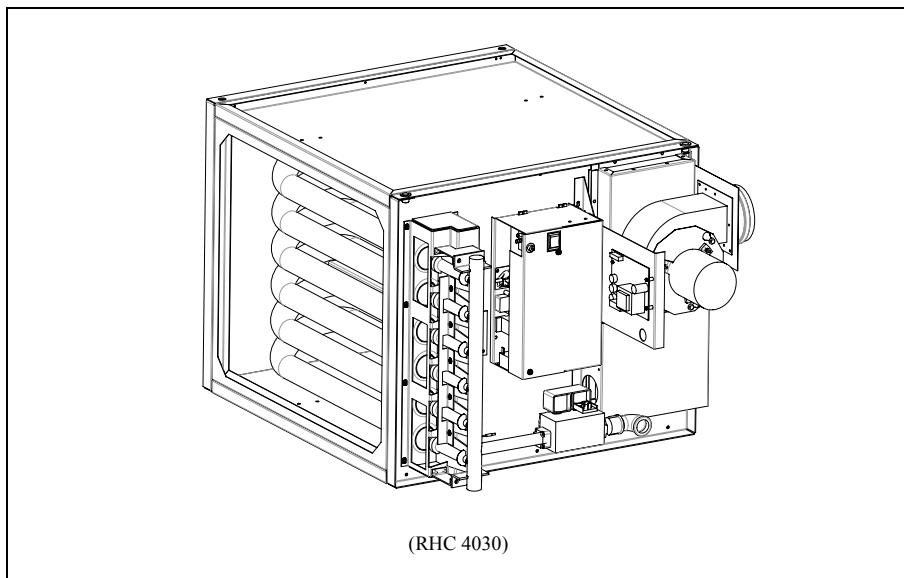


# RHC 4011, 4015, 4018, 4024, 4030 & 4036 RJL

## Gas-Fired, Balanced-Flue or Power-Vented Unit Heater INSTRUCTION DOCUMENT

**APPLIES FOR:** Installation/Commissioning/Servicing



These appliances meet the following EC Directives

DIR CE 90/396/EEC:GAD

DIR CE 89/336/EEC: EMC

DIR 73/23/EEC: LVD

**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

**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.

**Subject to modifications**

**Reznor U.K. Limited – Park Farm Road – Folkestone – Kent – England**  
Tel : 01303-259141 – Fax : 01303-850002

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## **HAZARD INTENSITY LEVELS**

1. **DANGER:** Failure to comply will result in severe personal injury or death and/or property damage.
2. **WARNING:** Failure to comply could result in severe personal injury or death and/or property damage.
3. **CAUTION:** Failure to comply could result in minor personal injury and/or property damage.

### **WARNING:**

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 fan prematurely and may damage the heat exchanger, invalidating the warranty.

## **1.0 INTRODUCTION**

### **1.1 Basic Information**

The instructions in this manual apply to Model RHC 4000 RJL (sizes 4011, 4015, 4018, 4024, 4030 & 4036) gas-fired/fan-assisted warm air heaters suitable only for incorporation in air handlers built for outdoor installation. This appliance 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.

Model RHC 4000 RJL (sizes 4011, 4015, 4018, 4024, 4030 & 4036) heaters are approved for outdoor or rooftop application.

**Category II<sub>2H3+</sub>**

These instructions are only valid for the countries Great Britain (GB) and the Republic of Ireland (IE).

Check that the local distribution conditions of electricity supply, type of gas and pressure of the appliance are compatible.

When installed in Great Britain the total installation must comply with the requirements and recommendations of British Standard BS 6230 1991 "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.

When the external control calls for heat, an electronic control begins the ignition sequence to provide for a safe start. Under normal conditions the fan motor 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 electronic control 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 running to cool down the heat exchanger

After approximately 45 seconds, the fan delay relay will turn off the fan (if wired).

## 1.2 Warranty

### Warranty is void if:

- a) Model RHC 4000 RJL (sizes 4011, 4015, 4018, 4024, 4030 & 4036) 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.
- b) The installation is not in accordance with these instructions.
- c) The maximum airflow through the heat exchanger tubes is not respected (see§ 3.5).
- d) The minimum required air delivery is not respected (see table 3a)
- e) The duct dimensions do not comply with the prescribed dimensions (see table 3b)
- f) The inlet temperature (measured at the heat exchanger inlet) is lower than the value stated on the chart (see figure 5).

## **2.0 TECHNICAL DATA**

### 2.1 Specifications

**Table 1**

Model	Heat input		Heat output	Gas rate <sup>3</sup>		Power Consumption
	G20	G31				
	kW gros <sup>1</sup>	kW net <sup>2</sup>	kW	m <sup>3</sup> /h	kg/h	kW
4011	13.00	12.00	10.8	1.26	0.94	0.153
4015	17.60	15.85	14.5	1.68	1.26	0.153
4018	22.00	19.81	18.0	2.10	1.57	0.153
4024	29.30	26.38	24.0	2.79	2.10	0.153
4030	36.60	33.00	29.8	3.49	2.61	0.153
4036	44.00	39.60	35.8	4.20	3.14	0.153

**Notes to table 1:**

1. GCV (Hs)
2. NCV (Hi)
3. Natural gas G20 gross calorific value 10,48 kW m<sup>3</sup> @ 15 °C, 1013,25 mbar  
Butane gas G30 gross calorific value 13,7 kW/kg  
Propane gas G31 gross calorific vale 14,0 kW/kg

**Table 2A : Injector size and burner pressure**  
**G20 natural gas**  
**inlet pressure = 17.5 mbar for UK**  
**20.0 mbar for IE**

Model	Quantity	Injector size		Burner pressure (mbar) (1)
		mm	marking	
4011	3	1.85	185	9.00
4015	4	1.85	185	8.90
4018	5	1.85	185	9.00
4024	5	2.20	220	7.70
4030	6	2.20	220	9.20
4036	8	2.20	220	7.00

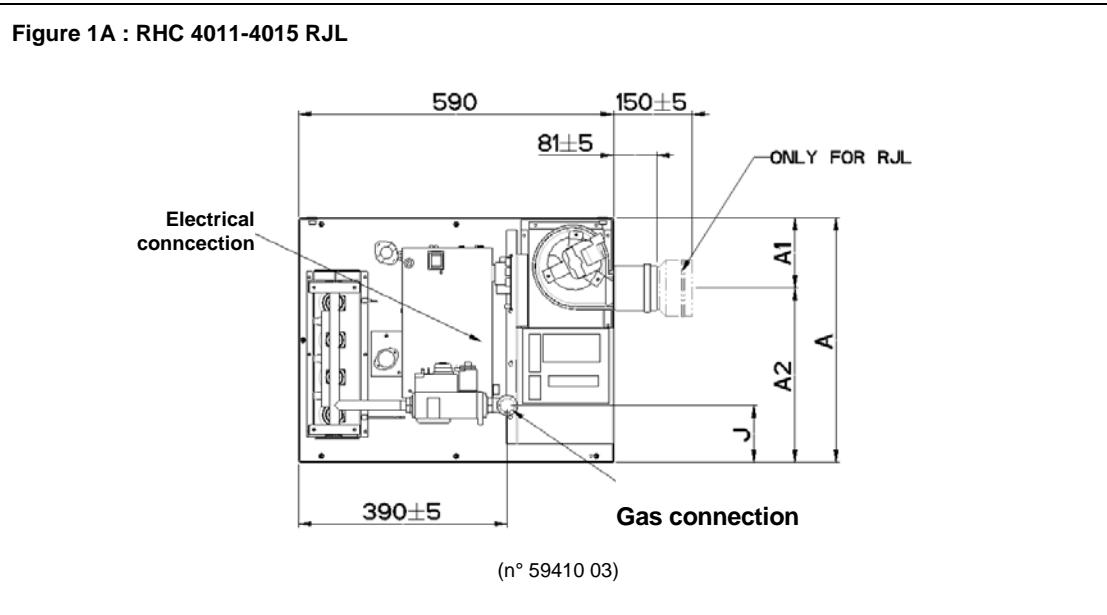
**Table 2B : Injector size and burner pressure**  
**G31 butane/propane**  
**inlet pressure G31 = 37mbar**

Model	Quantity	Injector size		Burner pressure (mbar) (1)
		mm	marking	
4011	3	1.00	100	36.9
4015	4	1.00	100	36.8
4018	5	1.00	100	36.9
4024	5	1.15	115	36.5
4030	6	1.20	120	36.5
4036	8	1.15	115	36.0

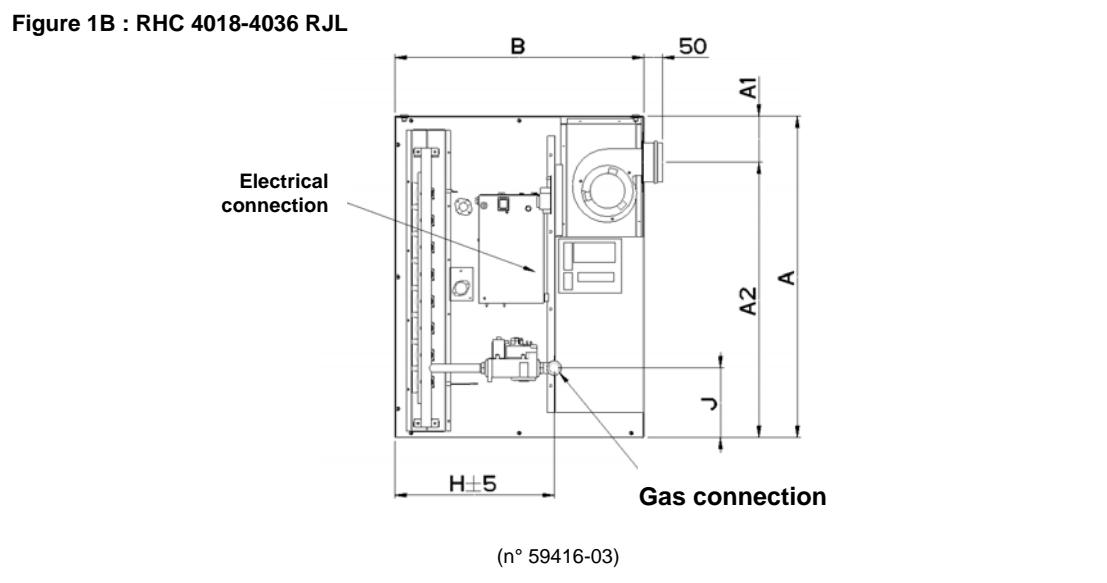
(1) : with open service door

## 2.2. Mounting flange & main dimensions

Figure 1 : Dimensions side view (mm)



