

Gas-Fired, Balanced-Flue or Power-Vented Unit Heaters
RHC 4000(M) DJL for indoor use
RHC 4000(M) RJL for outdoor use

INSTRUCTION DOCUMENT APPLIES FOR:
Installation
Commissioning
Servicing

Applies to

Austria, Belarus, Bulgaria, China, Czech Republic, Croatia, Cyprus, Denmark, England, Estonia, Finland, Germany, Greece, Hungary, Iceland, Latvia, Lithuania, Montenegro, New Zealand, Norway, Poland, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Turkey, Ukraine

These appliances meet the following EC Directives

Dir 2009/142/EC: GAD

Dir 2004/108/EC: EMC

Dir 2006/95/EC: LVD

Dir 2006/42/EC: MD (annex II, sub B)

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.

Reznor Europe N.V. – J&M Sabbestraat 130 – B 8930 Menen
Tel : +32 56/52 95 11 - Fax : +32 56/52 95 33

Subject to modifications

TABLE OF CONTENTS

1.0 INTRODUCTION

- 1.1 Basic Information
- 1.2 Warranty

2.0 TECHNICAL DATA

3.0 GENERAL REQUIREMENTS

- 3.1 General
- 3.2 Specific heater location
- 3.3 Minimum airflow duty
- 3.4 Compartment dimensions
- 3.5 Maximum airflow conditions
- 3.6 Combustion air supply & flue system (applies only to DJL models)
- 3.7 Air Supply (applies only to DJL models)
- 3.8 Electrical supply
- 3.9 Gas supply

4.0 INSTALLATION

- 4.1 Uncrating and preparation
- 4.2 Fitting the combustion air inlet/flue system (applies only to DJL)
- 4.3 Electrical Connection
- 4.4 Room Thermostat Siting

5.0 COMMISSIONING AND TESTING

- 5.1 Electrical Check
- 5.2 Gas Connection
- 5.3 Lighting the Heater
 - 5.3.1 To Turn the Heater ON
 - 5.3.2 To Turn the Heater OFF for Short Periods
 - 5.3.3 To Turn the Heater OFF for Long Periods
- 5.4 Heater Pipework
- 5.5 Adjustments
- 5.6 Options
 - 5.6.1 2 stage burner control
 - 5.6.2 Modureg V7335A 2000 series modulation system
- 5.7 Air heater controls & operation
- 5.8 Handing Over

6.0 SERVICING INSTRUCTIONS

7.0 REMOVAL AND REPLACEMENT OF PARTS

- 7.1 Main Burner Removal
- 7.2 Main Burner Injectors
- 7.3 Ignition System
- 7.4 Gas control valve
- 7.5 Limit Controls
- 7.6 Combustion Air Control Switch
- 7.7 Combustion Air Fan

8.0 FAULT FINDING

9.0 PARTS LIST

10.0 GAS CONVERSION

11.0 USERS INSTRUCTIONS

12.0 HEALTH & SAFETY STATEMENT

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.

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

1.0 INTRODUCTION

1.1 BASIC INFORMATION

The instructions in this manual apply to the following gas-fired/fan-assisted warm air heaters:

RHC 4000(M) DJL model suitable for indoor air handlers only (when installed where the height above floor level is greater than 1,8 meters measured to the underside of the appliance they may be used as a garage air heater).

Model RHC 4000(M) DJL heaters are approved for:

Type C₁₂ - horizontal vent for balanced-flue heaters;

Type C₃₂ - vertical vent for balanced-flue heaters;

Type B₂₂ – vertical vent (through the roof) or horizontal vent (through the wall)

RHC 4000(M) RJL model suitable for incorporation in air handlers built for outdoor installation only.

Model RHC 4000 RJL heaters are approved for outdoor or rooftop application.

Category : see table 2A.

All models & sizes are available for use with either natural, propane or butane gas with operating temperatures between -15°C and 40°C.

These instructions are only valid for the country of use as indicated on the appliance. If these symbols are not shown, it is necessary to obtain appropriate technical instructions. Such instructions may be obtained upon request from your supplier.

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

The installation must comply with the requirements and recommendations of all relevant national and local standardisations.. The installation must also be in accordance with the relevant electrical and IEE regulations.

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

In some applications, after approximately 45 seconds, the fan delay relay will turn off the fan (if wired).

1.2 WARRANTY

Warranty is void if:

- Model RHC 4000(M) DJL/RJL heaters are installed in atmospheres containing flammable vapors or atmospheres containing chlorinated or halogenated hydrocarbons or atmospheres containing any silicone, aluminum oxide, etc., that adheres to spark ignition flame sensing probes.
- The installation is not in accordance with these instructions.
- The maximum airflow through the heat exchanger tubes is not respected (see section 3.5).
- The required minimum air delivery is not respected (see table 3a).
- The duct dimensions do not comply with the prescribed dimensions (see table 3b).
- The inlet temperature (measured at the heat exchanger inlet) is lower than the value stated on the chart (see fig. 5 : dew point occurrence chart).

2.0 TECHNICAL DATA

2.1 SPECIFICATIONS

Table 1 – Specifications

Model	Heat input		Heat output H2	Gas rate ⁴			Power Consumption	Heat output 50% 2 stage ³	Minimum modulating output
			100% ³	G20	G30	G31			
	kW gros ¹	KW net ²	kW	m³/h	kg/h	kg/h	kW	kW	kW
4050 06	62.00	55.90	50.80	5.90	4.50	4.40	0.15	24.00	24.00
4060 07	74.60	67.20	61.20	7,10	5.40	5,20	0.15	28.60	28.60
4075 09	91.50	82.40	75.00	8,70	6.70	6,60	0.15	36.00	36.00
4100 12	120.00	108.40	100.00	11,40	8.80	8,60	0.15	47.00	47.00
4110M.13	136.60	123.00	112.30	13.00	--	9.60	0.28	51.20	51.20
4125M.15	153.50	138.30	126.30	14.60	--	10.80	0.28	51.00	51.00
4150M.18	182.90	164.80	151.30	17.40	--	12.80	0.28	75.80	75.80
4175M.21	211.80	190.80	175.00	20.20	--	14.90	0.28	99.40	99.40
4200M.24	240.60	216.80	198.70	22.90	--	16.90	0.65	99.40	99.40

1. GCV (Hs)

2. NCV (Hi)

3. Heat output depends on airflow – heat output H2 only for airflows above V2

4. Natural gas G20 gross calorific value 10.48 kWh/m³ @ 15 °C, 1013.25 mbar

Butane gas G30 gross calorific value 13.7 kWh/kg

Propane gas G31 gross calorific value 14.0 kWh/kg

Table 2A - Gas category

Country	Gas category
Austria	II2H3P
Belarus	II2H3+
Bulgaria	I2H or I3B/P
China	II2H3+
Czech republic	II2H3+
Croatia	II2H3P
Cyprus	II2H3+
Denmark	II2H3 B/P
Estonia	II2H3+
England	II2H3+
Finland	II2H3 B/P
Greece	II2H3+
Hungary	II2HS3P
Iceland	II2H3+
Latvia	II2H3+
Lithuania	II2H3+

Country	Gas category
Germany	I2ELL or I3P
Montenegro	II2H3+
New Zealand	II2H3+
Norway	II2H3 B/P
Poland	II2E3P
Portugal	II2H3+
Romania	II2H3P
Russian Federation	I2H or I3P
Serbia	II2H3+
Slovakia	II2H3+
Slovenia	II2H3+
Spain	II2H3+
Sweden	II2H3 B/P
Turkey	II2H3+
Ukraine	I2H or I3P

Table 2B :Injector size and burner pressure

Belarus, China Croatia, Czech Republic, Cyprus, England, Estonia, Greece, Iceland, Latvia, Lithuania, Montenegro, New Zealand, Portugal, Serbia, Slovenia, Slovakia, Spain , Turkey

			Model	4050 06	4060 07	4075 09	4100 12	4110M,13	4125M,15	4150M,18	4175M,21	4200M,24
Nat. Gas G20	Injector	quantity		6	7	9	12	13	15	18	21	24
	Injector size	mm		3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
		marking		300	300	300	300	300	300	300	300	300
	Burner pressure (1)	mbar		7,00	7,50	7,50	7,50	7,70	7,40	7,50	7,70	7,70
	Inlet pressure	mbar		20								
Prop. Gas G31	Injector	quantity		6	7	9	12	13	15	18	21	24
	Injector size	mm		1,55	1,55	1,55	1,55	1,55	1,55	1,55	1,55	1,55
		marking		155	155	155	155	155	155	155	155	155
	Burner pressure (1)	mbar		35,50	35,50	33,90	33,60	35,20	34,80	34,90	35,30	34,40
	Inlet pressure	mbar		37								

