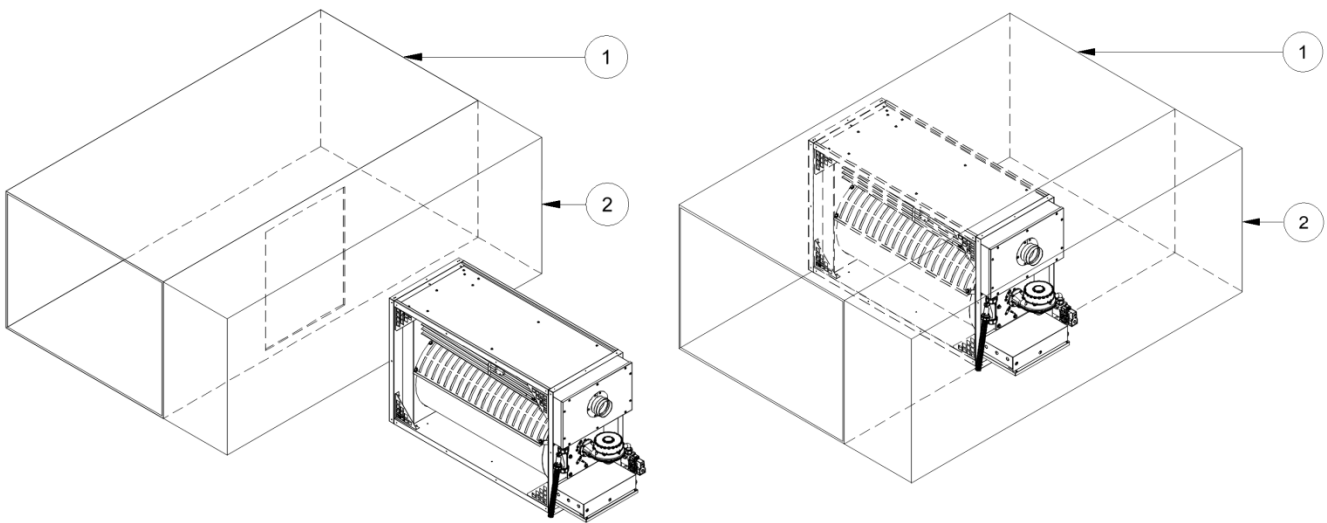
All components (fans, motors, filters, electrical wires, electric components, etc.) contained within an air handling unit, or ducting system into which the heating module is inserted, must be placed at a distance to protect from heat radiation especially in case of fan failure where heat will still build within the heater until the thermal protection switch activates.

The minimum distances must be:

- 1.0 m if made of plastic
- 0.8 m if made of metal

3.4 Inserting Into Air Handling Unit

The heating section is built within a structure that allows for easy insertion into an air handling unit. A flange is supplied around the heat exchanger element over which supply air is to be passed, this enables a flange on ducting to be affixed to the heater if needed. Please ensure that supply air **ONLY** passes through the heat exchanger and a partition is in place ensuring that the control compartment is not subjected to any positive/negative air pressure.



LEGEND:

1. Air volume path
2. Control compartment

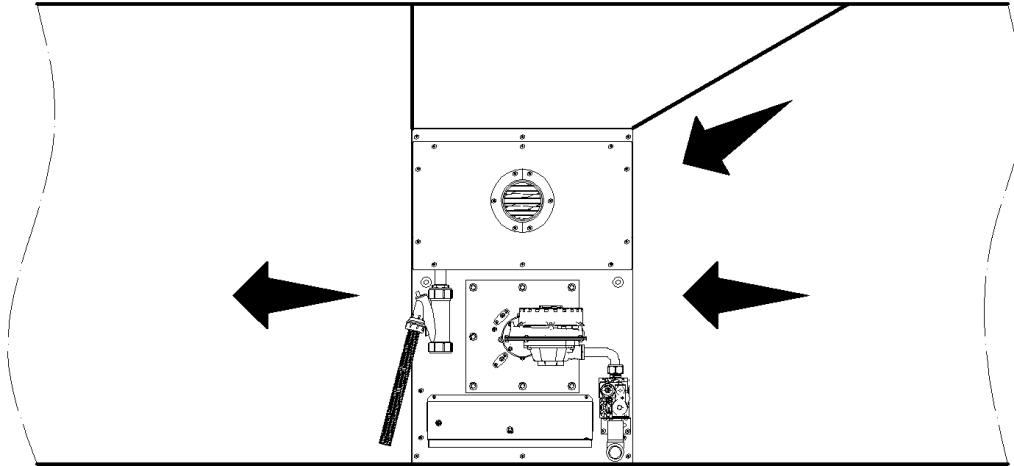


- The base of the air handling unit onto which the heating section is mounted, must be solid and able to support its weight. The use of suitable structural/stiffening crosspieces is therefore recommended.
- The gas burner section must be securely fixed within the air handling unit to ensure no movement occurs during transportation of the complete unit.
- Access for maintenance of the temperature sensor (located on the outlet side of the burner) must be provided.
- Air tightness of the flue pipe system into the flue outlet spigot is essential and **MUST** be checked on a regular basis.

Important

When air being passed through the heater section complies with the models minimum & maximum air flow rates, all of that air must pass through the heater. If the duct or air handling unit casing is taller and/or wider than the heater, then suitable transition plates must be fitted to ensure smooth passage of air through the heater.

Example of insertion into an air handling unit or duct system, with sizes exceeding the heating section

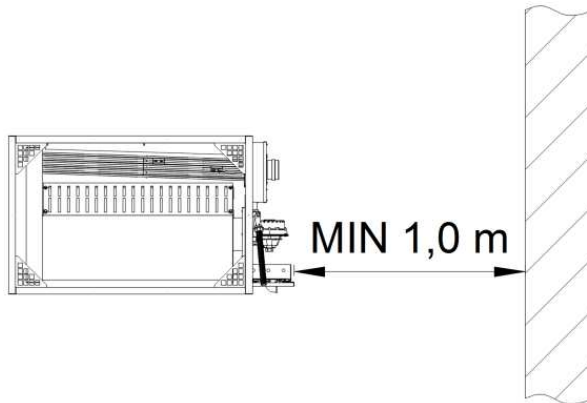


Should the air volume exceed the maximum stated in the technical data (page 5), it is possible to fit (by others) either a side or top air by-pass, through which the excess air volume can be passed. Please ensure that the by-pass duct is sized so the pressure drop is equal to that of the heater section. For further information see section **XX** or contact your supplier.

3.5 Maintenance Clearance

Consideration to the final installation of the heater (or air handling unit in which the heater is fitted) must be given, so that a minimum distance of 1.0m from the heater to any obstacle is observed. Failure to comply will prevent full and correct maintenance of the heater. When installed within an air handling unit that is located at ground level, a fence to guard against damage and to protect the public from possible injury should surround the entire unit.

Minimum distance from the wall:



3.6 Combustion Air Supply & Flue System

Flue pipe runs may be horizontal or vertical and terminate either through the wall or roof for heaters located inside a building. Care should be taken to ensure that the maximum flue runs are not exceeded (See table 1), only approved concentric terminals should be used when installing as a type C appliance.