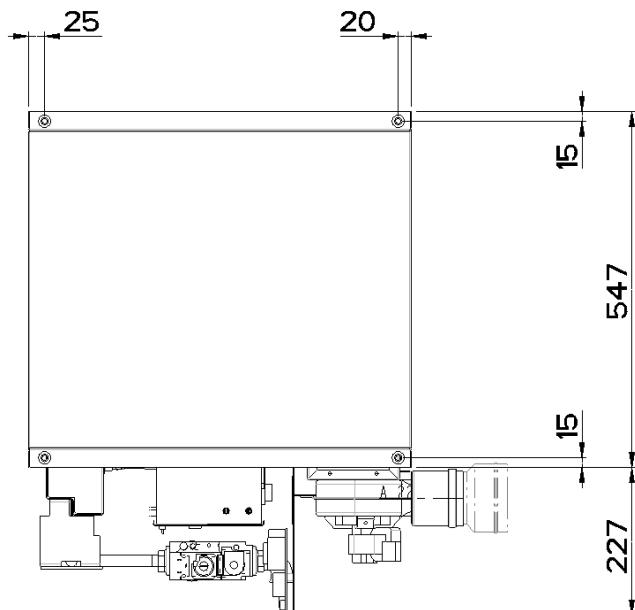
Type RHC	A	A1	A2	J
4011 RJL	305	131	174	100
4015 RJL	458	131	327	106



Type RHC	A	A1	A2	B	C	C1	H	J	K
4018 RJL	458	121	337	590	547	65	400	106	225
4024 RJL	559	121	438	648	677	65	425	112	225
4030 RJL	559	121	438	648	677	65	425	112	225
4036 RJL	837	121	716	648	677	80	425	181	230

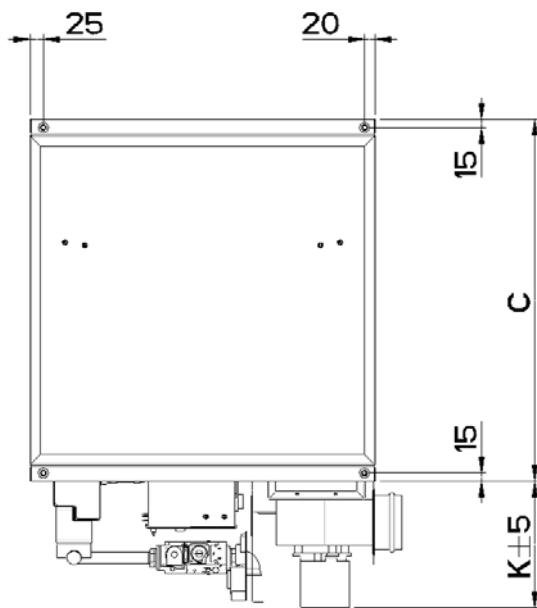
■Figure 2 : Dimensions top view (mm)

Figure 2A : RHC 4011-4015 RJL



(n° 59410 02)

Figure 2B : RHC 4018-4036 RJL



(n° 59416 02)

■Figure 3 : Dimensions back view (mm)

Figure 3A : RHC 4011-4015 RJL

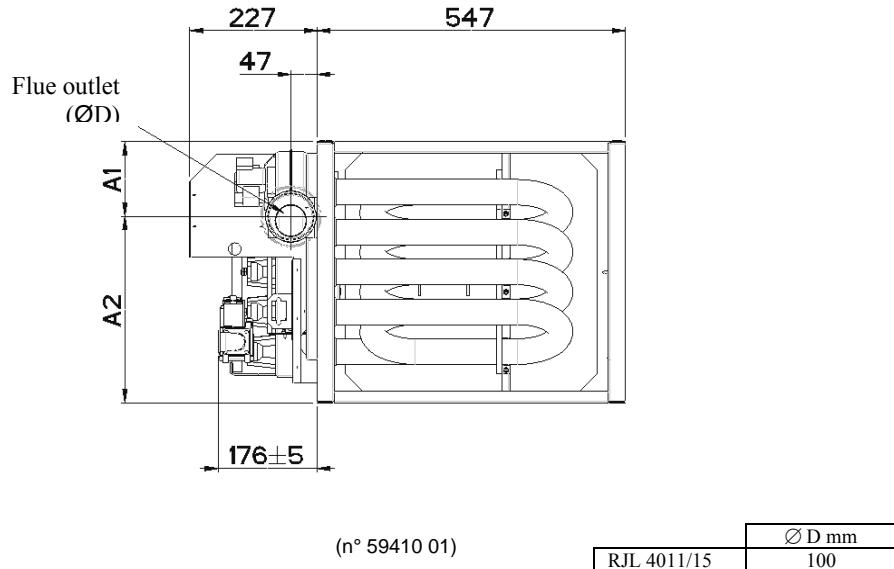
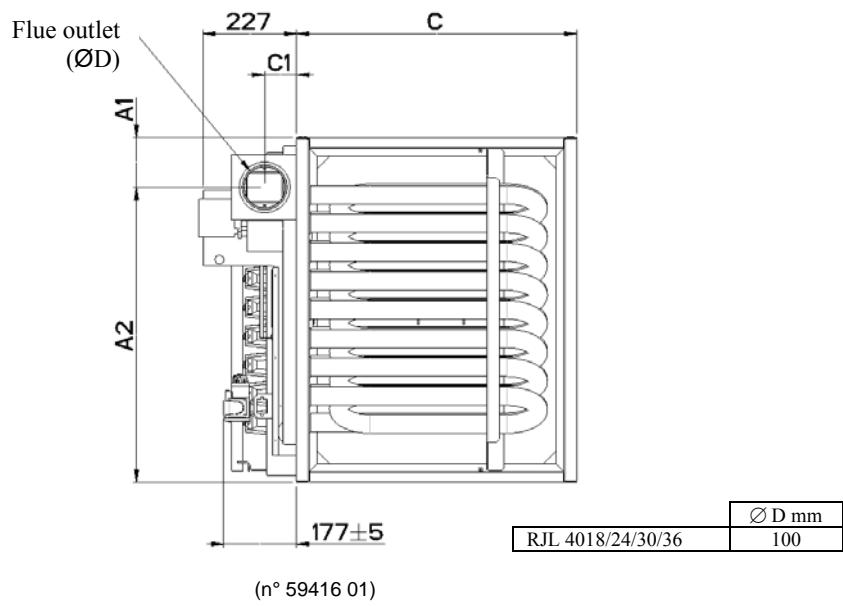


Figure 3B : RHC 4018-4036 RJL



■Weights (kg)

Type	4011	4015	4018	4024	4030	4036
unit	20	25	30	31	33	52
packaging	12	14	14	18	18	23
total	32	39	44	49	51	75

## **3.0 GENERAL REQUIREMENTS**

### **3.1 Related documents**

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 or degreasing plants or in areas where there is a fire risk.

### **3.2 Heater location**

The location chosen for the air heater outside the building must permit a satisfactory combustion.

The location where the air heater is to be installed must provide sufficient space around the heater for servicing and to allow the flue products to escape freely. A minimum distance of 1500mm must be maintained on the control side of the appliance.

When installed at ground level a fence to guard against damage and to protect the public from possible injury should protect the entire installation.

Ensure that the air heater is installed in a level plane and that the surface onto which it is installed is vibration free.

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 airflow across the heat exchanger resulting in heat exchanger spots and nuisance shut down of the gas burner due to regional overheating, thus activating thermal over-heat controls.

### **3.3 Minimum airflow requirement**

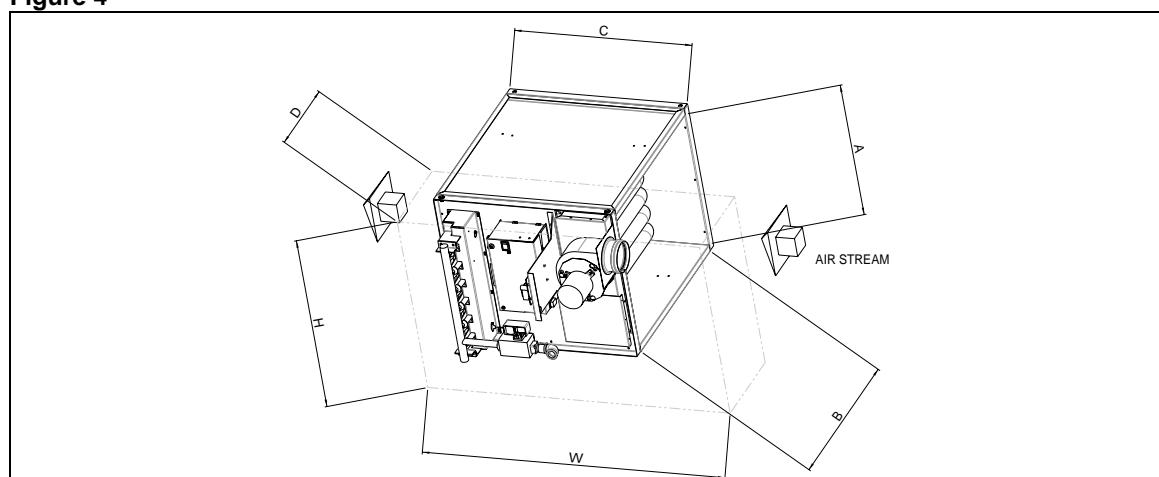
The minimum airflow duty through the heating section enclosure (see figure 4 – table 3b) must be observed as indicated in table 3a

**Table 3a**

MODEL	Min. air volume required (m <sup>3</sup> /h)
4011	1465
4015	1940
4018	2270
4024	2880
4030	3290
4036	5281

### **3.4 Compartment dimensions**

**Figure 4**



RHC ... RJL	A	B	C	D		H	W
				Min.	Max		
4011	265	487	590	315	373	400	1100
4015	418	487	590	315	373	550	1100
4018	418	487	590	315	393	550	1050
4024	509	617	648	315	393	650	1100
4030	509	617	648	315	393	650	1100
4036	787	617	648	330	408	1000	1100

### 3.5 Maximum airflow condition

Special attention must be given to ensure that the temperature rise of the air, passing through the enclosure (duct channel) around the heat exchanger tubes, is high enough to avoid condensation forming within the tubes. This condensation forming could occur by super cooling of the products of combustion. Such condensation can be the source of severe corrosion and damage to tubes or part of the tubes.