Romania, Poland

			Model	4050 06	4060 07	4075 09	4100 12	4110M,13	4125M,15	4150M,18	4175M,21	4200M,24
Nat. Gas G20	Injector	quantity		6	7	9	12	13	15	18	21	24
	Injector size	mm		3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
		marking		300	300	300	300	300	300	300	300	300
	Burner pressure (1)	mbar		7,00	7,50	7,50	7,50	7,70	7,40	7,50	7,70	7,70
	Inlet pressure	mbar		20								
Prop. Gas G31	Injector	quantity		6	7	9	12	13	15	18	21	24
	Injector size	mm		1,65	1,65	1,65	1,65	1,65	1,65	1,65	1,65	1,65
		marking		165	165	165	165	165	165	165	165	165
	Burner pressure (1)	mbar		28,90	28,44	27,90	26,80	28,20	28,20	27,90	28,40	26,50
	Inlet pressure	mbar		30								

Germany,Hungary, Russian Federation, Ukraine, Austria

			Model	4050 06	4060 07	4075 09	4100 12	4110M,13	4125M,15	4150M,18	4175M,21	4200M,24
Nat. Gas G20	Injector	quantity		6	7	9	12	13	15	18	21	24
	Injector size	mm		3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
		marking		300	300	300	300	300	300	300	300	300
	Burner pressure (1)	mbar		7,00	7,50	7,50	7,50	7,70	7,40	7,50	7,70	7,70
	Inlet pressure	mbar		20(*)								
Prop. Gas G31	Injector	quantity		6	7	9	12	13	15	18	21	24
	Injector size	mm		1,55	1,55	1,55	1,55	1,55	1,55	1,55	1,55	1,55
		marking		155	155	155	155	155	155	155	155	155
	Burner pressure (1)	mbar		35,50	35,50	33,90	33,60	35,20	34,80	34,90	35,30	34,40
	Inlet pressure	mbar		50								

(*) : Inlet pressure for Hungary = 25mbar

Bulgaria, Denmark, Finland, Norway, Sweden

			Model	4050 06	4060 07	4075 09	4100 12	4110M,13	4125M,15	4150M,18	4175M,21	4200M,24
Nat. Gas G20	Injector	quantity		6	7	9	12	13	15	18	21	24
	Injector size	mm		3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
		marking		300	300	300	300	300	300	300	300	300
	Burner pressure (1)	mbar		7,00	7,50	7,50	7,50	7,70	7,40	7,50	7,70	7,70
	Inlet pressure	mbar		20								
Prop. Gas G31	Injector	quantity		6	7	9	12	13	15	18	21	24
	Injector size	mm		1,55	1,55	1,55	1,55	1,55	1,55	1,55	1,55	1,55
		marking		155	155	155	155	155	155	155	155	155
	Burner pressure (1)	mbar		27,60	27,50	25,40	27,30	27,69	27,28	27,35	27,67	29,96
	Inlet pressure	mbar		30								

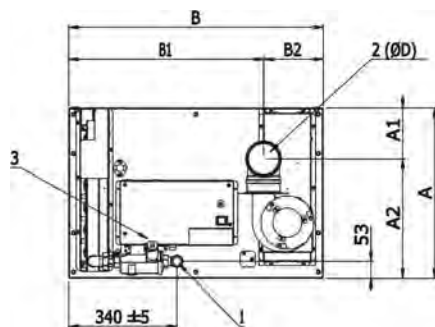
(1) : with open service door

2.2. MOUNTING FLANGE & MAIN DIMENSIONS

RHC 4000 DJL/RJL

RHC 4000(M) DJL/RJL

Figure 1 : Side view



- 1. Gas connection 3/4"
- 2. Flue outlet
- 3. Electrical connection

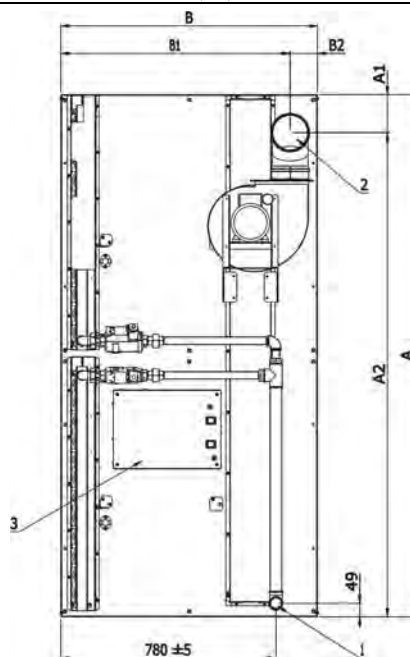


Figure 2 : Top view

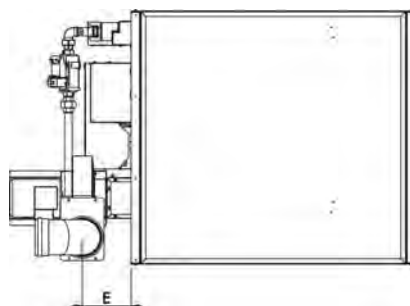
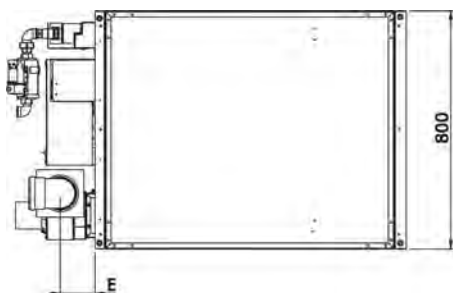
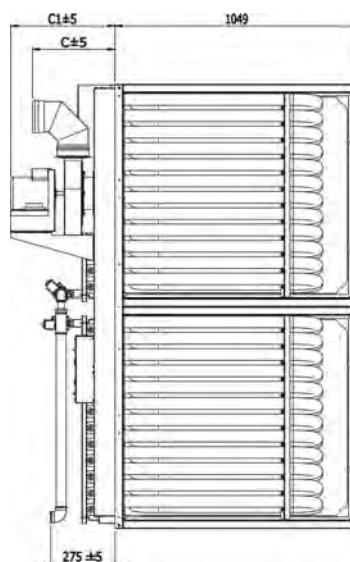
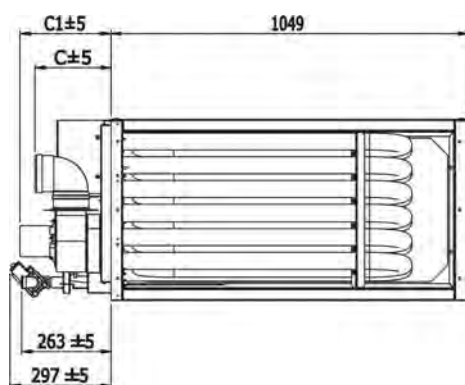


Figure 3 : Front view



TYPE	DJL/RJL				DJL					RJL				
	A	B	B1	B2	A1	A2	C	C1	E	A1	A2	C	C1	E
4050 06	531	800	613	187	85	466	224	268	118	85	446	291	268	118
4060 07	601	800	613	187	160	441	224	268	118	85	516	291	268	118
4075 09	741	800	613	187	160	581	224	268	118	85	656	291	268	118
4100 12	950	800	613	187	160	790	224	268	118	85	865	291	268	118
4110M.13	1132	930	778	152	190	942	361	348	188	190	942	364	351	191
4125M.15	1272	930	778	152	190	1082	361	348	188	190	1082	364	351	191
4150M.18	1481	930	778	152	190	1291	361	348	188	190	1291	364	351	191
4175M.21	1691	930	778	152	190	1501	361	348	188	190	1501	364	351	191
4200M.24	1900	930	831	99	139	1761	352	445	179	139	1761	354	447	181

2.3 WEIGHTS

Weights (kg)	4050 06	4060 07	4075 09	4100 12	4110M.13	4125M.15	4150M.18	4175M.21	4200M.24
unit	90	100	120	149	200	220	250	279	313
packaging	29	29	29	29	58	58	58	58	58
total	119	129	149	178	258	278	308	337	371

3.0 GENERAL REQUIREMENTS

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.

3.2 SPECIFIC HEATER LOCATIONS

DJL installation :

Do not locate the air heater where it may be exposed to water spray, rain, etc.