Model RHCLN heaters may be installed as type B or type C installation. 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 this unit is replacing an existing heater, be sure that the flue is of the correct size and that the existing flue is in good condition.

Table 1. Equivalent flue lengths

Maximum Flue Run	
Flue exhaust	9m
Combustion air	9m
Component	Equivalent straight run
1m length of pipe	1
45° Elbow	0.75
90° Elbow	1.5



- The flue must be in accordance with BS6230 or BS5440. Local requirements may apply in addition to national requirements.
- Failure to provide a flue system could result in death, serious injury and/or property damage.
- The products of combustion must be flued to outside atmosphere. Common flues (for more than one appliance) must not be used.
- Single wall flue pipe exposed to cold air or run through unheated areas should be insulated to avoid condensation.
- If the flue passes through a combustible element of the building it must be enclosed by a sleeve of non-combustible material and separated from the sleeve by at least a 25mm air break. The temperature of any combustible material near to the flue must not exceed 65°C when the heater is in operation. The flue must be at least 50mm away from any combustible material.

A correctly sized flue system is required for safe operation of the heater. An incorrectly sized flue system can cause unsafe conditions and/or create condensation.

The units may be installed as a balanced flue type C heater requiring both a combustion air inlet pipe and a flue pipe or as a power vented heater type B where the combustion air is taken from the space, where heater is installed, and only requires a flue pipe exhausting to outdoors.

All products of combustion must be flued to outdoor atmosphere. Each heater installed as a type B appliance must be fitted with an individual flue pipe. A combustion air inlet opening **MUST** be fitted into the AHU heater compartment and provided with a protection grille.

Each heater installed as a type C appliance must be fitted with an individual combustion air/flue pipe system. Type C2 appliance, with single pipe system for supply of combustion air and evacuation of flue gasses, are not allowed.

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.

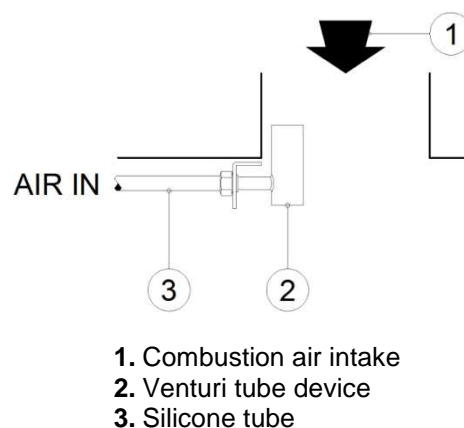
Condense drain

Attention

- A condensation drain must be fitted to both the unit and the flue outlet to properly drain all condensation.
- The condensation drain from the flue must be constructed from non-corrodible material not less than 20mm diameter. Copper or copper based alloys must not be used for condensation drain.

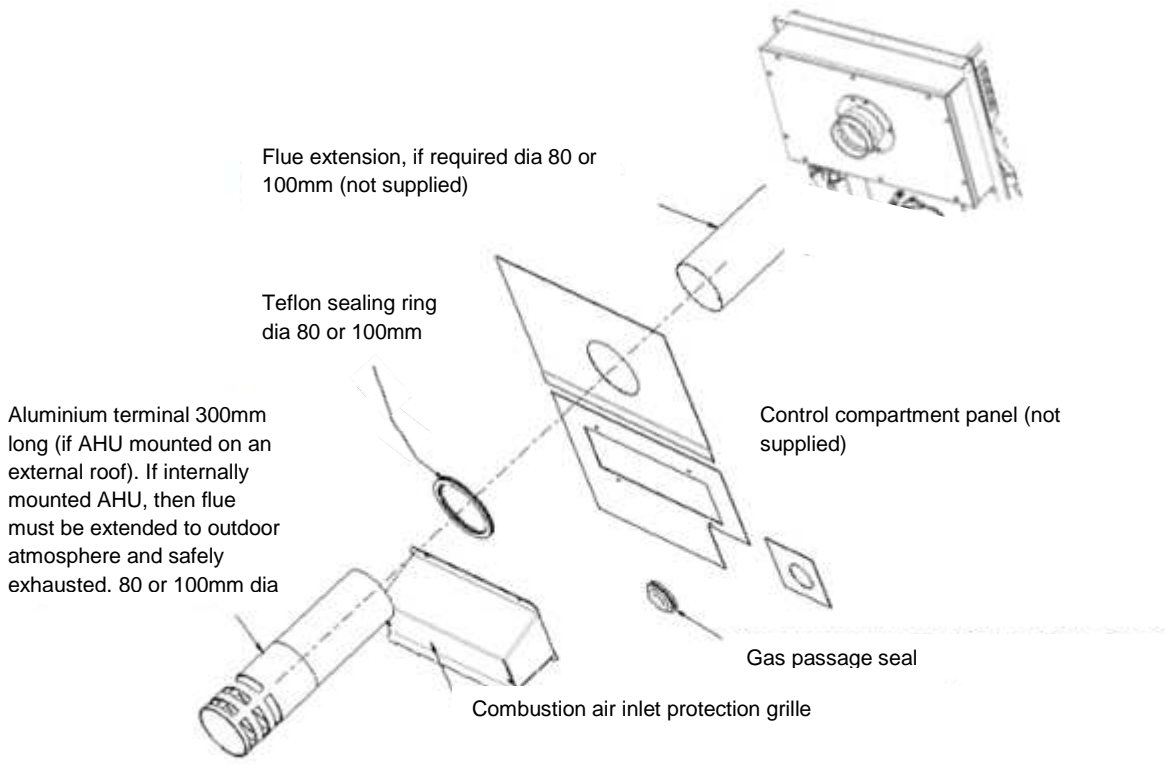
Combustion air supply

It is important to ensure that there is an adequate fresh air supply at all times for both combustion and heating requirements. Modern construction practice means that buildings are sealed much tighter than in the past. The combustion air supply for a power vented gas fired air heater (Type B installation) can be affected by lack of air supply, therefore natural infiltration may not be adequate. Use of extract fans aggravates this situation. It is important to ensure that there is an adequate air supply at all times. Reliance on doors and windows is not allowed. Always ensure that an adequate inlet for fresh air for combustion is provided sized to suit the total installation of any combustion apparatus. Fix an access guard (IP 20) into the wall for combustion air and take appropriate action to ensure that it remains unblocked. See national installation requirements for aeration & ventilation of buildings.

