



VPx

User, Installation & Servicing Manual

Issue 1.5 July 2020



Users, Installation and Servicing Instructions

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Warnings

When working on this appliance the following warnings must be observed:



Danger: Electricity



Warning: Flammable Materials



Warning: Hot Surfaces



Warning: Contains Moving Parts



Read and understand this Service Manual Instructions before operating or servicing this appliance

User Instructions



If the heater has not been left operational proceed as follows.

A) Checks before operating the Air Heater

The following preliminary checks should be made before lighting the heater(s)

- Ensure that the ELECTRICAL supply to the heater is switched OFF.
- Check that any warm air delivery outlets are open.
- Check that the thermostat is set.
- Check that the clock control is set to an ON period.
- Check that any other controls are calling for heat.

B) Operating the Air Heater

- Switch on the electrical supply at the isolator
- If the Red Limit indicator lamp is illuminated, identify the limit stat, remove the black cap and press the reset button.
- The startup sequence will commence. After a short delay the burners will light and the green 'ON' indicator on the front of the heater will be illuminated.
- If the burners fail to light the control box will automatically restart the ignition sequence. If after 5 attempts at ignition the burners have still failed to light the control box will go to lockout and the Amber lockout lamp on the front of the heater (or on the low level remote reset, or MC200/MC300 if fitted) will be illuminated. To restart the ignition sequence depress the reset button on the low level reset for about 1-2 seconds.



WARNING: If it is not possible to light the heater after several attempts, contact the installer or local service company.

C) To Shut Down the Air Heater

1) For Short Periods:

Turn the room thermostat to the OFF, or set to 'Summer Mode'.

2) For Long Periods:

Complete step 1 above. Wait for 5 minutes and then turn OFF the electrical supply at the isolator.

D) Description of Operation



Important: The heater must NOT be controlled by switching ON and OFF the main electrical supply to it.

1) Standard Units

The ignition sequence commences each time the external controls e.g. time clock, room thermostat, controller etc. call for heat. The internal exhaust fan will run and, when sufficient combustion airflow is proved by the air pressure switch, the ignition spark will be generated, the main gas valve opens and the burners will light on HIGH FIRE for the first 30 seconds irrespective of the requirements of the external control. The green 'ON' indicator will be illuminated. The heater fan will automatically start 30 seconds after the burners light. After the first 30 seconds, the heat output will then be controlled either to high fire or low fire depending on the requirements of the space being heated and the external controls fitted. When the external controls are satisfied the burners will be turned off and 2½ minutes later the heater fan will automatically stop. If the burners fail to light the control box will make another four attempts at ignition before going into burner lockout. The amber 'Lockout' indicator/reset switch will be illuminated.

2) Modulating Units

When the burners are alight, the heat output will be controlled to any point between high and low fire; depending on the requirements of the space being heated and the external controls fitted.

3) Summer / Winter Modes

Certain types of external controls will provide for two modes of operation i.e:

Summer: The heater fan alone will run at the dictate of the external controls to provide air movement.

Winter: The heater will operate normally.

4) Overheat Thermostat

This operates if high temperatures within the heater are detected, the burners are turned off and a Red indicator lamp on the front panel is illuminated. VPx35 - 70 units have a single thermostat located inside the heater. VPx90 - 140 units have an additional thermostat on the side of the unit at the opposite end to the controls (either thermostat can go to limit and shut off the burners). The fault condition must be identified and rectified and the thermostat manually reset via the red high limit reset switch. When the unit has cooled, identify the limit stat, remove the black cap and press the reset button. The red indicator lamp will go out and the unit is operational again.



Note: The limit thermostat(s) can only be reset once the unit has cooled down. Unless the cause of the fault condition is readily obvious, for example a power cut whilst the heater was operating, a service engineer should be contacted.

E) Maintenance

To maintain efficient, reliable and safe operation of the heater it must be serviced annually by a qualified person.

F) IMPORTANT

Free access must be maintained to and around the heater for servicing purposes and the air supply to the heater must not be restricted in any way. Combustible materials must not be stored adjacent to the heater.

If at any time a gas leak is suspected, turn OFF the gas supply at the meter and contact the local gas undertaking immediately.

All Powrmatic heaters use gas and electricity to power them, they may also contain moving parts such as pulleys and belts. It would be hazardous to tamper with or attempt to service unless you are a competent person in the field of Gas and Electrical work.

If you have any safety questions reference the servicing and installation of any of our heaters please do not hesitate to contact our head office for expert advice. Your safety is paramount to us.

Gas Safety (Installation & Use) (Amendment) Regulations 2018



It is law that all gas appliances are installed, adjusted and, if necessary, converted by qualified persons* in accordance with the current issue of the above regulations.

Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

* Gas Safe Registered Engineer

1.1 Introduction

The VPx range are highly efficient, gas fired, fanned circulation air heaters that cover heat outputs of 35kW to 140kW, have a closed combustion circuit and are supplied complete with a flue system that can be either vertical or horizontal.

VPx heaters are certified for use on Natural Gas, Group H - G20*. Appliance Categories are Cat II2H (GB, IE). All VPx heaters are CE certified and conform to all the European directives stated in section 1.3.1

VPx heaters are designed to be floor standing and have a centrifugal fan assembly fitted at the base of the heater to circulate the air being heated past the formed tube heat exchanger.

VPx heaters feature a closed combustion circuit and have an internal exhaust fan, mounted downstream of the heat exchanger, to evacuate the products of combustion and draw in air for combustion. The air heater must be connected to a flue system that is approved by Powrmatic Ltd.

The heaters intended primarily for heating commercial or industrial premises. They must not be used where the atmosphere inside the premises could be contaminated e.g. Dust, oil mist etc. or in areas classified as hazardous

as defined in BS 5345: Part 2. They are not suitable for siting externally.

Heaters are fitted as standard with inshot burners, a fully automatic control for ignition, flame sensing, gas supply control and safety functions, an internal exhaust fan, main air fan, fan command module and a limit thermostat.

Options include Modulating burner controls, inlet duct connection, outlet duct connection, 90° outlet bend and a full range of modular duct components.



IMPORTANT

Service and Maintenance Engineers shall ensure that replacement items are fitted, adjusted and set in accordance with the data and detail set out in these instructions. If in doubt consult Powrmatic Technical Department.

* LPG conversion kits available.

Technical Specification

VPx

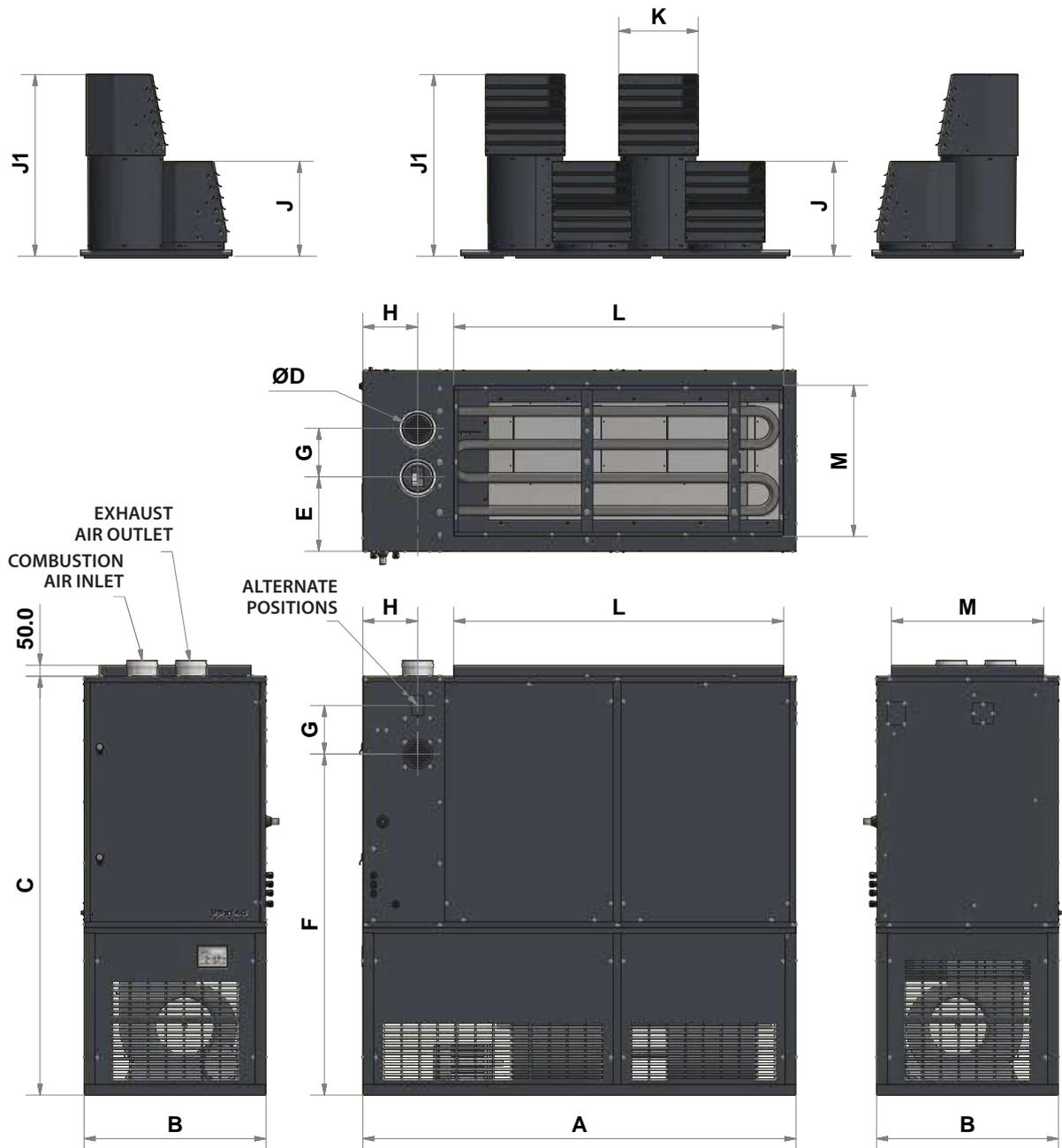
Model			35	50	70	90	120	140	
Output (nominal)	High Fire (max)	kW	34.0	50.5	70.0	90.0	118.5	137.0	
	Low Fire (min)	kW	23.8	33.9	46.7	65.3	83.5	93.3	
Input (nett CV)	High Fire (max)	kW	36.5	54.5	74.0	97.5	127.0	146.0	
	Low Fire (min)	kW	26.08	37.41	51.67	71.65	90.83	101.16	
Air Flow Volume		m ³ /s	1.11	1.51	1.94	2.81	3.56	3.75	
Airflow	Heads		3			4			
	Throw		m	12	22	25	27	30	32
	Fan Static	Standard	Pa	250	250	250	180	290	250
		Uprated	Pa	400	400	400	400	400	400
Electrics	Supply	Standard	V/ph/Hz	230/1/50					
		Optional*	V/ph/Hz	N/A		<i>(400/3/50)</i>			
	Start Current		amp	15.6	26.3	38(18)	34(14)	34(14)	46(29)
	Run Current		amp	4.7	7.6	11(5.3)	9.8(4.18)	9.8(4.18)	13.1(8.43)
Fuel	Connection		BSP/Rc	¾"					
	Nominal Inlet Pressure	Nat Gas	mbar	20.0					
		LPG	mbar	37.0					
	Consumption	Nat Gas	m ³ /h	3.86	5.77	7.83	10.32	13.44	15.45
LPG		m ³ /h	1.52	2.20	3.16	4.01	5.10	5.90	
Overall Dims	VPx UF	Height	mm	2184	2286	2381	2607	2607	2722
		Width	mm	819	819	819	819	819	819
		Depth	mm	1325	1325	1325	1950	1950	1950
Install Clearance	VPx UF	Front	mm	1000					
		Blank Side	mm	150 (wall facing side)					
		Louvred Side	mm	500					
		Rear	mm	500					
		Above	mm	1000					
Flue	Diameter		mm Ø	100	100	130	130	130	130
	Maximum Length	Flue Only	m	12					
		Room Sealed	m	6					
Combustion Air Spigot		mm Ø	100			130			
Noise Levels	VPx UF	dB(A)	60	62	63	68	69	70	
Nett Weight	VPx UF	kg	180	209	287	426	468	542	
Model			35	50	70	90	120	140	

Notes:

Fuel Consumption and input figures based upon nett calorific values as follows: -
 Natural Gas (G20) nett CV 34.02 MJ/m³ - Propane (G31) nett CV 88.00 MJ/m³

- Heaters have efficiency levels which meet with the minimum heater efficiency requirements of UK Part L Building Regulations.
- VPx heaters comply with the seasonal efficiency and NOx limits requirements of the Ecodesign regulation (EU) 2015/1188, Directive 2009/125/EC – Lot 21 Tier 1
- Standard heaters configured as High/Low. Optional modulation available.
- Air handling data is assessed at room ambient conditions
- Throw figures provide the distance to the point where the terminal velocity degrades to 0.25m/s

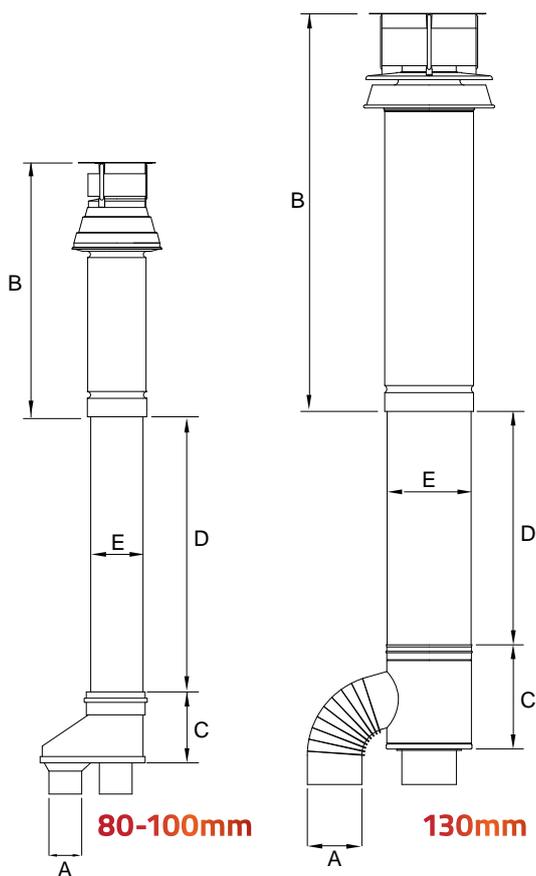
- Noise levels are applicable to standard VPx models and are measured 5m from appliance in a free field.
- Motor kW, run and start amps apply to standard electrical supply as stated. For optional data contact sales office.
- Optional 3 phase direct drive centrifugal blowers shown in italics within brackets()*.
- Connection of combustion air duct is not required for 'flue only' applications.
- It is the responsibility of the installing contractor to ensure that ductwork is correctly sized and balanced when installing VPx Centrifugal units.



