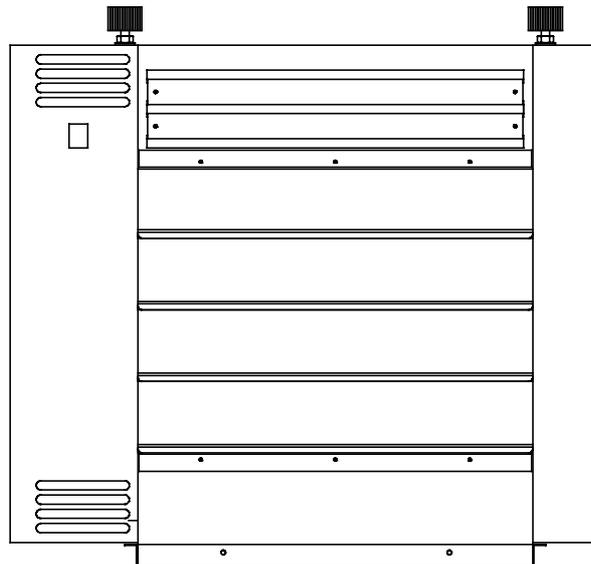


## GAS FIRED WARM AIR HEATERS TYPE ML 1511, 1515 & 1520

Axial Fanned, Forced Convection Air Heaters  
with Automatic Ignition & Fanned Flues for use as:  
Type B22 - C12 or C32 Appliances

Designed for Free Blowing use

### INSTALLATION, COMMISSIONING, SERVICE AND USER INSTRUCTIONS



These appliances meet the following EC Directives:

Dir. CE 90/396/EEC GAD  
Dir. CE 89/336/EEC EMC  
Dir. CE 89/392/EEC MD  
Dir. CE 73/23/EEC LVD

PLEASE READ THIS DOCUMENT BEFORE COMMENCING INSTALLATION. THIS DOCUMENT ALSO INCLUDES USER INFORMATION. AFTER INSTALLATION, PLEASE LEAVE IT WITH THE USER OR ATTACHED TO THE APPLIANCE OR THE GAS SERVICE METER.

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If optional equipment was ordered and supplied with this air heater, please refer to additional instructions for option(s).

## SECTION 1. GENERAL

- 1.1 Before installation, check that the appliance as described on the packaging label is in accordance with the correct type and model as specified on the data plate and complies with your customer order.
- 1.2 After unpacking the appliance, leave it fastened to the wooden pallet until it has been suspended or until just before base mounting. This affords protection to the painted underside which is normally exposed to view after installation.
- 1.3 Please read this document before commencing installation.
- 1.4 These instructions are only valid for the country of use indicated on the appliance i.e.: GB - IE. If these symbols are not shown, it is necessary to obtain appropriate technical instructions which will provide information concerning the necessary modification of the appliance for the conditions of use in the country concerned. Such instructions may be obtained upon request from your supplier.
- 1.5 Check that the local distribution conditions of electricity supply, type of gas and pressure, and adjustment of the appliance are compatible.
- 1.6 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 The "Building" and "Electrical Regulations" (in GB the IEE Regulations).  
The requirements of the "Local Building Standards Office", the premises "Insurance" undertaking and the "Fire Office" must also be observed.
- 1.7 Unauthorized modification of this appliance or departure from use in the manner for which it was intended by the manufacturer or installation in a manner contrary to these instructions, may constitute a hazard and jeopardize all warranties. Deviations should only be carried out after formal consent has been obtained from the manufacturer.
- 1.8 Ensure the environment in which the air heater will be installed will not create a hazard i.e. where excessive (volatile) dust, flammable or corrosive substances and/or vapours and combustible materials may be present.
- 1.9 This appliance has been tested, and set according to the data plate before leaving the factory.

## SECTION 2. TECHNICAL DATA

**Table 1. Appliance Data**

Type ML		1511	1515	1520	
Gas category 'Cat.'		II <sub>2H3+</sub>			
Air supply and flue type		B22 - C12 - C32			
Heat input (Hs) 'On'	kW	12,62	20,0	24,21	
Heat input (Hi) 'On'	kW	11,36	18,00	21,80	
High heat output	kW	10,30	15,50	19,00	
Number of jets		4	6	6	
Jet size	natural gas	Ø mm	1,7		
	propane/butane	Ø mm	0,9	1,0	
Gas supply pressure 'P'	natural gas <sup>1</sup>	mbar	(GB) = 17.5 (IE) = 20.0		
	propane	mbar	37.0		
	butane	mbar	28.0		
Burner pressure <sup>2</sup>	natural gas	mbar	6,7	7,6	10,0
Gas consumption	natural gas <sup>3</sup>	m <sup>3</sup> /h	1,20	1,90	2,30
	propane	kg/h	0,90	1,43	1,73
	butane	kg/h	0,92	1,46	1,77
Gas service connection (not supply line size)		Rc ¾			
Temperature rise ΔT (± 1)	K	28	30	32	
Air volume <sup>4</sup>	m <sup>3</sup> /h	1080	1530	1710	
Throw (terminal V <sub>0</sub> = 0,5 m/s)	≤m	11,0	15,3	17,1	
Nominal fan speed	rpm	1000	950		
Sound power level L <sub>w</sub>	dB(A)	57	62	64	
Sound pressure level L <sub>p</sub> <sup>5</sup>	dB(A)	42	47	49	
Electrical supply		230/240V 1 N ~ 50Hz			
Protection grade		IP20			
Fan motor rating	kW	0,02	0,15		
*Total electric rating <sup>6</sup>	kW	0,10	0,15		
Appliance weight net	kg	42	54		
Appliance weight gross (shipping)	± kg	49	62		

1 Maximum gas pressure at inlet to appliance = 50,0 mbar

2 All casing panels fitted, service door open

3 Natural gas G20, calorific heating value 10,48 kWh/m<sup>3</sup> on Hs @ 15°C & 1013 mbar

Propane G31, calorific heating value 14,00 kWh/kg. Butane G30, calorific heating value 13,70 kWh/kg

4 Isothermic condition (20 °C)

5 At a distance of 5,0 m, Q= 2, A= 160 2m<sup>2</sup>, louvres zero deflection, isothermic condition,

6 Total electrical rating during the start-up period ± 30 seconds is increased by 130 W and is not included on the appliance data plate or in the above table

Figure 1. DIMENSIONS

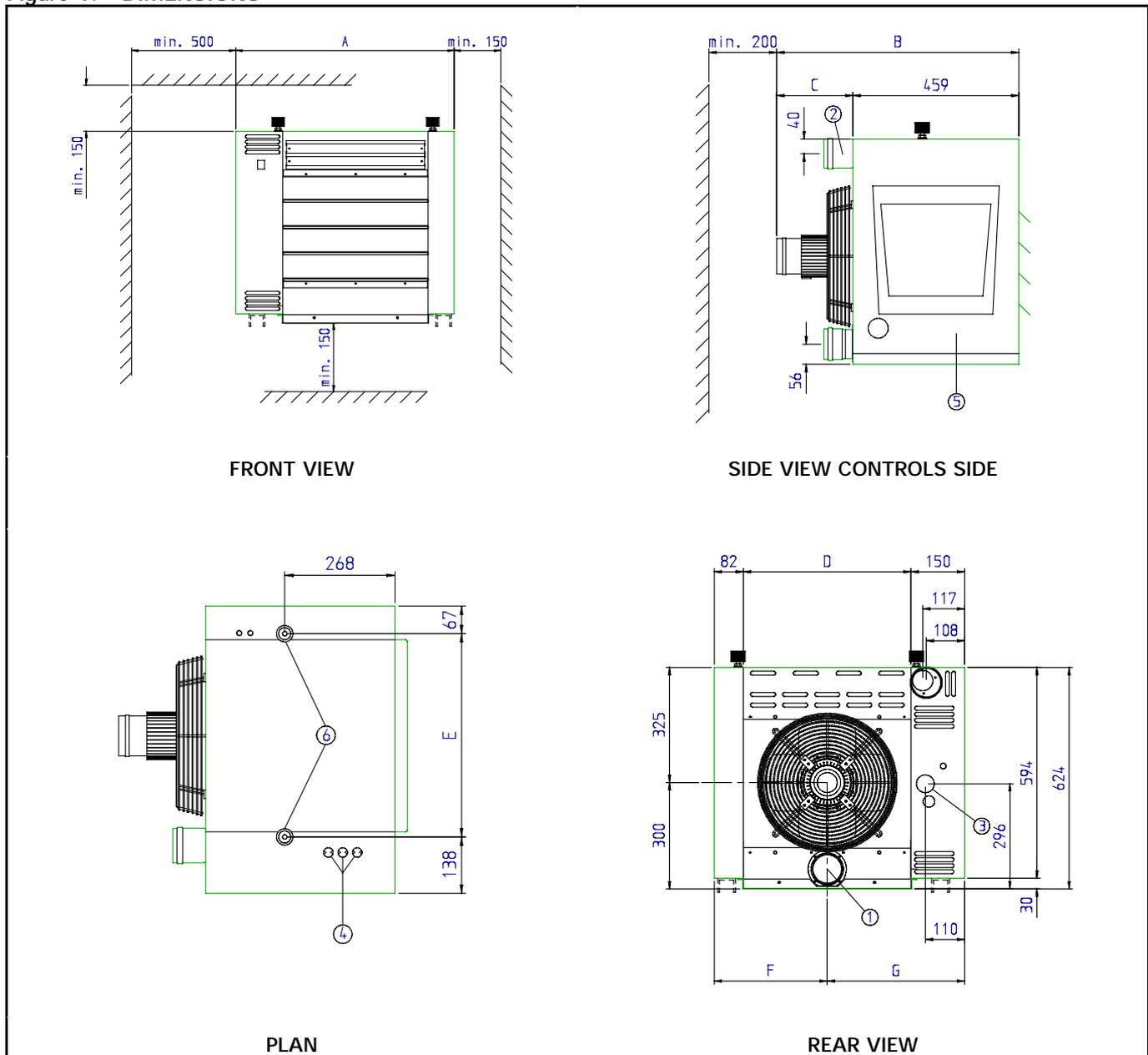


Table 2. DIMENSIONS Re: FIGURE 1

MODEL	1511	1515 / 1520
A Width overall	562	702
B Depth overall	639	670
C Depth of fan assembly	180	211
D Width of casing (burner access)	330	470
E Suspension socket centres	357	497
F Centre Combustion air inlet to opposite side	247	317
G Centre Combustion air inlet to controls side	315	385
Ø Flue socket, diameter internal	80,0	
Ø Combustion air inlet socket, diameter internal	80,0	

Legend figure 1.