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.

Installation clearances (mm) (towards combustible materials)

Top	150
Flue connector	150
Access panel	600
Non-access side	150
Bottom	50

RJL installation :

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 plain and that the surface onto which it is installed is vibration free.

3.3 MINIMUM AIRFLOW REQUIREMENT

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

Table 3a

Model	Min. air volume required			
	With heat output H1 (*)		With heat output H2 (*)	
	V1 m³/h	V1 m³/s	V2 m³/h	V2 m³/s
4050 06	3900	1.08	5950	1.65
4060 07	4700	1.31	7150	1.99
4075 09	5700	1.58	8800	2.44
4100 12	7500	2.08	11700	3.25
4110M.13	---	---	13600	3,80
4125M.15	---	---	15600	4,30
4150M.18	---	---	12300	3,40
4175M.21	---	---	14100	4,00
4200M.24	---	---	16300	4,50

(*) : cfr. table 1

3.4 COMPARTMENT DIMENSIONS

Figure 4

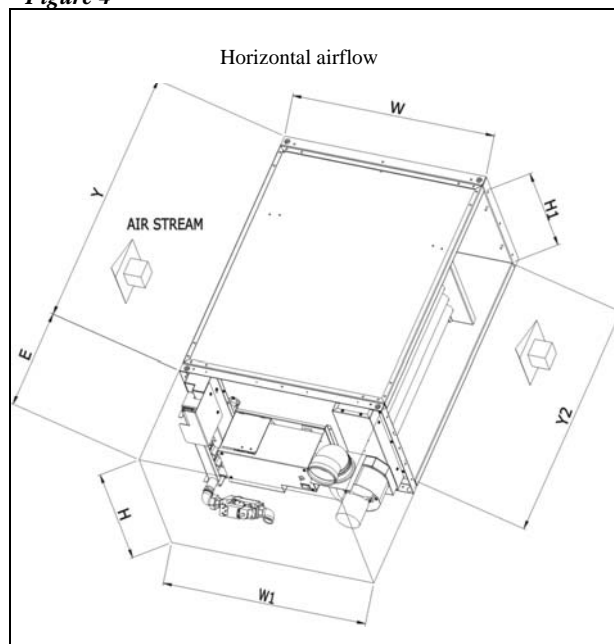


Table 3b (dim. expressed in mm)

Model	Duct channel & controls compartment						
	H	H1	Y	Y2	W	W1	E
4050 06	531	461	1049	975	800	800	400
4060 07	601	531	1049	975	800	800	400
4075 09	741	671	1049	975	800	800	400
4100 12	950	880	1049	975	800	800	400
4110M.13	1132	1062	1049	975	930	930	420
4125M.15	1272	1202	1049	975	930	930	420
4150M.18	1481	1411	1049	975	930	930	420
4175M.21	1691	1621	1049	975	930	930	420
4200M. 24	1900	1830	1049	975	930	930	470

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)
- 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 below (figure 5).

Example

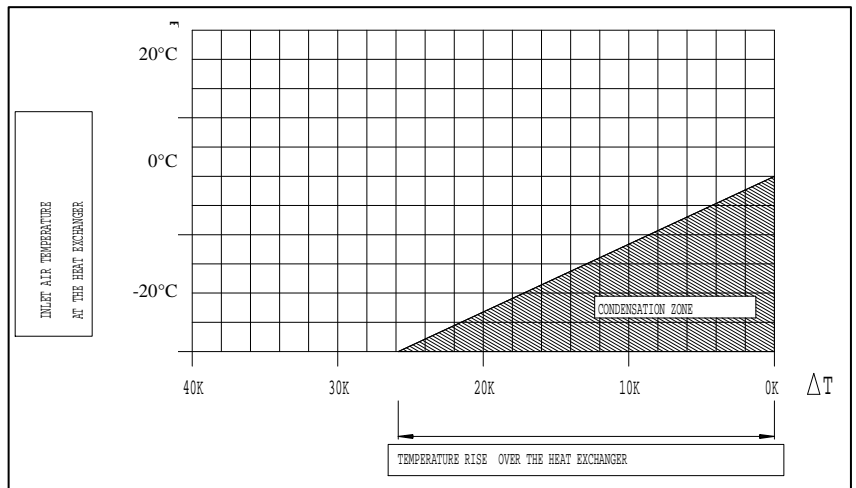
- expected minimum inlet temperature = -5°C
- minimum required temperature rise shown on the chart = +13°C

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 :

$$V_{\max}(\text{m}^3/\text{h}) = \frac{\text{heat output (kW)} \times 1000}{\Delta T_{\text{minimum}} \times 0.3423}$$

Figure 5 : Dew point occurrence chart (condensation zone)



Example :

$\Delta T_{\min} = 13\text{K}$ (with min. inlet temp. = -5°C)

model 4075 09 at 100% heat output : 75.00kW results into $V_{\max} = 16850\text{m}^3/\text{h}$

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.

Example :

$\Delta T_{\min} = 13\text{K}$ (with min. inlet temp. = -5°C)

model 4075 09 at 50% modulation (see table 1 'output') : 36W

results into :

$$V_{\max} = \frac{36(\text{kW}) \times 1000}{13 \times 0.3423} = 8090\text{m}^3/\text{h}$$

3.6 COMBUSTION AIR SUPPLY & FLUE SYSTEM

ATTENTION : this section only applies to DJL models !

The air heater may be installed as a balanced flue (Type C) heater, requiring both a combustion air inlet duct and a combustion flue outlet duct (use a seamless aluminium pipe) or as a power vented (Type B) heater, which requires only a flue pipe exhausting to outdoors and takes combustion air directly from the space to be heated.

The center distance between the combustion air inlet socket and the flue outlet socket is 225mm for all models.

Each appliance requires it's own individual flue system. When several appliances are installed, one common flue and combustion air system, thus combining several heaters, is not allowed.

IMPORTANT:

The flue must be installed in accordance with national and local regulations. Failure to provide proper fluing could result in death, serious injury and/or property damage.

The air heater must be installed with a flue to the outside of the building. Safe operation of any power vented gas apparatus requires a properly operating flue system, correct provision for combustion air, and regular maintenance and inspection.

Use of flue restriction rings (Only for 4000M units !!)

To ensure the efficiency of the units, eventually a flue restriction ring needs to be fitted in the outlet collar of the venter housing. The diameter of the restriction ring will be determined by the flue pipe length and the type of appliance (combustion air from environment (appliance B) or combustion air from outside (appliance C)).

Table 5 : Diameter flue restrictors for DJL

	Combustion out and inlet application	4110M.13	4125M.15	4150M.18	4175M.21	4200M.24
C Appliance	2X1m pipe length till 2X3m pipe length	99mm	95mm	93mm	95mm	102mm
	2X4m pipe length till 2X6m pipe length	107mm	107mm	99mm	107mm	114mm
	2X7m pipe length till 2X9m pipe length	open	open	open	open	open
B appliance	1X1m pipe length till 1X3m pipe length	90mm	86mm	90mm	90mm	92mm
	1X4m pipe length till 1X6m pipe length	93mm	90mm	93mm	95mm	97mm
	1X7m pipe length till 1X9m pipe length	96mm	93mm	95mm	99mm	102mm

3.6.1 Flues for power vented installations (Type B appliances)

If the air heater is to be installed as a type B appliance, air for combustion will be taken from within the space where the heater is installed. Ensure that an adequate air supply for combustion and ventilation is provided within the building in accordance with the regulations & rules in force.

The combustion air inlet socket at the appliance must be foreseen with an inlet grill of class IP20 (dia 130 = PN 06 22786 134 (for all types))

Table 5 below shows flue pipe sizes and maximum vent lengths. The minimum flue length is 0.5 meters.

Model RHC 4000(M) DJL		
Heater socket & pipe dia	mm	130
Center distance B	mm	225
Maximum straight length	mm	9
Equivalent length of 90° elbow	mm	1.5

To avoid leakage use single wall flue pipes of seamless aluminium. All joints must be sealed to prevent products of combustion from leaking into the building. An approved flue terminal (installed through the roof or the wall) is required.

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 25 mm 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 50 mm away from any combustible material.

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

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

3.6.2 Combustion air inlet pipe & flue pipe for balanced flue installation (Type C appliances)

Balanced flue air heaters are designed to be fitted with a combustion air inlet duct that obtains outdoor air and a flue pipe that exhausts flue products to outdoors.

The heaters must be installed with an appropriate concentric vertical or horizontal vent terminal. The heaters are only approved for use when installed with the appropriate approved concentric vent terminal (see table 6.)