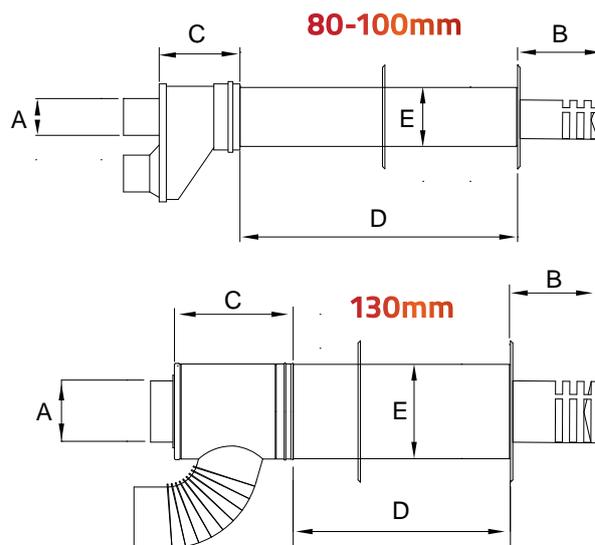
Model		35	50	70	90	120	140
A	mm	1325	1325	1325	1950	1950	1950
B	mm	819	819	819	819	819	819
C	mm	1672	1672	1672	1900	1900	1900
DØ	mm	100	100	130	130	130	130
E	mm	356	356	356	337	337	337
F	mm	1314	1314	1236	1547	1547	1547
G	mm	142	142	220	220	220	220
H	mm	237	237	237	247	247	247
J	mm	255	286	345	345	345	400
J1	mm	512	614	709	707	707	822
K	mm	207	256	308	308	308	320
L	mm	915	915	915	1485	1485	1485
M	mm	685	685	685	685	685	685

Dimensions

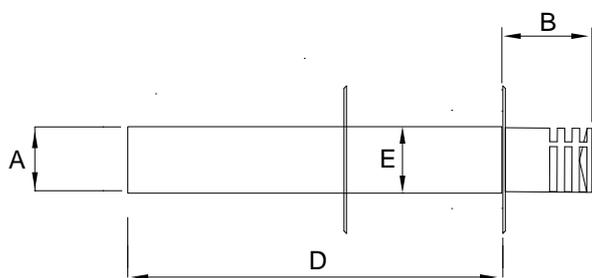
Flue and Flue Components



Concentric Horizontal Terminal					
Size	A mm	B mm	C mm	D mm	E mm
80	80	175	105	560	130
100	100	170	145	560	150
130	130	185	250	420	200

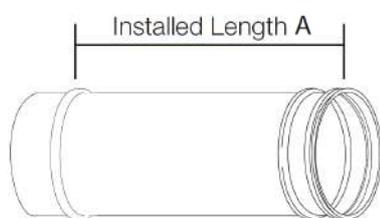


Concentric Vertical Terminal					
Size	A mm	B mm	C mm	D mm	E mm
80	80	605	105	630	130
100	100	550	145	770	150
130	130	960	250	560	200

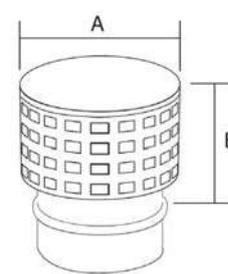


SW Horizontal Terminal				
Size	A mm	B mm	D mm	E mm
80	80	175	560	130
100	100	170	560	150
130	130	185	420	200

Lengths	
Size	A mm
1000	974
500	474
250	224



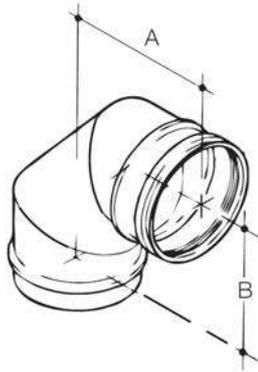
SW Vertical Terminal		
Size	A mm	B mm
80	210	90
100	210	90
130	235	115



Dimensions

Flue and Flue Components

90° Elbow		
Size	A mm	B mm
80	155	105
100	160	110
130	175	125



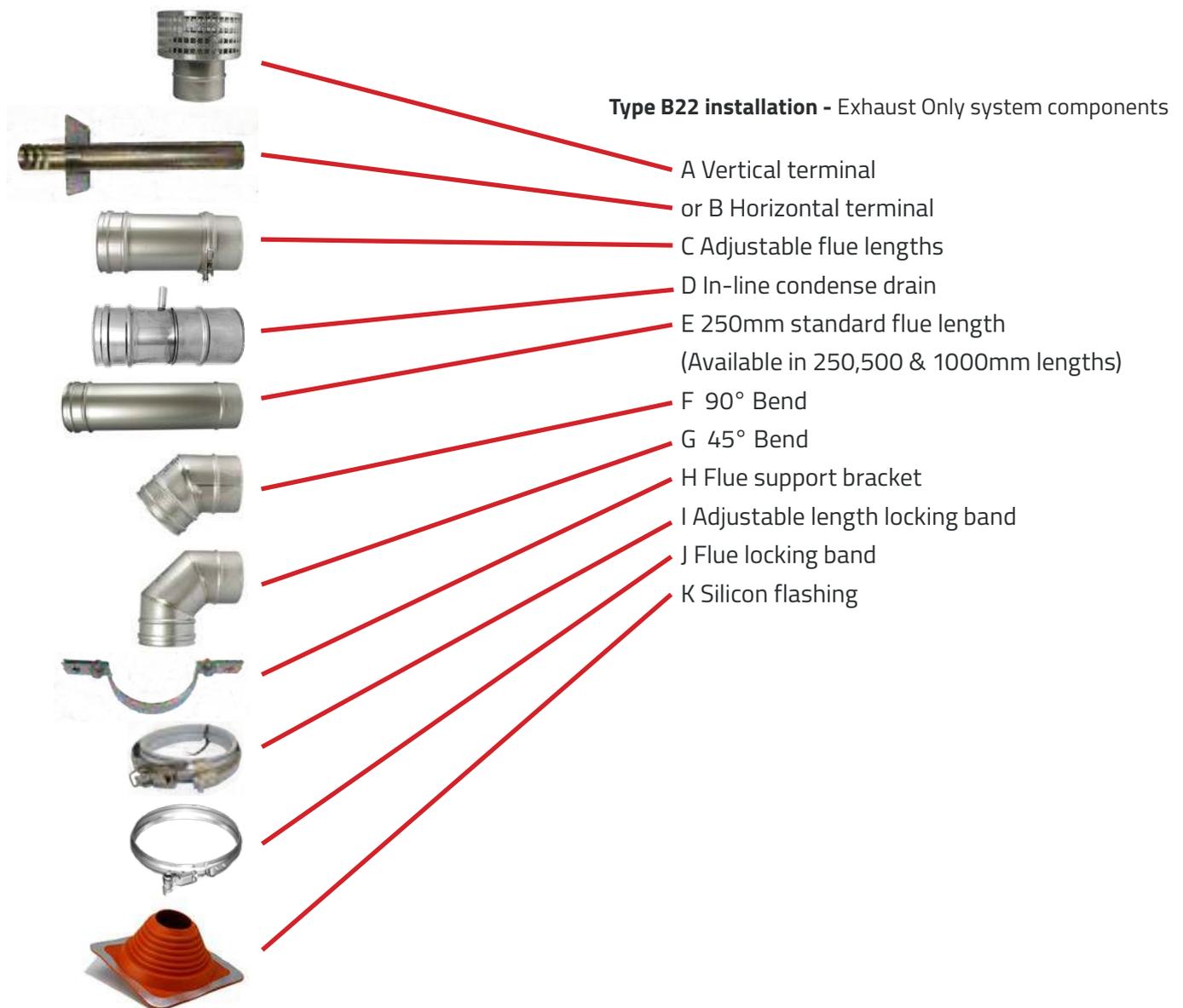
45° Elbow		
Size	A mm	B mm
80	62	102
100	66	106
130	70	116



Flue Options

Single Flue type B22

The flue system will take form of individual components.



Flue Options

Balanced Flue type C12 or C32 Kits

The flue kit will take form of the following components:

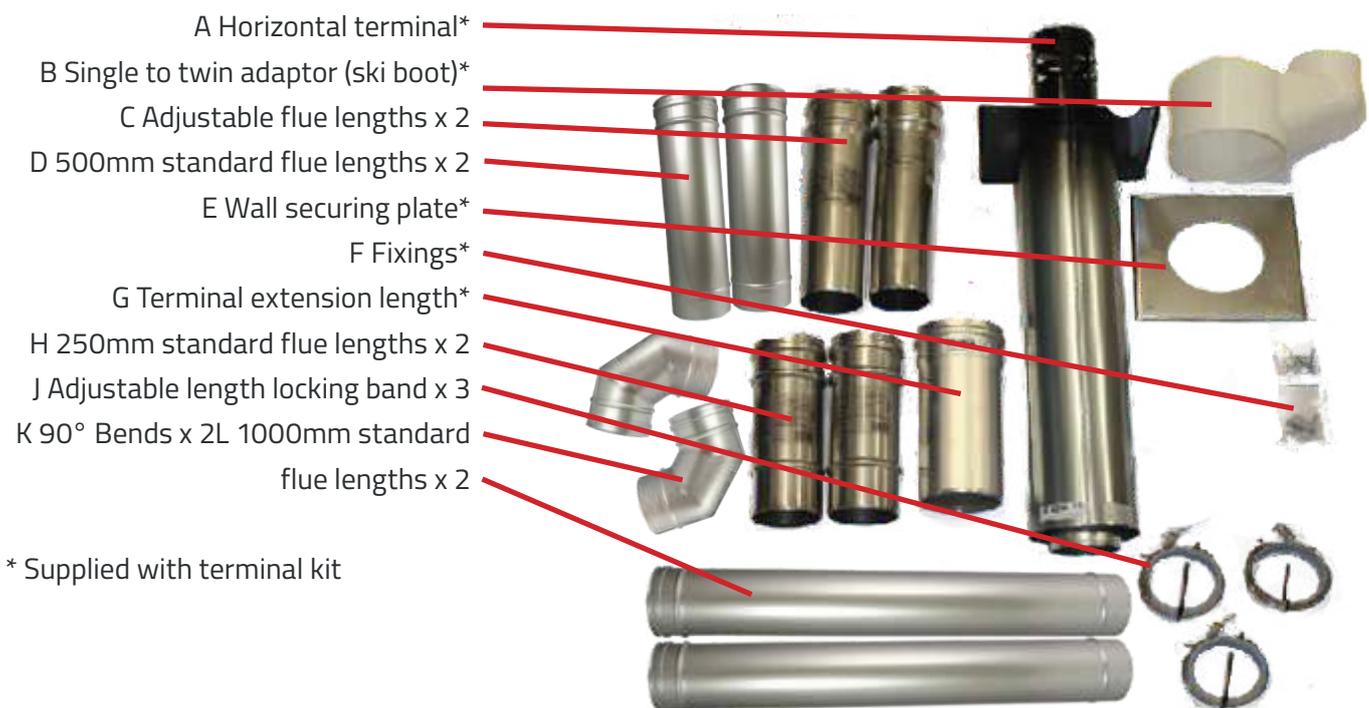
Type C32 installation - Vertical Balanced Flue kit



- A Vertical terminal*
- B Single to twin adaptor (ski boot)*
- C Adjustable flue lengths x 2
- D In-line condense drain
- E 250mm standard flue length
- F Terminal extension length*
- G Flue support bracket
- H Fixings and glue*
- I Adjustable length locking band x 3
- J Silicon flashing

* Supplied with terminal kit

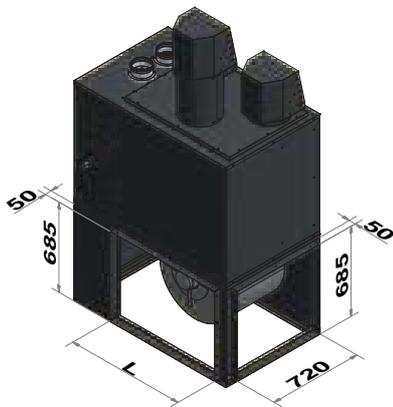
Type C12 installation - VPx Horizontal Balanced Flue kit