- |                                |                                 |
|--------------------------------|---------------------------------|
| 1. Combustion air inlet socket | 4. Electrical & controls inlets |
| 2. Flue connection socket      | 5. Service access panel         |
| 3. Gas inlet connection        | 6. Suspension sockets 1" BSPT   |

## SECTION 3 INSTALLING

- 3.1 Figure 2 shows the clearances necessary to ensure safety for combustibles and service access.
- 3.2 Ensure that the structural elements which will be used to suspend or support the appliance, are adequate to carry the weight of the appliance and its ancillary components i.e. flue system.
- 3.3 The location where the air heater is to be installed, must provide sufficient space around the heater for servicing and clearances for safety.
- 3.4 Ensure that the air heater is installed in a level plain.
- 3.5 Base mounting is optional; see figure 2 & 3. The air heater must be fastened securely to any base mounting arrangement. Note especially that the burner access on the ML series air heaters is via the

base of the appliance. A space of at least 500 mm must be allowed for this purpose. Base support elements must be installed respecting the criteria shown in figure 3.

- 3.6 Two threaded sockets are supplied on top of the appliance for suspension purposes. An alternative location for the socket on the controls side is available which serves if used, for better balancing. Alternatively the sockets can be removed and other forms of suspension employed.

Specially designed wall brackets are available from your Reznor dealer.

- 3.7 After suspension, the air heater should be rigid so as to avoid placing a strain on the flue system, gas services and electrical wiring.

Figure 2. INSTALLATION CLEARANCES, SUSPENSION & MOUNTING

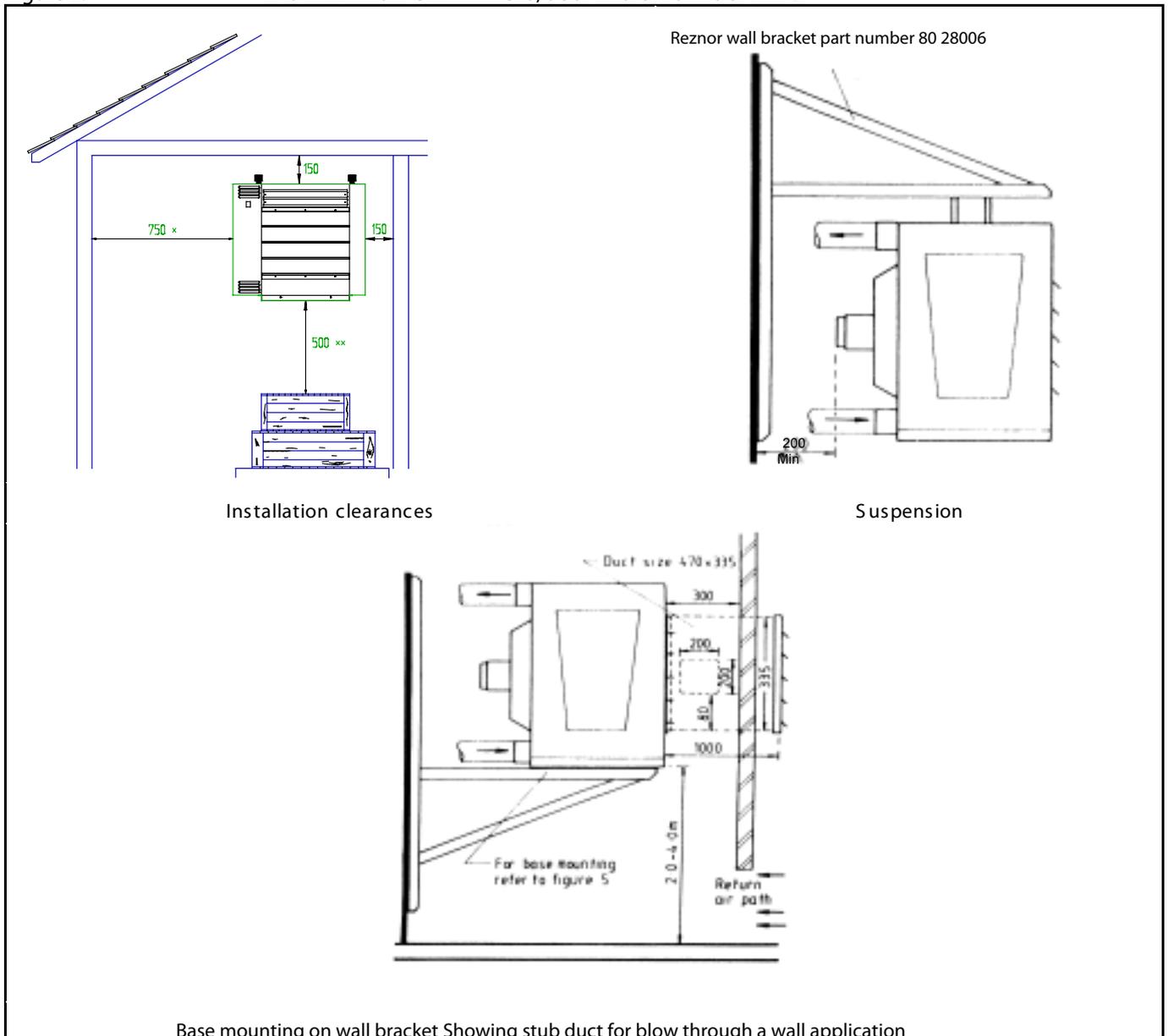
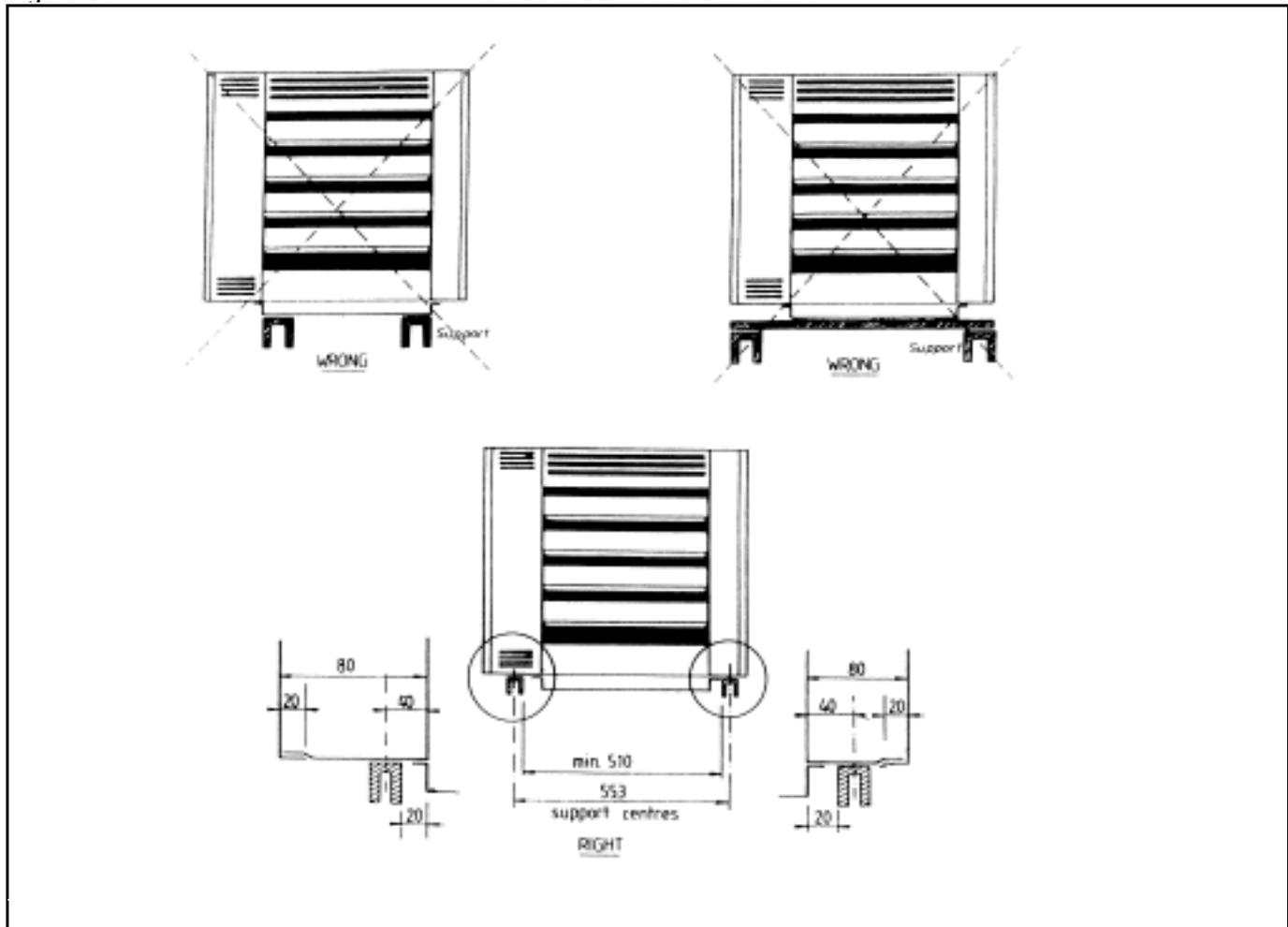


Figure 3: BASE MOUNTING CRITERIA



## SECTION 4. FLUE SYSTEM & COMBUSTION AIR SUPPLY

- 4.1 Flue systems must comply with the rules in force and national and local regulations.
- 4.2 The products of combustion must be flued to outdoor atmosphere. Common flues for more than one appliance must **NOT** be used.
- 4.3 Combustion air should be taken from outdoor atmosphere, this improves the operational efficiency of the heating system.
- 4.4 Flues and combustion air ducts where connected to the air heater must incorporate a disconnect section adjacent to the appliance to facilitate removal of the venter assembly for servicing. The flue system must therefore, be supported independently.
- 4.5 Dimensions and allowances in suggested flueing and combustion air intake arrangements are based upon the use of smooth wall aluminium flue and combustion air ducts and fittings.
- 4.6 **Type C Appliances**
- 4.6.1 When using a concentric termination arrangement as figure 4, then only an approved system using Reznor specified components may be used. These items are manufactured from seamless aluminium with connection sockets fitted with silicone double edged seals, thus assuring, if the components are undamaged, leak free flue systems.
- Important:** This type of flue/Combustion air intake system is regarded as an integral part of the air heater therefore, departure from this method of flueing is in breach of the EC Gas Appliance Directive.
- 4.6.2 Distance between the appliance and the concentric flue termination must not be greater than 9.0 m. When calculating the total length the following equivalent data must be taken into account:  
 1 elbow @ 45° = 1 m  
 1 elbow @ 90° = 1,5 m.