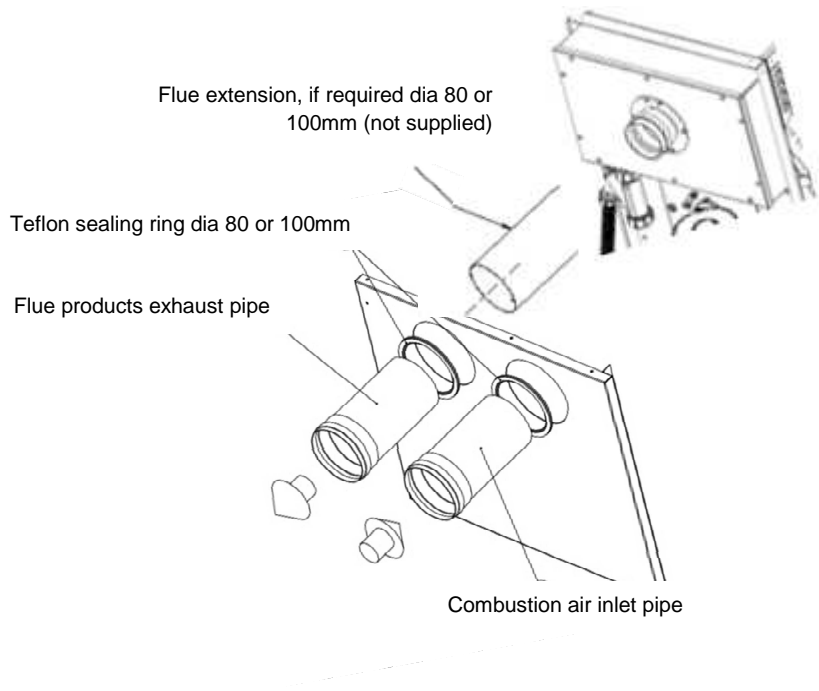


Models 90 & 120 only (near to the combustion air inlet) it is necessary to install the Venturi tube device already connected to the gas solenoid valve, to the pressure intake called AIR IN (included in the supply).

Typical type B Flue installation



Typical type C Flue installation for an internally mounted AHU



3.7 Condensate Removal

Each RHCLN heating module is fitted with a condensate trap with an internal float as the combustion products are loaded with moisture, some of which will condense out within the flue. No condensate leakage is permitted. Indoor horizontal flue runs must rise by 1° (17mm per meter) from the appliance to ensure that the condensate returns to the flue drain.

The condensate disposal system must be installed in compliance with the European, National and Local Reference Standards, ensuring the need for a neutralization treatment if necessary.

When starting-up for the first time, fill the container of the condensate drain syphon with water.



WARNING

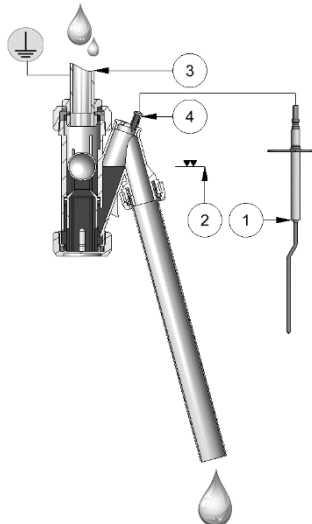
An incorrectly designed/installed drain will compromise the correct operation of the appliance, therefore please take into account the following points:

- Models designed for outdoor must be equipped with an anti-frost thermostat and electrical 'Trace heating' to protect the condensate drain system
- The total weight of the condensate drain system must not be supported by the heater, and must be suitably and separately supported.
- The condensate discharge system must be inclined suitably. It is forbidden to install pipes that are levelled and/or not inclined;
- The configuration of the condensate discharge system must allow for the easy removal of the various inspection panels.
- The condensate discharge system must be easily removable, for any inspection and/or maintenance operations.

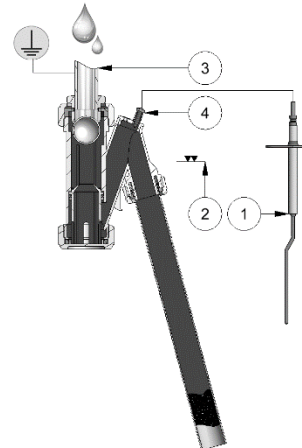
For the connection of the condensate trap to the condensate disposal system, use a PVC or silicone pipe. It is recommended that an internal diameter of not less than 20mm is used, however care must be taken to ensure that the disposal system is suitably sized to handle the volume of condensate produced, especially if more than one RHCLN module is connected.

Under normal operation conditions, the water level in the trap will not reach the self-threading screw, located in the traps 'catch basin'. However should a blockage occur in the condensate discharge system, the water level inside the trap will increase until reaching the self-threading screw, whereupon the ionising electrode is earthed causing the burner to immediately switch off. The heater can then only be started, once the blockage has been cleared.

Normal operating condition



...with blocked condensate disposal system



LEGEND:

- | | | | |
|----|--------------------|----|----------------------|
| 1. | Ionising electrode | 3. | Metal pipe |
| 2. | Condensate level | 4. | Self-threading screw |

3.8 Electrical Supply



- Wiring external to the RHCLN must be carried out in accordance with the rules in force and by appropriately qualified persons.
- Check the electrical specification is in accordance with the specification on the appliance data plate.
- A unique appliance wiring diagram is supplied as a separate document attached to this one, plus an additional copy attached to the air heater.
- A constant 230 volt 50 Hertz single phase with neutral link fused electricity supply is required. All heaters and controls must be earthen.
- A lockable isolator with contact separation of at least 3.0 mm on all poles should be installed adjacent to the appliance and within reach of any person working on the heater.
- When a number of heaters are to be connected as part of a single installation each heater must be provided with a separate isolator.
- Ensure that electrical supply cables do not touch the very hot combustion collector box.
- The final connection must be made in the terminals provided in the control compartment. Follow the wiring diagram provided with the air heater and the air handler.
- Electrical supply cable conductor size should be 1.5 mm. The length of conductors between the cord grip and the terminals must be such that in the event that the cable becomes taut the line conductors do so before the earth conductor

3.9 Gas supply

RHCLN air heaters are designed to operate on either natural gas (G20) or propane (G31) / butane (G30) gas. Refer to the specifications in section 2 of this document and to the data plate for details of supply pressures.

The gas meter and gas service must be checked by the supply undertaking to ensure that they are adequate to deal with the total load of all gas fired apparatus installed.

Connection to a gas service may only be carried out by appropriately qualified persons. The gas installation must comply with the rules in force using materials appropriate for gas installations. To facilitate servicing, the air heater must be fitted with an approved gas service tap and union fitting or union tap adjacent to the appliance. The inlet gas supply line must be installed so as to permit the access door to be opened and to allow removal of slide out burner assembly.

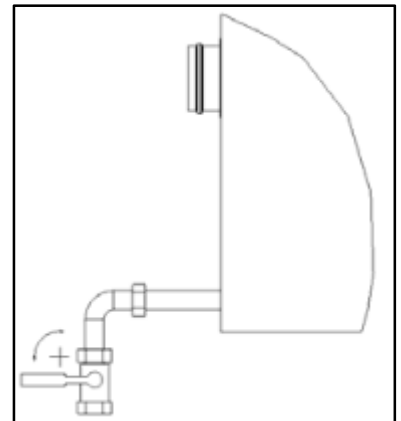
Check that the gas category is in accordance with the data described on the air heater. An adequate gas supply sized to provide the dynamic pressure for the volume required for the air heater(s) is essential to maintain the nominal heat input. Account of other gas fired plant using the same gas service must also be taken into account.

A 90° action, positive stopped gas service tap must be fitted adjacent to the appliance, fitted in a manner to facilitate appliance burner removal for service purposes.

Ensure that the gas service includes a filter and has been tested and purged in accordance with prescribed practice prior to commissioning and taking the appliance into service. As a rule, gas service pipes should not be routed through air ducts. Should it be necessary to do so then pipework joints must not be made within the air duct.