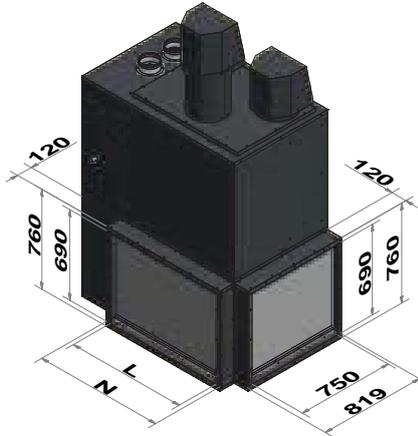
- A Horizontal terminal*
- B Single to twin adaptor (ski boot)*
- C Adjustable flue lengths x 2
- D 500mm standard flue lengths x 2
- E Wall securing plate*
- F Fixings*
- G Terminal extension length*
- H 250mm standard flue lengths x 2
- J Adjustable length locking band x 3
- K 90° Bends x 2L 1000mm standard flue lengths x 2

* Supplied with terminal kit

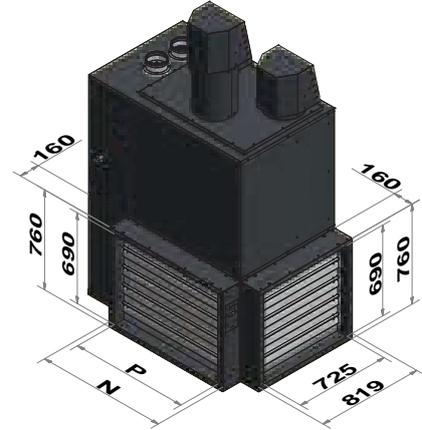
Side/rear Inlet Spigots



Filters



Dampers



Model		35	50	70	90	120	140
L	mm		915			1485	
N	mm		995			1620	
P	mm		900			1525	

Notes -

- All dimensions are outside dimensions
- Standard filter specification is 10ppi
- Higher specification filters available on request - contact our sales team for more information
- Standard dampers are manual operation - motorised options available

Head Plans

Head Plan 1

(35, 50 & 70)



Head Plan 2

(90, 120 & 140 only)



1.2 Technical Data

Injector Sizes & Burner Pressures - Natural Gas - Group H - G20 Net CV (Hi = 34.02MJ/m³)

(All variants)				High Fire		Low Fire	
Injectors				Burner Pressure	Gas Rate	Burner Pressure	Gas Rate
MODEL	No.	Size (mm)	Marked	mbar	m ³ /h	mbar	m ³ /h
VPx35	5	2.26	580	13.2	3.86	5.8	2.76
VPx50	7	2.54	750	9.5	5.77	4.5	3.96
VPx70	10	2.54	750	8.5	7.83	4.5	5.47
VPx90	8	3.5	1500	5.5	10.32	3.0	7.58
VPx120	10	3.5	1500	6.7	13.44	3.3	9.61
VPx140	12	3.5	1500	6.2	15.45	2.9	10.7

Nominal Inlet Pressure = 20mbar

Minimum Inlet Pressure = 17.5mbar

1.3 General Requirements

1.3.1. Related Documents

All VPx heaters comply with the following European Directives:

Energy Related Product Directive:	2009/125/EC*
Gas Appliance Directive:	2009/142/EC
Electromagnetic Compatibility Directive:	2004/108/EC
Low Voltage Directive:	2006/95/EC
Machinery Directive:	2006/42/EC

Air heater(s) must be installed in accordance with **BS6230** and **BS5440** plus any relevant requirements of local and national building codes. * *where appropriate*.

1.3.2 Location

Powrmatic VPx units are designed to operate within an ambient temperature range of -10 to 25°C.

VPx heaters should be located on a solid and level surface. The location chosen must have adequate space for servicing and air circulation around the air heater as well as an adequate air supply.

Consideration should be given to flue routes and points of exit, gas, electrical and control connections. Consideration should also be given to the throw characteristics of the heater, issues of public access and siting of environmental control stations and/or remote temperature sensors where the position needs to be representative of the zone temperature to which they refer.

Where the location of the air heater is such that it might

suffer external mechanical damage e.g. from overhead cranes, fork lift trucks, it must be suitably protected.

Heaters should not be installed in hazardous areas or areas where there is a foreseeable risk of flammable or corrosion inducing particles, gases or vapours being drawn into the combustion air or main fan circuits.

Areas where special consideration or advice may be required could include but is not limited to –

- Where de-greasing solvents are present, even in minute concentrations
- Where paint spraying is carried out
- Where styrenes or other laminating products are used
- Where airborne silicone is present
- Where petrol engine vehicles are stored or maintained
- Where dust is present (i.e. wood working or joinery shops)
- Where high levels of extract persist.

Installation in such areas may be possible under specific conditions. Please consult our Technical Department for further information.

1.3.2.1 Sizing of the heater

The heater should be correctly sized for the area that it is heating, Full calculations need to be performed to ensure the correct KW output heater is fitted (CIBSE elemental methodology can be used, or the Powrmatic Technical Department can provide guidelines).

1.3.3 Electrical Supply

Wiring external to the air heater must be installed in accordance with the I.E.E. Regulations for Electrical Installations and any local regulations which apply.

All standard heaters are supplied by 230V - 1ph, 50Hz. The method of connection to the main electricity supply must:-

- facilitate the complete electrical isolation of the unit(s) via a suitable fused isolator (see section 2.4.5 for ratings)
- be in a readily accessible position adjacent to the unit(s)
- serve only the unit(s)
- have a contact separation of at least 3mm in all poles.

See the accompanying wiring diagram for the heater electrical connections

VPx 90-140 units can also be supplied for 400V 3N, 50Hz.

1.3.4 Gas Supply

A servicing valve and union to facilitate servicing must be fitted to the gas inlet pipe work of the heater. The gas supply must be completed in solid pipe work and be adequately supported.

Heaters suspended by drop rods, straps or chains must have a flexible connection as the final link between the gas supply pipe work and the heater. Sufficient slack must be left in the connection to take account of normal movement of the heater.



WARNING: When completing the final gas connection to the heater do not place undue strain on the gas pipe work of the heater.

1.3.4.1 Service Pipes

The local gas undertaking should be consulted at the installation planning stage in order to establish the availability of an adequate supply of gas to suit the building requirements. An existing service pipe must not be used without prior consultation with the local gas undertaking.

1.3.4.2 Meters

An existing meter should be checked, preferably by the gas undertaking, to ensure that the meter is adequate to deal with the total rate of gas supply required by all connected equipment.

1.3.4.3. Installation Pipes

Installation pipes should be fitted in accordance with IGE/UP/2. Pipe work from the meter to the air heater must be of adequate size.

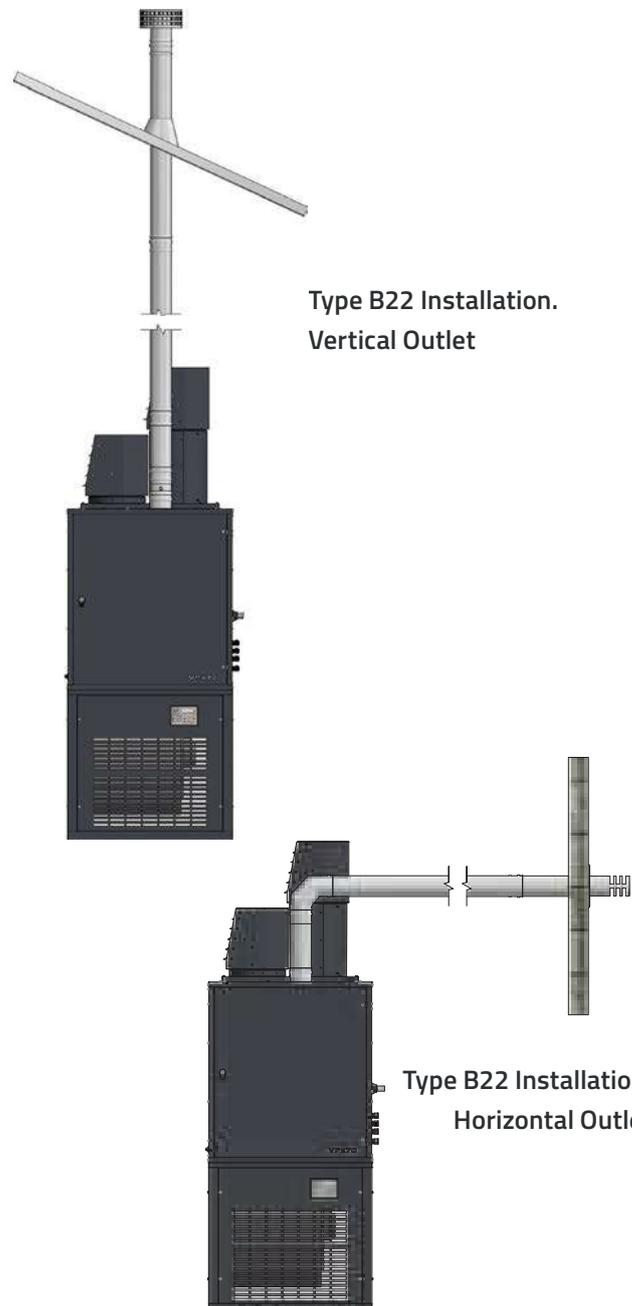
Do not use pipes of a smaller size than the inlet gas connection of the heater.

The complete installation must be tested for soundness as described in the above Code.

1.3.5 Flue System

Only flue systems supplied through Powmatic Ltd may be used with VPx units. Several configurations of flue and combustion air ducts are available.

The flue must terminate in a freely exposed position and be sited to prevent the products of combustion entering any opening in a building in such concentration as to be prejudicial to health or a nuisance.

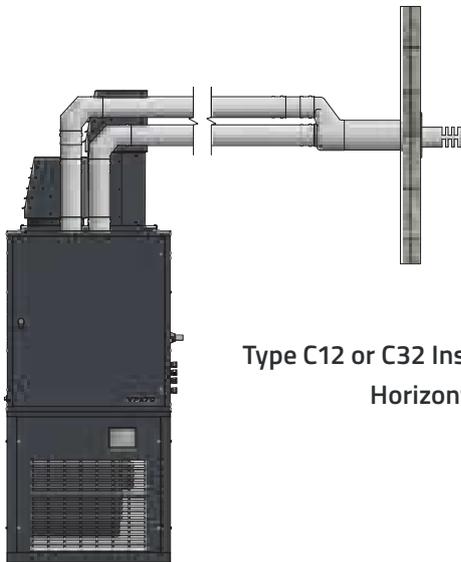
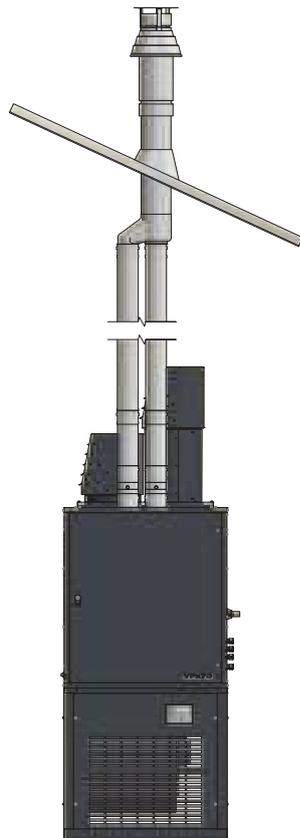


Type B22 Installation.
Vertical Outlet

Type B22 Installation.
Horizontal Outlet

1.3 General Requirements

Type C12 or C32 Installa
Vertical Outlet



Type C12 or C32 Installation.
Horizontal Outlet

If the building design air change rate is **less than 0.5/h**, additional provision for natural or mechanical ventilation **is required**. These being:

- **Natural Ventilation:**

Grilles having a free area of at least 2cm² per kW of rated heat input shall be provided at low level i.e. below the level of the heater flue connection.

- **Mechanical Ventilation:**

Must ensure that the space air change rate is at least 0.5/h, must be of the 'input' type and interlocked to ensure the heaters cannot work if the input system is not working.

Type B flued installations.

Where VPx heaters are **installed in a plant room or an enclosure (i.e. not within the heated space)** having combustion air drawn directly from the room and connected to a flue that evacuates the products of combustion directly from the room additional provision for natural or mechanical ventilation **is required**.

These being:

- **Natural Ventilation:**

There must be permanent air vents communicating directly with the outside air, at high level and at low level.

Plant Rooms

Low level (inlet) 4cm²/kw of total rated net heat input

High level (outlet) 2cm²/kw of total rated net heat input

Enclosures

Low level (inlet) 10cm²/kw of total rated net heat input

High level (outlet) 5cm²/kw of total rated net heat input

- **Mechanical Ventilation:**

The minimum flow rate of ventilation shall be 4.14m³/h per kilowatt of total rated heat input.

Type C flued installations.

Where VPx heaters are **Installed within the heated space (i.e. not in a plant room or an enclosure)** having combustion air ducted to the appliance and combustion products ducted to the outside air, **NO additional provision for the supply of either combustion air or for combustion products dilution or additional provision for the supply of air is necessary**.

Type C flued installations.

Where VPx heaters are **installed in a plant room or an enclosure (i.e. not within the heated space)** having combustion air ducted to the appliance and combustion products ducted to the outside, **air vents shall be provided and be permanently open**.

- **To room or internal space**

Low level (inlet) 10cm²/kw of total rated net heat input

High level (outlet) 10cm²/kw of total rated net heat input

- **Direct to outside air**

Low level (inlet) 5cm²/kw of total rated net heat input

High level (outlet) 5cm²/kw of total rated net heat input.

1.3.6 Ventilation Requirements

Type B flued installations.

Where VPx heaters are **installed within the heated space (ie not in a plant room or an enclosure)** and having a building design air change rate of greater than 0.5/h, additional provision for ventilation is **not required**.