#### 4.7 Type B Appliances

4.7.1 If the air heater is to be installed as a B type appliance i.e. air for combustion to be taken from within the space to be heated, figure 5, then it must be ensured that an adequate air supply for combustion and ventilation is provided, in accordance with the regulations and rules in force.

4.7.2 A horizontal distance between air heater and flue terminal and any combustion air intake duct, must not be in excess of 16 m.

**Note:** 2 Meters of vertical rise negates the resistance imposed by 1 meter of horizontal run. Runs exceeding 16m may be subject to condensation forming within the flue.

Equivalent lengths of flue fittings:

Elbow @ 45° = 1 m.

Elbow @ 90° = 1,5 m.

Flue terminal ≤ 3.0 m. (dependant on type)

4.7.3 To ensure that the allowable resistance is not exceeded in the case of horizontal runs of flues, a positive rise from the air heater of 1° i.e. 17 mm per metre should be maintained.

4.7.4 If condensation is to be avoided, flues should be insulated if they are installed in cold areas. The use of twin wall flues should also be considered.

4.7.5 When mechanical ventilation is used, it shall be by mechanical inlet with either mechanical or natural extraction. Automatic means of control such as interlocks must be provided. The function of other ventilation systems in the heated zone must be taken into account. At no time should a negative pressure environment exist in the zone, this can lead to a hazardous situation, whereby the air heater flue may act as a pressure relief.

4.7.6 The terminal of a vertical flue must extend 1 m above a roof surface, flues must not terminate where combustion products might enter the building. Terminals must be fitted to flues and combustion air inlets. **The combustion air inlet if not used must be protected with an access guard.**

Figure 4

#### FLUE SYSTEMS FOR TYPE C APPLIANCES

Reznor concentric flue system

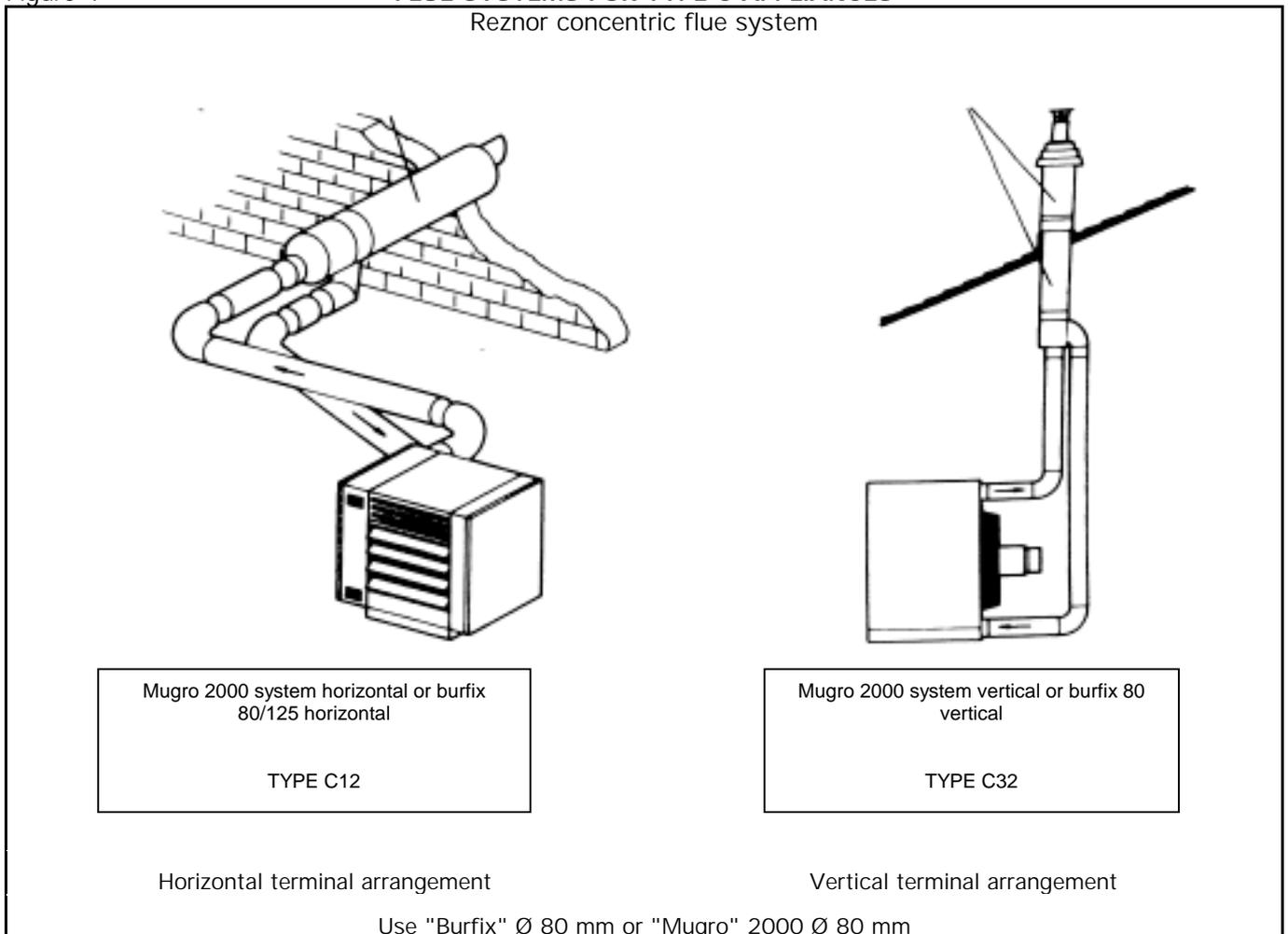
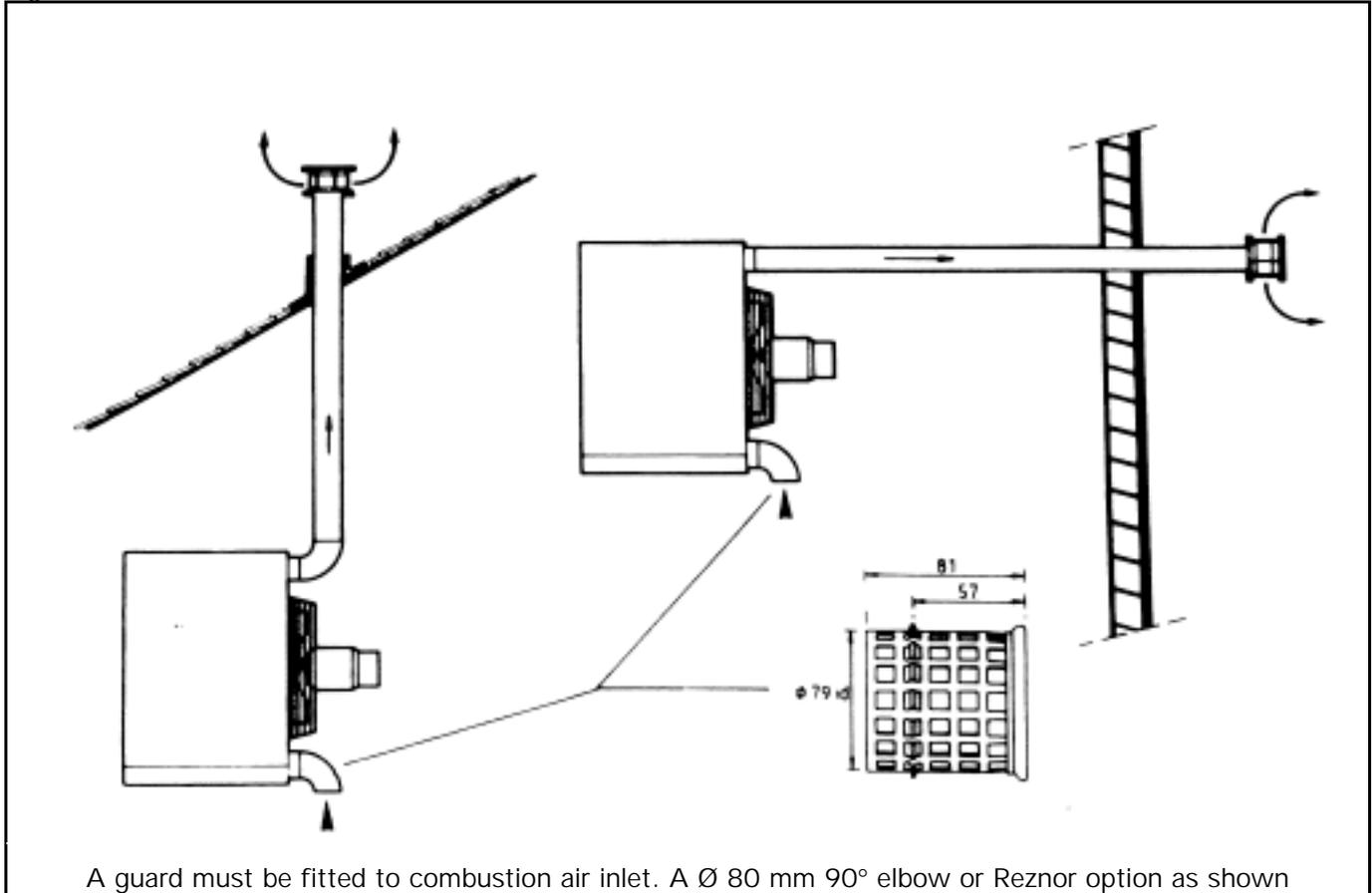