Figure 5 indicates the probability of condensation forming within the tubes reference :

- the temperature rise of the air through the enclosure (around the tubes) (see table 3b – fig. 4)
- the inlet air temperature passing over the heat exchanger

In function of the expected minimum inlet air temperature, the minimum required temperature rise (to avoid condensation) must be derived from the chart shown in figure 5.

#### Example

- expected minimum inlet temperature = -5°C
- minimum required temperature rise shown on the chart = +13°K

Table 1 indicates the heat output (kW) of the different models.

The maximum allowable airflow [through the enclosure (duct channel) around the tubes] can be calculated as follows :

$$V_{\max} (\text{m}^3/\text{h}) = \frac{\text{heat input (kW)} \times 1000}{\Delta T_{\min} \times 0,3423}$$

#### Example :

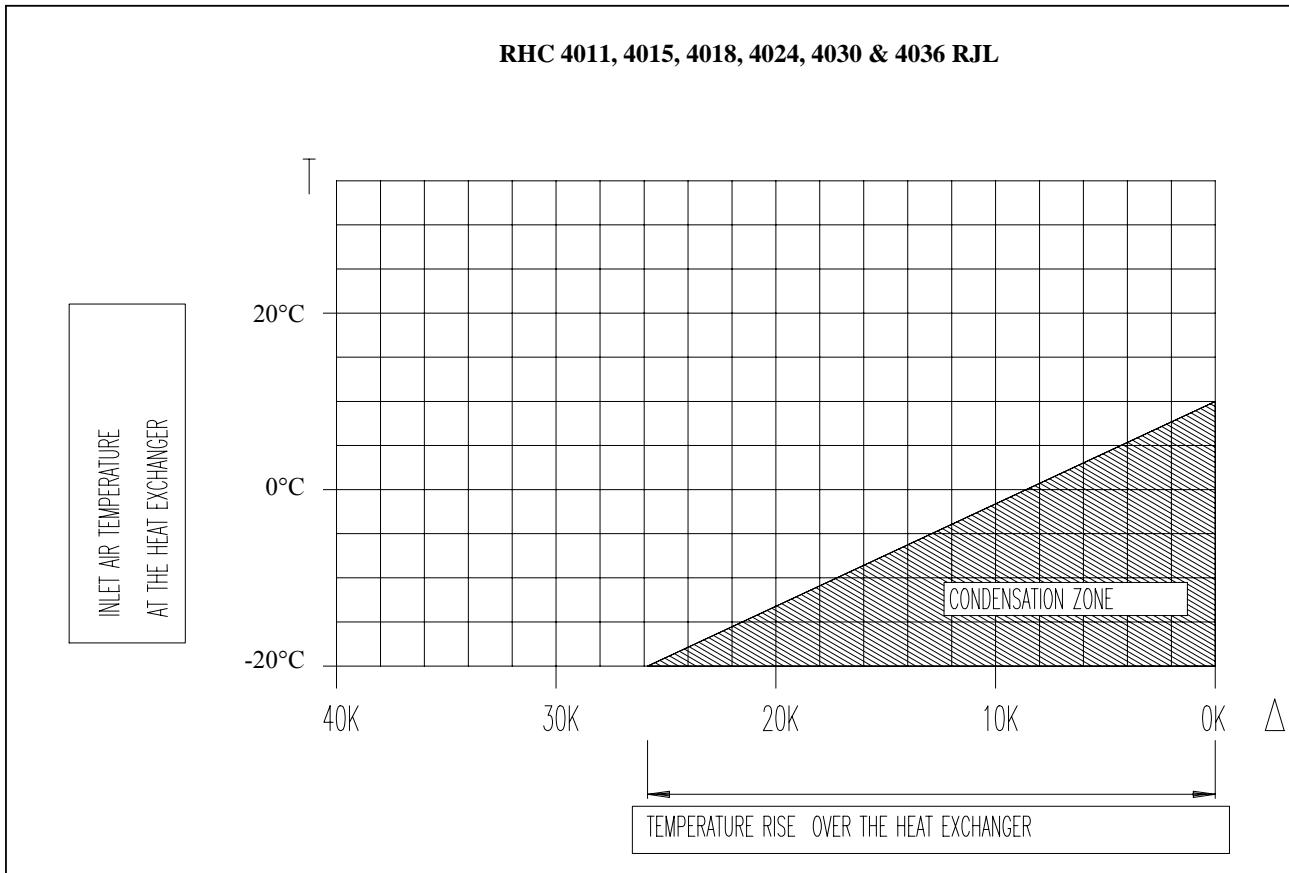
$$\Delta T_{\min} = 13\text{K}$$

model 4036 at 100% heat input : 35,80kW results into  $V_{\max} = 8045\text{m}^3/\text{h}$

#### Remark :

For air heaters with the option 2 stage gas valve (50% minimum heat input) or the option modulating gas valve (30% minimum heat input) attention must be given to determine the maximum allowable airflow in function of the appropriate heat input.

**Figure 5 : Dew point occurrence chart (condensation zone)**



### 3.6 Electrical supply

The electrical installation may only be carried out by appropriately qualified persons observing the rules in force.

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.

#### RHC 4000 RJL air heaters must be earthed.

Ensure that when planning the controls circuitry, power will be supplied at all time to the air heater, even when control is switched in the **heat off** mode. This is necessary to ensure that the air circulating fan can operate independently of the heating control. Therefore, never incorporate automatic controls that electrically isolate the appliance.

Ensure that electrical supply cables do not touch the very hot combustion collector box. The cables must be fitted on the gas pipe inside the service compartment.

The final connection must be made in the terminals provided in the control compartment. Follow the wiring diagram provided with the air heater or air handler.

Electrical supply cable conductor size should be 1.5 mm. Fit the cord grip supplied with the heater. 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.

### 3.7 Gas Connection

RHC 4000 RJL 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.

Check that the gas category is in accordance with the data described on the air heater.

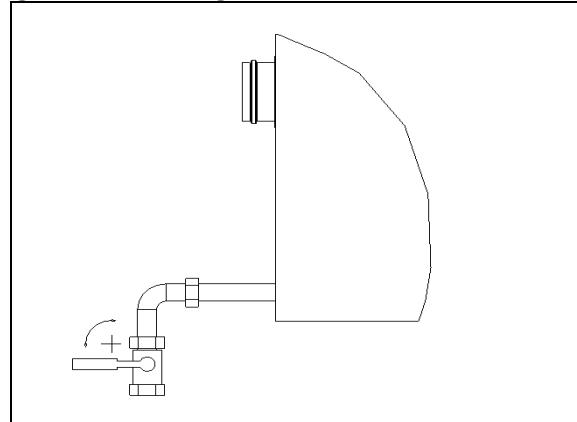
An adequate gas supply sized to provide the dynamic pressure for the volume required for the air heater(s) is essential to maintain the nominal heat input. Account of other gas-fired plant using the same gas service must also be taken into account.

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, see figure 6.

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 pipe work joints must not be made within the air duct.

**Figure 6 : Detail of gas connection 3/4"**



## 4.0 INSTALLATION

### 4.1 Unpacking and preparation

Prior to dispatch, the air 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 compatible. Read this document and become familiar with the installation requirements and the appliance before commencing installation.

### 4.2 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 switch 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.

**IMPORTANT: 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).**

#### **4.3 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.

Avoid location in draughty areas or where it may be influenced by heat sources e.g. the sun, process plant, etc. The thermostat or temperature sensor should be mounted on a vibration free surface and mounted about 1,5 meters above floor level. Follow the thermostat manufacturers fitting instructions. The thermostat must be suitable for switching 230 volts.

## **5.0 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 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 to ensure 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 earthened 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.

### **5.2 Gas connection (gas service connection of $\frac{3}{4}$ "")**

**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.

**CAUTION: Never use a flame for checking gas soundness.**

### **5.3 Lighting the air heater**

RHC 4000 RJL heaters are all fitted with automatic spark ignition systems. When adequate airflow for combustion is proven by an air proving control and a pre-purge period has elapsed, the integral igniter and multi-functional gas control operate. The ignition spark ignites the gas creating the burner flame, which is detected by a flame rod sensor. If a burner flame is not detected, the ignition controller proceeds to lockout and requires manually resetting. Lockout is indicated by the red warning light on the air heater.

**NOTE: If the first reset is not successful, wait 15 seconds before attempting reset.**

#### **5.3.1 To turn the air heater "ON"**

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. to above room ambient temperature (or follow the instructions of the air handler). The burner will now light. The burners can be seen through the viewing port;
- \* Adjust the room thermostat to the required operating comfort temperature. The air heater will now start automatically when the room thermostat calls for heat;

**NOTE: If the air heater will not start on initial start-up, the ignition controller may be in lockout position and require resetting. This may occur especially if the appliance has been on stand-by for a prolonged period.**

### 5.3.2 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).

### 5.3.3 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).

## 5.4 Air heater gas pipe work

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.

**Caution:** Never use a flame for testing for gas soundness

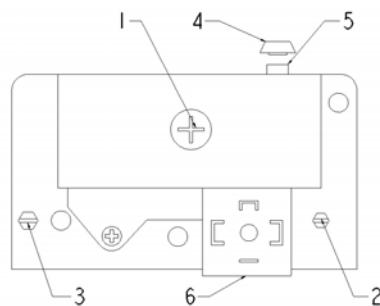
## 5.5 Adjustments

### Burner gas pressure adjustment

The gas pressure is set for the required heat input before the appliance leaves the factory, normally provided the gas supply to the air heater is in accordance with the supply pressure described on the appliance data plate the operating pressure will not require adjustment. To check the pressure, the following procedure should be carried out:

- \* Ascertain from section 1 of this document and the appliance data plate the correct operating gas pressure for the air heater.
- \* Turn the room thermostat control to its lowest setting (see instructions of the air handler).
- \* Remove the screw from the outlet pressure test point of the multi-functional control valve. Connect a manometer to the test point.
- \* Adjust the room thermostat to call for heat e.g. above room ambient temperature.
- \* Observe the burner gas pressure on the manometer and compare to the required pressure (on/off system).
- \* If necessary, adjust the burner gas pressure. Remove the cover screw (Honeywell application) or cover cap (Sit application). Turn the regulator screw anti-clockwise to decrease pressure or clockwise to increase pressure.
- \* Set room thermostat to lowest setting to turn OFF the burners. Replace the test point screw (if removed) and with the main burner alight, test for gas soundness using a soapy solution.
- Reset temperature control/room thermostat to comfort operating level.