1.3 General Requirements

<p>Type B₂₂ Installation (these refer to section 2.2 of these instructions) Air vents shall be permanently open. In all cases figures are per heater installed. For multi heater installations the appropriate values for each heater must be added together</p>	<p>Type C₁₂ or C₃₂ Installation (these refer to section 2.2 of these instructions) Air vents shall be permanently open. Figures are for heaters in plant rooms or enclosures ONLY In all cases figures are per heater installed. For multi heater installations the appropriate values for each heater must be added together.</p>
--	---

VPx	Input kW	In the heated space	In a plant room, ventilation to outside			In an enclosure, ventilation to outside		In the heated space	Ventilation is to a room or internal space		Ventilation is to a outside air	
		Low level grille. Free area cm ²	Low level grille. Free area cm ²	High level grille. Free area cm ²	Low level grille. Free area cm ²	High level grille. Free area cm ²	Free area grille cm ²	Low level grille. Free area cm ²	High level grille. Free area cm ²	Low level grille. Free area cm ²	High level grille. Free area cm ²	
35	36.5	73.0	146.0	73.0	365.0	182.5	n/a	365.0	365.0	182.5	182.5	
50	54.5	109.0	218.0	109.0	545.0	272.5	n/a	545.0	545.0	272.5	272.5	
70	74.0	148.0	296.0	148.0	740.0	370.0	n/a	740.0	740.0	370.0	370.0	
90	97.5	195.0	390.0	195.0	975.0	487.5	n/a	975.0	975.0	487.5	487.5	
120	127.0	254.0	508.0	254.0	1270.0	635.0	n/a	1270.0	1270.0	635.0	635.0	
140	146.0	292.0	584.0	292.0	1460.0	730.0	n/a	1460.0	1460.0	730.0	730.0	

1.3.7 Air Distribution System

1.3.7.1. Freeblowing Units

VPx units are equipped with rotatable air delivery heads fixed to the top panel of the unit providing rotational and lateral direction. The quantity of heads depend on the heater size (see Head Plans in section 1.2) and consist of a number of standard and extended heads. Extended heads are placed on the rear of the heater when located adjacent to a wall to allow complete freeblowing access without any restrictions.



NOTE: We do not recommend removing and blanking off any of these heads or removing singular heads and replacing with similar sized spiral ductwork. Ducted units are available for these applications.

For free-blowing units installed in buildings having a low heat loss i.e. where single units are required to cover a large floor area, and in buildings with high roof or ceiling heights Calecon thermal economiser units should be fitted to ensure even heat distribution and minimise stratification.

Care should be taken to avoid impeding the heater air throw with racking, partitions, plant or machinery etc. Various outlet configurations are available as optional extras to modify the air throw pattern to suit particular site conditions.

1.3.7.2. Ducted Units

These are designed for use with duct work to more precisely define the point of air delivery, and /or provide ducted return air or ducted fresh air inlet.



IMPORTANT. Ductwork must comply with current regulations and be correctly calculated to comply with the maximum static resistance available for the specific model installed (refer to the duct resistance/ air volume tables shown opposite).



WARNING Ensure that the total aggregate resistance¹ of the duct system, including any dampers, grilles or filters etc, is equivalent to the static pressure capability of the selected heater.

If the total static resistance of the duct system is greater than the stated for that heater, airflow will be restricted and the heater may trip to overheat. Resistance must be reduced to avoid nuisance temperature overheat conditions.

Conversely if the duct system resistance is insufficient, then the main fan motor may draw excess current and trip to overload. Additional resistance must be introduced to stop the fan motor from 'free-wheeling' and eventually causing an electrical thermal trip condition. (e.g. by adjustment of duct outlet nozzles and balancing of the duct system).

1.3 General Requirements

Using a clamp meter around the fan power cable and with all side panels closed, check the running current of the centrifugal fan once the heater is running and compared with the table shown in section 2.6.6.4.

Adjust the balancing dampers within the airflow ductwork system to achieve the current suitable for that specific model.



WARNING: DO NOT EXCEED THE STATED MAXIMUM. Exceeding the MAX running current will cause the fan's thermal overload to trip!



*** IMPORTANT. Furthermore, a 2000mm (2M) straight plenum box with the same cross sectional area as the heater outlet duct spigot, must be fitted to outlet spigot prior to any restriction² in ductwork.**



WARNING: Failure to install this plenum box could cause excess temperatures issues with the heater and nuisance overheats.

All ducting must be independently supported of the air heater. Joints and seams of supply ducts and fittings must be securely fastened and made airtight.

It is recommended that ducting should be connected to the heater spigots via an airtight flexible coupling of noncombustible material. Before fitting coupling it must be ensured that an adequate clearance will be maintained between the ends of the ducting and the heater spigots.

All delivery and return air ducts, including air filters, jointing and any insulation or lining must be constructed entirely of materials which will not contribute to a fire, are of adequate strength and dimensionally stable for the maximum internal and external temperatures to which they are to be exposed during commissioning and normal operation.

Model	Air Volume (m ³ /h)	Max Duct Resistance (Pa)
VPx35 UD	4000	200
VPx50 UD	5450	250
VPx70 UD	7000	250
VPx90 UD	10100	180
VPx120 UD	12800	290
VPx140 UD	13500	250

Where inter-joist spaces are used as duct routes they should be suitably lined with a fire-resisting material.

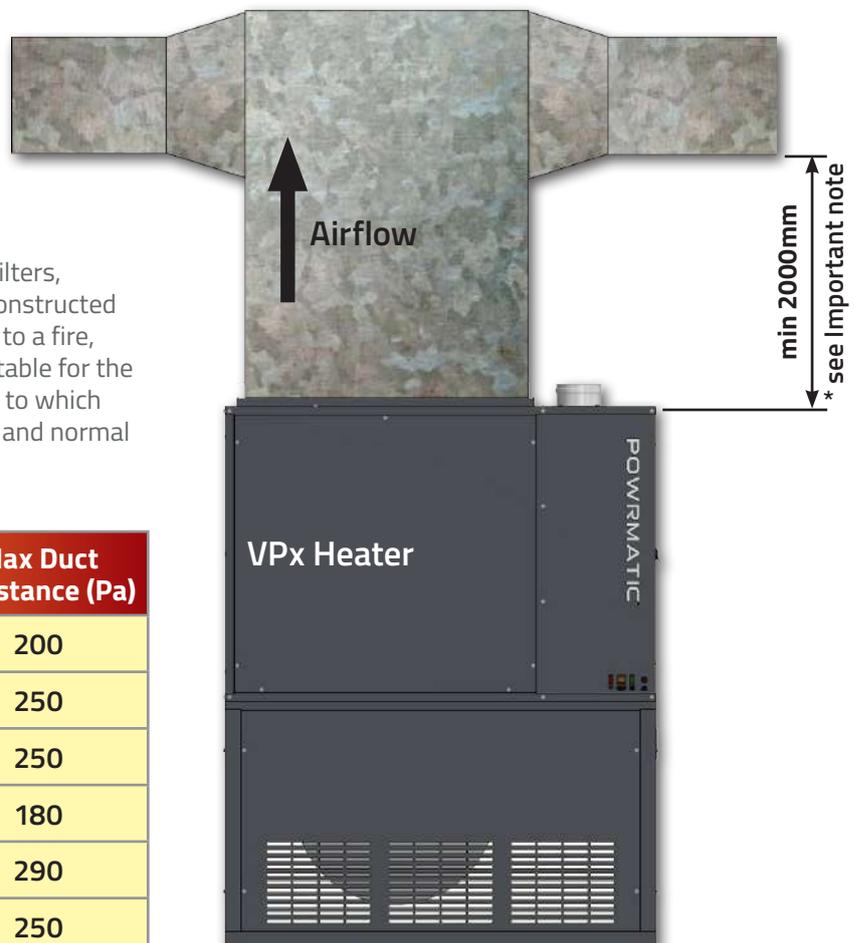
A full and unobstructed return air path to the air heater(s) must be provided. If the air heater(s) is installed in a plant room the return air intake(s) and the warm air outlet(s) from the heater(s) must be fully ducted, into and out of the plant room to avoid interference with the operation of the heater from other equipment.

The openings in the structure of the plant room through which the ducting passes must be fire stopped. Care must be taken to ensure that return-air intakes are kept clear of sources of smells and fumes, and where there is any possibility of pollution of the air by dust, shavings etc., precautions must be taken to prevent contamination.

If necessary suitable barrier rails should be provided to prevent any combustible material being placed within 900mm of the outlets.

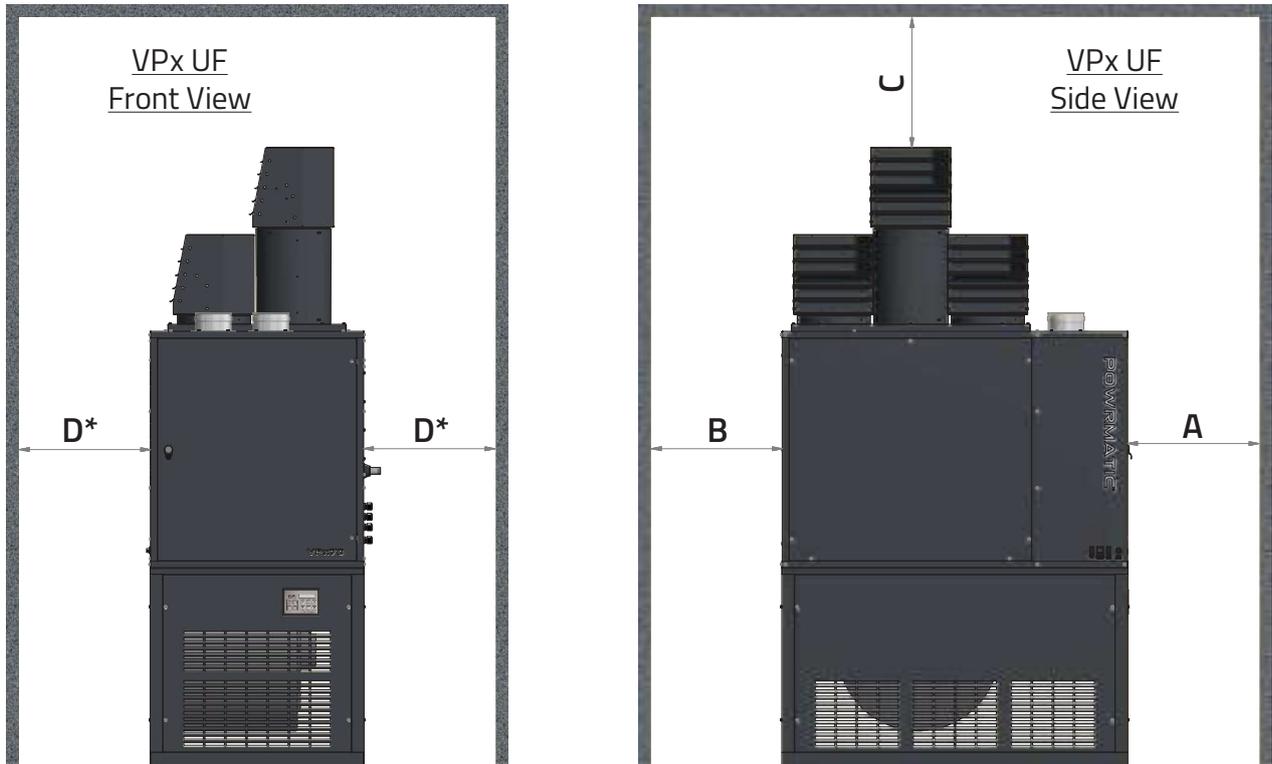
If required sound attenuators may be fitted in inlet and outlet ducts to reduce airborne fan noise. Materials used in outlet sound attenuators must be capable of withstanding 100°C air temperature without any deterioration.

¹ inlet ducting and outlet ducting. ² in respect to reducer, bend or bi-directional section.



2.1 Fitting the Unit

2.1.1 Fitting space requirement



Distance from outside of heater to closest obstacle				Distance
A	Front		mm	1000
B	Rear		mm	500
C	Above		mm	1000
D*	Side adjacent to wall		mm	150
	Opposite Side		mm	500



Note: The minimum clearances must be observed for installation and servicing.



Warning: Any combustible material adjacent to the air heater and the flue system must be so placed or shielded as to ensure that its temperature does not exceed 65 °C.



Note: The access door to the controls section may be removed to improve access. Open the door to 90°, remove the earth cable at the bottom, and then lift the door vertically

upwards to disengage the hinge plates. Refit in reverse order. Ensure that the earth cable is refitted.

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

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

2.1 Fitting the Unit

spraying is carried out, in wood working departments etc. If necessary consideration should be given to mounting the heater on resilient pads, or equivalent, to minimise transfer of noise and vibration to the structure of the building.

Floor mounted heaters must be installed on a level noncombustible surface.

Heaters mounted at high level must be supported on a purpose designed platform or framework that is suspended from vertical drop rods, chains or straps or mounted on specifically designed cantilever brackets from a non-combustible wall.

The method of installation support must be capable of adequately supporting the weight of the unit (See section 1.2) and any ancillary equipment.

Before installing the heater the existing structure must be inspected to ensure it is suitable.

All supports should be protected against the effects of rust or corrosion.

If the method of mounting allows for any movement of the heater it is essential that all gas, duct, and electrical connections to the heater are made with flexible connections to maintain continuity of connection.

2.1.3 Air Distribution System

2.1.3.1 General

VPC heaters, if required, can be used with duct work either to more precisely define the point of air delivery, and / or provide ducted return air or ducted fresh air inlet.

The system should be checked to ensure that the installation work has been carried out in accordance with the design requirements.

Particular attention should be given to the correct arrangement of delivery ducts and registers, return air ducts and grills and general adequacy of return air paths.