Figure 5

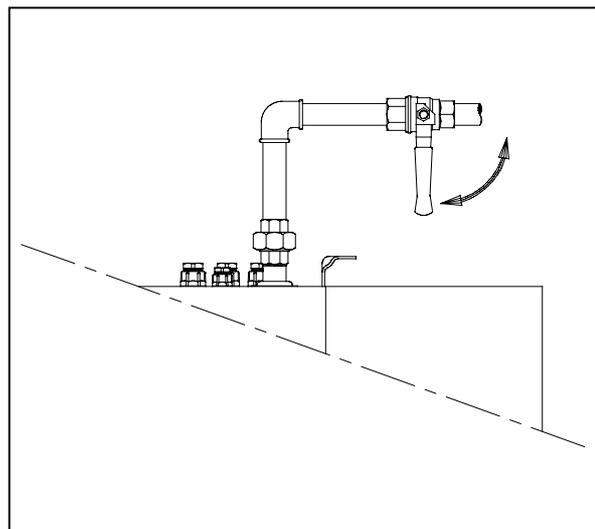
FLUE SYSTEMS FOR TYPE B APPLIANCES



**SECTION 5 GAS CONNECTION**

- 5.1 Connection to the gas supply may only be carried out by suitably qualified persons. The gas installation must comply with the rules in force using materials appropriate for gas service installations.
- 5.2 Check that the gas category is in accordance with the data described on the air heater and its packaging.
- 5.3 An adequate gas supply sized to provide the dynamic pressure for the volume required by the air heater(s) is essential to maintain the nominal heat output of the appliance.
- 5.4 A 90° action service tap and, to facilitate servicing a disconnect union must be provided adjacent to the appliance, see figure 6.
- 5.5 Ensure that the gas service is provided with a filter and that it is tested and purged in accordance with prescribed practice prior to commissioning and taking the air heater into service.

Figure 6 GAS CONNECTION DETAIL



**WARNING: NEVER use a FLAME to test for GAS SOUNDNESS !!!**

## SECTION 6 ELECTRICAL CONNECTION

- 6.1 Electrical installation may only be carried out by suitably qualified persons observing the rules in force.
- 6.2 Check that the electrical specification is in accordance with the specified data on the air heater. A unique appliance wiring diagram is supplied as a separate document attached to this one, plus an additional copy attached to the air heater.
- 6.3 These appliances **must** be earthed.
- 6.4 A separate key lockable electrical isolator for each heater must be provided adjacent to the appliance and in site of any person working on it. The isolator must have a contact separation of at least 3.0 mm on all poles.
- 6.5 Ancillary controls are required to provide timed heat cycles, room comfort temperature level, frost protection, override air circulation etc. These are not included with the appliance and should be ordered separately.
- 6.6 Ensure when planning the external appliance control circuitry, that power will be supplied at all times to the air heater, even when it is control switched in the 'heat-off' mode. This is necessary to ensure that the fan can operate independent of the heating control. Therefore, **Never** incorporate automatic controls that electrically isolate the appliance.

### NOTE:

**ML SERIES AIR HEATERS ARE SUPPLIED WITH EXTERNAL CONTROL CIRCUITS BRIDGED. THE AIR HEATERS WILL OPERATE CONTINUOUSLY UNLESS THESE ARE REMOVED AND TIME AND TEMPERATURE CONTROLS SUBSTITUTED FOR THEM**

## SECTION 7 COMMISSIONING

### 7.1 Commissioning general:

Reznor ML series air heaters do not require commissioning. Final testing during production ensures that if a suitable gas and electrical service and external controls have been connected to the appliance strictly in accordance with the instructions contained in this document then it is ready to be taken into service. However, preliminary checks as listed below are necessary to ensure safety and correct operation.

Understand the controls lay-out figure 10 and how the heater works text 7.2

- A test for earth continuity
- A test for resistance to earth
- Zero voltage neutral to earth
- Check phase 230/240V to correct input terminal
- Correct external controls connections. Check that when external controls are operated that a constant electrical supply to the air heater is maintained when the controls are in the OFF mode. This is necessary so that the air circulation fan may operate at all times at the dictates of the thermally activated fan switch.

### 7.2 Understanding how the ML series air heaters work.

- 7.2.1 Reznor ML series air heaters employ the direct burner ignition principle i.e. a separate ignition burner is not used to light the main burner. Flame failure protection is by the ionisation principle i.e. the ability of a suitable flame to pass an electrical current between an electrode and the earthed burner assembly.

- 7.2.2 At the dictates of the external controls an electrical circuit is made to an electronic burner control. The burner control checks to ensure a safe start is possible by ensuring that the combustion air induced draught fan ("venter") is stationary as monitored by a differential pressure switch. If no air flow is proven, then the "venter" is switched on and the proving switch moves from the no airflow to the airflow position provided adequate airflow exists. This safeguards a blocked flue, faulty flue fan etc.

Once in the proved air flow condition the second period of the ignition process commences this is called the pre purge time and lasts for  $\pm 18$  seconds to ensure no unburnt gas is present in the combustion chamber. If during this period, a flame or simulated flame is detected, lockout will occur. At the end of the pre purge period the ignition sequence commences, a hot surface igniter heats and glows, after a heating-up period of  $\pm 23$  seconds ignition temperature will have been reached and the main gas valves will open and the burner will light during a maximum time period not exceeding 5.0 seconds. Provided the flame remains adequate as sensed with a nominal flame ionisation current of 1.5 - 3.2  $\mu\text{A}$  the burner will remain alight until the external controls are satisfied.

- 7.2.3 Simultaneously to the ignition circuit and gas valve circuit being energised as described above, electrical power is supplied to an anticipator within the air circulation thermal fan control. The anticipator advances the warm up of the thermal fan control thus ensuring that the air flow when the fan is switched on is temperate at  $\pm 45^\circ\text{C}$ . The air circulation fan will continue to run on after the burner has switched off to cool the heat exchanger.

7.2.4 In the event of the combustion air volume falling below a safe level or in the event of the burner flame being extinguished for any reason during a run cycle then safe shut down and lockout of the burner control will take place. Reset by manual intervention at a control panel or on the air heater is necessary to put the air heater back into service.

7.2.5 In the event of overheating for any reason thermally activated fail safe overheat controls operate to switch off the burner. The first control (LC1) switches off the burner and upon its cooling automatically resets and the burner will relight. The second control (LC3) which operates at a higher temperature setting, will switch off the burner and itself set to a lockout condition which also requires manual intervention to reset before it can be restored to normal operational condition. This reset is on the right hand front side of the heater.

7.3 To check if the gas rate is correct, it is necessary to connect a manometer to the burner pressure test point. After the ML air heater has been burning continuously for 10 minutes check that the burner pressure is in accordance with that described on the data plate. If it is low check also that the inlet gas pressure measured on the test point at the inlet to the gas control valve is correct according to the technical data in section 3. Adjust burner pressure as necessary.

7.6 To check if the flame current is adequate connect a DC micro ampere meter between terminals 17 & 18 of the burner control after removing the bridge connector ; it should be set to the range 0-10  $\mu$ A. A reading of 1.5 to 3.2  $\mu$  should be recorded.

**WARNING: During operation the sensor circuit carries mains electric current.**

7.7 **To light the air heater:**

7.7.1 Carry out the following procedure (which is also displayed on the air heater casing).

To light the air heater with air discharge louvres set to open :

1. Turn on gas supply, including heater manual valve (handle in line with valve).
2. Switch on electrical supply to heater.
3. Set room thermostat to desired temperature.
4. Set time switch (if fitted) to an ON cycle.
5. If heater reset button glows on the heater or remote control press reset button.

The heater should now light within 2 minutes.

N.B.: If the heater has been off for a prolonged period, up to three attempts to light it may be necessary. If the ML air heater still does not light follow fault finding procedure, section 9.

**TO TURN OFF :**

1. **SHORT PERIOD :** Turn room thermostat to lowest setting. To relight reset thermostat.
2. **PROLONGED PERIOD :** Turn room thermostat to low setting. Turn heater manual gas valve OFF. After 5 minutes or when heater fan has stopped, turn off electricity supply to heater. Turn OFF the gas supply to the air heater. To relight follow the lighting instructions.

**WARNING : The gas service tap must not be operated except in emergencies or for servicing or prolonged periods of shutdown of the air heater.**

7.7.2 Upon completion of the commissioning, ensure the user or a responsible person is aware of :

- A) How to operate the air heater ;
- B) The need for maintenance and servicing;

**End of Commissioning Instructions**

## SECTION 8 SERVICING & MAINTENANCE

8.1 **Attention:** Inadvertent substitution or replacement of components similar to those specified or replacement in a manner contrary to the manufacturer's designed method could constitute a hazard.

8.2 Before commencing servicing turn OFF the main gas supply to the air heater; switch OFF the main electricity supply to the air heater after the air circulation fan has stopped.

8.3 General:

8.3.1 Reznor ML series air heaters require maintenance and service at least once a year. More frequent servicing may be required dependent upon the environmental circumstances where the air heater(s) is installed. Advise the user of recommended service frequency. Regular inspection is recommended initially especially in dirty areas to assess the servicing requirement frequency. Refer

to the illustrations provided by figure 10 for component and visual instruction as a guide to carrying out service work. Items that require inspection during servicing are :

8.3.2 All components and surfaces both inside and outside of the air heater require cleaning. Check for damage which could affect the continuing prolonged use of the air heater especially the bottom burner access panel. Check condition and security of flue and combustion air system. Check for security and worthiness of the suspension or mounting system.