Regarding propane gas (G31) supply, it is recommended to install a pressure regulator at the connection to each heater (or in the case of multiple heaters in one AHU, on the supply before it branches off to each appliance) to ensure the correct inlet pressure is achieved.

Gas connection detail



4.1 Unpacking and Preparation

Prior to dispatch, the heater was operated and tested at the factory. Check the shipping label and data plate to ensure the specification of gas and electrical supplies are correct.

Read this document and become familiar with the installation requirements and the appliance before commencing with the installation.

4.2 Fitting Combustion Air Inlet/Flue Pipe

This section only applies to internally mounted AHU's.

Flue pipe runs may be horizontal or vertical and terminate either through the wall or roof. See table to the right for maximum pipe lengths along with flue component equivalent to a straight run maximum lengths for a heater installed as a type C appliance.

Maximum Flue Run	
Flue exhaust	9m
Combustion air	9m
Component	Equivalent straight run
1m length of pipe	1
45° Elbow	0.75
90° Elbow	1.5

4.2.1 Fitting The Flue Pipe

Flue pipes must be sealed. Use seamless, aluminum or stainless steel pipe as supplied by your Reznor distributor or equivalent. Follow pipe manufacturer's instructions

4.2.2 INSTALLING A GRILLE ON THE COMBUSTION AIR INLET PIPE FOR POWER VENT (TYPE B INSTALLATIONS)

When installed as a type B appliance, protect the inlet by fitting an access grille on the socket. Do not block this socket as it supplies combustion air for the burner.

The inlet must be provided with a protection grille IP20

Figure 10 :

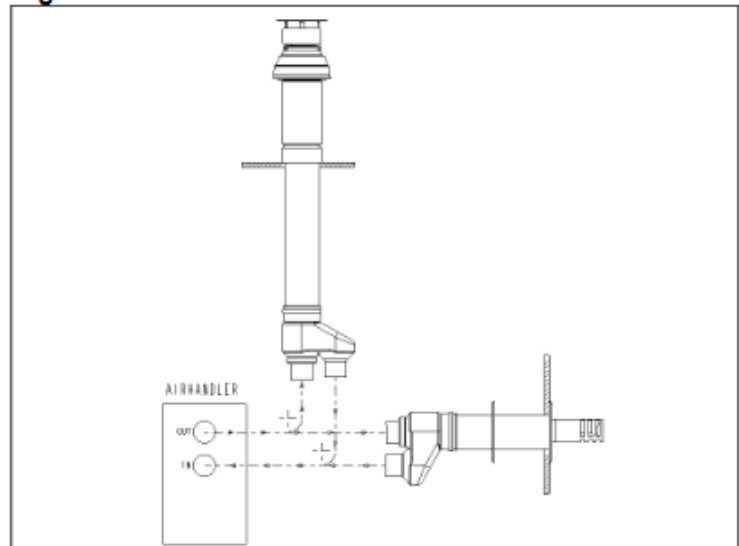


Figure 11:

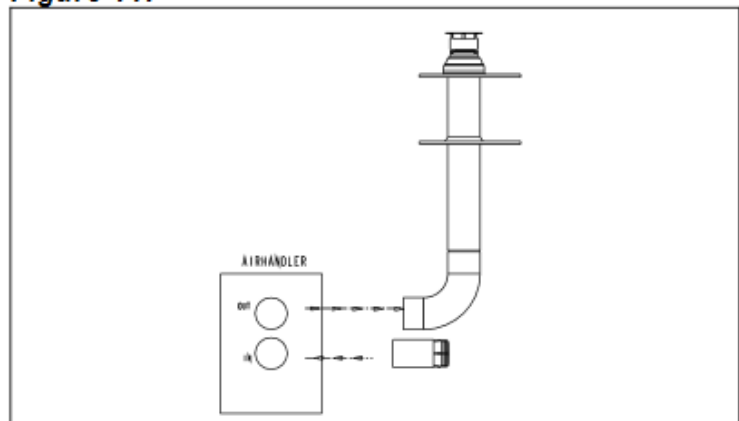
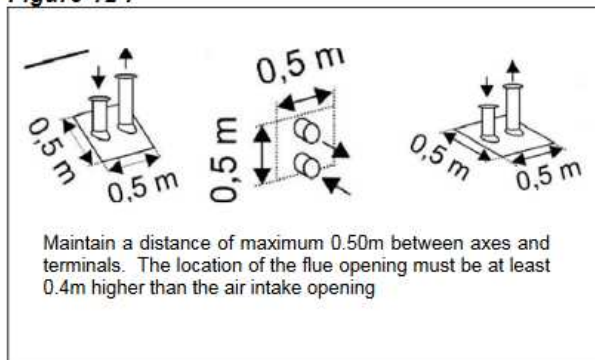


Figure 12 :



4.2.3 FITTING THE COMBUSTION AIR INLET PIPE FOR BALANCED FLUE (TYPE C INSTALLATIONS)

The combustion air pipe attaches directly to the inlet socket.

Air inlet pipes must be sealed. Use seamless aluminum or stainless steel. Follow the pipe manufacturer's installation instructions. See typical installations in figures 10/11/12.

4.3 Electrical Connections

The electrical installation may only be carried out by appropriately qualified persons observing the rules in force. All electrical connections should be made in the heater control compartment. Screw type terminals are provided. Connections should be in accordance with the terminal markings and the wiring diagram affixed to the air heater or included with this document.



DANGER

THIS APPLIANCE MUST BE EARTHED.

The minimum external controls required for the air heater are a room thermostat. It is essential the main input line and neutral to terminals L and N remains live at all times even when the appliance is switched off this is to ensure correct operation of the unit.

An indicator light and burner-reset button are fitted inside the appliance. To add a remote reset button, make connections to the terminals in the electric box as indicated on the wiring diagram.

Attention

If the reset button requires activating for any reason, the cause should be identified before resetting. After resetting stay with the appliance for long enough to ensure that lockout does not reoccur (suggest 5 minutes).

4.4 Room Thermostat Siting

Do not attempt to control more than 1 air heater from a room thermostat or control panel unless a properly wired relay is fitted. Follow instructions supplied with such panels.

The siting of the room thermostat is important. It should not be fitted on an outside wall but on a vibration free surface and mounted about 1.5m above floor level. Follow the thermostat manufacturers fitting instructions. The thermostat must be suitable for switching 230 volts. Avoid location in draughty areas or where it may be influenced by heat sources e.g. the sun, process plant, etc.

5

Commissioning & Testing

Appropriately qualified persons may only carry out the commissioning and testing. This section should be read and fully understood before commencing commissioning and testing.

5.1 Preparing For First Start-up

The initial start-up of the unit must be carried out by appropriately qualified persons who will then validate the Warranty Certificate. Before turning the unit on and performing the functional testing of the appliance, check that:

- All safety conditions have been complied with
- The PVC film has been removed from any pre-painted panels
- The appliance has been correctly sited
- There is sufficient space around the unit
- All gas connections have been made correctly
- The flue exhaust pipes and combustion air intake have been installed correctly
- The gas supply connected is the same as detailed on the appliance data label
- All the electrical connections have been made correctly
- Gas supply is present at the appliance



WARNING

During the initial start-up, there may be the presence of odours and fumes due to the evaporation of the oil added to protect the heat exchanger during storage. This is normal and it will disappear after a short period. It is recommended to suitably ventilate the room.