Ensure that the total duct system resistance does not exceed the available air pressure of the equipment supplied refer to section 1.2. If the duct system resistance is less than the available air pressure of the equipment supplied additional resistance must be introduced e.g. by adjustment of duct outlet nozzles and balancing of the duct system. Conversely if the duct system resistance is greater than the available air pressure of the heater supplied the system resistance must be reduced.

2.1.3.2 Noise Reduction

Ducting should be connected to the heater spigots via an airtight flexible coupling of noncombustible material.

Before fitting the coupling it must be ensured that a minimum clearance of approximately 15mm will be maintained between the ends of the ducting and the heater spigots.

Sound attenuators may be fitted in inlet and outlet ducts to reduce airborne fan noise. If sound attenuators are used then these must be factored into the total static resistance of the ductwork. Materials used in outlet sound attenuators must be capable of withstanding 100°C air temperature without any deterioration.

2.1.4 Room Thermostat Siting

The room thermostat should be fitted at a point which will be generally representative of the heated area as far as temperature is concerned. Draughty areas, areas subjected to direct heat e.g. from the sun, and areas where the air movement is relatively stagnant e.g. in recesses, should be avoided. The thermostat should be mounted approximately 1.5m from the floor.

Any room thermostat, frost thermostat, time clock etc. must be suitable for switching 230V, 5A and must be of the 'snap action' type to minimise contact bounce.

2.2 Fitting the Flue/Combustion Air

For electrical connections of external controls see section 2.5 or the accompanying wiring diagram. The minimum distance between surfaces of the flue pipe and any surfaces made from combustible materials is 150mm. If it is necessary for the flue pipe to pass through a structure made from combustible materials a metal sleeve must be used so that the minimum clearance of 25mm is maintained.

The flue and combustion air ducts supplied with the heater are capable of withstanding their own weight over the allowable flue lengths. Wall bands and bracing brackets, or equivalent, must be used to provide lateral stability and should be used at centres not exceeding 2.5 metres.

All models are supplied as standard with a top flue outlet and combustion air sockets.

2.2.1. General Requirements

See Figures 1a to 2b for the different types of flue installation. In all cases the flue outlet socket must be connected via the provided flue system to outside air.

2.2 Fitting the Flue/Combustion Air



IMPORTANT: The maximum permitted length of flue system is 6m, or 12m if the flue outlet only is used. If an offset is required two sets of 45° bends should be used each set being equivalent to 0.5m of flue length. 90° bends may be used but each set will be equivalent to 1.0m of flue length.

All outer joints must be finished with the provided locking bands. A smear of silicon grease to the inside of sockets will assist in fitting components together. All flue and combustion air ducts must be supported independently of the air heater.



Note: For flue positioning and minimum clearances of flue, please refer to current IGE/UP/10, BS5440-1 and BS5440-2 standards.

2.2.2. Installation of Flue System



Note: A terminal guard, as supplied by Powrmatic Ltd, must be fitted to horizontal flue terminals.

Notes for all systems.

- i) Final overall length of adjustable disconnection piece must be between 360 - 415mm.
- ii) 45° offsets may be used if required. Each set is equivalent to 0.5m of flue length.
- iii) A terminal guard must be fitted to a horizontal flue terminal situated below 1.8m from floor level.
- iv) Where LNVx heaters are used in clean environments it is permissible to take the combustion air directly from the heated space.
- v) for existing NVx type B22 installations only. It is recommended that both air inlets are utilized and that both are fitted with the mesh inlet plates supplied. In addition a 90° bend should be fitted to the rear inlet, the inlet opening of the bend facing to the side of the heater i.e. away from the main air fan.
- v1) We do not recommend cutting the terminal or flue pipe. All adjustment must be made by the use of the adjustable length and additional lengths of flue, (250mm, 500mm, and 1000mm are available.)

2.2.2.1 Jointing

The flue system is jointed by pushing the male end into the female end of the proceeding component, and then applying a Locking Band.

Each flue item comes complete with a factory bonded elastomer seal which provides a secure grip to the male

end of the next flue component. A seal lubricant gel can be used to facilitate ease of installation and prevent potential damage of the seal during installation.

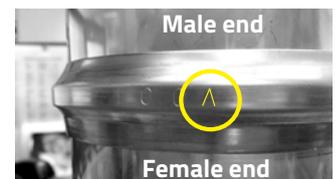
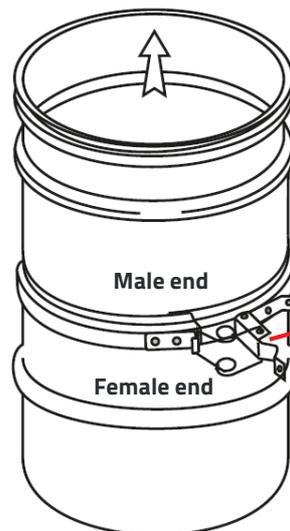
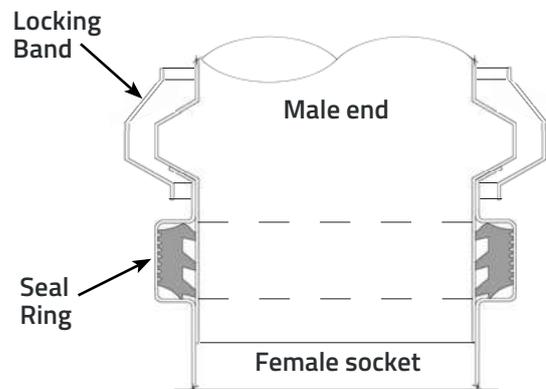
2.2.2.1.1 Using the Regular Flue Locking Bands



NOTE: The locking band has a defined profile which will only allow for the toggle to be closed one way. An indication arrow marked on the face of the clamp must be pointing towards the inserted male end.

Therefore when assembling the band onto the flue, the toggle **must snap to the right** (see diagram below)

Cross sectional area detailing sealing arrangement.



Arrow **MUST** be pointing towards the inserted male end of the flue



Toggle must snap to the right

2.2.2.1.2 Adjustable Lengths

The Adjustable Length consists of a slip section of flue, the lower non-beaded end of which is designed preferably to be located into a standard length. It can also be inserted into the female end of other components, but however applied, must engage to a depth equivalent to at least half

2.2 Flue/Combustion Air Duct System

of the diameter of the flue being used. Adjustment from 75mm to 230mm. Where pressure and moisture resistance are required a special Locking Band & Seal is required to make the joint.

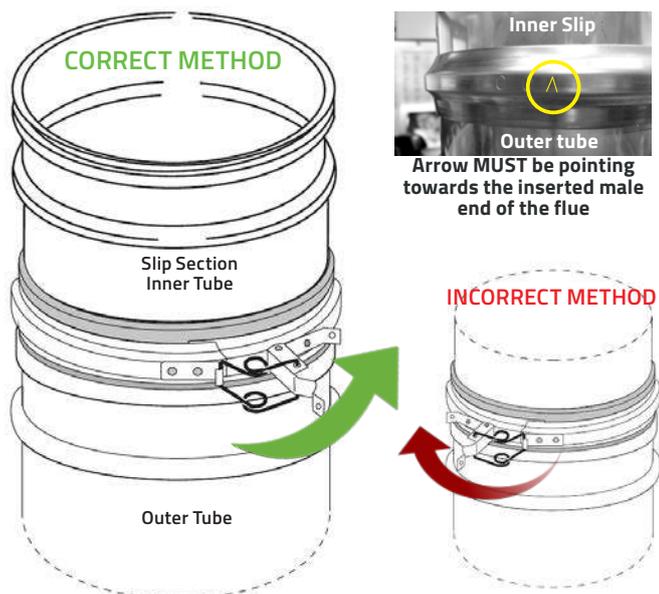
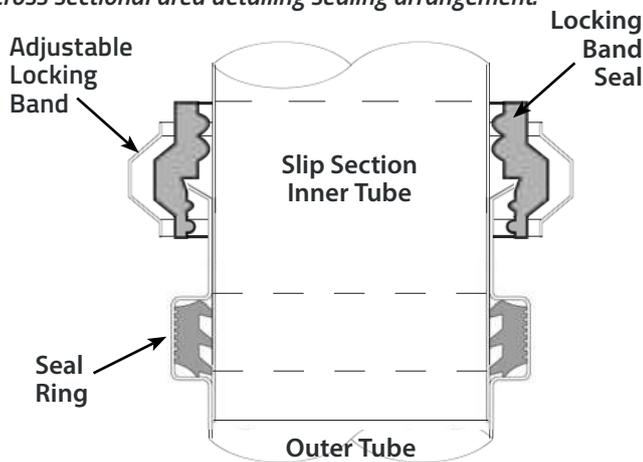
2.2.2.1.3 Using the Adjustable Locking Bands



NOTE: The locking band has a defined profile which will only allow for the toggle to be closed one way. An indication arrow marked on the face of the clamp must be pointing towards the inserted male end.

Therefore when assembling the band onto the flue, the toggle **must snap to the right** (see diagram below).

Cross sectional area detailing sealing arrangement.



Locate the seal over the socketed female end of the outer tube or component female end before inserting the male end, and then pull the seal up so that the angled notch on

its inside locates over the turned end of the female socket as shown on the previous page.

A seal lubricant gel can be used to facilitate ease of installation and prevent potential damage of the seal during installation.

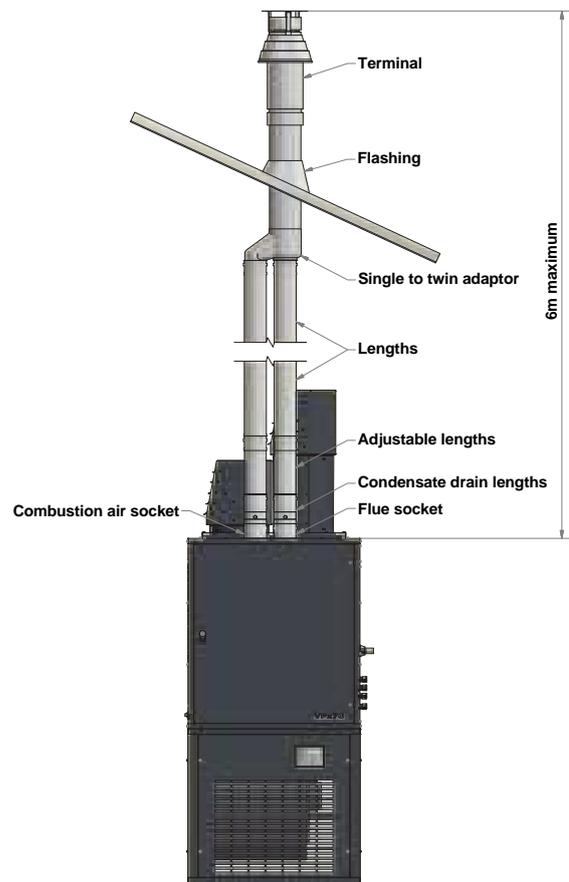
2.2.2.2 Vertical Balanced Flue Assembly type C12



IMPORTANT: The maximum length for a balanced flue system is **6 metres**.

The maximum length of flue is subsequently shortened if bends are added to the planned flue run. **90° bends are equivalent to a 1m length and 45° bends are equivalent to a 0.5 m length.**

Fig 1a . Individual system - Type C32 vertical



Using the glue and screws provided, attach the silicon flashing into place over the hole in the roof, then cut the flashing to match the size of flue.

Insert the vertical terminal through the roof to give the correct height above the roof to relevant regulations or rules in force. Secure using the terminal securing bracket.

Attach the terminal extension length (not required on

2.2 Flue/Combustion Air Duct System

Ø130mm) and the terminal adaptor (ski boot).

Check that the spigots on the heater contain their seals.



NOTE: Refer to breakdown sketch shown opposite to aid with the following procedures.

Slide a condense length fully into the exhaust air spigot and a 250mm standard length fully into the combustion air spigot of the heater (a smear of paraffin will ease fitting).

Place an adjustable length locking band onto each end of the condense and the 250mm standard length ensuring the rubber gasket is the correct way round (see section 2.2.2.1.3). Do not tighten at this stage.

Slide an adjustable length section into each of the ends of the condense and 250mm standard length.

Allow a suitable distance for each adjustable length to slide backwards - to release the flue in the event that the flue needs to be separated in future.

Extra lengths of standard flue can now be added between the adjustable length and the terminal adaptor (ski boot) if required. Clamp all extra lengths with locking bands.

Prior to connection to the terminal adaptor, place an adjustable length locking band onto the last section of the exhaust flue pipe only.