8.4 Check condition of total air heater electrical circuit including isolator. Look for damage to conduits/ conductor insulation. Check for loose terminals and escaped conductor strands. Ensure that no conductors are under tension. Note condition of all electrical components.

**NOTE :** Fan motors are lubricated for life and do not require further lubrication.

8.5 It is necessary to remove the burner rack assembly to clean the burner ribbons and to inspect and clean the inner surfaces of the heat exchanger.

To remove the burner rack assembly refer to figure 7, 6 step procedure

- A) Remove Qty. 4 screws and remove bottom panel.
- B) Spring inwards left hand and right hand burner rack locators and lower front end of burner rack to below level of casing.
- C) Ease burner rack toward front of air heater until disengaged from injectors.

8.5.1 With the burner assembly removed, it is now possible to inspect the heat exchanger with the aid of an inspection lamp and mirror. Cleaning can be carried out using a stiff flue brush and vacuum cleaner.

8.5.2 Inspect the burner assembly for damage, corrosion and cleanness.

With a brush and vacuum clean all exposed surfaces and flame ports. If injectors are dirty these can be removed after disconnecting the gas manifold from the air heater. Any sticky deposits on the injectors should be removed using acetone.

**Do not clean the injector with a sharp metal object. The orifice is machined to fine limits.**

8.5.3 Inspect the igniter element assembly Fig.9 checking especially the condition of the insulation. If in doubt about its condition it is wise to renew this item.

**N.B. The igniter element is an extremely fragile device. Handle with care.**

8.6 To remove the burner manifold assembly incorporating the gas burner injectors and multi-functional gas valve. Figure 10 key 21.

- A) Unscrew Qty 4 screws securing adaptor elbow gas inlet on valve or if gas service connection will permit unscrew disconnect union fitting outside.
- B) Un-clip wires leading to gas valve operators noting their appropriate terminal points for reconnection.
- C) Remove Qty. 2 hexagon nuts securing manifold.
- D) Withdraw manifold sideways.

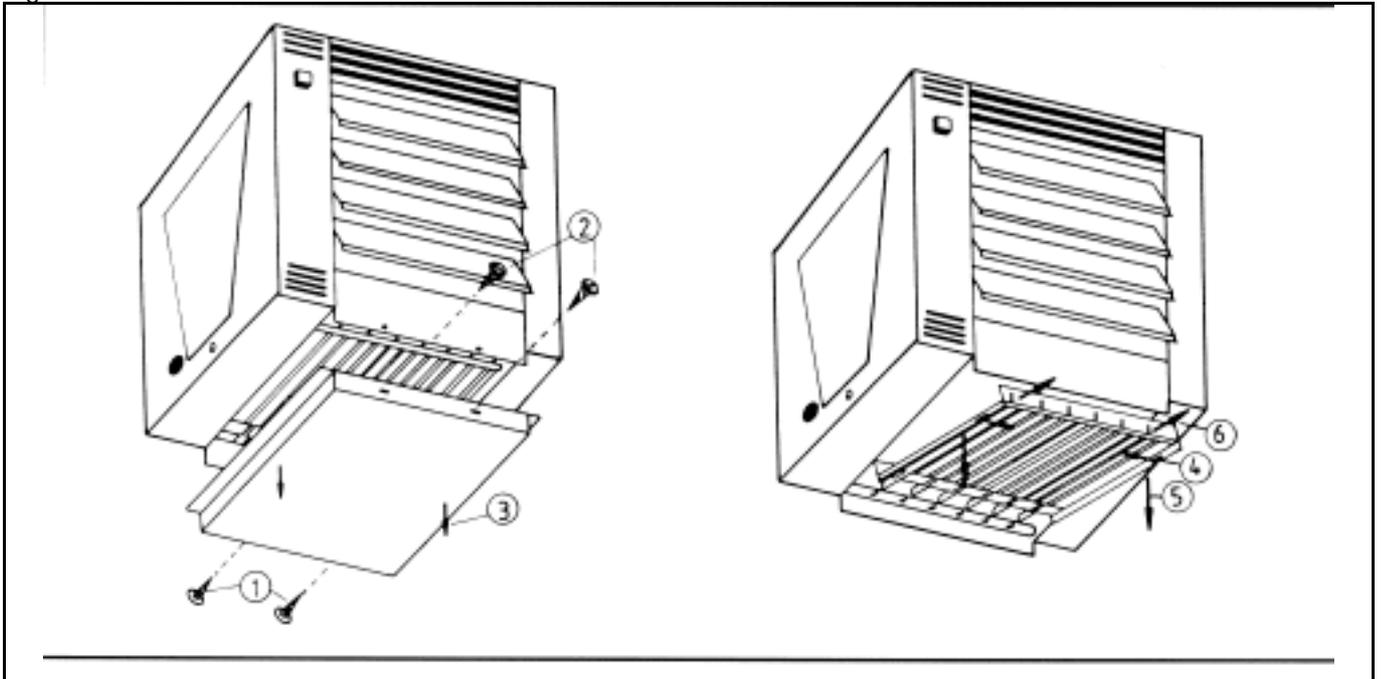
**Note: Burner rack assembly must be removed before manifold can be removed.**

8.7 To service the air circulation fan figure 10 key 29

To clean only. The electrical wire connection between the fan motor and the appliance termination is long enough to allow removal of the fan assembly for cleaning purposes. To prevent strain on the conductors the fan assembly should be secured with a string or cord whilst carrying out cleaning.

To replace components of the fan assembly when it is necessary to disconnect the motor, the motor lead wire should be disconnected at the motor end.

Figure 7: ACCESS TO AND REMOVAL OF THE BURNER ASSEMBLY

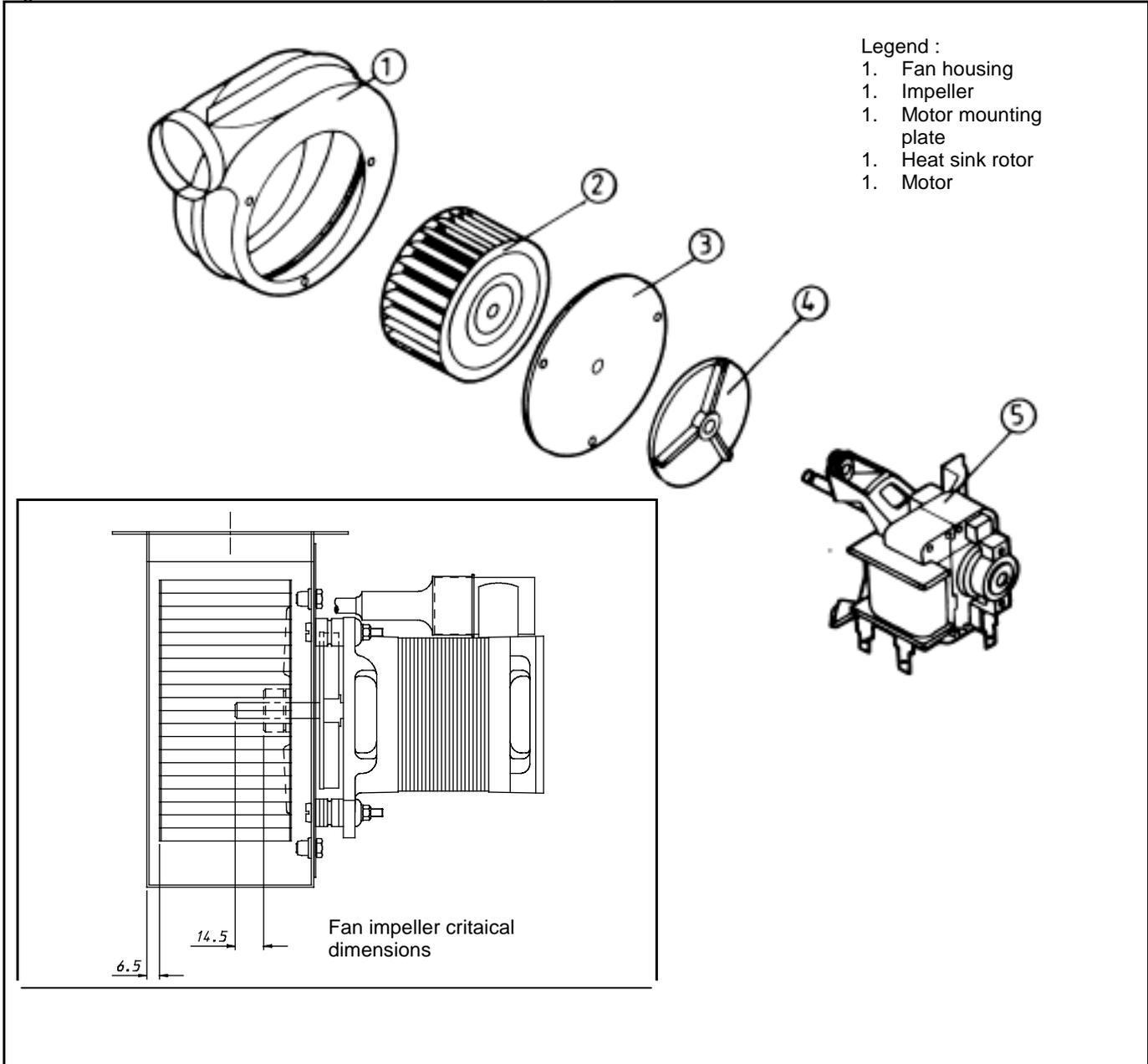


Legend:

- 1 & 2. Remove 4 screws front & rear
- 3. Lower base tray
- 4. Spring retaining clips to release burner front end and lower (5) at the same time pulling forward (6)