Both the flue and combustion air pipes must be sealed. Use seamless aluminum pipe.

The flue pipe may include a re-sealable test port to allow good average sampling of the flue gas mixture for testing, the port must be at least 450 mm away from the air heater flue connection socket.

Follow any flue pipe manufacturers installation instructions for making joints, including connections to the air heater, for passing through a building element and for support requirements. If more than one air heater is being installed in the same place each heater must have a separate flue system.

Table 6 Combustion air inlet & flue pipe requirements

Model RHC 4000(M) DJL		
Heater socket & pipe dia mm	Flue pipe	130
	Inlet pipe	130
Max. straight length m	Flue pipe	9
	Inlet pipe	9
Equivalent length of 45 ° elbow m	Flue pipe	0.75
	Inlet pipe	0.50
Equivalent length of 90 ° elbow m	Flue pipe	1.5
	inlet pipe	1.5
Concentric vertical/horizontal vent or wall terminal: types : Mugro or Burfix dia130		

3.7 AIR SUPPLY

ATTENTION : this section only applies to DJL models !

It is important to ensure that there is an adequate fresh air supply at all times for both combustion and heating requirements. Modern constructions involve the greater use of insulation, improved vapor barriers, and weather proofing. This 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. 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.

WARNING: This model air heater is installed as a type B application and is designed to take air for combustion from the space in which it is installed. Do not restrict the combustion air intake.

3.8 ELECTRICAL SUPPLY

Wiring external to the air heater 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 (gas service connection Rc 3/4)

RHC 4000(M) DJL/RJL 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. Refer also to section 4.4 'Gas connection'.

Connection to a gas network may only be carried out by appropriately qualified persons. The gas installation must comply with the rules in force using materials appropriate for gas installation.

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.

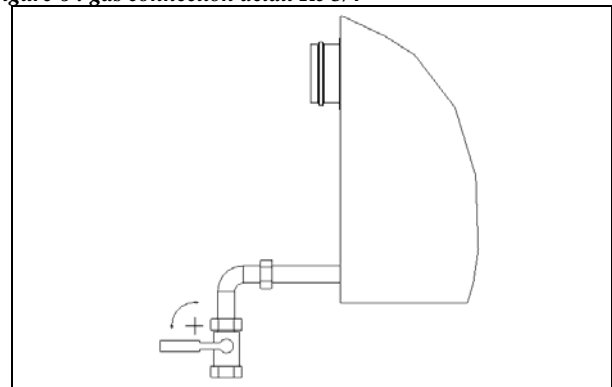
An adequate gas supply sized to provide the dynamic pressure for the volume required for the air heater(s) is essential to maintain the nominal heat input. Account of other gas fired plant using the same gas service must also be taken into account.

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 : gas connection detail Rc 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 FITTING THE COMBUSTION AIR INLET/FLUE SYSTEM

ATTENTION : this section only applies to DJL models !

Flue pipe runs may be horizontal or vertical and terminate either through the wall or roof. See table 5 for maximum vent length for an appliance installed as type B or table 6 for maximum lengths and approved supplied concentric terminals for a heater installed as a type C appliance.

4.2.1 Fitting the flue pipe

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

Table 8 : Flue pipe socket size (Ø mm)

RHC 4000(M) DJL	
Socket	130

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 grill IP20.

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 equivalent. Follow the pipe manufacturer's installation instructions. See typical installations in figures 7 & 8.

Table 7 Air inlet socket size (Ø mm)

RHC 4000(M) DJL	
Socket	130

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 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).

Figure 7 :

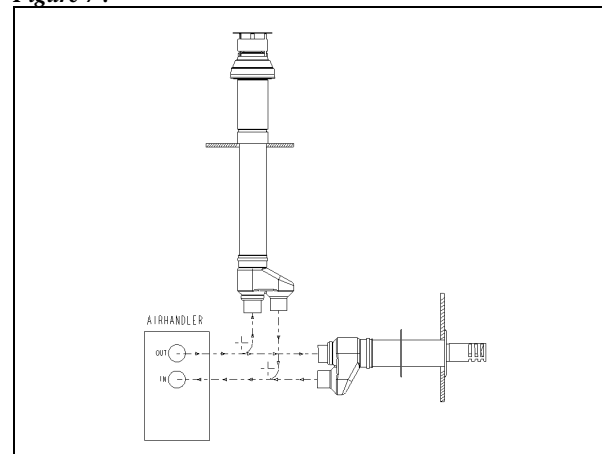
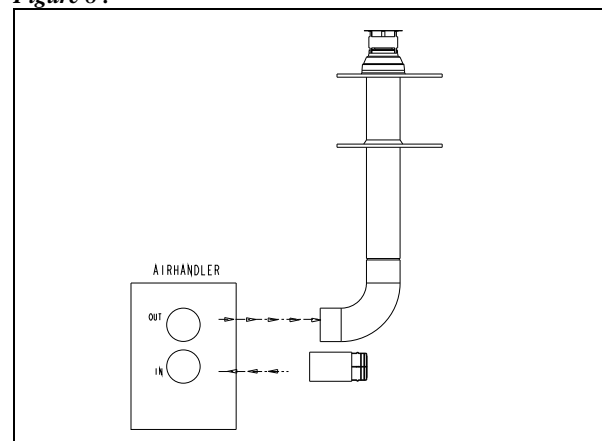


Figure 8 :



4.4 ROOM THERMOSTAT SITING

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. **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.**

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 that electrical cables/wiring do not touch the 'hot' combustion collector box and fix them;
- * 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.

5.2 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.

Caution: Never use a flame for checking gas soundness.

5.3 LIGHTING THE AIR HEATER

RHC 4000(M) DJL/RJL air 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 wiring panel inside the 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. 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.

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 PIPEWORK

The soundness of the air heater pipework has been checked prior to leaving the factory. However during installation, connections may have been loosened. Check the soundness of the appliance pipework 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

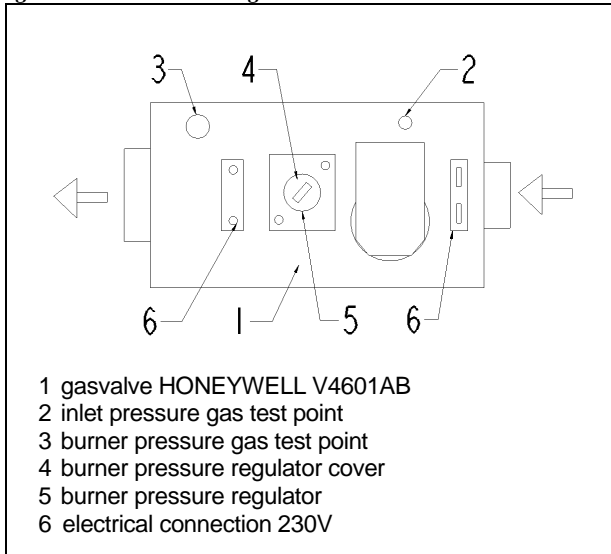
Burner gas pressure adjustment

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 : tables 2A/2B);
- * If necessary, adjust the burner gas pressure. Remove the cover screw (Honeywell 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 9 : HONEYWELL gas valve



5.6 OPTIONS

5.6.1 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 10 shows in outline view the valve operator and indicates its principal components.

Field adjustment & check-out :

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 10.

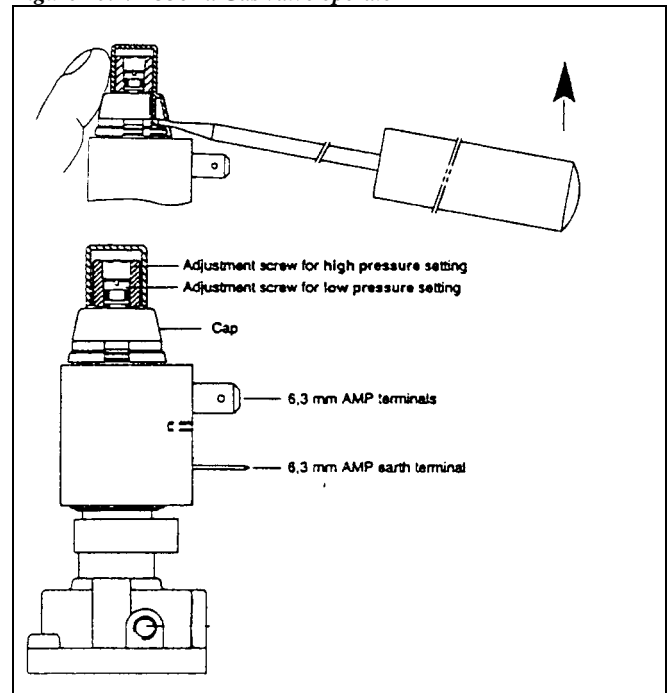
Setting (refer to figure 10) :

- 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 9.