A correctly sized air volume required to ideally heat the room, moreover it is necessary to properly cool the heat exchanger.

For this reason, it is essential that the air flow generated by the fan encounters no resistance, therefore no obstacles must be present in the air supply and return paths.

5.2 Recommended Operating Cycle

The fan unit (not supplied) must turn on at the same time as the burner, or with a maximum delay of 30 seconds. The fan assembly must stop approx. 4 minutes after the burner has turned off, therefore it is essential that a permanent (not time controlled) electrical supply is connected to the heater. In order for the supply air fan to run on at the end of a heating cycle, it is essential that the fan is inter-locked electrically to the RHCLN.

Safety thermostats on air delivery line are intended to stop the burner operation in case of abnormal air overheating. Therefore the correct air flow must be established by the Installation engineer. It is recommended to use suitable airflow monitoring systems (flow switches - differential pressure switches - etc), which must turn off the burner in case of no, or reduced air flow.

5.3 Electrical Check

After completion of the installation and before switching on the electrical supply to the appliance, a qualified electrician must carry out a preliminary check. The following must be checked:-

- Check that electrical cables/wiring do not touch the 'hot' combustion collector box and fix them on the gas pipe
- Check that all wiring is connected in accordance with the appliance circuit diagram
- Ascertain that the correct fuse value and cable size has been provided
- Check to ensure that the appliance is earthed by conducting an earth continuity test. Connect a test meter, one lead to the appliance earth terminal and the other to the mains incoming earth point at the electrical isolator. A resistance reading of 1.0 ohm or less must be indicated. If a higher reading is obtained, check all cable connections to ensure adequate security and cleanliness. If problem still exists, it may be necessary to consult the electricity supply undertaking
- Carry out a polarity test. Connect one lead of a suitable AC voltmeter to earth and connect the other lead to the live supply terminal (L) at the air heater. Switch ON the power to the air heater and check for correct voltage. The same result should be obtained by connecting the test leads between live and neutral. Connect the voltmeter test leads to N and E. A reading of $\pm 0V$ should be obtained. If these tests do not conform with the above, there is a fault which must be rectified before proceeding further with the commissioning
- Check that a suitable thermostat or control panel has been fitted
- Ensure that an electrical isolator with two pole separation with a minimum air break between poles of 3,0 mm has been fitted adjacent to the air heater.
- 0-10V DC control signal exists, without this the burner cannot fire.

5.4 Gas Connection

Only persons formally qualified to work on gas fired apparatus may carry out commissioning and testing. The whole of the gas service installation including the meter must be inspected, tested for soundness and purged in accordance with appropriate requirements by a qualified person.



Never use a flame for checking gas soundness

5.5 Lighting The Air Heater

When the external control calls for heat, the electronic ignition sequence starts whereupon the pre-mix gas burner fan introduces the combustion air/gas mixture and the spark electrode will operate. The electronic control within the RHCLN will supervise the flame during the entire heating cycle to ensure safe operation.

The following checks should be carried out before attempting to light the air heater.

- Ensure that the gas supply to the air heater is turned ON
- Ensure that the electrical supply to the air heater is switched ON
- If fitted ensure that a time switch is set to an ON period
- Set room thermostat to call for heat. e.g. above room ambient temperature (see air handling system
- Adjust the room thermostat to the required operating comfort temperature. The air heater will now start automatically when the room thermostat calls for heat.

Should the burner fail to ignite after four ignition attempts, then the electronic controller will go to lock-out. Which will require manual intervention to establish the reason for non-start and to press the burner reset button to re-commence the ignition sequence. This may occur if the appliance has been in stand-by mode for a prolonged period.

To turn the air heater "OFF" for short periods Adjust the room thermostat to its lowest setting or 'OFF'. The fan will continue to run to cool the heater and then switch OFF automatically (or follow the instructions of the air handler).

To turn the air heater "OFF" for long periods Adjust the room thermostat to OFF or its lowest setting. When the fan has stopped, turn OFF the gas supply and then switch OFF the electricity supply to the air heater (or follow the instructions of the air handler)

5.6 Air Heater Gas Pipework

The soundness of the air heater pipe work has been checked prior to leaving the factory. However during Installation connections may have been loosened. Check the soundness of the appliance pipe work using a soapy solution. If any leaks are found they must be rectified immediately.

5.7 Adjustments

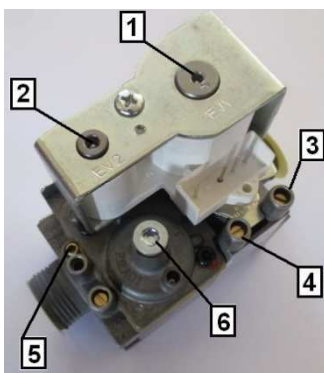
The appliance is configured with a modulating output where the pressure of the gas to the burner is managed directly by the electronics on board. The correct operating pressures must be checked as follows:

- Enable burner operation at maximum output.
- Connect a pressure gauge to the input pressure intake (see below)
- Check that the supply gas pressure is stable and that the burner pressure corresponds to the appliance rating plate.
- Stop the unit and make sure that the pressure does not change.



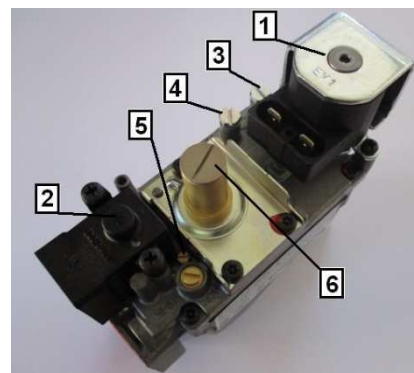
In no case should the gas supply pressure exceed 60mbar. If such a value is exceeded, irreparable damage to the gas solenoid valve will occur.

Models 30, 40, 50 & 60



1. Spool on-off EV1
2. Spool on-off EV2
3. Inlet pressure intake

Models 90 & 120



4. Outlet pressure intake
5. Pressure adjustment screw at the MAX power
6. Pressure adjustment screw at the MIN power

Models 30, 40, 50 & 60. To adjust the max output pressure use a 2.5mm hex male wrench and rotate the screw ⑤ clockwise to reduce the gas flow. To adjust the min output pressure use a 4mm hex male wrench and rotate the screw ⑥ anti-clockwise to reduce the gas flow.



WARNING

Models 90 & 120. To adjust the max output pressure use a small slotted screwdriver and rotate the screw ⑤ clockwise to reduce the gas flow. To adjust the min output pressure use a medium cross-headed screwdriver and rotate the screw ⑥ anti-clockwise to reduce the gas flow.



Only appropriately qualified persons may carry out servicing and fault finding on this gas fired equipment. Before commencing service ensure that both the gas and the electricity are turned and switched "OFF" and that the air heater has cooled down. Inadvertent substitution or replacement of components similar to those specified or replacement in a manner contrary to the method herein described could constitute a hazard and lead to prosecution.