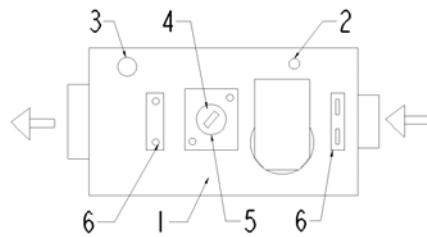
Figure 7a :SIT gas valve



### Legend :

- ① gas valve SIT 830 Tandem 040
- ② inlet pressure gas test point
- ③ burner pressure gas test point
- ④ burner pressure regulator cover
- ⑤ burner pressure regulator
- ⑥ electrical connection 230V

Figure 7b : HONEYWELL gas valve



### Legend :

- ① gas valve HONEYWELL V4601AB
- ② inlet pressure gas test point
- ③ burner pressure gas test point
- ④ burner pressure regulator cover
- ⑤ burner pressure regulator
- ⑥ electrical connection 230V

## 5.6 Air heater controls and operation

Check air heater operation after all adjustments have been carried out. Set the temperature control above ambient temperature.

RHC 4000 RJL air heaters are fitted with a pressure sensitive, combustion air safety control that monitors pressure differential if the combustion airflow. The control operates with the settings given in table 4 (settings are for sea level installations).

When the combustion air safety control closes verifying airflow, the gas control valve will open and the burner will light. If the burner does not light, the ignition controller will lockout and must be manually reset. The air heater is fitted with a signal lamp and manual reset button that indicates lockout.

**NOTE: If the first reset is not successful wait 15 seconds before resetting the igniter.**

**Table 4 : Combustion air pressure control settings**

Model	Normal equilibrium warm (Pascal)	Set point 'off' (Pascal)
4011	95	68
4015	90	68
4018	180	130
4024	178	130
4030	180	130
4036	176	130

Wait approximately 30 seconds after the burner has lit, the time delay relay will activate the thermal fan control and will also activate the fan if wired (most air handlers are equipped with constant running fans). Continue to operate the air heater for several minutes to ensure correct operation.

Turn room thermostat to its lowest setting. The main burners should extinguish while the fan continues to run to cool the air heater. The fan delay relay will normally be de-energized and stop the fan motor in approximately 45 seconds (if wired).

## 5.7 Options

### 5.7.1 Two-stage burner control

#### Description

This option provides a 2-stage burner control system providing 100% & 50% heat input. Appliances so equipped will only operate in a two-stage manner when connected to a two-stage external control (room thermostat) or duct stat.

#### Important

Safe operation of the burner is only assured when the low rate setting is 50% or greater than the high rate setting.

The low rate gas setting pressure should therefore never be less than 25% of the normal high rate setting pressure. See table included in this document.

## Nomenclature

This option may only be used in conjunction with appliances fitted with Honeywell multi-functional gas controls types VR 4601P. or type V 4600P.. The valve operator V 4336A.. 3/20 for natural gas or V 4336A..4/37 for propane gas may be used to replace the single stage gas regulator already fitted if conversion is being undertaken.

Regulation is possible for the pressure range 3-20 mbar for natural gas and 4-37mbar for propane gas. A relay in the burner controls circuit is necessary to ensure that burner start-up takes place on high fire rate so that good main burner cross lighting takes place.

#### Note:

The maximum gas pressure for all gas type is 60 mbar.

Care should be taken when handling the operator for the purpose of replacement or exchange.

If upgrading of an existing single stage valve is being carried out then the gas valve must be marked accordingly to ensure that replacement parts for the future are readily identified.

Figure 8 shows in outline view the valve operator and indicates its principal components.

## Field adjustment & checkout

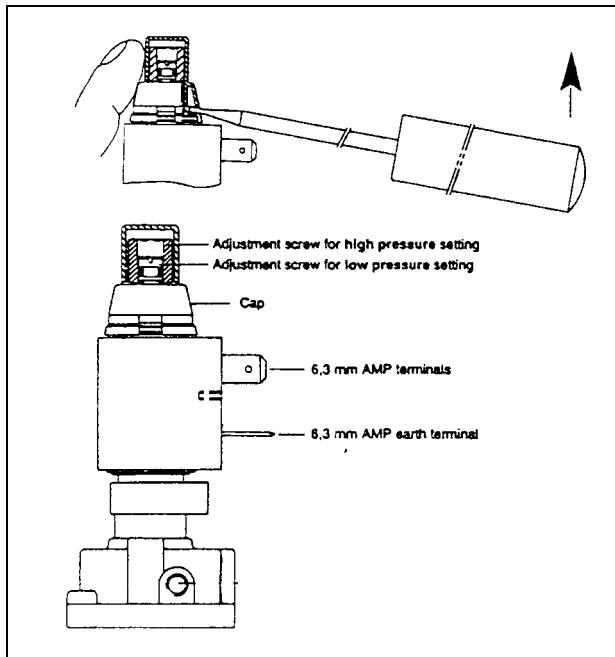
#### Important

1. Fitting and adjustment may only be carried out by qualified persons.
2. Allow time for pre-set pressure to stabilise before making adjustments i.e. 1 minute.
3. Operate high-low regulator a few times after adjustment to ensure correct setting.
4. Remove cover cap as indicated in figure 8.

#### Setting (refer to figure 8)

- lever off cover cap as indicated.
- before commencing an adjustment connect a manometer to the burner pressure test point.
- maximum high rate setting **must** be adjusted first after which the minimum low rate setting can be adjusted. Any adjustment of the maximum setting influences the minimum rate setting.
- do not adjust maximum or minimum settings above or below the pressure stated on the data plate or in table 5.

**Figure 8 : V 4336A .. Gas valve operator**



#### Adjusting maximum pressure

- energise high-low regulator, set gas control in operation (light burner) and wait until an outlet pressure is recorded on pressure gauge.

- use a 6mm hexagon wrench or a 10mm screw drier to turn adjustment screw for maximum pressure setting, clockwise to increase counter clockwise to decrease pressure until the desired maximum pressure is obtained.
- check maximum pressure several times.

#### Adjusting minimum pressure setting

- disconnect electrical connection of high-low regulator.
- set gas control in operation and wait until an outlet pressure is recorded on the pressure gauge.
- if minimum pressure setting needs adjusting use a 3,5mm screw driver to turn adjustment screw for minimum pressure setting clockwise to increase counter clockwise to decrease pressure until desired minimum pressure is obtained.
- re-connect high-low regulator in circuit.
- check maximum pressure setting, re-adjust if necessary and check minimum pressure again. Replace regulator cap when finished.

**Note :** It is necessary to re-check pressure settings during routine service and maintenance of the appliance.

**Table 5 : Models High/Low burner gas pressures and low rate consumption values**

RHC 40.. RJL			4011	4015	4018	4024	4030	4036		
Burner pressure	Pressure at 100%	nat gas G20	mbar	9.00	8.90	9.00	7.70	9.20	7.00	
		butane G30	mbar	27.90	27.80	27.80	28.70	27.50	27.30	
		propane G31	mbar	36.90	36.80	36.90	36.50	36.50	36.00	
	Pressure at 50%	nat gas G20	mbar	2.25	2.23	2.25	1.93	2.30	1.75	
		butane G30	mbar	6.98	6.95	6.95	7.18	6.88	6.83	
		propane G31	mbar	9.23	9.20	9.23	9.13	9.13	9.00	
	Pressure at 30%	nat gas G20	mbar	0.81	0.80	0.81	0.69	0.83	0.63	
		butane G30	mbar	2.51	2.50	2.50	2.58	2.48	2.46	
		propane G31	mbar	3.32	3.31	3.32	3.29	3.29	3.24	
Gas consumption at 50% <sup>1</sup>		natural G20	m³/h	0.63	0.84	1.05	1.40	1.75	2.10	
		butane G30	kg/h	0.48	0.64	0.80	1.07	1.34	1.61	
		propane G31	kg/h	0.47	0.63	0.79	1.05	1.31	1.57	

<sup>1</sup> Natural gas G20 gross calorific value 10.48 kWh/m³ at 15°C & 1013 mbar  
Low fire rate must not be reduced below the values stated above for 50% rating.

Butane gas G30 gross calorific value 13.7 kg/h  
Propane gas G31 gross calorific value 14.4 kg/h

**Note :**

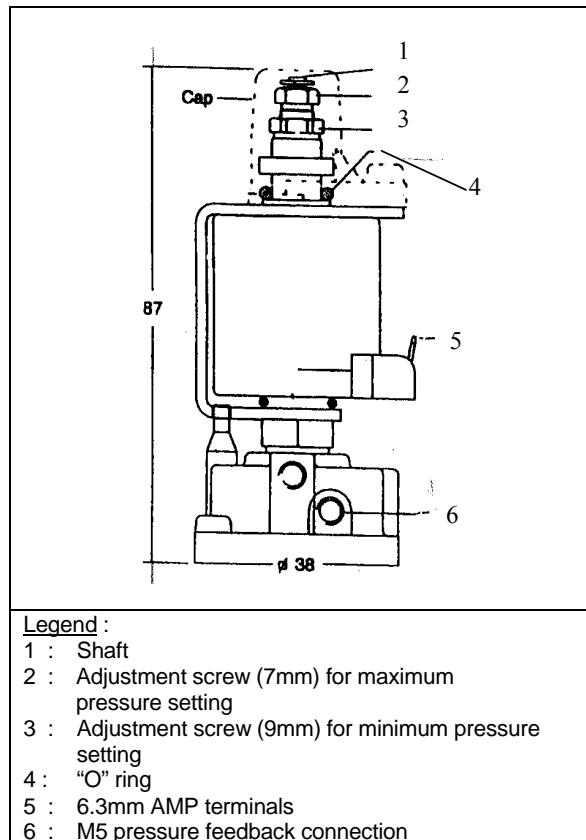
Burner pressures for butane/propane gasses are approximate based on regulated supply pressure :

Calculation burner pressure : burner pressure at 100% input x (load)<sup>2</sup>

Example : type 4030, 75%, prop.gas G31: 36,4 mbar x 0,75<sup>2</sup> = 20,48 mbar

## 5.7.2 Modureg V7335A 2000 series modulation system

**Figure 9: Modureg V7335A**



The Modureg V7335A 2000 Series Modulating gas pressure regulators are an optional addition, which can be used on "Honeywell" Multifunctional gas controls for modulating the burner gas pressure for firing over the range 50% to 100% of the nominal high fire burner rate. Two model types are used dependant on the gas type. They are identified Grey cover = Natural gas, outlet pressure range 1,5 - 20,0 mbar. Yellow cover = Propane/Butane gas, outlet pressure range 4,0 - 37,0 mbar<sup>(1)</sup>

### Caution:

Reznor air heaters must be controlled so that burner start-up takes place in the high fire (100%) mode.