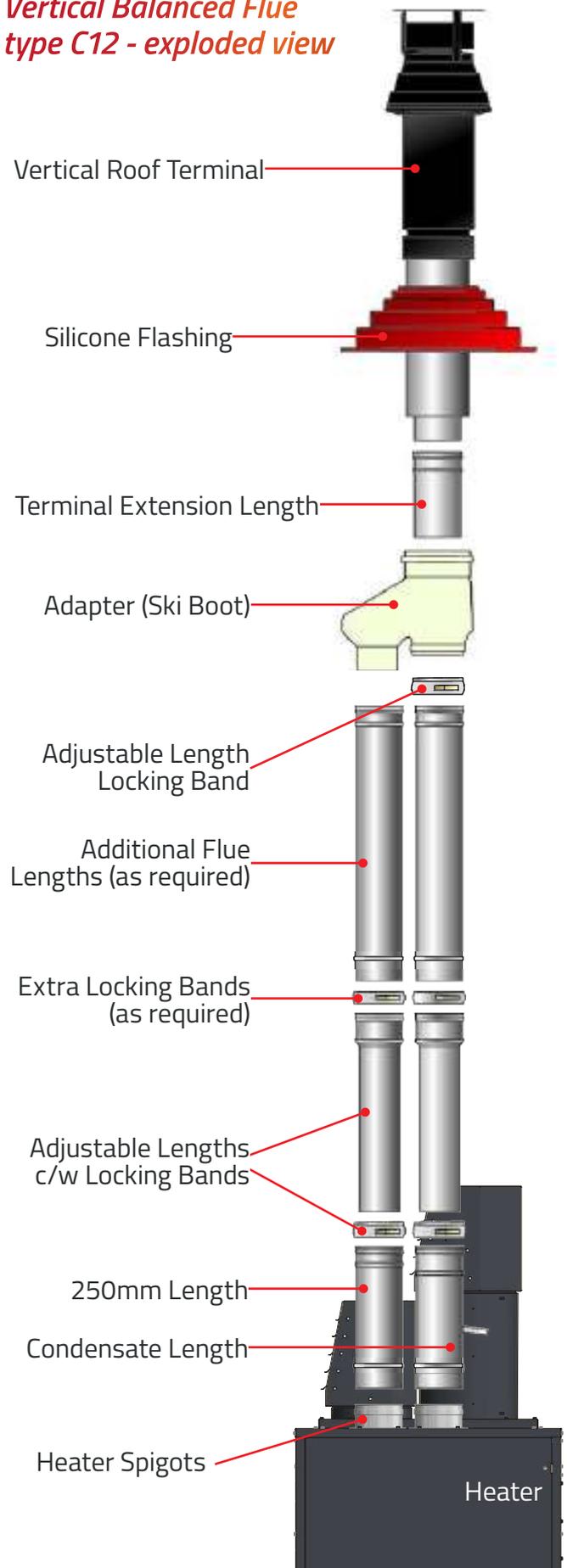
Ensure that the exhaust air connects to the internal tube of the terminal adaptor (heel of the ski boot) and the fresh air inlet connects to the outer flue of the terminal adaptor (toe of the ski boot).

Clamp the adjustable length locking band onto the exhaust flue connection of the terminal adaptor (ski boot).

Once all flue components are correctly in place, lock the adjustable length locking bands back at the adjustable length sections.

Clamp any further flue locking band. (locking bands may be very tight!, see section 2.2.2.1.1 for correct installation).

Vertical Balanced Flue type C12 - exploded view



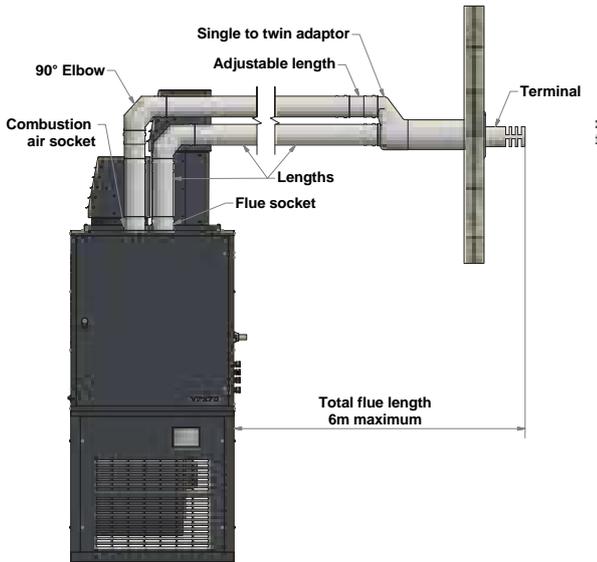
2.2 Flue/Combustion Air Duct System

2.2.2.3 Horizontal Balanced Flue Assembly type C32

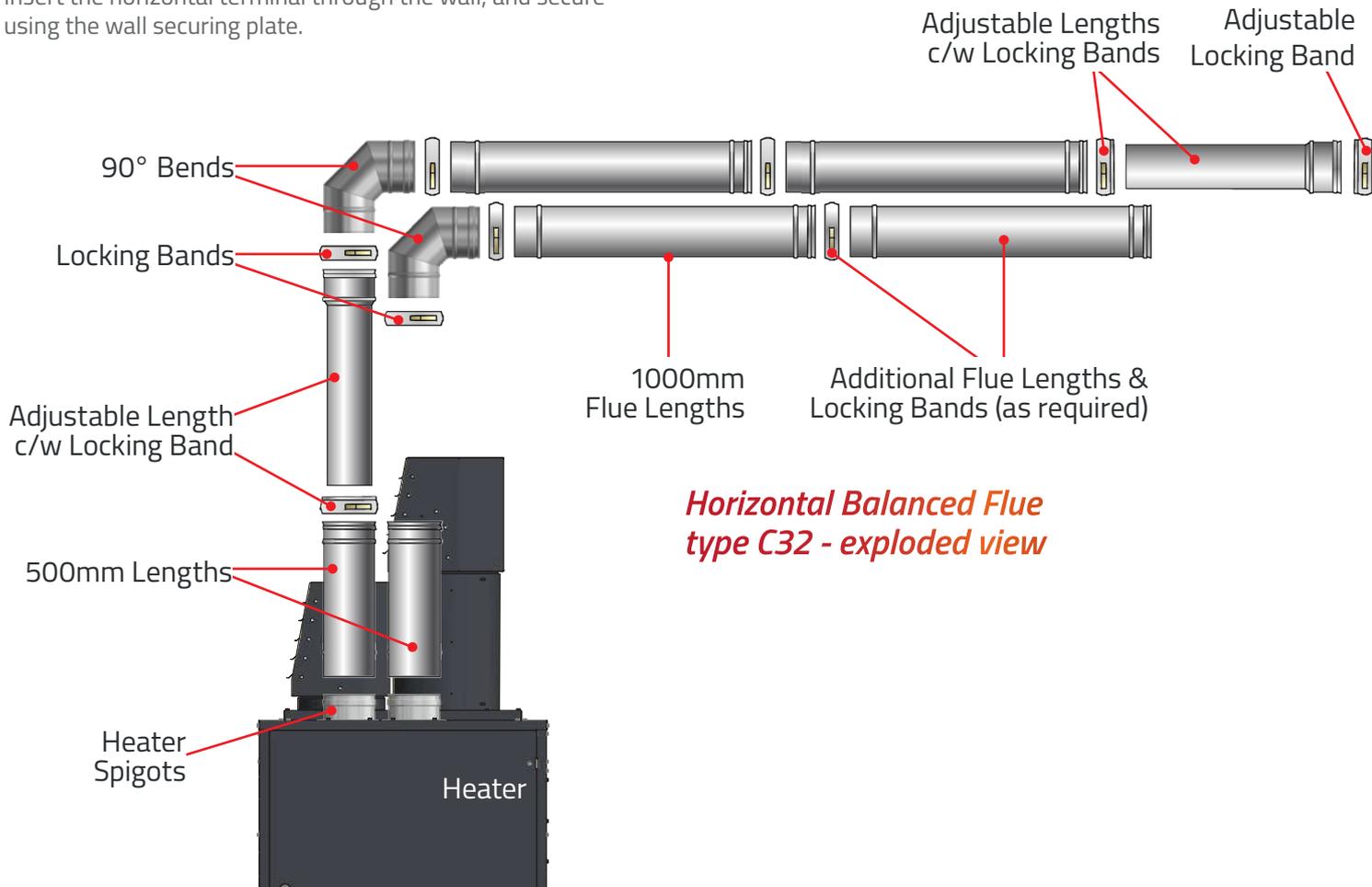


IMPORTANT: The maximum length for a balanced flue system is **6 metres**.

Fig 1b . Individual system - Type C32 vertical



Insert the horizontal terminal through the wall, and secure using the wall securing plate.



Horizontal Balanced Flue type C32 - exploded view

Attach the terminal extension length (not required on Ø130mm) and the terminal adaptor (ski boot).

Check that the spigots on the heater contain their seals.



NOTE: Refer to breakdown sketch shown below to aid with the following procedures.

Slide a 500mm length fully into the exhaust spigot and another into the air inlet spigot of the heater (a smear of paraffin will help ease fitting).

Place an adjustable length locking band onto the end of the air inlet flue pipe ensuring the rubber gasket is the correct way round (see section 2.2.2.1.3). Do not tighten at this stage.

Slide an adjustable length section into the open end of the 500mm length air inlet flue pipe.

Allow a suitable distance for each adjustable length to slide backwards - to release the flue in the event that the flue needs to be separated in future.

Place 90° bends onto each open end of the air inlet and

2.2 Flue/Combustion Air Duct System

exhaust flue pipes. Clamp with locking bands.

Any extra lengths of standard flue can now be added between the adjustable length and the terminal adaptor (ski boot) where required. Clamp with locking bands.

Place an adjustable length locking band onto the end of the air inlet pipe ensuring the rubber gasket is the correct way round (see section 2.2.2.1.3).

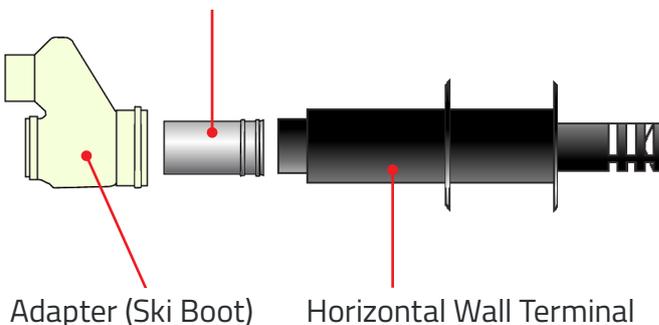
Slide an adjustable length section into the open end of the air inlet flue pipe. Ensure that this adjustable length will connect to the air inlet of the terminal adaptor (toe of the ski boot).

The open end of the flue outlet pipe connects to the inner flue terminal extension length of the terminal adaptor (heel of the ski boot). (a further adjustable section may be necessary to complete any gap created).

Once all flue components are correctly in place, lock the adjustable length locking bands back at the adjustable length sections.

Clamp any further flue locking band. (locking bands may be very tight!, see section 2.2.2.1.1 for correct installation).

Terminal Extension Length



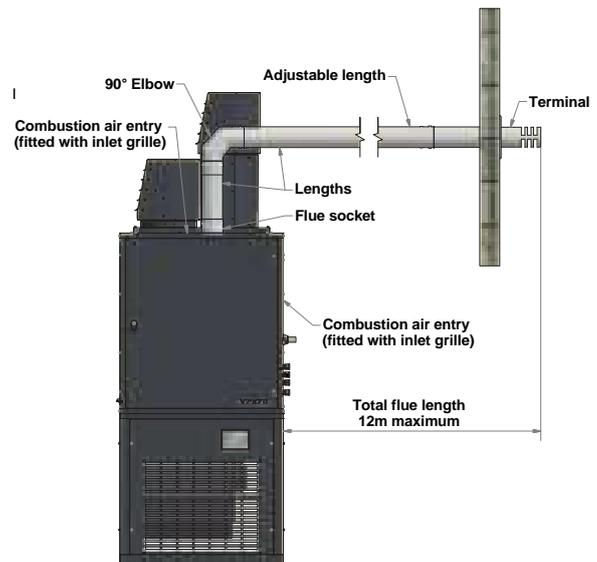
2.2.2.4 Horizontal Single Flue Assembly type B22



IMPORTANT: The maximum length for a balanced flue system is **12 metres**. The maximum length of flue is subsequently shortened if bends are added to the planned

flue run. **90° bends are equivalent to a 1m length and 45° bends are equivalent to a 0.5 m length**

Fig 2b. Exhaust only system - Type B22 vertical



NOTE: Refer to breakdown sketch shown on the next page to aid with the following procedures.

Insert the horizontal terminal through the wall, and secure using the wall securing plate.

Check that the exhaust air spigot on the heater contains a seal.

Slide a 500mm length fully into the exhaust spigot of the heater (a smear of paraffin will help ease fitting).

Place a 90° bend onto both the open end of the 500mm length. Clamp the flue locking band. (This locking band may be very tight!, see section 2.2.2.1.1 for correct installation)

Place a 1000mm length of flue pipe onto both the open end of the 90° bend. Clamp with a locking band.

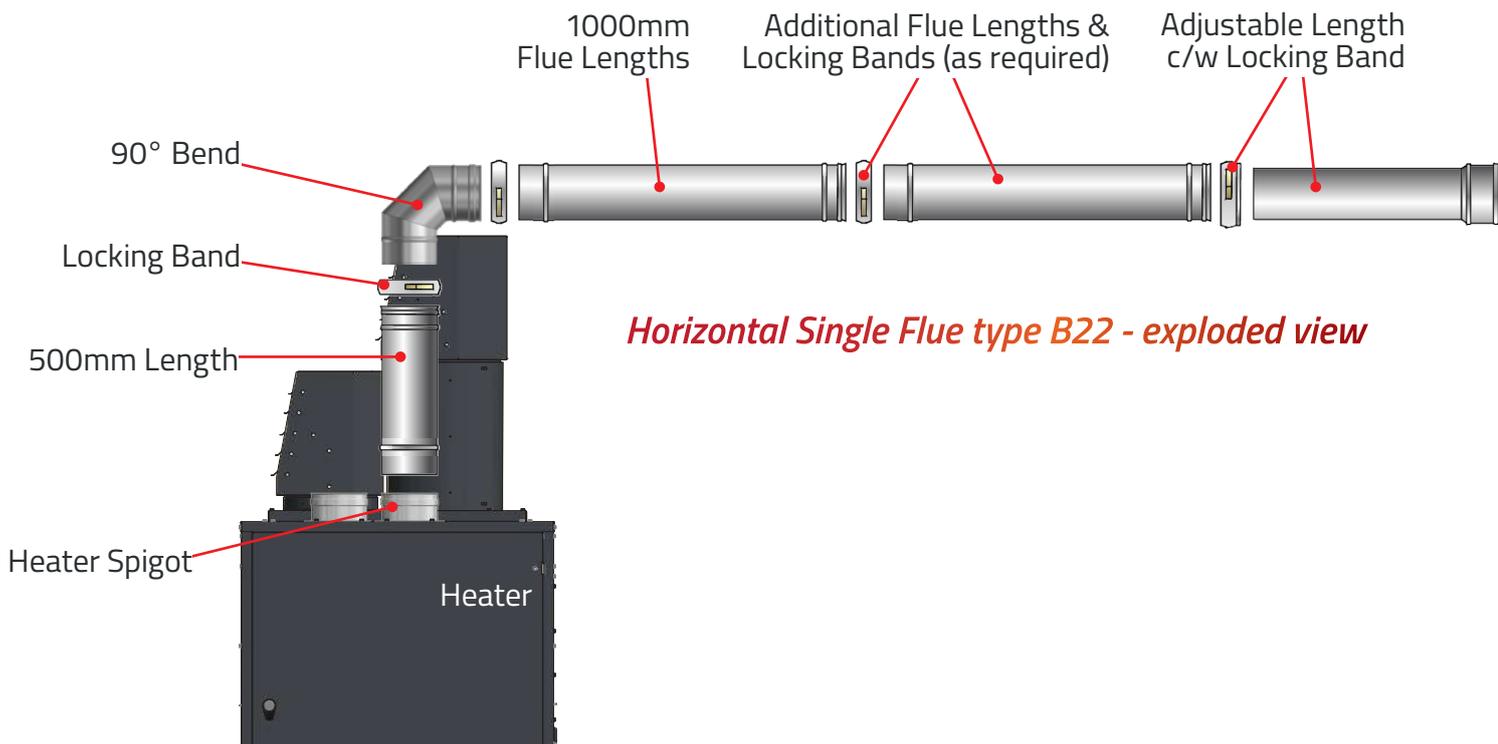
Additional lengths of standard flue can now be added between the adjustable length and final flue connection. Clamp with locking bands.