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 driver 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.

Figure 10: V 4336A.. Gas valve operator



Adjusting minimum pressure setting :

- Disconnect electrical connection of high-low regulator.
- Det 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 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 9 : Models High/Low burner gas pressures and low rate consumption values

RHC 4000(M) DJL/RJL				4050 06	4060 07	4075 09	4100 12	4110M.13	4125M.15	4150M.18	4175M.21	4200M.24
Burner pressure	Pressure at 100%	nat gas G20	mbar	7,00	7,50	7,50	7,50	7,70	7,40	7,50	7,70	7,70
		butane G30		26,40	27,20	24,90	25.00	---	---	---	---	---
		propane G31		35,50	35,50	33,90	33,60	35,20	34,80	34,90	35,30	34,40
	Pressure at 50%	nat gas G20	mbar	1,75	1,90	1,90	1,90	1,93	1,85	1,88	1,93	1,93
		butane G30		6,60	6,80	6,23	8,40	---	---	---	---	---
		propane G31		8.87	8.87	8.48	8.40	8,80	8,70	8,73	8,83	8,60
Gas consumption at 50% ¹ Reference 15°C - 1013mbar	Natural G20 (m³/h)		2.96	3.56	4,40	5.72	6,51	7,32	8,72	10,10	11,47	
	Butane G30 (kg/h)		2.27	2.73	3.37	4.38	---	---	---	---	---	
	Propane G31 (kg/h)		2.67	2.67	3.30	4.28	4,80	5,39	6,43	7,44	8,46	

¹ Natural gas G20 gross calorific value 10.48 kWh/m³ at 15°C & 1013 mbar
 Propane gas G31 gross calorific value 14.0 kWh/kg
 Butane gas G30 gross calorific value 13.70 kWh/kg
 Low fire rate must not be reduced below the values stated above for 30% rating.

Note :

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

Calculation burner pressure : burner pressure at 100% input x (load)²

Example 1: type 4100 12, 50%, nat. gas G20: 7,0mbar x 0,5² = 1,75mbar ≈

Example 2: type 4050 06, 75%, prop.gas G31: 35,5 mbar x 0,75² = 19,97mbar ≈ 20mbar

5.6.2 Modureg V7335A 2000 series modulation system

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

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

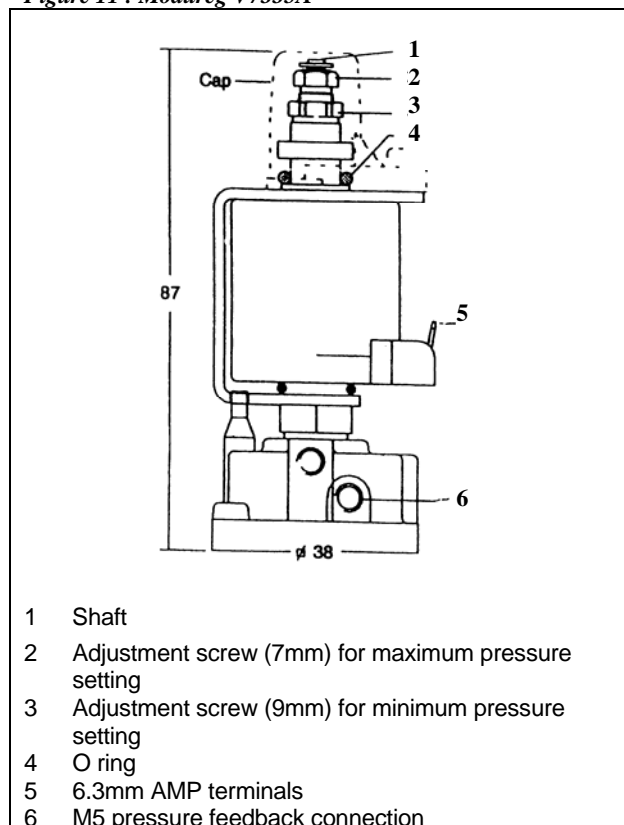
Adjusting the V7335A Regulator : refer to figure 11.

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 stabilise before making adjustments.

Figure 11 : Modureg V7335A



- 1 Shaft
- 2 Adjustment screw (7mm) for maximum pressure setting
- 3 Adjustment screw (9mm) for minimum pressure setting
- 4 O ring
- 5 6.3mm AMP terminals
- 6 M5 pressure feedback connection

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. Energise 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 volts 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;

5.7 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(M) DJL/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 10 (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 lock-out.

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

Table 10 : Combustion air pressure control settings

Model	Normal equilibrium warm (Pascal)RJL/DJL	Set point 'off' (Pascal)DJL	Set point 'off' (Pascal)RJL
4050 06	200	150	150
4060 07	200	130	130
4075 09	175	135	135
4100 12	110	68	68
4110M.13	170	155	155
4125M.15	190	155	155
4150M.18	180	155	155
4175M.21	115	114	220
4200M.24	470	450	450

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).

5.8 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 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.

Reznor RHC 4000(M) DJL/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 buildup 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 face mask 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 buildup 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 12 & 13 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 it's 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 & REPLACEMENT OF PARTS

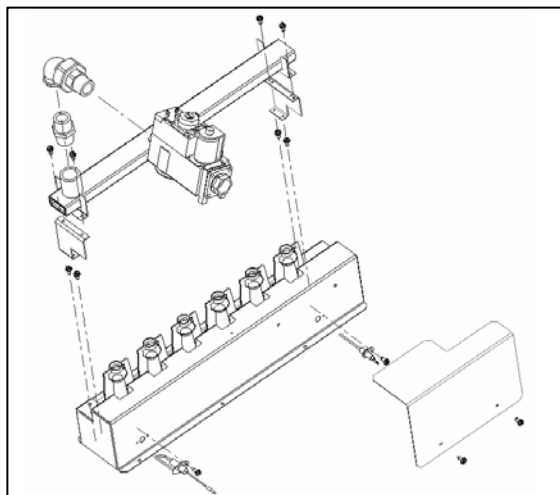
7.1 MAIN BURNER REMOVAL

7.1.1 Instructions for burner removal (see fig. 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 multifunctional gas control valve - remove flame sensor wire from flame sensor & high tension ignition wire from burner relay
6. The burner rack assembly is now visible
7. At the bottom & top of the burner rack assembly, remove the 2 bolts that secures the burner rack to the burner box bottom & top.

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 12 :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)



7.1.2 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 13a : View of the Control Compartment – RHC 4000 DJL/RJL