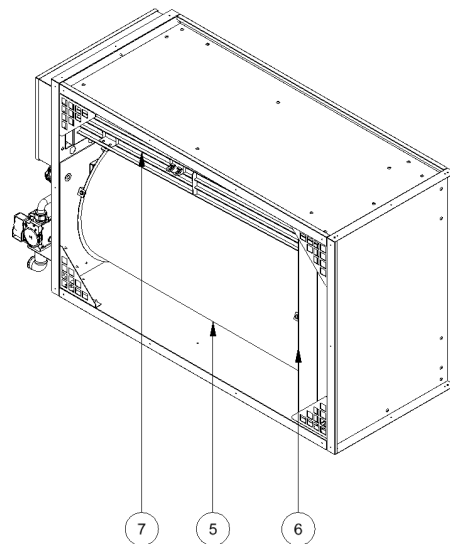
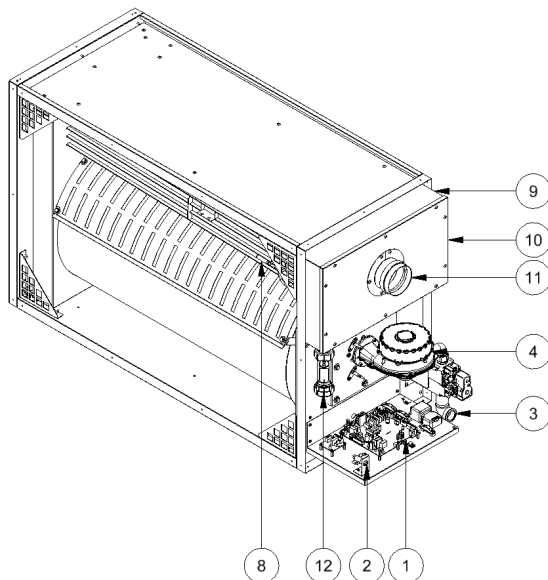
In order to ensure that the machine works correctly, some basic parameters should be checked. When the unit has been continuously operating for approx. 20 minutes, the following operations should be performed:-

- Check that the supply air fan (by others) starts simultaneously with the burner or with a 30 sec delay.
- Ensure there are no fuel leaks.
- Check the pressure of the gas upstream of the solenoid valve.
- Check the correct fuel flow rate via the meter.
- Check that the fan (by others) runs on for approx..4 minutes from when the burner switches off before stopping.
- Make sure that the condensate discharge system works.
- Check that the condensate discharge trap works correctly.
- Check that the safety devices have not tripped.



All the inspections mentioned above must be carried out in all operating conditions (max and min).

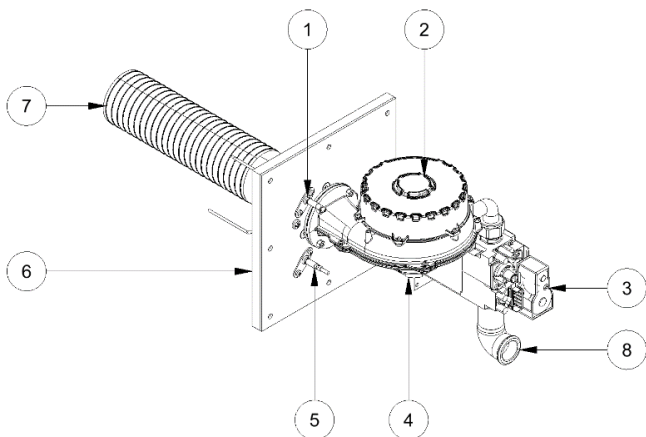
6.1 Component Identification



1. Multifunctional electronic board
2. Multifunctional warning light
3. Gas inlet connection
4. Premix gas burner
5. Combustion chamber
6. Rear flue manifold

7. Heat exchanger
8. Multifunctional temperature sensor
9. Front flue manifold
10. Front flue venter inspection door
11. Flue spigot
12. Condensate drain pipe

Pre-mix burner components



1. Ignition electrode
2. DC brushless fan
3. Gas-air control gas solenoid valve
4. Mixer
5. Ionization electrode
6. Burner plate with thermal insulation
7. Burner firing tube
8. Gas inlet

6.2 Burner/High Limit Reset

Fitted to the appliance is a multifunctional electronic board (see right), that contains a push button reset. This has the ability to restore the appliance operation:-

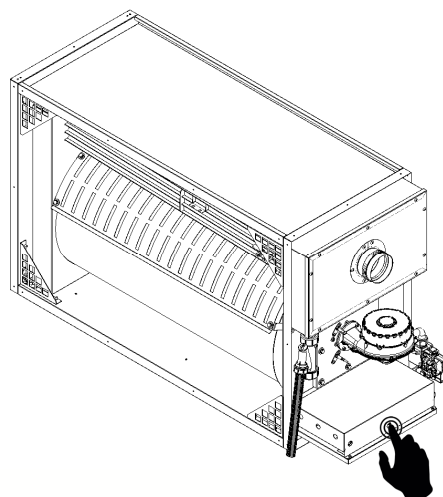
1. After four failed starts of the burner (burner reset)
2. High limit thermostat trip.



WARNING

Before resetting any safety device, the cause should be detected and resolved. In case of doubt, please contact the technical department for further assistance

Do not use screwdrivers or sharp tools to reset the multifunctional board.



6.3 Burner Fan Settings

The appliance is adjusted at the point of manufacture with the rotation speed shown in the following table:

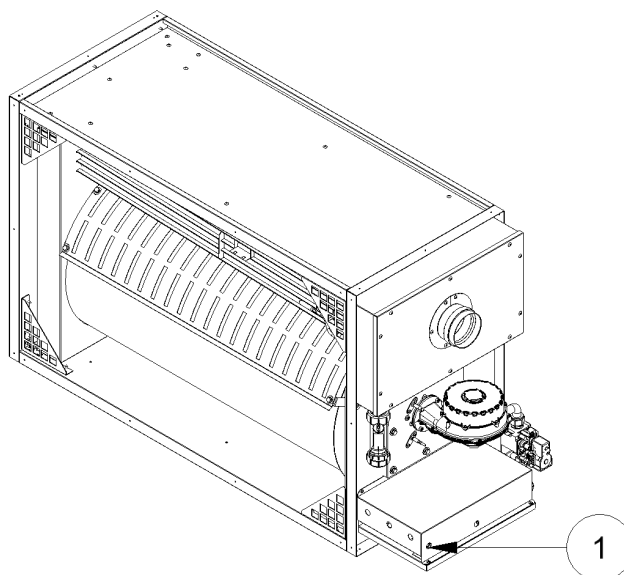
TSP PARAMETER	RHCLN 30			RHCLN 40			RHCLN 50		
	[rpm]			[rpm]			[rpm]		
	G20	G25	G31	G20	G25	G31	G20	G25	G31
MAXIMUM SPEED	5.175			6.525			4.275		
MINIMUM SPEED	900 (1.950*)			975 (2.325*)			900 (1.800*)		
START-UP SPEED	3.075			3.900			2.625		
TSP PARAMETER	RHCLN 60			RHCLN 90			RHCLN 120		
	[rpm]			[rpm]			[rpm]		
	G20	G25	G31	G20	G25	G31	G20	G25	G31
MAXIMUM SPEED	4.800			4.575			5.925		
MINIMUM SPEED	750 (1.725*)			1.125 (1.950*)			1.125 (2.325*)		
START-UP SPEED	3.000			2.850			2.850		

(*) The information in brackets is displayed on the screen of the Brahma software



- To turn the appliance on, the ON-OFF contact must be closed and the signal must be on min 2.0V.
- The maximum speed corresponds to a 10V signal.
- The minimum speed corresponds to a 1,6V signal, under which the burner turns off.