Modureg gas pressure regulators require to be powered by a maximum 24 V DC voltage over the range 15 - 165 mA maximum. Maximum outlet pressure occurs at the high set point value (high fire). Minimum outlet pressure occurs at low set point value (low fire). The power signal may be obtained from a system amplifier which

may be an integral control within the appliance or from a remote control system designed to provide the required controlling voltages.

Adjusting the V7335A Regulator  
Refer to figure 9.

To check the minimum or low fire and maximum or high fire pressures for limits of modulation use the following procedures.

Fit a manometer to appliance burner pressure test point.

### Important :

Allow time for gas pressure to stabilize before making adjustments.

### To Set Minimum (low fire) 50% or 30% rate (see table)

1. Remove regulator cover cap;
2. Disconnect electrical connection to the regulator coil;
3. Energize operator, set control in operation and wait until outlet pressure is recorded on manometer;
4. Use a 9 mm wrench to turn the minimum rate adjustment screw clockwise to increase or counter-clockwise to decrease the minimum pressure setting

**The minimum pressure setting must be adjusted first, because any adjustment of the minimum pressure setting influences the maximum pressure setting.**

### To set Maximum (high fire) 100% rate

1. Follow point 1 above. Connect electrical connection to the regulator coil and ask for maximum heat;
2. Using a 7 mm wrench to turn the maximum adjustment screw clockwise to increase or counter-clockwise to decrease the maximum pressure setting to the value stated on the appliance data plate;
3. Replace cover cap, re-wire coil in circuit;
4. Operate burner several times in high, intermediate and low pressure modes and check performance on the manometer.

### **FAULT FINDING "MODUREG" OPERATION :**

follow setting procedure for fault finding

1. Minimum or Low Fire unobtainable :
  - Ambient temperature too high in location of regulator max 70°C;
  - Check input voltage to coil,  
Zero volt is low fire mode, shaft out;

2. Cannot obtain Maximum or High fire :
  - Open circuit to regulator coil;  
Measure coil resistance = 127 Ω;
  - Short circuit between coil and casing;  
Check resistance between one terminal and casing, reading indicates short circuit;
  - Low voltage to regulator;  
Check for correct voltage range, should be:  
0 - 24 V DC;
  - Low gas supply pressure;  
Check natural gas GB = 17.5-20.0 mbar. Push down plunger, burner pressure should rise to high-fire rate;
  
3. Erratic operation:
  - Fluctuating or pulsating DC voltage;  
Check using meter, if pulsating suspect input signal, transients, etc.
  
4. Minimum rate lower than setting required or below 1.5mbar :
  - Minimum pressure set too low; re-adjust;
  - Line supply gas inlet control regulator faulty or requires adjustment;
  - Appliance gas tap not fully open

### **5.8 Handing over**

Upon satisfactory completion of commissioning and testing, hand the instructions to the user or their representative. Advise the appropriate person how to safely use and operate the air heater and describe the use of appropriate external controls. Ensure that the person understands how to start the heater and how to turn it OFF.

Suggest that the instructions are placed close to the air heater for future reference. In the absence of an appropriate location fix them to the gas service meter. Ensure they are not placed where they may restrict the airflow from the heater or where they may catch fire from a hot surface. **Do not fix them in the control section.**

Advise the person who is resuming responsibility that for continued safe operation the air heater should be serviced at least once a year.

## **6.0 SERVICING INSTRUCTIONS**

### **IMPORTANT:**

**Only appropriately qualified persons may carry out servicing and faultfinding 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.**

Reznor RHC 4000 RJL air heaters will operate with a minimum of maintenance. To ensure long life and satisfactory and safe performance, an air heater that is operated under normal conditions should be inspected and cleaned at the start of each heating season. If the air heater is operated in an area where unusual amounts of dust, etc are present in the air, more frequent servicing is recommended. When any service is completed, be sure that components are reassembled correctly to ensure that no unsafe condition exists. Upon completion of the service carry out the commissioning instructions outlined in section 5 of this document.

### **WARNING:**

**Excessive dirt build-up on the inside of the burner ports could cause unburned gas to spill out of the back of the burner tube causing a fire or explosion. To prevent this occurring, clean all of the burner ports at least annually.**

### **CAUTION:**

**When cleaning air heaters, wearing of eye protection and a dust facemask is recommended.**

### **6.1 Service procedure**

**The following procedures should be carried out at least annually:**

1. Remove the burner assembly as in section 7.1. Clean thoroughly, (cleaning the burners requires an emery cloth, wire brush and a cleaning cloth - stubborn deposits on burners are best cleaned using "acetone" as a solvent).
  - \* Check the condition of the igniter and clean to remove all deposits. Check the spark gap (3.0 mm).
  - \* Check the sensor - clean as necessary.
  - \* Remove any soot deposits from the burner with a wire brush. Clean the ports with a degreaser or acetone. A vacuum cleaner or compressed air may assist in this cleaning operation. Wipe the inside of the burner tube clean (cleaning thoroughly with a degreaser as recommended will retard future build-up of dirt).
  - Inspect the burner for any damage or deterioration. If the burner is damaged or corroded, replace it.
  
2. The heat exchanger should remain clean unless a problem has developed due to poor combustion. Examine the heat exchanger tubes internally and externally for any sign of deterioration. The outside of the tubular heat exchanger can be cleaned from the front of the heater with an air jet and/or a flexible brush. Remove any dust and grease deposits.

- The inner surfaces of the heat exchanger can be reached for cleaning with the burner and combustion air fan (venter) assemblies removed, (see figures 10/11 and section 7). Clean with a flue brush or a heavy wire to which wire wool has been attached. Brush inside each heat exchanger tube until all foreign material has been removed. The use of a flashlight is necessary to carry out this operation.
3. Remove any dirt and/or grease that may have accumulated on the venter fan motor and its housing. **NOTE:** Venter fan motors are lubricated for life and do not require greasing.
  4. The gas multi-functional control valve requires no field maintenance except cleaning of its exterior and checking the condition of the wire connections. Instructions for testing pressure are given in section 5.5.
  5. Check the flue/combustion air system for soundness. Reseal/replace any parts that are not sound.
  6. Check all wiring connections. Check wiring for any signs of damage. Replace any suspect wiring with an equivalent specification.
  7. Check operation of thermal fan control and control relay.

8. When service is complete carry out full commissioning procedure as per section 5 of this document.

## **7.0 Removal and replacement of parts**

**RHC 4000 RJL air heaters must only be fitted with Reznor authorized replacement parts. These heaters must use certificated spare parts to comply with legislation.**

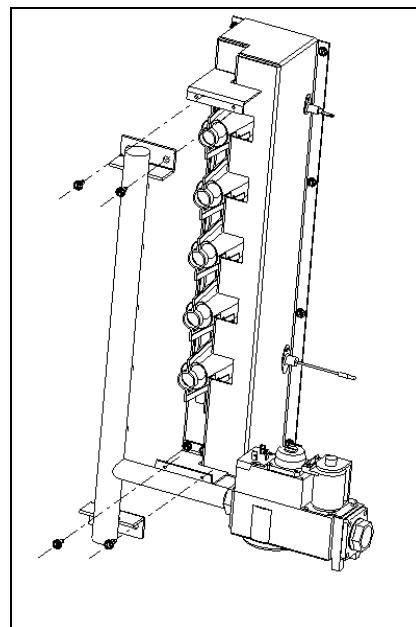
### **7.1 Main burner removal**

**Instructions for burner removal (see figure 10):**

1. Turn OFF the gas supply to the air heater.
2. Switch OFF the electricity supply to the air heater.
3. Open the access door.
4. Disconnect the union in the gas supply outside of the appliance.

5. Remove gas supply pipe from multi-functional gas control valve.
6. On the burner box end of the flexible pipe, loosen the hose clamp. Slide the hose from the socket.
7. Disconnect the silicon tube from the static tapping point on the burner box cover.
8. Remove the small manifold cover plate. Remove the burner box cover. The burner rack assembly is now visible.
9. At the bottom of the burner rack assembly, remove the nut that secures the burner rack to the bolt welded to the burner box bottom. At the top of the burner rack assembly, remove the bolt that attaches the burner rack assembly to the bracket. Lift the burner rack/manifold assembly upward (to clear the locating weld pins) and pull the assembly out of the air heater.