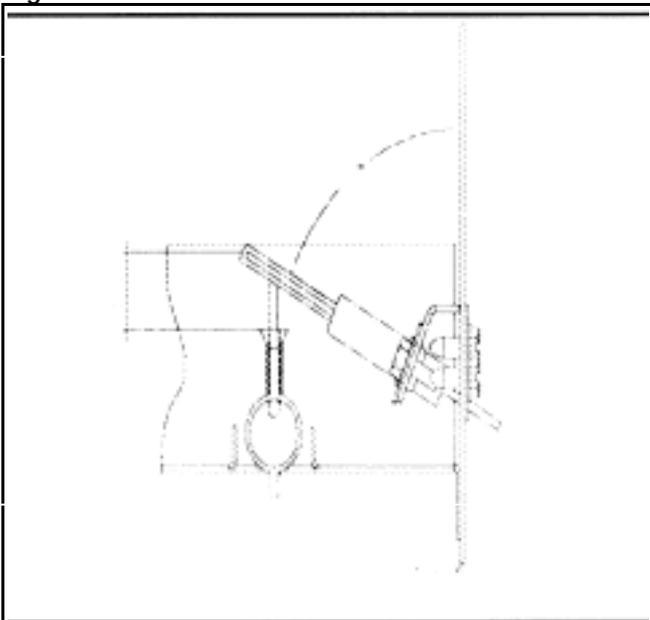
Figure 8

FLUE GAS FAN (venter) COMPONENTS



- Legend :
- 1. Fan housing
  - 1. Impeller
  - 1. Motor mounting plate
  - 1. Heat sink rotor
  - 1. Motor

Figure 9 IGNITER ASSEMBLY DETAIL



- 8.8 To renew the motor capacitor. Fig.10 key 24. This is located behind the motor end plate, access is by removal of two screws. The capacitor is secured in a spring clip and wire connection is by 1/4 "Faston" electrical connectors.  
**N.B. : ensure the "milor plastic" insulation ring fitted inside the motor terminal housing is correctly relocated should this become dislodged whilst changing the capacitor and ensure the capacitor end bolt touches the motor terminal housing thus ensuring the capacitor electrical terminals do not touch the opposite side of the motor housing.**
- 8.9 To service the combustion air fan ("Venter") Fig.10 key 3 and Fig.8
  - A) Disconnect wires at the fan motor .fig.10 key 4.
  - B) Unscrew Qty. 3 cross head screws securing motor and mounting plate to venter scroll.

- C) The fan impeller is attached to the motor shaft by a  $\varnothing$  4.0 mm socket grub screw. This can be released using a 2 MM AF hexagon wrench (allen key).
- D) It should be noted that a groove is machined on the outer end of the motor shaft figure 8 when the fan impeller is pushed onto the motor shaft until the groove is visible the correct end location of the fan impeller into the fan scroll is assured. Ensure the securing grub screw is tight after service.
- E) Check condition of motor and note especially for excessive end float of motor shaft, which could indicate wear.

8.10 To renew thermal overhear control LC3. Fig. 10 key 12.

- 8.10.1 A) Disconnect wires at terminals on control
- B) Access capillary bulb through air outlet louvres and un-clip from its bracket. If ducted via access panel.
- C) Unscrew Qty 2 screws which secure sealing plate. Fig. 7 key 12.
- D) Remove reset push button cover cap.
- E) Unscrew hexagon retaining nut and remove control.

**N.B. : When fitting a new thermal overhear control do not bend capillary on a less than 20 mm radius.**

8.11 To renew combustion air proving pressure differential switch Fig. 7 key 7.

- A) Disconnect wires leading to terminals
- B) Disconnect reference port tubes at pressure switch end
- C) Remove Qty. 3 screws securing mounting bracket to air heater
- D) Pressure switch fixing screws are now accessible from rear of mounting bracket.

**N.B.1: Ensure reference port tubes are correctly reconnected when replacing or renewing pressure switch:**

Port P1 on switch to lower reference Key 6.  
Port P2 on switch to top reference Key 6

**N.B.2 : Combustion air proving switch operating pressures.**

Cutout = 68 Pa.

To check this it is necessary to connect a manometer in the air sensing circuit by use of a  $\varphi$  9.0 mm tee piece fitting; ensure a positive seal is maintained.

The switch should not be adjusted for any reason.

The unique part number of this device ensures the correct differential pressure is maintained thus assuring good combustion.

8.12 To renew electronic burner control Fig. 10 key 14.

- A) Disconnect wires at control end leading to ignition device. Fig. 7 key 17.
- B) Carefully unplug multi-point terminal connectors by pulling off key 14.
- C) To remove unscrew Qty. 2 control fixing screws
- D) Control is now released.

**N.B. : This is not a repairable item therefore, no attempt should be made to do so. Replacements of this unique specification must be obtained from Reznor.**

8.13 To renew or replace thermal fan control fig. 10 key 11 and/or thermal limit control fig. 7 key 8, simply disconnect the "Faston" wire terminals and unscrew Qty 2 screws in each device to remove from air heater casing.

8.14 To renew or replace Ignition device assembly fig. 10 key 17 and Fig.9.

- A) Disconnect lead wires at burner control end. Fig. 7 key 14.
- B) Unscrew Qty. 2 screws securing the assembly to the air heater
- D) Withdraw the assembly carefully from the combustion chamber.

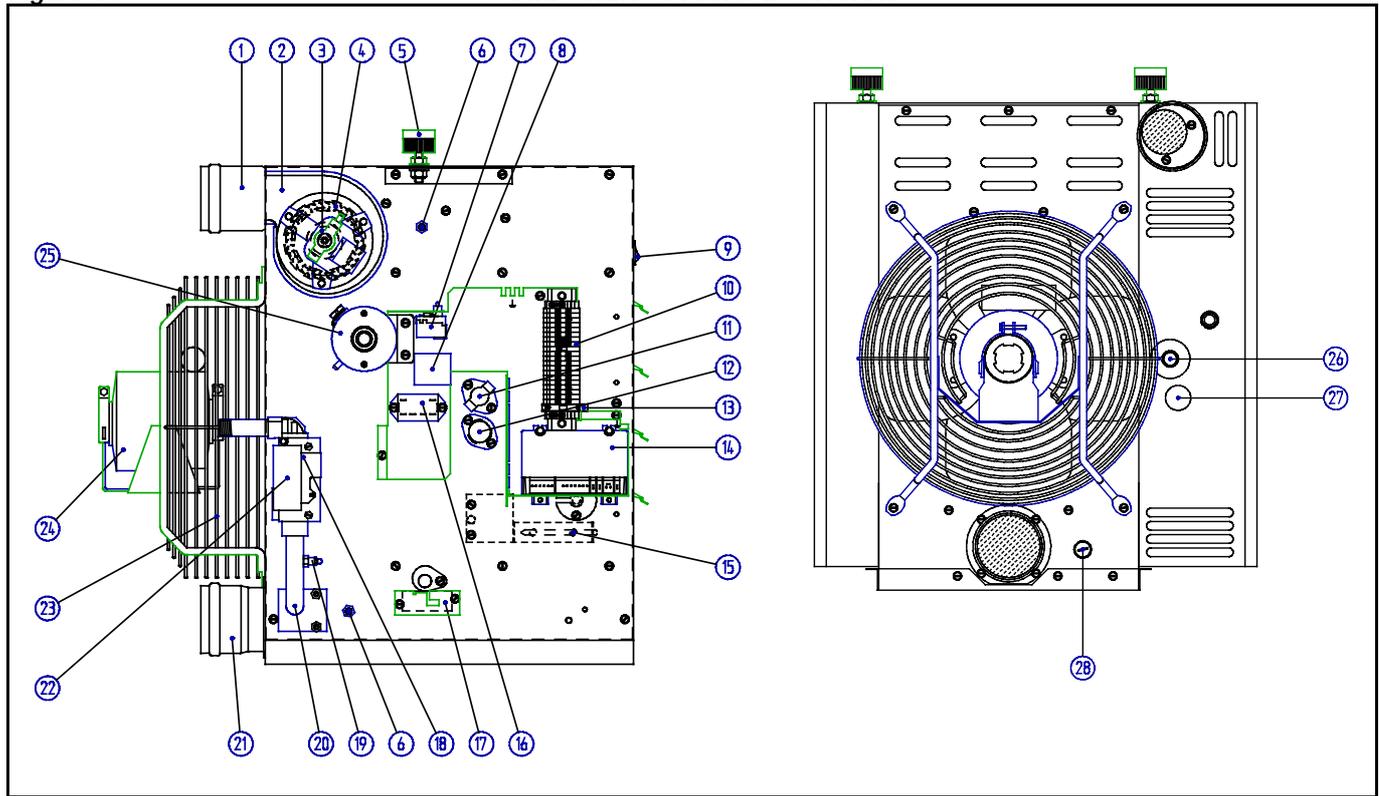
8.15 After completion of any service or maintenance work re-commission the air heater in accordance with section 5 of this document.

8.16 Check functionality of external controls and reset in accordance with users preferences.

**End of servicing instructions**

Figure 10

COMPONENT PARTS LOCATION



Legend figure 10:

- |  |  |
|--|--|
| 1. Flue outlet                                   | 15. Capillary for LC3                          |
| 2. Venter housing                                | 16. Relay for isolation transformer (not GB)   |
| 3. Venter motor                                  | 17. Igniter assembly                           |
| 4. Fan impeller                                  | 18. Multi-functional gas control               |
| 5. Suspension socket 1" BSP                      | 19. Burner pressure test point                 |
| 6. Combustion circuit reference pressure points  | 20. Burner manifold                            |
| 7. Thermal overheat control and reset switch LC3 | 21. Combustion air inlet socket                |
| 8. Isolation transformer (not GB)                | 22. Gas control solenoids                      |
| 9. Burner lock-out reset switch                  | 23. Air circulation fan                        |
| 10. Wiring terminals                             | 24. Air circulation fan motor                  |
| 11. Thermal limit control LC1                    | 25. Combustion air proving differential switch |
| 12. Thermal fan control FCR                      | 26. Inlet gas connection Rc 1/2                |
| 13. Fuse in terminal assembly                    | 27. Burner gas pressure adjustment access      |
| 14. Automatic burner control                     | 28. Test point for combustion air temperature  |