6.4 Multi-functional LED



1. Multifunctional LED

The RHCLN is able to signal, via the multi-coloured LED, its operating conditions or the presence of some faults.

The following figure displays the possible combination of colours, shown by the LED.

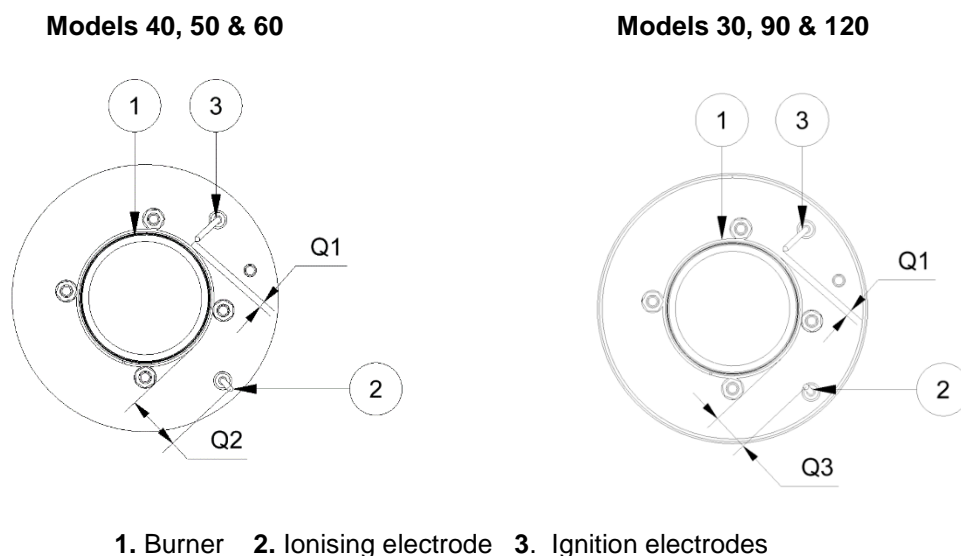
V		V		V											Stand-by
V		V		V		V		V		V		V		V	Pre-ventilation
A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	Starting
V	V	A	V	V	A	V	V	A	V	V					Reduced speed at start-up
V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	Speed
A	R	A	R	A	R	A	R	A	R	A	R	A	R	A	Opening of fire damper contact STF
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	Interruption because not turned on
R	R	A	R	R	A	R	R	A	R	R					Stoppage due to over temperature (LIMIT)
A		A		A		A		A		A		A		A	Presence of parasitic flame / temperature probe error (SR)

LEGEND:

V	Green LED
A	Orange LED
R	Red LED

6.5 Electrode Positions

For a correct start-up and operation of the appliance, it is important to check the correct position of the ignition and ionisation electrodes.



NOTE:

- Q1.** Distance between ignition electrode and burner equal to **6mm** for all models.
- Q2.** Distance between ignition electrode and burner equal to **28mm** for models **40, 50 & 60**
- Q3.** Distance between ignition electrode and burner equal to **22mm** for models **30, 90 & 120**

6.6 Combustion Analysis

For optimal operation of the appliance, ensure that the values of carbon dioxide (CO₂) contained within the flue gases are close to the figures shown in the following chart.

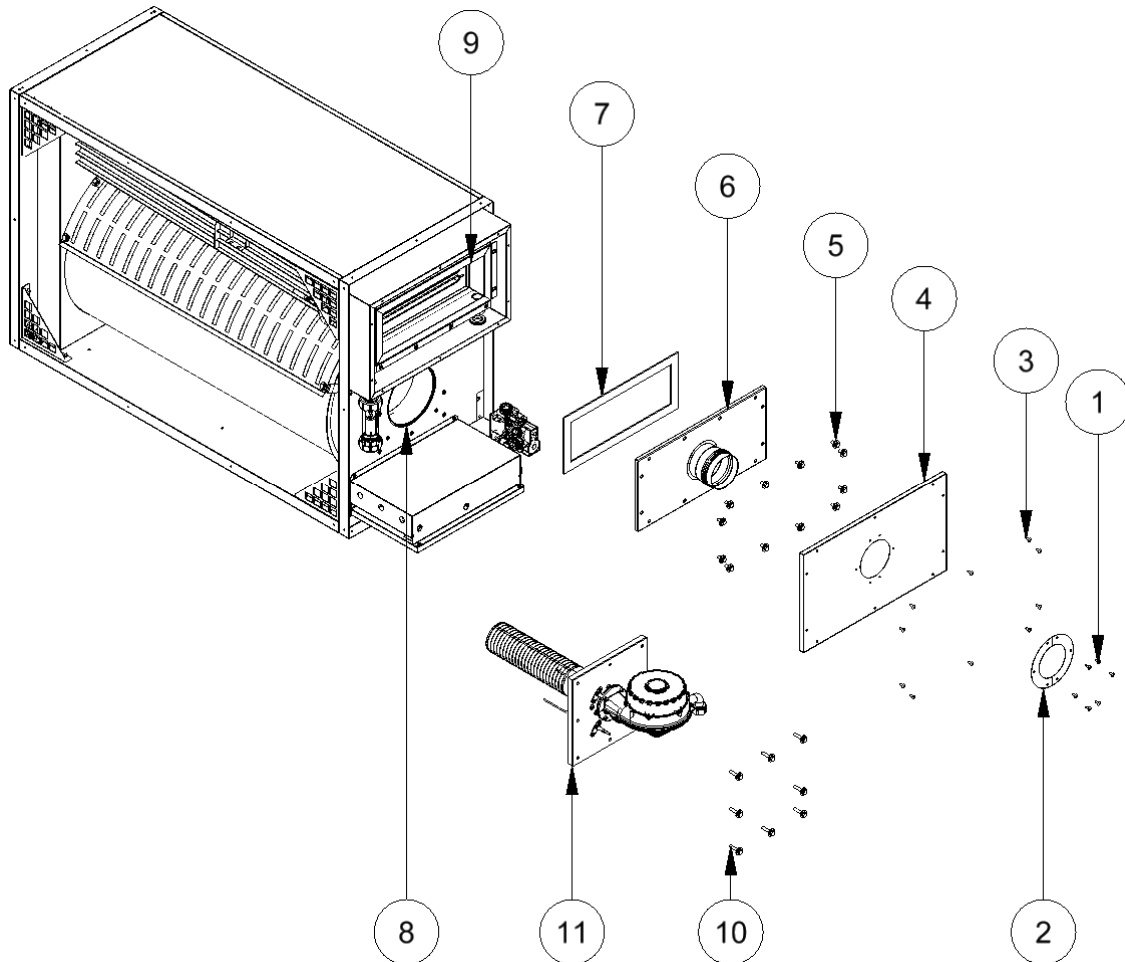
Reference chart for carbon dioxide [%] and flue gas temperature ⁽¹⁾ [°C]