**Figure 10 :**  
**Removing the burner rack/manifold assembly**  
(for clarity, the heater cabinet & other parts are not illustrated; do not remove the burner box assembly from the heater)

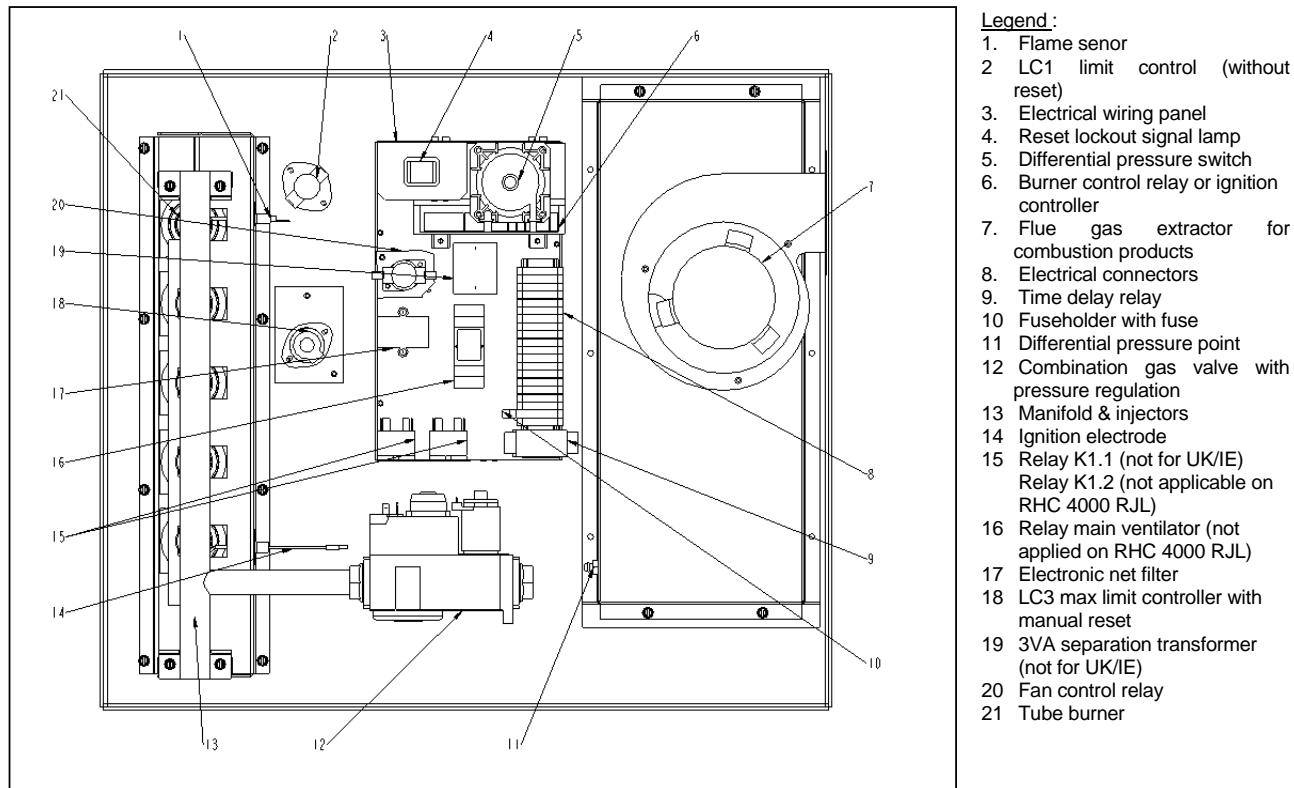


### **Instructions for re-assembly:**

1. Reverse the procedure for removal making sure that all parts are installed correctly. Check that all components are secure.
2. When lighting, always follow the lighting instructions on the air heater.

**Remember!** After any service work has been carried out, the air heater must be fully commissioned. See section 5 of this document.

**Figure 11 : View of the Control Compartment**



## 7.2 Burner injectors

1. Carry out steps 1 to 8 of section 7.1.
2. Unscrew the main burner injectors.
3. Re-fit new injectors.
4. Re-assemble in reverse order.

## 7.3 Ignition system

To access the ignition system, follow steps 1 to 3 in section 7.1.

**Ignitor** - refer to figure 11 and locate the igniter (on the side of the burner rack). Disconnect the wire, remove the screw and the igniter. Clean with an emery cloth.  
Note: Spark gap must be maintained to 3.0 mm (see figure 12a). Figure 12b shows how the igniter must be installed.

**IMPORTANT:** When re-assembling the earth wire must remain attached to the igniter

**CAUTION: Due to high voltage on the spark wire and electrode, do not touch when energised. See hazard levels.**

**Flame sensor** - Refer to figure 11 and locate the flame sensor. Disconnect the wire, remove the screw and the flame sensor. Clean with an emery cloth.

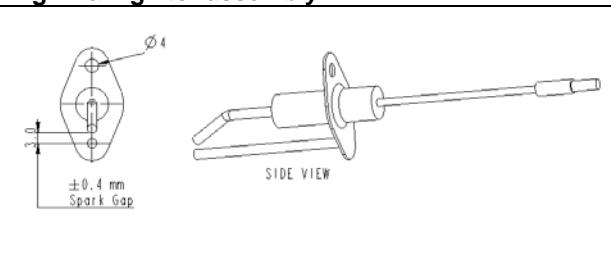
**Ignition controller** - The enclosed integrated circuit monitors the operation of the burner including ignition. Do not attempt to dismantle the ignition controller.

Each heating season lead wires should be checked for insulation deterioration and good connections.

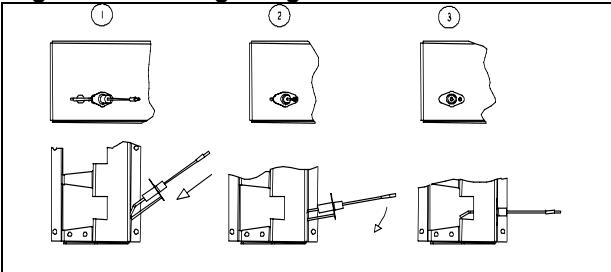
**Proper operation of the direct spark ignition system requires a minimum flame current of 1,0 .A when measured with a micro ammeter.**

For further information and checkout procedure of the direct spark ignition system, refer to the manufacturers control operating instructions a copy of which is supplied with the air heater.

**Fig. 12a - Ignitor assembly**



**Fig. 12b : Installing the ignitor**



#### **7.4 Multi-functional gas control valve**

1. Ensure gas supply to the air heater is turned OFF.
2. After the air circulation fan has stopped, switch OFF the electricity supply to the air heater.
3. Mark for future identification and disconnect the wires connected to the valve.
4. Disconnect the gas service union between the control valve and the gas service tap. Remove the gas control valve.
5. Re-fit a replacement valve making all of the required connections.
6. Carry out complete commissioning procedure prior to placing the appliance back into service as outlined in section 5.0

#### **CAUTION:**

***The gas control-operating valve is the prime safety shut-off. All gas supply lines must be free of dirt, scale, etc. before connecting to the air heater thus ensuring positive closure of the control valve.***

#### **7.5 Thermal overheat (limit) controls**

If it is determined that the thermal overheat control needs replacing, use only Reznor authorized replacements that are designed for this appliance.

To gain access to the control, open the hinged controls compartment access door. Refer to figure 11 for control locations. The control near the top of the air heater is a disc type control. The lower one is a capillary type one with a capillary tube that extends into the heat exchanger area. To remove the controls, disconnect the wires leading to them, remove the fixing screws and lift clear of the inner casing panel.  
**NOTE:** The capillary control is fitted to a bracket. With the bracket removed from the air heater, remove the control from the bracket.

When replacing the capillary control be careful not to damage the capillary tube by kinking. Make bends with a generous radius ( $\pm 25$  mm). When replacing the disc type control never manually attempt to operate the disc by pushing on the disc. Doing so will alter the calibration and could be hazardous.

#### **7.6 Combustion air control pressure switch**

If it is determined that the air differential pressure switch needs replacing, use only Reznor authorized replacements that are designed for the air heater being serviced. These switches are calibrated to operate at the designed combustion airflow duty for each appliance size in the product range.

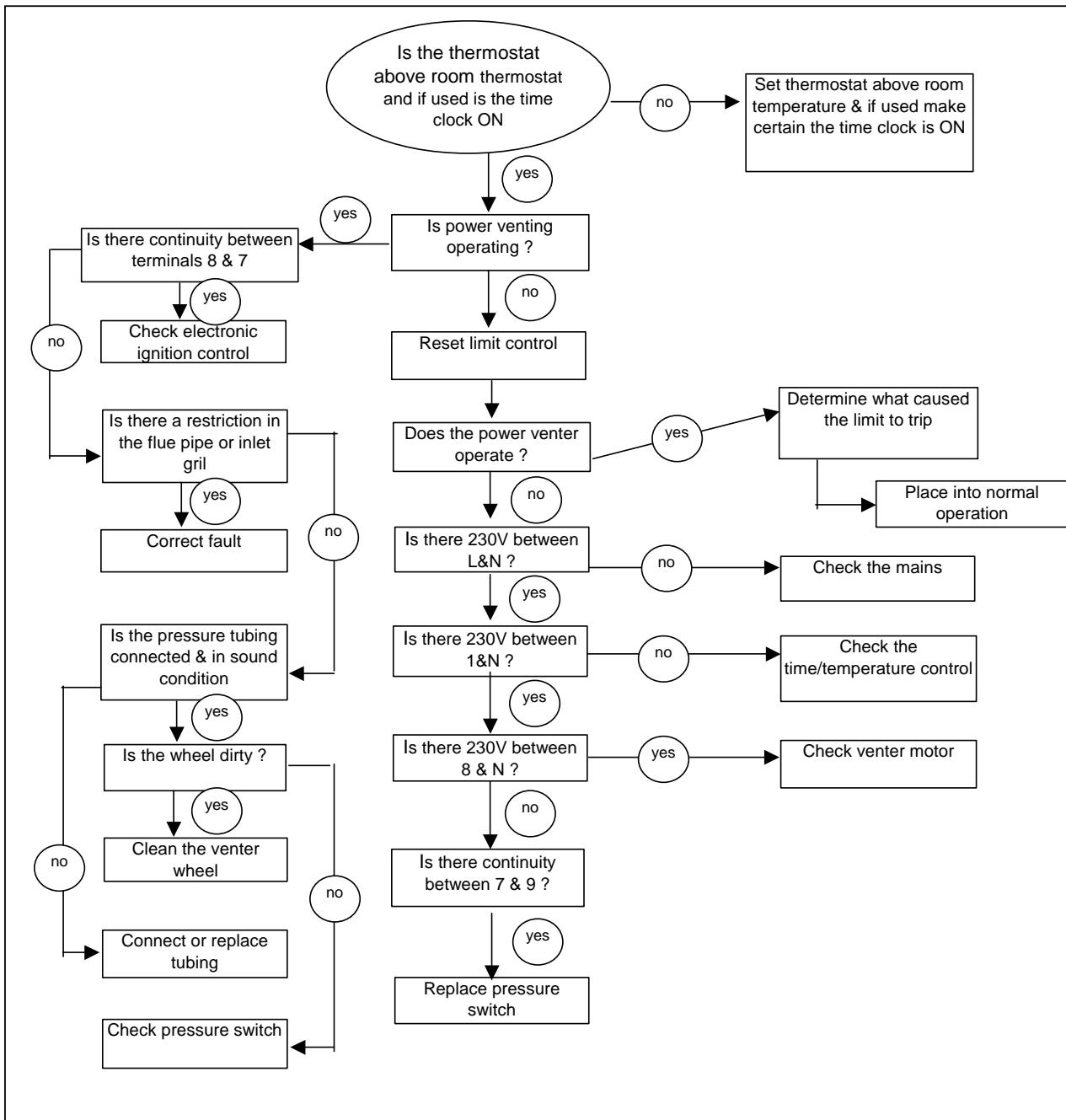
#### **7.7 Combustion air fan (venter)**

1. Ensure gas supply to the air heater is turned OFF
2. After the air circulation fan has stopped, switch OFF the electricity supply to the air heater.
3. To gain access to the fan open the controls compartment access door. Refer to figure 11 for location
4. Mark for future identification and disconnect the wires connecting the fan motor at the terminals on the main wiring junction.
5. Remove combustion air fan and clean as necessary using a wire brush and solvent to remove sticky residues.
6. Re-assemble and check for free rotation before proceeding to test the appliance.