END OF SERVICE INSTRUCTIONS

## SECTION 9 : ML Short Parts Listing

ITEM	DESCRIPTION	MAKERS REF.	PART NO	USED ON
<b>GAS</b>				
1	Gas Valve "SIT"	830040 ½"	03 25250	Natural & Propane gas
2	Burner Jet	170 = φ 1.7 mm	07 25801 170	Natural Gas
3	Burner Jet	090 = φ 0.9 mm	07 25801 090	Propane/Butane 15-11 / 15-15
4	Burner Jet	100 = φ 1.0 mm	07 25801 100	Propane/Butane 15-20
5	Test Nipple	_ NPT x 9mm	07 25264 02	All
6	Gas Valve 90° Flange	½" 400104B	03 24982	All
7	Igniter Assembly	Norton 240V	36 25216	All
<b>ELECTRICAL</b>				
8	Burner Control "Honeywell"	S45-70LS	03 25317	All
9	Overheat Control LC3	LSI 541510 86°	03 24958	All
10	Limit Control LC1	60TII500 283	03 24970	All
11	Thermal Fan Control FCR	TOD29 TI2(250V)	03 25166	All
12	Terminal Assembly	Entrelec	06 41635	All
13	Fuse	2A Fast DIN41571	06 00157 2A	All
14	Connector Gas Valve	V1	03 25250 V1	All
15	Venter assembly	ES 30 + fan & house	36 79015	All
16	Fan Motor	MAC 30 W6	01 26026 1520	All
17	Fan Motor Capacitor	3 mfd 400V	01 25598 03 MF	1515 - 1520
18	Fan Motor Capacitor	2 mfd 400V	01 25600 02MFD	1511
19	Lock-out indicator/switch	5A	60 61988	All
20	Air Pressure Switch	Honeywell C6065F	30 60607 68	All
<b>AIR HANDLING</b>				
21	Fan motor	Elnor RIBX 135/EV1	01 25620 01	1511
22	Axial fan	N4-305-28-½	02 25702	1511
23	Fan Assembly	MAC 30W 625	02 26030 15	1515
24	Fan Assembly	MAC 30W 635	02 26030 20	1520
25	"Venter" Complete	ES 30-986	36 79015	All
26	"Venter" Wheel (impeller)	ES 30	02 25730	All
27	"Venter" Scroll (housing)	ES	08 17509	All
28	Air Fan	350 x 25°	02 26028 15	1515
29	Air Fan	350 x 35°	02 26028 20	1520
<b>MISCELLANEOUS</b>				
30	LC3 Capillary Seal Plate	-	08 07727	All
31	Gasket for item 31 (LC3)	-	06 07726	All
32	Gasket for item 28 (venter)	-	08 17551	All
33	Sampling Pressure Point	M8	07 25811 02	All
34	Silicon Tubing	φ 5 - 8 x 1.0m length	06 20224 cm	All
35	Suspension Sockets	1" BSP (R1)/M10	35 20003	Optional

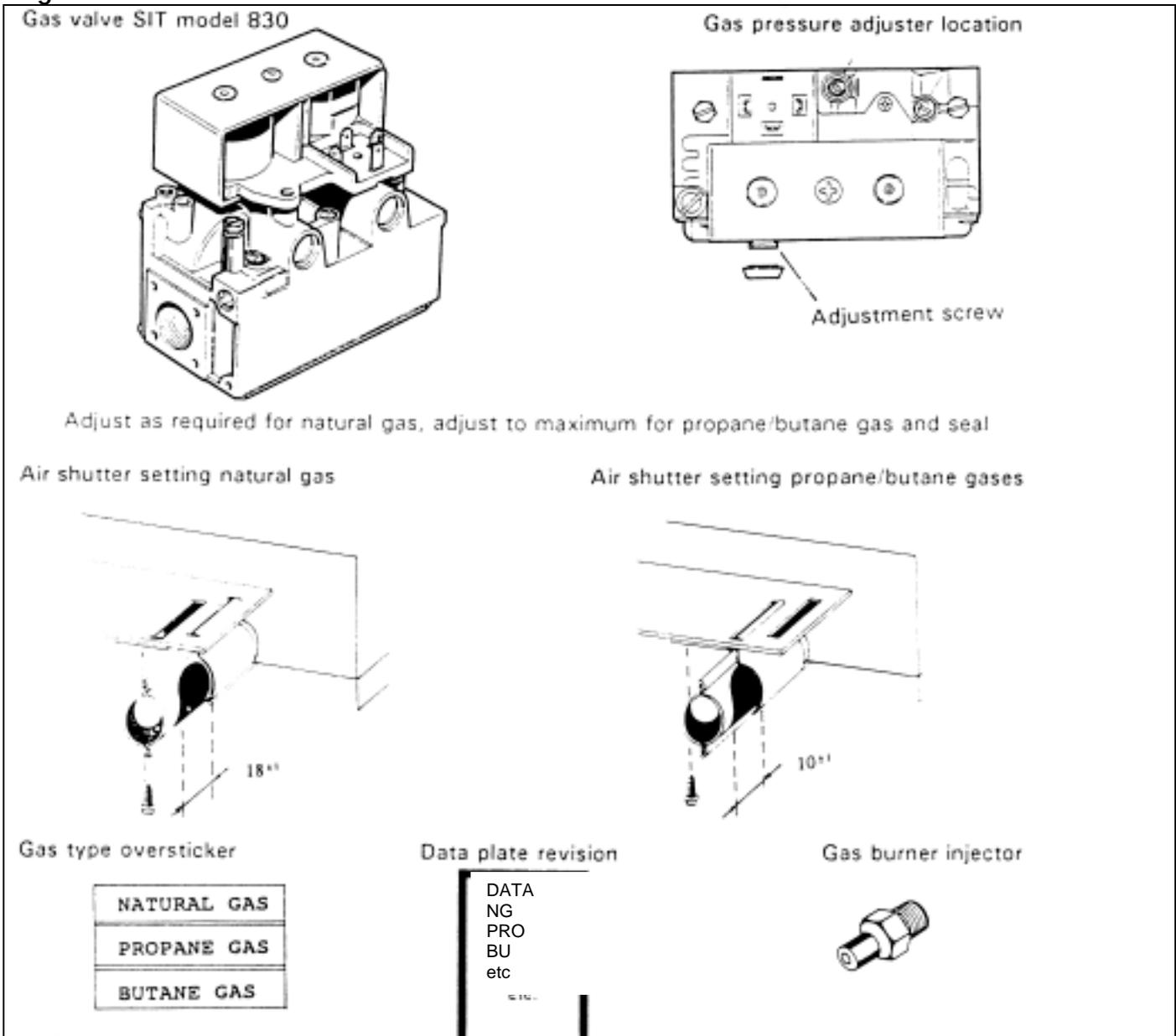
## SECTION 10 GAS CONVERSION INSTRUCTIONS

- 10.1 Reznor ML series air heaters are designed to operate on Natural-Propane-Butane gas and will be supplied as ordered for the gas type specified.
- 10.2 In the event it is required to convert to a different gas type to what has been supplied, the conversion of the gas burner and gas controls is necessary. A Reznor conversion kit must be used and comprises the items illustrated in fig.11.
- 10.3 When converting from natural gas to Propane or Butane gas the gas regulator on the gas valve should be adjusted to maximum pressure, i.e. screwed inwards to stop position, and then sealed to prevent re-adjustment.

N.B. Normally natural gas air heaters are supplied without air shutter assemblies. If converting to from propane or butane to natural gas set air shutter as below 18.0mm open.

- 10.4 To carry out the conversion, refer to the appropriate instructions in section 8, specifically paragraphs 8.5 and 8.6 which explain appropriately the accessibility and testing requirements. In addition to changing the gas valve and burner injectors, it is necessary to reset the burner ribbon aeration shutter as appropriate & place the necessary over stickers. Carry out the commissioning procedure stated in section 7 of this document when conversion is completed.

**Fig. 11 Gas Conversion Kit Items.**



## SECTION 11 FAULT FINDING

### 11.1 Air heater will not light :

- A) Read lighting instructions;
  - B) Check gas supply is turned on;
  - C) Check electricity supply is switched on;
  - D) Check burner control lockout condition: Fig.10 Key 9 local or remote. Reset as applicable
  - E) Check thermal overheat control lockout condition: Fig.10 Key 7. Reset local
  - F) Combustion air fan not rotating: check free to run
  - G) Combustion air fan running air flow not being sensed:  
Check connections to reference ports on heater and pressure switch - check connection tubes not perforated - check no condensation in tubes - check flue is not blocked - check combustion air inlet duct is not blocked - check flue length & combustion air duct length Re. section 4 - check operation of pressure switch by: disconnecting tube and gently blowing into tube, switch should be heard to click or metered to indicate switch opening/ closing
- N.B. Terminals 1 & 2 normally closed position no air flow.  
Terminals 1 & 3 normally open and close on positive air flow 6.5 - 7.5 mbar.  
Faulty pressure switch! renew.
- H) Faulty burner control! renew.
  - J) Faulty ignition device or wire connection: check earth potential/continuity, Faulty! Renew
  - K) Faulty gas valve : renew.

### 11.2 Heater tries to light igniter glows brightly

Gas turned off ?  
Air in gas supply - check purged supply.  
Gas pressure inlet too low/high - check, if necessary call gas supplier.  
Gas valve not operating: check wiring - check valve - check burner control renew as appropriate.

### 11.3 Burner lights & goes out immediately :

Insufficient flame proving current: check ignition device & wiring measure flame current 7.6: faulty burner control - flame sensor electrode incorrectly located!

### 11.4 Cool air during operation - continuously when burner is off:

- A) Ensure specification is not for constant run fan (CRF);
- B) Low gas pressure - check, adjust if not in accordance with data plate;

- C) Manual fan override switch if fitted set to **on** - check and switch off;

### 11.5 Air circulation fan will not run:

- A) Open circuit - check wiring;
- B) Faulty thermal fan control switch - check renew;
- C) Defective capacitor - check renew;
- D) Defective motor - check renew;
- E) Fan blocked - check it rotates freely.

### 11.6 Air circulation fan runs and stops while gas burner remains alight:

- A) Thermal fan control switch faulty or incorrectly wired - check circuit against wiring diagram;
- B) Faulty fan control switch - renew;
- C) Faulty fan motor - renew;
- D) Low ambient air temperature causing fan control switch to cool and open circuit - maintain higher ambient temperature near the air heater. This symptom will cease as the heating period lengthens due to gradual rise of air-on temperature.