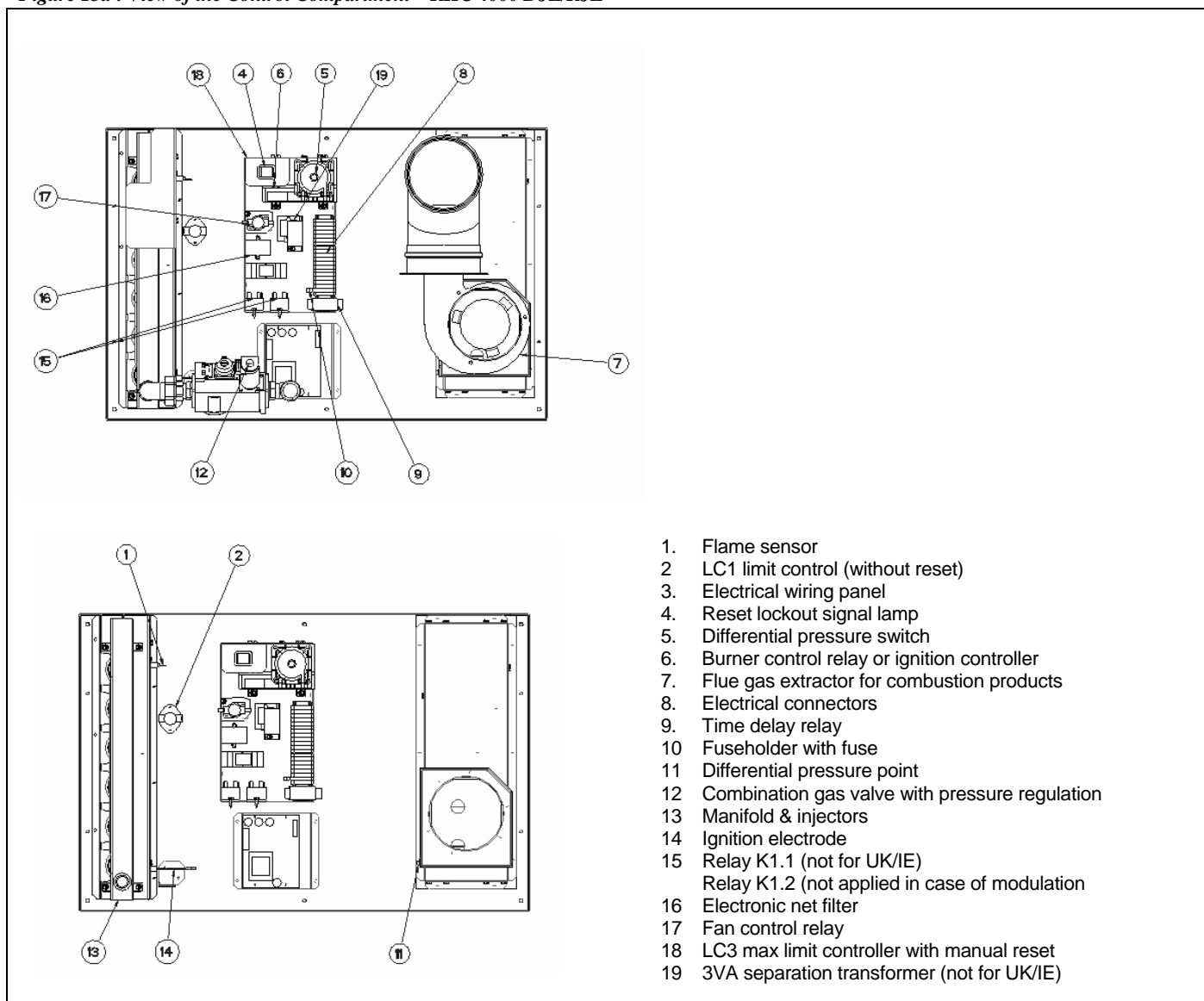
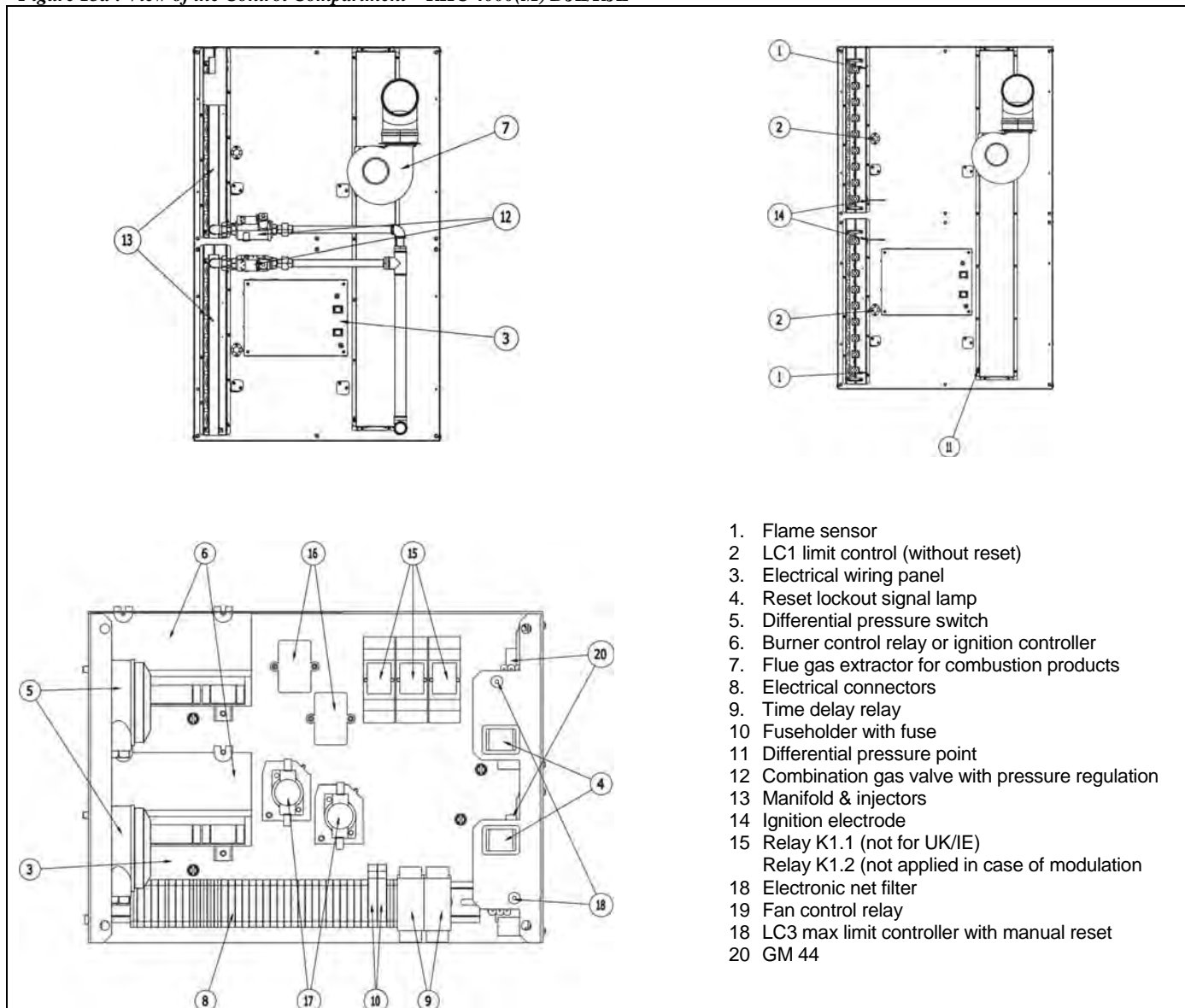


Figure 13a : View of the Control Compartment – RHC 4000(M) DJL/RJL



7.2 BURNER INJECTORS

1. Carry out steps 1 to 7 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.

Igniter - refer to figure 13 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 14a.

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

We refer to figure 14b for installing the igniter.

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

Flame sensor - Refer to figure 13 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 μ 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. 14a - Igniter assembly

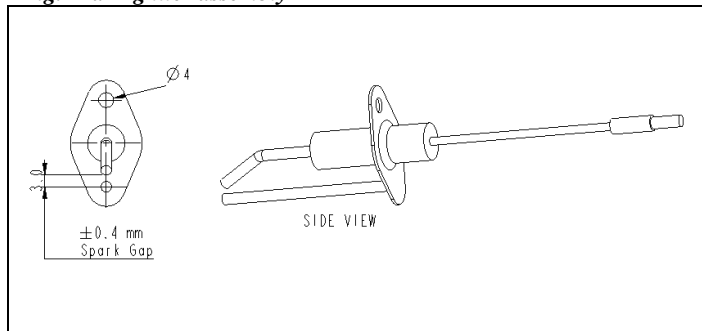
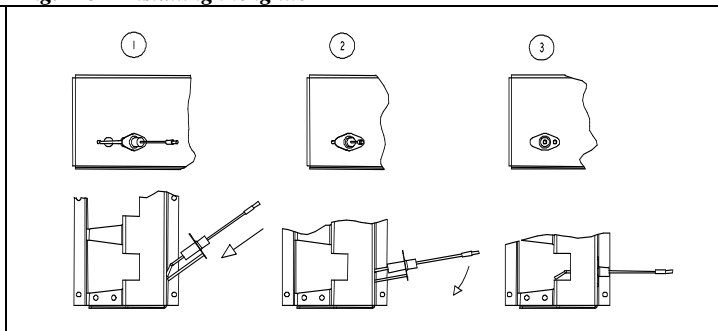


Fig. 14b - Installing the igniter



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 overhear 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 13 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 (± 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.