Place an adjustable length locking band onto the end of the exhaust pipe ensuring the rubber gasket is the correct way round (see section 2.2.2.1.3).

Slide an adjustable length section into the open end of the exhaust pipe. Ensure that this adjustable length will connect to the inlet of the wall terminal.

Once all flue components are correctly in place, lock the adjustable length locking band back at the adjustable length section.

2.2 Flue/Combustion Air Duct System



2.2.2.5 Vertical Single Flue Assembly type B22



IMPORTANT: The maximum length for a balanced flue system is **12 metres**. The maximum length of flue is subsequently shortened if bends are added to the planned flue run. **90° bends are equivalent to a 1m length and 45° bends are equivalent to a 0.5 m length**

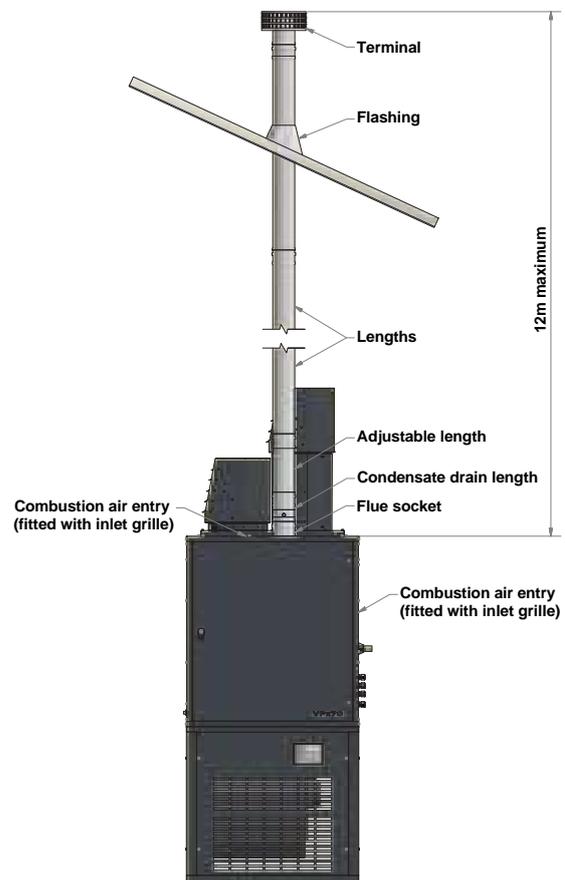
Using the glue and screws provided, attach the silicon flashing into place over the hole in the roof, then cut the flashing to match the size of flue.

Insert a section of flue through the roof to give the correct height above the roof to relevant regulations or rules in force. Secure using the terminal securing bracket.

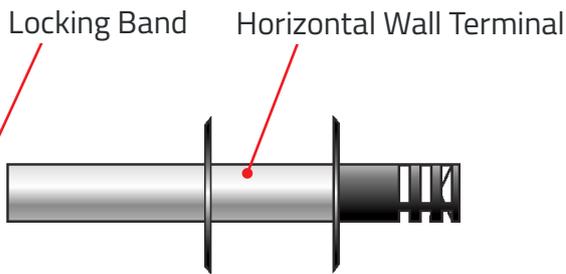


Place a vertical terminal into the open end and clamp into place using a locking band. (This locking band may be very tight!, see section 2.2.2.1.1 for correct installation).

Fig 2a. Exhaust only system -Type B22 horizontal



2.2 Flue/Combustion Air Duct System



Check that the exhaust air spigot on the heater contains a seal.



NOTE: Refer to breakdown sketch shown opposite to aid with the following procedures.

Slide a condense length fully into the exhaust air spigot (a smear of paraffin will help ease fitting).

Place an adjustable length locking band onto the end of the 250mm standard length ensuring the rubber gasket is the correct way round (see section 2.2.2.1.3). Do not tighten at this stage.

Slide an adjustable length section into the end of the 250mm standard length.

Allow a suitable distance for the adjustable length to slide backwards - to release the flue in the event that the flue needs to be separated in future.

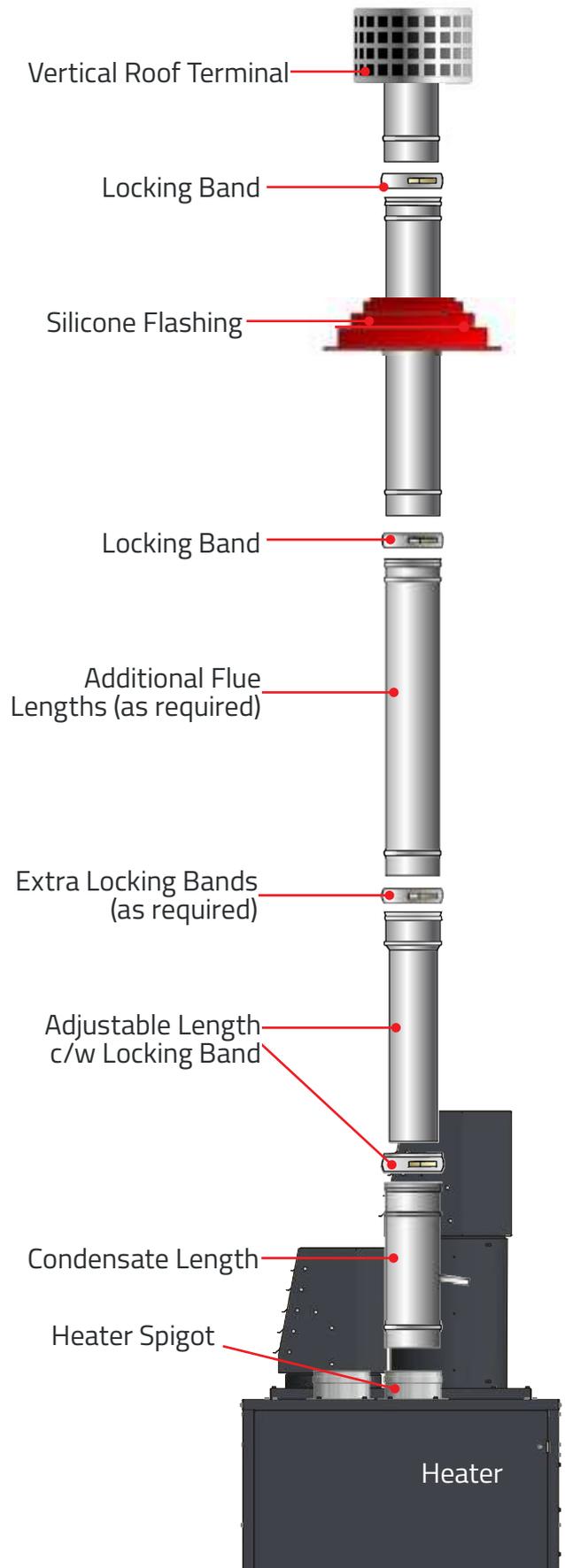
Extra lengths of standard flue can now be added between the adjustable length and final flue connection.

Prior to connection to the final piece of flue, place a locking band onto the end of the flue pipe.

Clamp the flue locking band. (This locking band may be very tight!, see section 2.2.2.1.1 for correct installation).

Once all flue components are correctly in place, lock the adjustable length locking band back at the adjustable length section.

Vertical Balanced Flue type B22 - exploded view



2.2 Flue/Combustion Air Duct System

2.2.3. Condense Drain

We recommend installing an inline condense flue drain when flued vertically, due to the lower flue gas temperatures experienced when the heater is operating at low firing rates. even if the drain point is capped, should the drain be required in the future. Other relevant factors include installations where significant length of the flue is used which may cause chilling, or if heater may be exposed to high winds and heavy rain, which may ingress the flue.

The condensate drainage pipe should be run in a standard drain pipe material and have a fall of at least 2.5° in every 50m. Any condense pipework must be adequate to prevent sagging. A maximum spacing of 0.5m for horizontal and 1.0m for vertical sections should be adequate. Bends should be kept to a minimum. Copper or copper based alloy must not be used for condensate drains. See BS 6896.

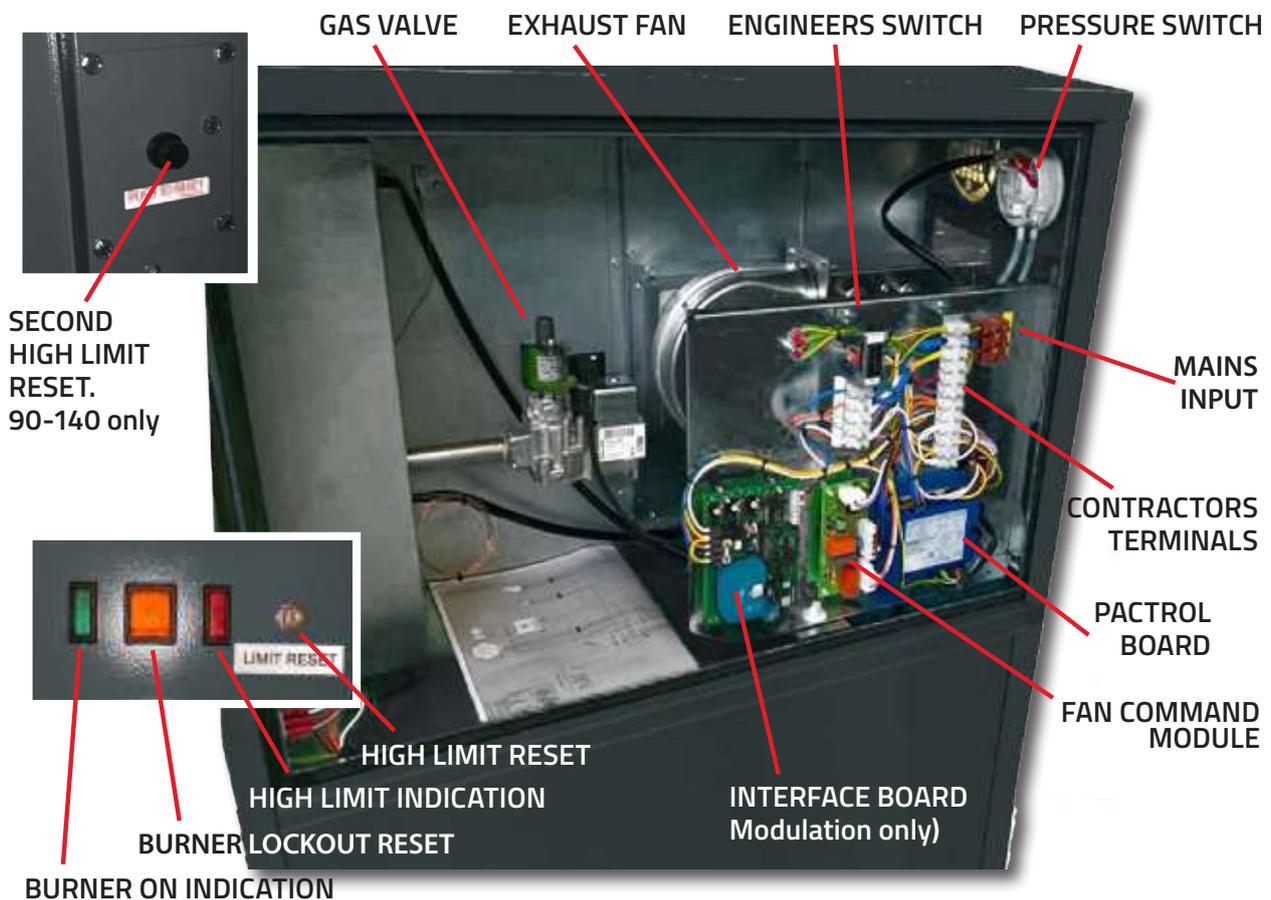
Condensate may be piped and discharged to a number of points within a building including:- internal stack pipe, waste pipe, external drain or rainwater hopper provided it is part of a combined system (i.e. sewer carries both rainwater & foul water).Alternatively, the condensate can

be discharged into the rainwater system or a purpose-made soakway. Where a drain point cannot be reached by gravity, a suitable condensate pump can be considered. Pump manufacturer's instructions must always be followed.