### 11.7 Air circulation fan cycling on its thermal overload protector:

- Check electrical current rating - check power supply - check fan rotates freely and is not imposing an abnormal load - check capacitor is operational.

### 11.8 Air heater cycles on thermal overheat control LC1:

- A) Control faulty - renew;
- B) Air flow restricted - clean fan assembly; check louvre setting;
- C) Fan faulty - renew;
- D) Gas rate too high - adjust burner gas pressure;
- E) Local ambient air temperature near the air heater too high - above 30° check for stratification - install a Reznor "Maximisor" and save energy!

### 11.9 Air circulatory fan keeps running :

Faulty fan control : renew.  
Gas valves open : check valve or wiring fault by removing wires at valve solenoid terminals by unplugging.  
Faulty valve : renew.  
Faulty wiring : correct.

**End of fault finding guide.**

## SECTION 12 HEALTH AND SAFETY STATEMENT

### Health and Safety Information for the Installer and Commissioning-Service Engineer

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: "ML Series"**

12.1 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.

12.2 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.

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

12.4 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: Synthetic Ceramic Fibre with Organic binder.

Description: Tapes and Papers

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. As with any dust pre-existing respiratory condition and lung diseases may be aggravated.

Prolonged exposure for the purposes envisaged pertaining to this Reznor product is not anticipated.

Precautions: Wear protective gloves when handling. If abrading and dust is generated suitable protective respirators must be used.

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.

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.

END OF HEALTH AND SAFETY STATEMENT

## SECTION 13 USER INSTRUCTIONS FOR OPERATING AND LIGHTING

**NOTE:** Please keep a copy of this document near your air heater!

13.1 Your Reznor ML series air heater was intended to be installed, commissioned and tested in accordance with these manufacturer's written recommendations.

13.2 In the interest of safety and user satisfaction it is important that this document is read and understood. If in any doubt, consult your installer or your local gas regional supplier.

13.3 It is in your interest to ensure proper service and maintenance is carried out on a regular basis. Reznor suggests at least once a year.

13.4 In the event of difficulties in resolving any of these matters, please do not hesitate to contact Reznor or their official distributor.

### 13.5 About your air heater:

13.5.1 Reznor ML series air heaters are "state of the art" gas fired appliances and incorporate an atmospheric burner which can use air for combustion from outdoors provided the combustion air inlet is ducted. This is identified by 2 round pipes/ducts being connected to the rear of the air heater. Products of combustion are vented to outdoor atmosphere via permanently connected forced draught flue.

13.5.2 This heater has not been designed for use with air distribution ducting to provide heat for more than one room.

13.5.3 The location of the air heater should be maintained at normal atmospheric pressure. Changes to the building after air heater installation should have regard to the heating installation, i.e. structural changes causing excessive draughts from doors, windows. Other air handlers and installation of air extraction equipment which may cause a negative pressure environment which can seriously affect the operation of this type of air heater. Especially if combustion air supply is unducted.

13.5.4 The space heating process using Reznor ML series air heaters is for air to be circulated through the appliance whereby it gains heat from a heat exchanger, which is directly discharged into the space to be heated. The air is eventually recirculated through the appliance, thus an unobstructed path for the circulation of the air must be maintained. This is particularly important if the air heater has been installed to blow through the wall between two rooms.

### 13.6 How the air heater works:

Gas is burned at an atmospheric burner which fires into a multiplex combined combustion/heat exchanger. The gas burner is controlled by a double gas valve via an automatic electronic burner control, which is switched via external controls i.e. a room thermostat and or a time switch.

Reznor ML air heaters incorporate a hot surface ignition device and is protected by electronic flame

sensing. Safe operation of the air heater operation is automatic following the dictates of the external timing and temperature controls.

Safety against overheating is assured by the inclusion in the controls circuit of two thermal overheat controls. There is an automatic recycle control which protects against low air flow i.e. clogged air ways, fan failure! The second control being a super overheat control which locks out and switches off the burner in the event of gross overheating for any reason. Manual intervention to reset is necessary should the super overheat operate. Resetting of the electronic burner control may also be required.

When the main burner fires and warms the heat exchanger, the heat is sensed by a thermally actuated fan control which switches the fan on when the air temperature reaches approximately 45° C. At the end of a heating cycle when 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. Should residual heat within the appliance or high ambient temperature in the vicinity of the appliance exist then, the fan will run automatically to maintain the appliance in a cool condition.

### 13.7 To light the air 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;
6. If the air heater does not light:
  - a) Check that the burner control does not require resetting. An indicator light glows on the air heater and if fitted the remote control panel when in lock out condition press & release to reset.
  - b) Check at the air heater if the thermal overheat (limit) control requires resetting refer figure 12

**NB:** If a remote control reset is not fitted as described in (a) above, check and reset if necessary the reset burner control on the air heater.

### To turn off the air heater for short periods:

- 1) Adjust room thermostat to lowest setting. **To turn off the air heater for a prolonged period:**
- 2) Carry out operation 1 above and wait five minutes and then switch OFF the main

electric supply to the air heater provided the air circulatory fan has stopped.

3) Turn off the gas supply to the air heater.

### 13.8 IMPORTANT

If the thermal overload (limit) control requires resetting & doing so restarts the air heater, wait until it warms up to thermal equilibrium to ensure the overload control does not reactivate and lock out. If it does and the room air temperature near the air heater is less than 30° C then switch **OFF** the air heater & call for service.

### 13.9 Air circulation

Some Reznor unit air heaters have fans connected to a remote override switch. This enables cool air to be used for circulation purposes when the air heater is not used for heating purposes e.g. in summer months.

To use this feature :

- a) Switch ON mains electricity supply to the air heater.
- b) Switch ON the manual override switch. This may be on a remote control panel.

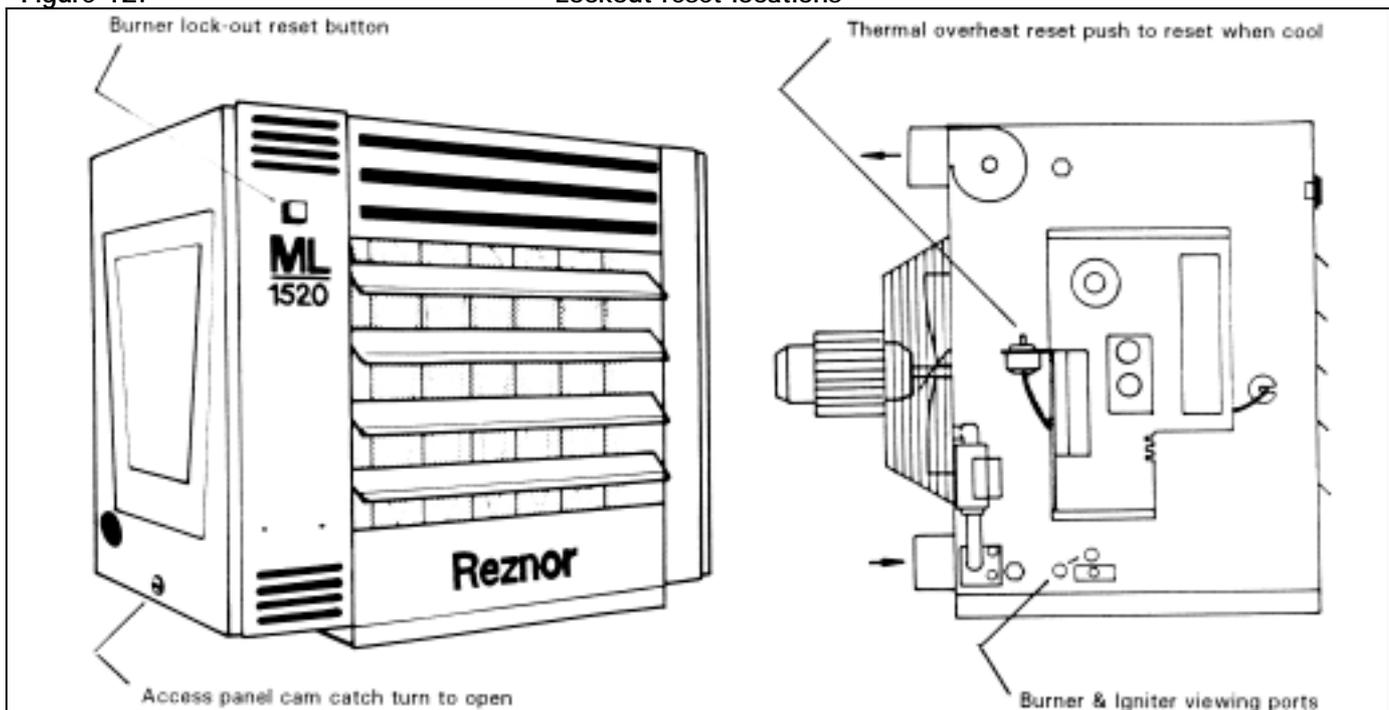
### 13.10 Maintenance and servicing

Maintenance and service must only be carried out by competent persons. Periods between service are dependent upon the local environment where the air heater is installed. Regular inspection is recommended initially to ascertain routine service intervals.

The service instructions in section 8 of this document suggest that the engineer informs the user of his findings. Where the installed environmental circumstance change e.g. different processes being carried out in a factory, the service interval should be reconsidered. If in doubt, ask your installer, service undertaking or the manufacturer about inspection and service intervals. The air heater should be serviced at least once every heating season. Ensure that any combustion air vents fitted to the building in which the air heater is installed are unblocked at all times. Periodically check to ensure that the outer casing of the air heater is clean; excessive dust might constitute a hazard.

13.11 **Warning** : Never switch off the mains electrical supply to the air heater unless the mains gas supply is turned off.

Figure 12: Lockout reset locations



# Reznor® ML SERIES

ONE OF THE Reznor GENERATION OF CE MARKED GAS FIRED  
ENERGY EFFICIENT AIR HEATERS

BEST USED WITH Reznor OPTIONAL ELECTRONIC CONTROL PANELS  
SAVE ENERGY AND OPTIMISE THERMAL COMFORT