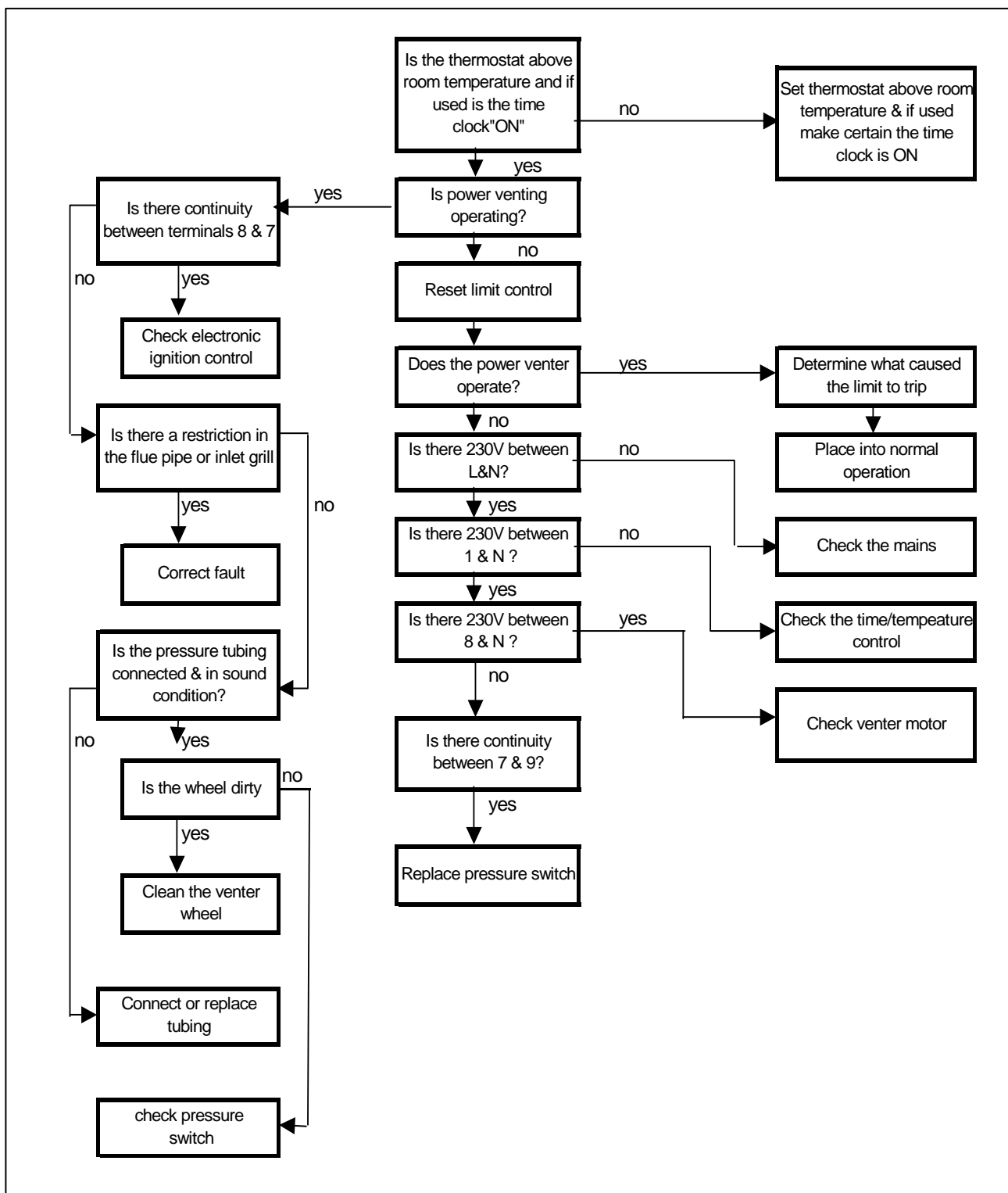
7.7.COMBUSTION AIR FAN (VENTER)

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 13 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

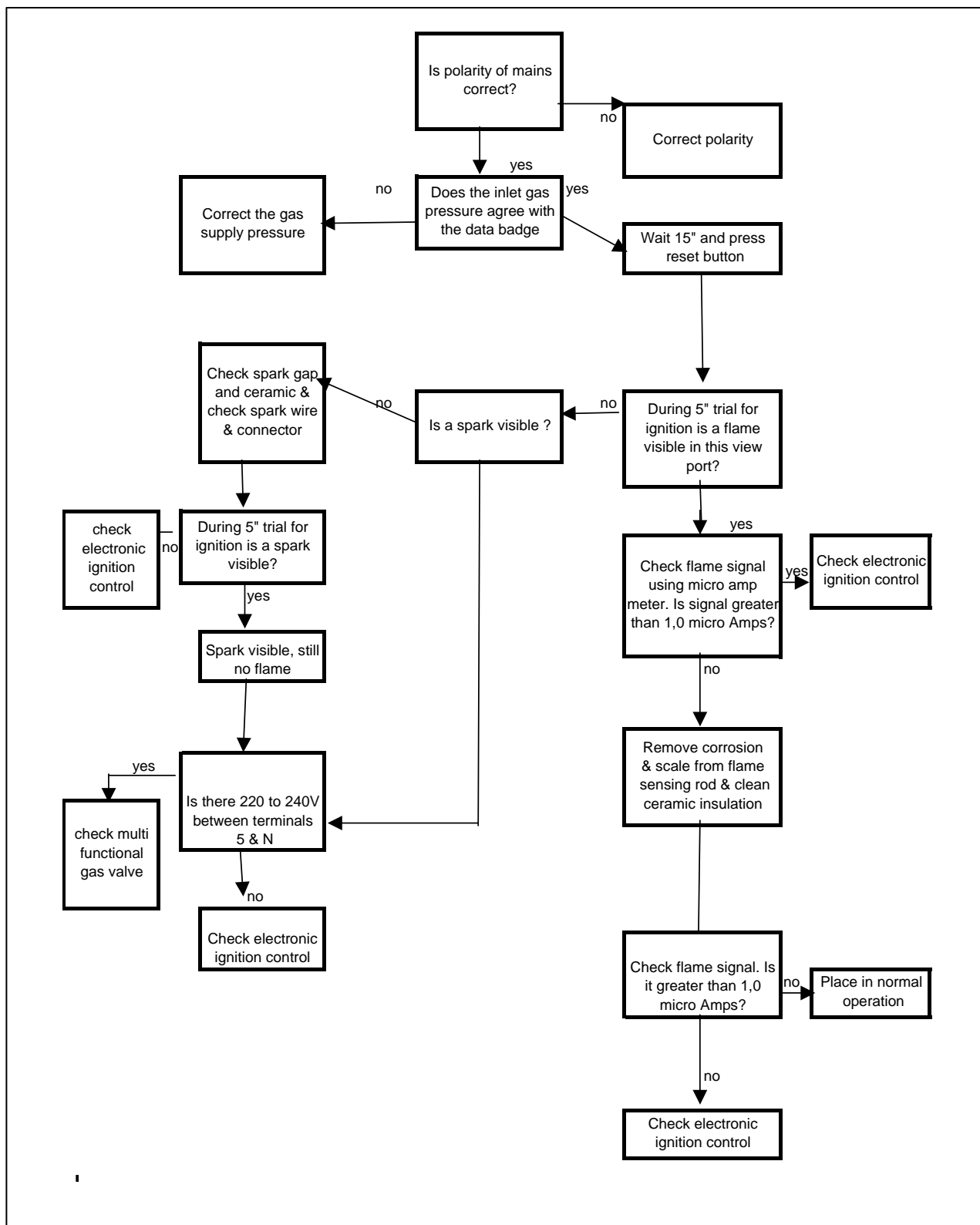
8.1 MAIN FAULT FINDING CHART - LOCKOUT INDICATOR LIGHT IS "OFF", BUT AIR HEATER WILL NOT OPERATE