## **8.0 FAULT FINDING**

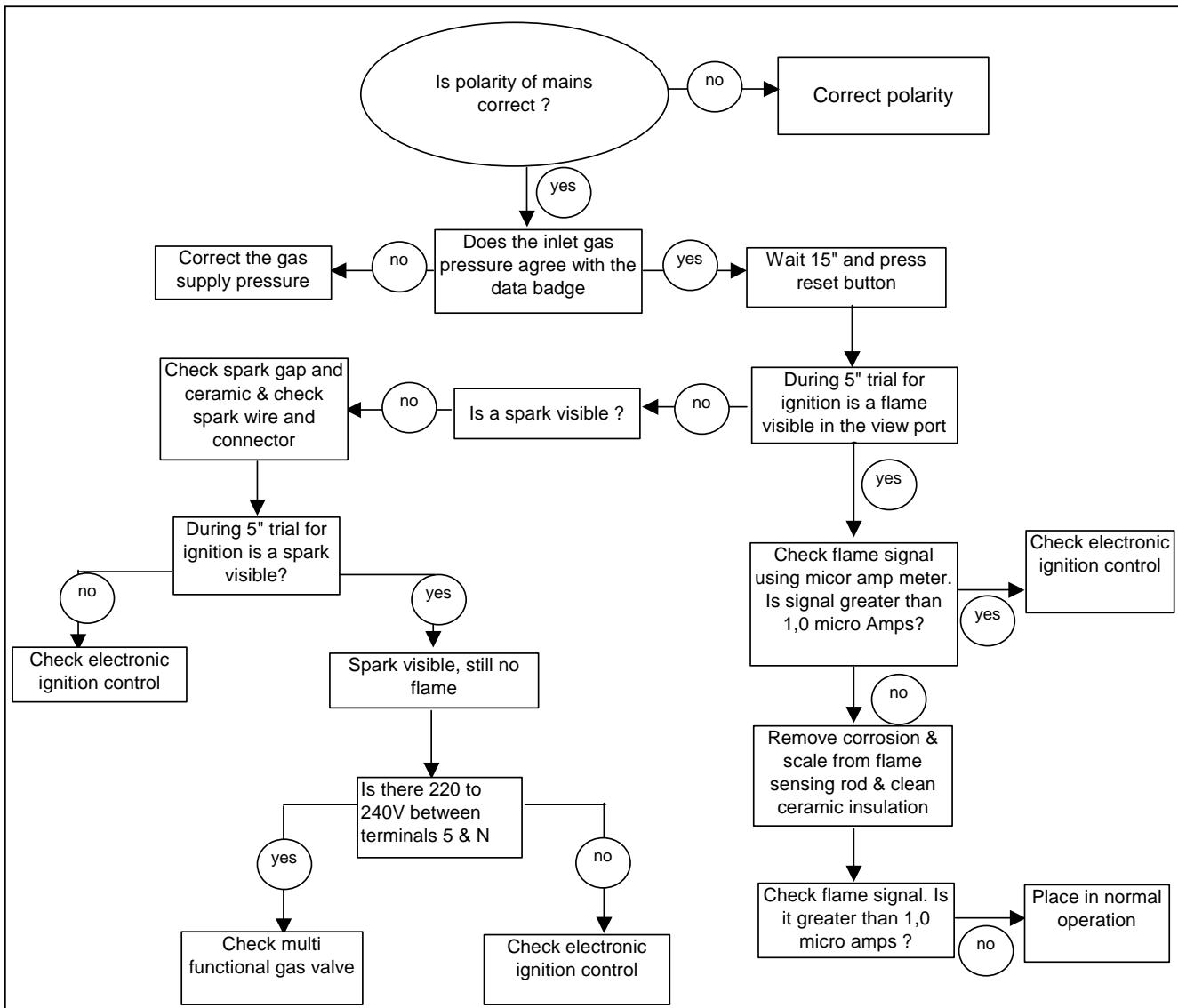
### **8.1 Main fault finding chart - Lockout indicator light is "OFF", but air heater will not operate**

**WARNING:** Fault finding may only be carried out by appropriately qualified persons



## 8.2 Ignition Controller Lockout indicator Light Repeatedly Comes "ON"

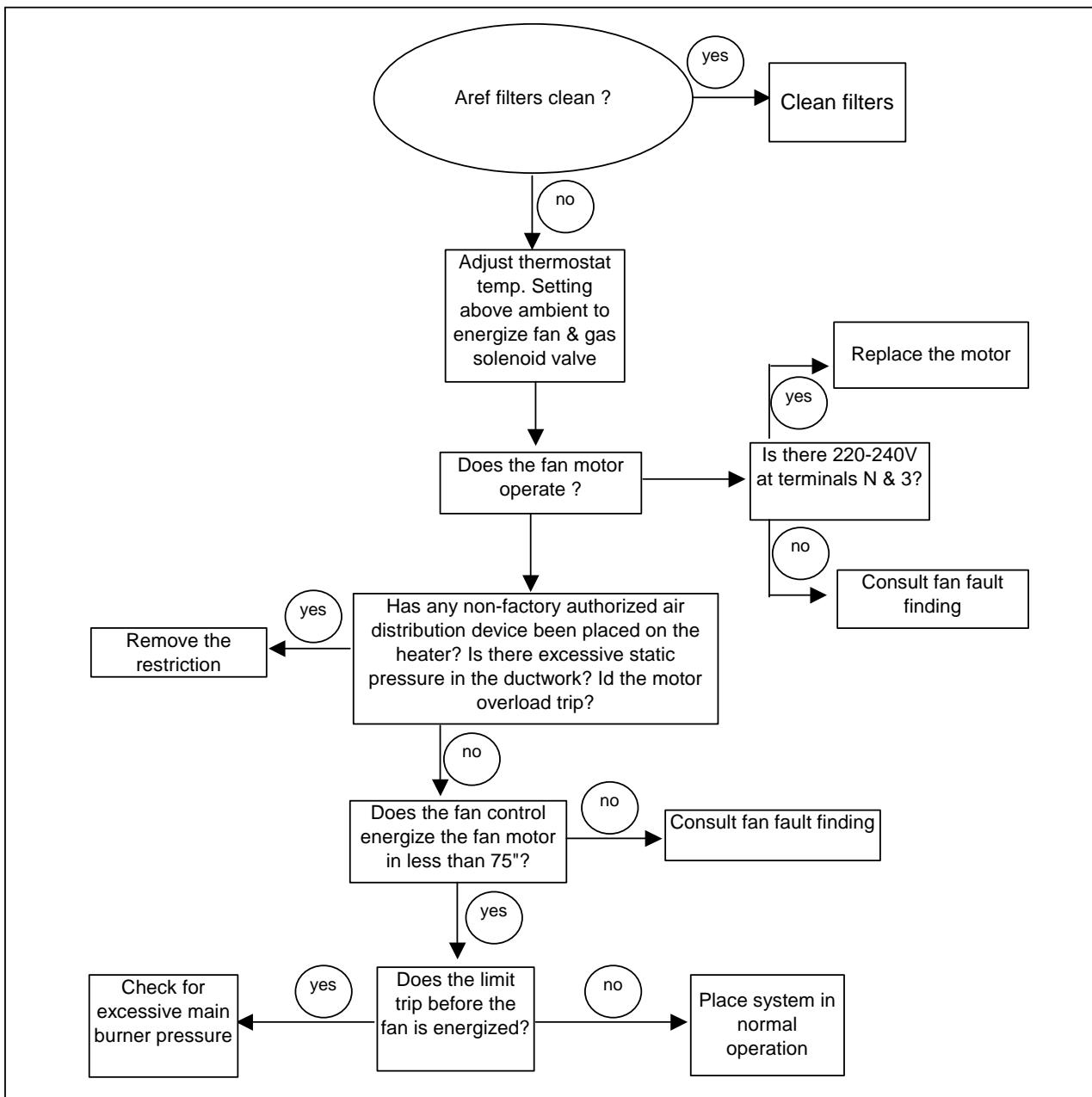
**WARNING:** Fault finding may only be carried out by appropriately qualified persons