COMBUSTION GAS	POWER	RHCLN 30		RHCLN 40		RHCLN 50	
		[%]	[°C]	[%]	[°C]	[%]	[°C]
Natural gas (G20)	MIN	9,0	37,0	9,0	39,0	9,0	42,0
	MAX	9,3	92,5	9,3	111,0	9,3	94,0
Natural gas (G25)	MIN	9,0	36,0	9,0	42,0	9,0	45,0
	MAX	9,3	90,0	9,3	110,0	9,3	92,0
Propane (G31)	MIN	10,3	35,5	10,3	42,0	10,3	40,0
	MAX	10,6	91,0	10,6	115,0	10,6	92,0
COMBUSTION GAS	POWER	RHCLN 60		RHCLN 90		RHCLN 120	
		[%]	[°C]	[%]	[°C]	[%]	[°C]
Natural gas (G20)	MIN	9,0	39,5	9,2	30,0	9,2	36,0
	MAX	9,3	89,5	9,5	54,0	9,5	60,0
Natural gas (G25)	MIN	9,0	38,0	9,2	32,0	9,2	34,0
	MAX	9,3	87,0	9,5	53,0	9,5	56,0
Propane (G31)	MIN	10,3	36,0	10,5	28,0	10,5	33,0
	MAX	10,6	87,0	10,8	51,0	10,8	57,0

⁽¹⁾ Based upon an ambient temperature of 15°C.

6.7 Heat Exchanger Inspection

The inspection and cleaning of the heat exchanger must only be carried out by suitably qualified personnel. It is recommended to perform inspection at least once a year, at the start of each heating season. For such operation, perform the following operations:



- Remove the two profile seals **2** with the screws **1**;
- Remove the inspection panel **4** with the screws **3**;
- Remove the inspection door **6** with the screws **5**, making sure not to damage the gasket **7**;
- Via the flue manifold **9**, inspect the exchanger elements and if needed, clean and remove any residue using compressed air and/or chemical systems;
- Disassemble the premix burner unit **11** after loosening the screws **10**. Attention! Before disassembling the burner unit, it is necessary to disconnect the gas solenoid valve unit;
- Through the opening **8**, inspect the combustion chamber and if necessary remove any deposits using a vacuum cleaner;
- Reassemble all the pieces, ensuring all gaskets have been correctly located and screws are securely fastened.

6.8 Cleaning the Condensate Drain

Visually check where possible or with suitable tools the condition of the drain system and ensure no leaks exist.

Clean the trap, checking the condition of the connections. Make sure that there are no traces of metal residues. In

case of formation of metal residues, increase the frequency of service visits.

After the cleaning of the trap and before re-starting the appliance, ensure that the trap is filled/topped up with water.

6.9 Cleaning the Burner Tube

The cleaning of the burner must be carried out by removing it from its housing and removing any deposits which may have settled on the surface of the tube using **only** compressed air. Damaged gaskets **must** be replaced.

6.10 Cleaning The Electrodes

For correct ignition and operation of the appliance, it is important to clean the ignition and ionisation electrodes carefully removing any deposits and/or oxidation from the surface.

6.11 Cleaning The Flue & Combustion Air System

To clean the flue and combustion air inlet pipes, the use of a vacuum cleaner is suggested so that any dust or foreign matter deposited inside can be mechanically removed.

6.12 Casing Maintenance

It is recommended to check the following points:

- Ensure that all screws used to assemble the machine are in place and secure.
- Check the condition of the components making up the casing. If any oxidation is present, treat with appropriate products to remove and prevent any reoccurrence.



Incorrectly secured fastenings may cause noise or irregular vibrations.

7

Gas Conversion

RHCLN models are supplied, as standard, to operate on natural gas (G20). Kits are available for converting the unit for operation on propane gas (G31). This conversion must be performed only by appropriately qualified personnel.

Conversion can be also be carried out also after the unit has been installed.

Instructions for conversion:

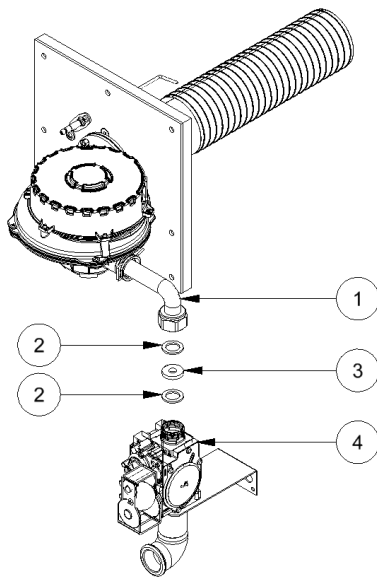
From Natural Gas (G20), to Natural Gas (G25), or to Propane Gas (G31)

1. Disconnect power supply from the appliance and close the gas supply tap.
2. Replace the gas diaphragm.
3. Re-open the gas supply tap and re-connect the electrical supply.
4. Check and adjust the gas supply pressure.
5. Perform combustion analysis and then check the values of carbon dioxide in the flue gases.
6. Affix the adhesive label indicating the change of fuel.

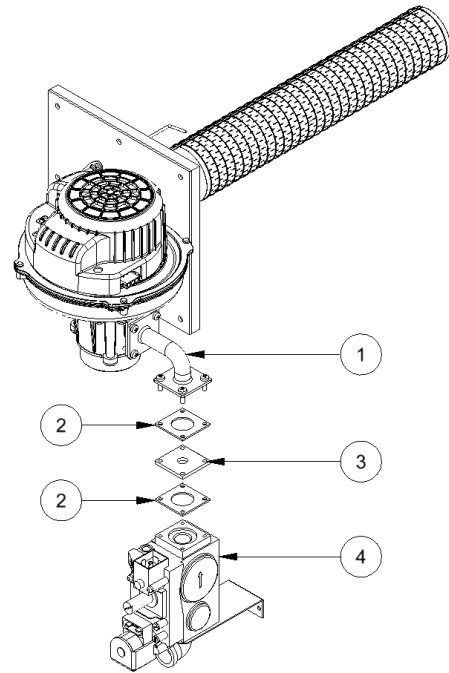
Gas diaphragm replacement:

The appliances are provided with a gas diaphragm installed as shown in the following figure, proceed to the replacement of the diaphragm with the desired gas kit:

Models 30, 40, 50 & 60



Models 90 & 120



Legend

1. Blower connection 2. Gasket 3. Gas diaphragm 4. Gas solenoid valve

Diaphragm diameter chart for the various fuels:

Model	30	40	50	60	90	120
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Natural Gas (G20) – Supplied as std	Ø 4,90	Ø 5,00	Ø 8,95	Ø 8,95	Ø 12,10	Ø 12,10
Natural Gas (G25) – Optional kit	Ø 5,30	Ø 5,50	Ø 15,00	Ø 15,00	Ø 12,40	Ø 12,10
Propane (G31) – Optional kit	Ø 3,80	Ø 3,85	Ø 6,30	Ø 6,30	Ø 8,20	Ø 8,10

Replacement of self-adhesive label gas conversion:

The gas conversion kit includes a self-adhesive label which, once the conversion has been completed, **MUST** be applied over the original label. The new label shall completely cover the previous one, so that no doubts can arise about equipment configuration.

Conversion date	_____
Type of conversion gas	_____
Performed by	_____

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