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



8.2 IGNITION CONTROLLER LOCKOUT INDICATOR LIGHT REPEATEDLY COMES "ON"

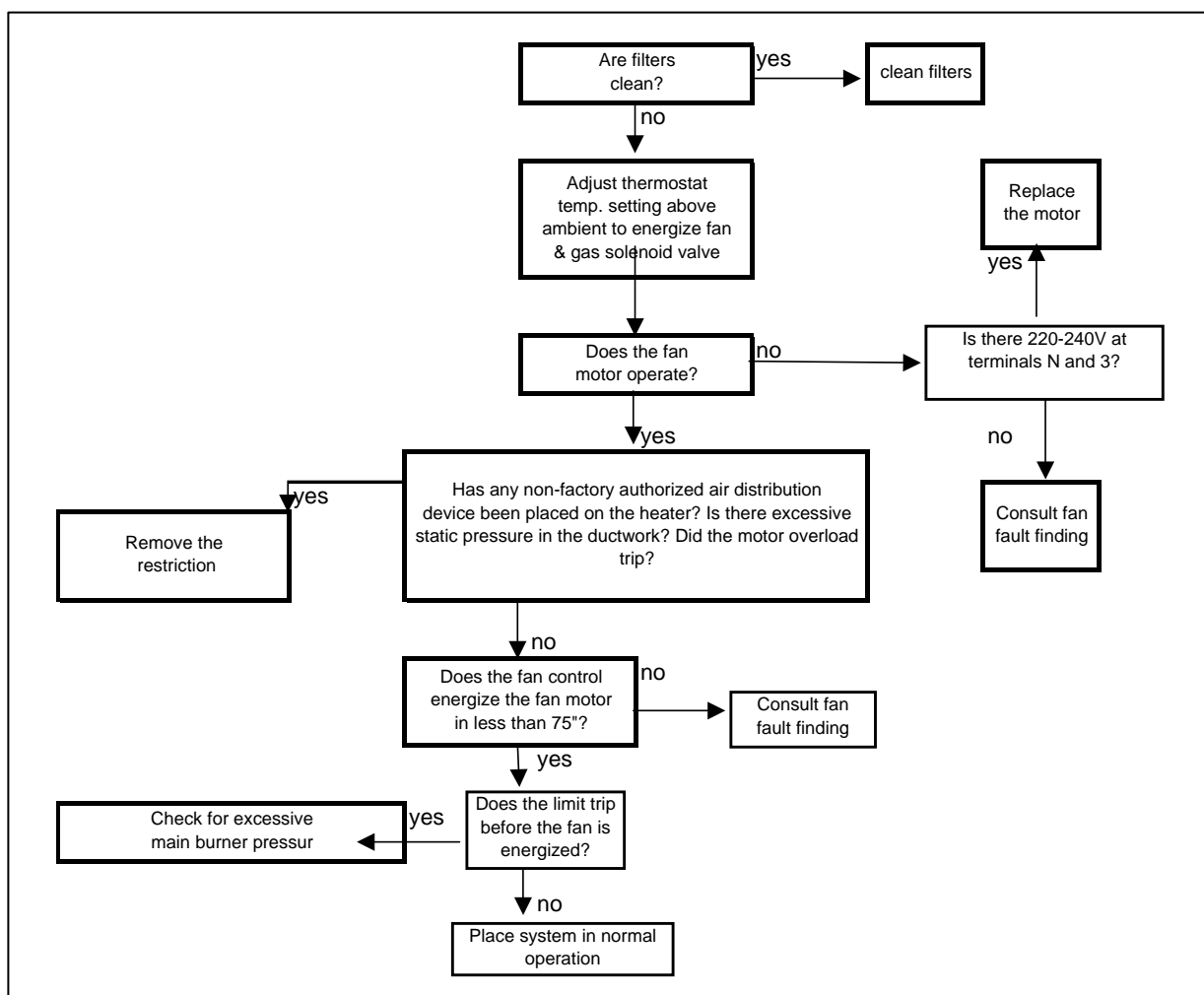
WARNING: Fault finding may only be carried out by appropriately qualified persons



8.3 LIMIT CONTROL FAULT FINDING CHART (LIMIT CONTROL TRIPS)

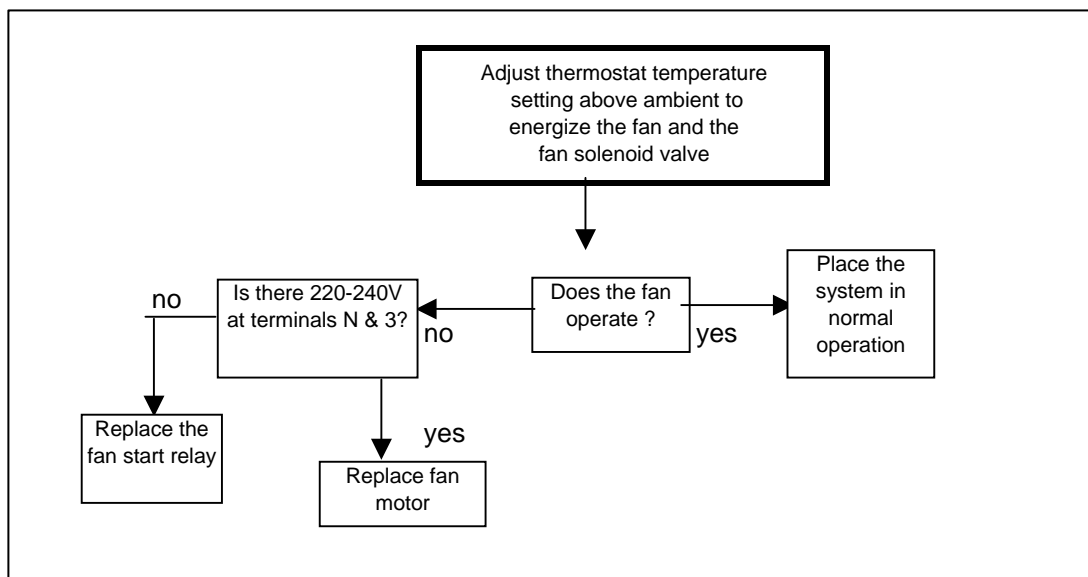
WARNING: Fault finding may only be carried out by appropriately qualified persons

Note : RHC 4000(M) DJL/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	Part number	Settings	
Differential pressure switch S3	Yamatake/Honeywell C6065FH..	30 60607 **	**	
	Huba/Kromschroeder	30 60617 ***	***	
	Huba/Kromschroeder	30 60618 ***	***	
Thermal overheat control (limit) LC1	TOD 60T 11 201614	03 400US 01	170F out	130F in
Thermal cut off device LC3	IMIT LS1	03 24959	96°C - 6	reset
Fan delay control (K1,1) FCR	TOD 12S 20 LX-2578A	03 25167	20-60 sec	60-120 sec
Combustion fan M3	Drouardtec CP78+wheel+housing	36 79094	applies to mod 4050 -> 4100	
	Airflow 90BWTG0	20 25746	applies to mod 4200	
	EBM G2E160-AL19-56	20 25745	applies to mod 4110 -> 4175	
Gas valve one stage nat/prop	Honeywell VR4601 AB	03 25136		
Gas valve on stage prop (1)	Honeywell VR4601AB1042U	03 35137 01	applies to mod 4110 -> 4200	
Gas valve two stage 50-100% V+V' nat/prop	Honeywell VR4601 PB	03 25136 02		
Gas valve mod. 50-100% V+V' nat/prop	Honeywell VR 4601 MB	03 35145		
Burner relay E	Brahma	03 25322		
Ignition electrode ER	Channel products	03 400US 42		
Flame sensor electrode IS	Channel products	03 401US 195292		
Filter	FAH-DA-3100ZC (1,6A)	30 61747		

(1) : only for AT, DE, UA, RU, HU

- **: RHC 4050 06 <P setting : 150Pa off (PN 30 60607 150)
 RHC 4060 07 <P setting : 130Pa off (PN 30 60607 130)
 RHC 4075 12 <P setting : 135Pa off (PN 30 60607 135)
 RHC 4100 12 <P setting : 68Pa off (PN 30 60607 68)
- *** RHC 4110 13, 4125 15, 4150 18 <P setting 155Pa off (PN 30 60615 155)
 RHC 4175 21 DJL <P setting 114Pa off (PN 30 60615 114)
 RHC 4175 21 RJL <P setting 220 Pa off (PN 30 60615 220)
 RHC 4200 24 <P setting 450Pa off (PN 30 60616 450)

10.0 GAS CONVERSION

- 10.1 Reznor RHC 4000(M) DJL/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 : use Honeywell VR4601AB (PN 03 25136) - set pressure regulator as per table 2A
propane/butane : use Honeywell VR4601B (PN 03 25136B) or VR 4601AB + blocking plate.
To adapt gas injectors and gas inlet pressures, we refer to table 2A.

11.0 USER INSTRUCTIONS

OPERATING

How the air heater works:

Gas is burned by an atmospheric burner that 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 overheat controls. The first is an automatic recycle control which protects against low air flow i.e. clogged air ways, 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 a '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 overheat control requires resetting
7. If the thermal overheat control requires resetting and doing so restarts the air heater, wait until the appliance warms to thermal equilibrium, to ensure the overheat 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(M) Series air heaters.

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.

12.3 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.

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. 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.

12.6 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 and defat the skin. Prolonged contact may cause dermatitis. Avoid breathing vapour. Avoid eye contact. Do not ingest.

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.