### 8.3 Limit Control Fault Finding Chart (limit control trips)

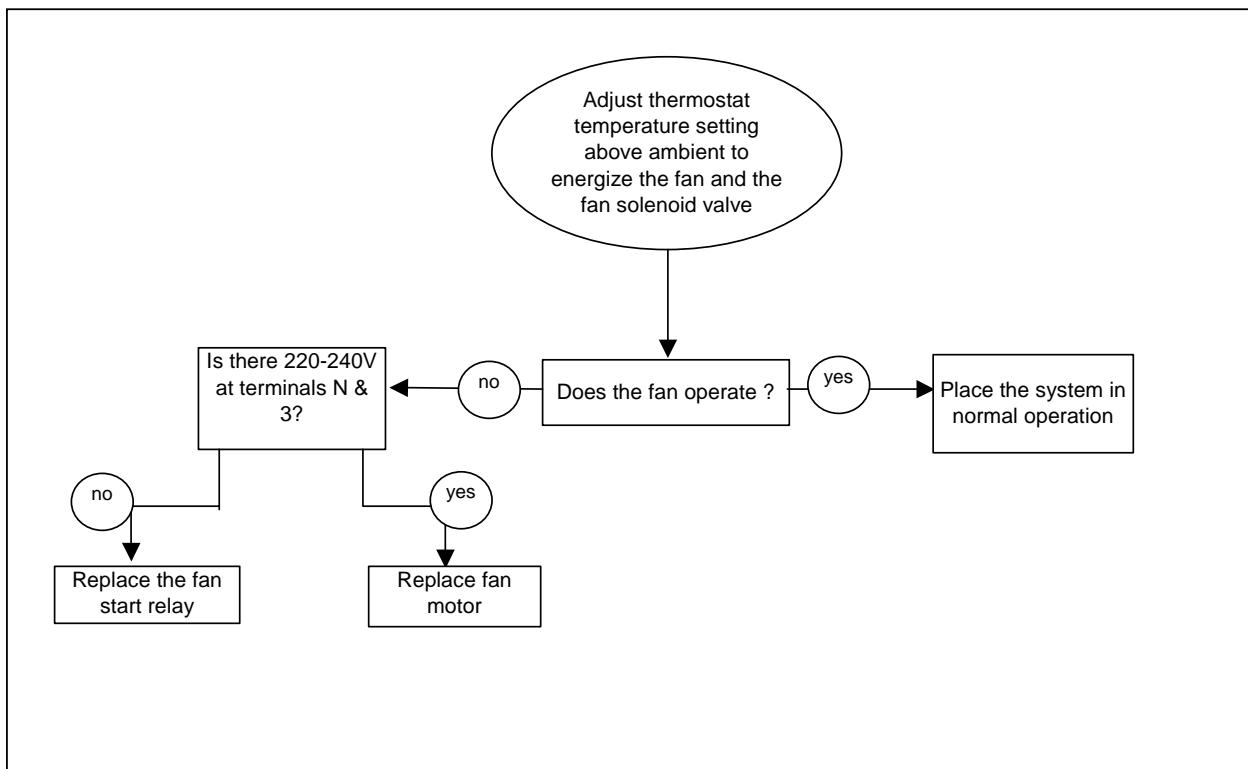
**WARNING:** Fault finding may only be carried out by appropriately qualified persons

**Note :** RHC 4000 RJL air heaters are equipped with 2 limits (a recycling limit and a manual reset limit). During normal operation, neither limit should trip even if the main electric supply is interrupted during operation. In the event of motor failure, the recycling limit will trip opening the gas valve.



#### 8.4 Fan Fault Finding Chart

**WARNING:** Fault finding may only be carried out by appropriately qualified persons



## **9.0 PARTS LISTING**

Description	Type	PN	Application	Settings	
differential pressure switch	Yamatake/Honeywell C6065FH..	30_60607_xxx	all		
Thermal overheat control (limit) LC1	T.O.D. 60T 11201614	03_400US_01	all	170F out	130F in
Thermal overheat control (limit) LC3	T.O.D. 10H14 212557	03_400US_03	4011-4036	240F out	reset
Relay K1,1	Thermodisc 12 S 20	03_25167	all	20-60sec	60-120sec
Combustion fan with weel	ES30-98 (4011-15)	36_79015	4011-4015		
Combustion fan with weel	Drouardtec CP78+weel+house	36_79090	4018-4036		
Gas valve V + V'	SIT Tandem 830.040 type 4011-4036	03_25250	4011-4036		
Burner relay E	Honeywell S4560 C 1079	03_25320	all		
isolation transformer	Erea 3VA (not appl.)	30_41530_3VA			
Relay K1.2	Potter & Brumfield T 92 S11 A22 (not appl.)	30_61742_240V	all		
Ignition electrode ER	channel products	03_400US_42	all		
Ionisation electrode IS	channel products	03_400US_41	all		
Filter	FAH-DA-3100ZC (1.6A)	30_61747	all		

XXX :RHC 4011/4015 :\*\* : ΔP setting out 68Pa (PN 30 60607 68)  
 RHC 4018/4036: ΔP setting out 130Pa (PN 30 60607 130)

## **10.0 GAS CONVERSION**

- 10.1 Reznor RHC 4000 RJL air heaters are designed to operate on natural, propane or butane gas and will be supplied fitted for the gas type ordered. In the event of site conversion to a different gas type it is necessary to convert the gas burner and burner controls.
  - 10.2 Affix new data plate and gas type over-sticker.
  - 10.3 Upon completion of conversion re-commission the air heater in accordance with section 5 of this document.
  - 10.4 Changes to carry out :
    - natural gas : SIT Tandem 830.040 (PN 03 25250) - set pressure regulator as per table 2A
    - propane/butane : set pressure regulator on maximum pressure and seal regulation screw
- To adapt gas injectors and gas inlet pressures, we refer to table 2A (page 4)

## **11.0 USER INSTRUCTIONS**

### **OPERATING**

#### **How the air heater works:**

Gas is burned by an atmospheric burner which fires into a heat exchanger. The gas burner is controlled by a double gas valve via an electronic burner control, which is actuated automatically via external controls i.e. a room thermostat and/or a time switch. The burner is ignited by a spark igniter. When the burner fires and warms the heat exchanger, the heat is sensed by a thermally actuated fan control which switches on the fan (in case there is no constant running fan) when the air temperature has reached its preset operating level.

At the end of a heating cycle the burner is switched off, the air circulation fan will continue to run until the air heater has cooled to a safe condition. Thereafter the fan will remain off until the next cycle is initiated.

#### **Safety:**

1. Flame failure is detected by the ionization probe which is the sensor and will immediately result in gas valve shut down.
2. Safety against overheating is assured by two overheating controls. The first is an automatic recycle control, which protects against low airflow i.e. clogged airways, fan failure etc. The second, which is set to a higher level than the first one, is a control, which locks out and switches off the burner in the event of gross overheating for any reason. Manual intervention is necessary to reset this control device. Resetting of the automatic burner control may also be required.

#### **To light the heater:**

1. Turn on the gas supply to the air heater.
2. Switch on the electricity supply to the air heater.
3. Ensure time switch (if fitted) is set to an 'ON' cycle.
4. Adjust control/room thermostat to desired temperature.
5. Air heater will light automatically when the room thermostat calls for heat after +/- 30 sec.
6. If the appliance does not light:
  - a) check that the burner control does not require resetting. An indicator light glows at the back panel of the appliance and on a remote control if fitted. Reset by pushing reset/button on appliance or the remote control.
  - b) check if thermal overheating control requires resetting

7. If the thermal overheating control requires resetting and doing so restarts the air heater, wait until the appliance warms to thermal equilibrium, to ensure the overheating control does not lock out again. **If it does and the return air temperature near the heater is less than 30°C, then switch off the appliance and call for service.** If the return air temperature is over 30°C, take appropriate action to reduce the ambient temperature near the air heater.

#### **Air circulation:**

The space heating process is for air to be circulated through the appliance whereby it gains heat from a heat exchanger. The air is directly discharged into the space to be heated. The air is eventually recirculated. Therefore it is very important that an unobstructed path for the circulation of the air will be maintained.

#### **Maintenance:**

1. Maintenance and service must only be carried out by appropriately qualified persons e.g. "Corgi" registered undertakings.
2. It is in your interest to ensure proper service and maintenance is carried out at a regular basis. Periods between service are dependent upon the local environment where the heater is installed. All gas appliances should be serviced at least once a year.
3. In case of any damage to the appliance, it must be shut down completely and checked by an appropriately qualified person.
4. In the event of difficulties in resolving any of these matters, please do not hesitate to contact Reznor or their official distributor.

**NEVER SWITCH OFF ELECTRICITY SUPPLY TO THE AIR HEATER WITHOUT FIRST CLOSING THE GAS TAP**

## **12.0 HEALTH & SAFETY STATEMENT**

### **12.1 General**

Under the Consumer Protection Act 1987 and Section 6 of the Health and Safety at Work Act 1974 we hereby provide the following information on substances hazardous to health.

Product range reference RHC 4000 RJL Series air heaters.

Follow good hygiene practices, wash hands before consuming food or using the toilet.

**First Aid:** Medical attention must be sought following eye contact or prolonged reddening of the skin.

### **12.2 Cautionary note**

During first firing some smoking may occur, this is due to the burning off of protective/lubricating oils used during appliance production. Most of this will have been removed during the production testing process. It is a wise precaution to ensure that adequate ventilation is provided during the initial firing and throughout the commissioning period, this is particularly important if the discharge air is to blow into a confined space. This smoking does not constitute a poison hazard.

### **12.6 Thermostat.(Thermal overheat (limit) control LC3)**

**Material:** Illuminating Kerosene.

**Description:** Sealed phial contains a small quantity in liquid form.

**Recognition:** Colourless liquid, paraffin oil/petroleum hydrocarbon odour.

**Characteristics:** Non-corrosive, flammable with no poisonous reference-CH poison Class 3

**Precautions:** Avoid handling. This product can irritate skin and eyes. Do not ingest.

### **12.3 Declaration**

Reznor products contain no asbestos; copper is not employed in gas carrying components; solder which has a melting point below 450 C is not used; paints for corrosion protection and decoration are heat cured and contain no lead.

The above appliances meet the Electrical Safety requirements of EN60 335 Pt 1 1988.

**First Aid:** Skin. Wash thoroughly with soap and water.

**Eyes.** Rinse immediately with copious amounts of clean water.

**Ingestion:** Seek medical advice.

**NOTE:** If skin irritation persists seek medical advice.

### **12.7 Electrolytic Capacitor**

Two types are used by random selection:

**Recognition:** 1. Plastic enclosure 2. Aluminium enclosure

**Material:** Contained liquid electrolyte

**Known hazards:** Electric shock possible if charged.

**Precautions:** Discharge to ground/earth. Do not incinerate.

**First Aid:** Treat for electric shock if affected.

### **12.4 Miscellaneous**

Small quantities of adhesives and sealants used in the product are dried and cured and present no known hazard.

### **12.5 Insulation and Seals.**

**Material:** Alumino - silicon fibre - crane glass  
**Description:** Tapes

**Known hazards:** Some people can suffer reddening and itching of the skin. Fibre entry into the eyes will cause foreign body irritation. Inhalation will cause irritation to the respiratory tract.

**Precautions:** Wear protective gloves when handling.

People with a history of skin complaints may be susceptible to irritation.

Dust levels are only likely when the material is abraded.

In general normal handling and use for this purpose will not present discomfort.

**Thomas&Betts**