If the termination is to be to an external stack then in addition to the requirements for connecting to an internal stack, extra care is necessary in order to reduce the risk of the drain becoming blocked due to the condensate freezing. A length of pipe external to the building of not less than 50mm diameter should be kept as short as possible and not more than 3m. Any trap in the drainpipe must be fitted within the building. In exposed locations the pipe should be protected with waterproof pipe insulation to prevent ice forming within the condensate pipework.

Building regulations require a trap in the pipe whether it is terminated directly to the outside or before it connects to another waste pipe. If the drain pipe is taken directly to a gully or rainwater hopper, a water seal of no less than 38mm is required. When connected to another waste pipe the water seal must be at least 75mm, to prevent foul smells entering the building.

2.3 General Identification of Electrical Items



2.4 Electrical Cable Installation

2.4.1. Electrical Connections



Warning: THIS APPLIANCE MUST BE EARTHED.



Warning: Lockout reset is by a switched Neutral to the controls in the heater.



Warning: Wiring external to the unit must be carried out by an appropriately qualified person to current IEE regulations for

Electrical Installations and any local regulations which apply.

The local electrical supply must be run to a point adjacent to the heater and be suitably terminated to provide an isolation point that will prevent remote activation of the unit during servicing. Wiring should be completed in flexible conduit.

The local electrical supply conditions must be compatible with the electrical data given on the appliance data plate.

Heaters are for use with 230V, 1N, 50Hz supplies.

The method of connection to the main electricity supply must:-

- facilitate the complete electrical isolation of the heater(s) via a suitable fused isolator that will prevent remote activation of the heater during servicing (see section 2.4.5 for ratings).
- be in a readily accessible position adjacent to the heater(s).
- serve only the heater(s).
- have a contact separation of at least 3mm in all poles.

See section 2.5 or the accompanying wiring diagram for the heater electrical connections.

Reference must be made to Section 2.4.5 to ascertain the electrical loading of the unit(s) being installed so that cables of adequate cross-sectional area are used for the electrical installation. The length of the conductors between the cord anchorage and the terminals must be such that the current carrying conductors become taut before the earth conductor if the cable or cord slips out of the cord anchorage. All external controls must be of an approved type.

All units are fully prewired and only require final connections for the incoming mains supply. Heaters not supplied with inbuilt time and temperature controls will also require completion of the external control circuit

(230V) via a room thermostat, time clock etc. and, if applicable, the remote low level lockout reset see 2.4.5.



Note: To achieve maximum system efficiency it is recommended that VPx units are controlled by an MC200 or MC300 unit. Simple room thermostat and thermostat/time clock control systems will not provide optimum system efficiency and fuel savings.

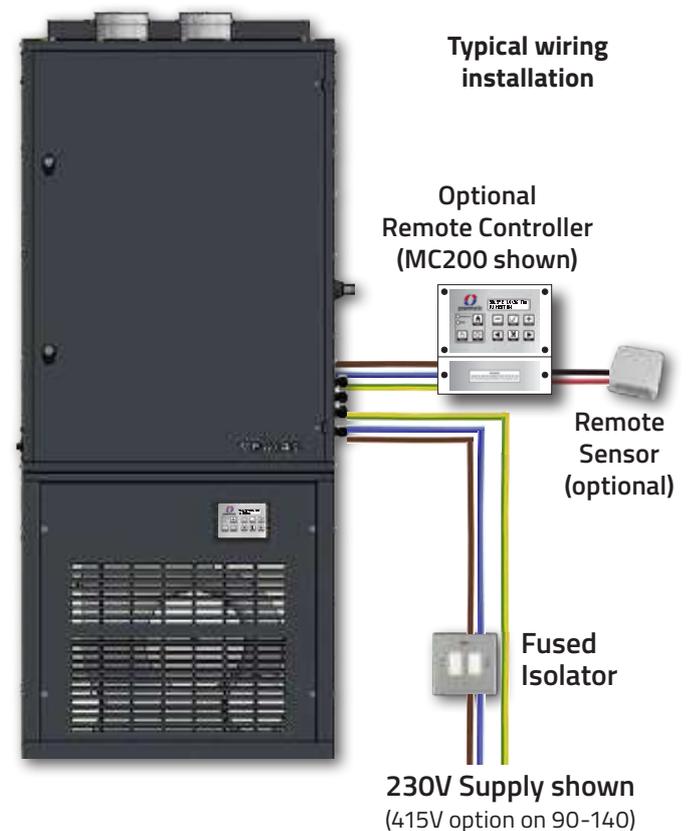
Wiring drawings and instructions are supplied with the respective controller.

2.4.2. Typical Wiring Installation showing remote controller

Key:

Mains supply	= 2 core and earth
MC200 Controller	= 8 core and earth
alt. MC300 Controller	= 6 core screened + LNE
Optional MC200 sensor	= Screened 2 core*

* (screen must be grounded only at the MC200, See instructions supplied with controller for wiring sizing, Max. 100m)



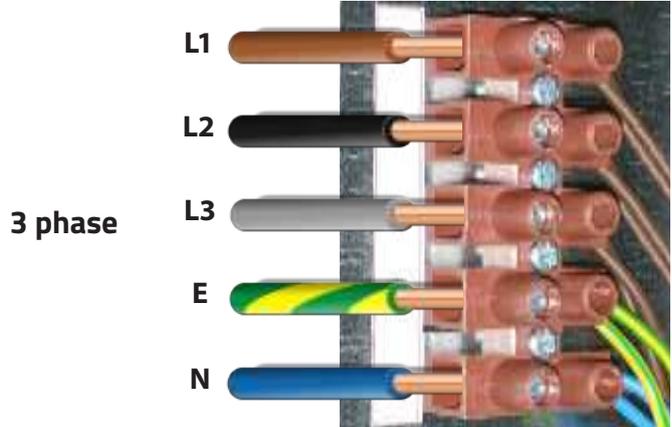
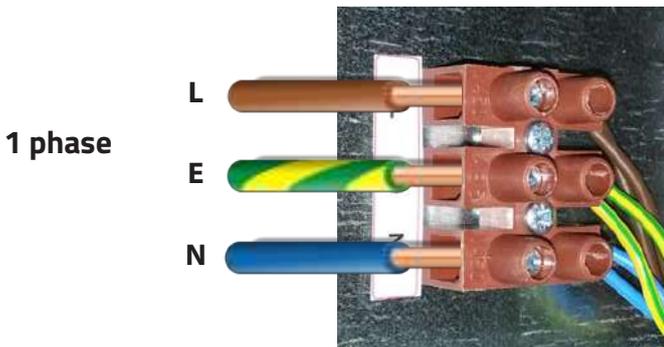
2.4 Electrical Cable Installation

2.4.3. Wiring

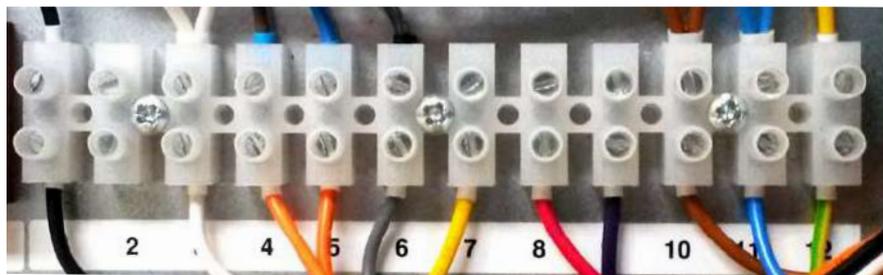
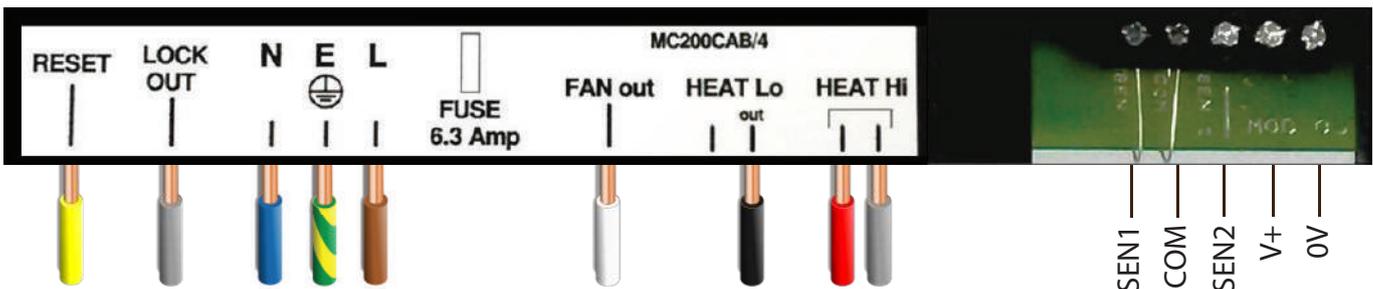
The wiring terminals are located on the electrical panel behind the side door of the heater which firstly has to be opened.

Mains input of either 230V 50Hz 1Ph or 415V 50Hz 3Ph supply connections are via a separate terminal block. For input power refer to table below.

2.4.3.1. Mains Supply



2.4.3.2. Intergral Control Wiring



Integral control wiring terminal

2.4.4. External Fuses

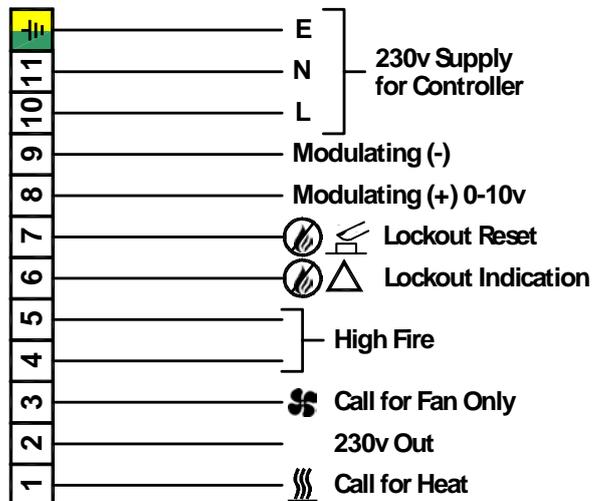
Model	Single Phase Units		Three Phase Units	
	Running Current (A)	Fuse/MCB Rating (A)	Running Current (A)	Fuse/MCB Rating (A) <i>(motor rated Protection Device)</i>
VPx35	4.7	10 / 6	N/A	N/A
VPx50	7.6	10 / 10	N/A	N/A
VPx70	11.0	15 / 16	5.3	10 / 10
VPx90	9.8	15 / 16	4.2	10 / 10
VPx120	9.8	15 / 16	4.2	10 / 10
VPx140	13.1	15 / 16	8.5	10 / 10

2.4 Electrical Cable Installation

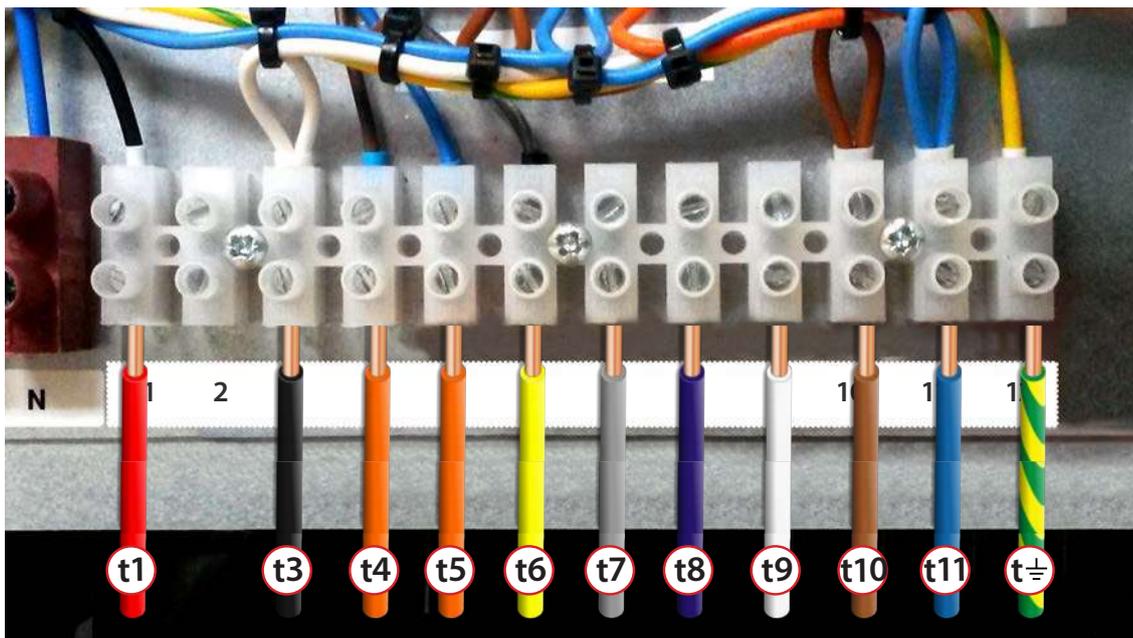
2.4.5. Wiring Connections

Controlling circuitry is via a numbered terminal strip wired back to the in-built MC200/CAB controller. If an external control panel is to be used, then these terminals must be used. Connection terminals are:

terminal 1	230V Heat Low Demand
terminal 3	230V Main Fan Only
terminal 4 & 5	Heat High Circuit
terminal 6	Lockout indication - 230V Output
terminal 7	Burner reset - Neutral Switch
terminal 8	0-10V d.c. Modulation
terminal 9	0V Modulation
terminal 10	Live to Controller
terminal 11	Neutral to Controller
terminal E	Earth to Controller



Wiring terminal strip for External Controller



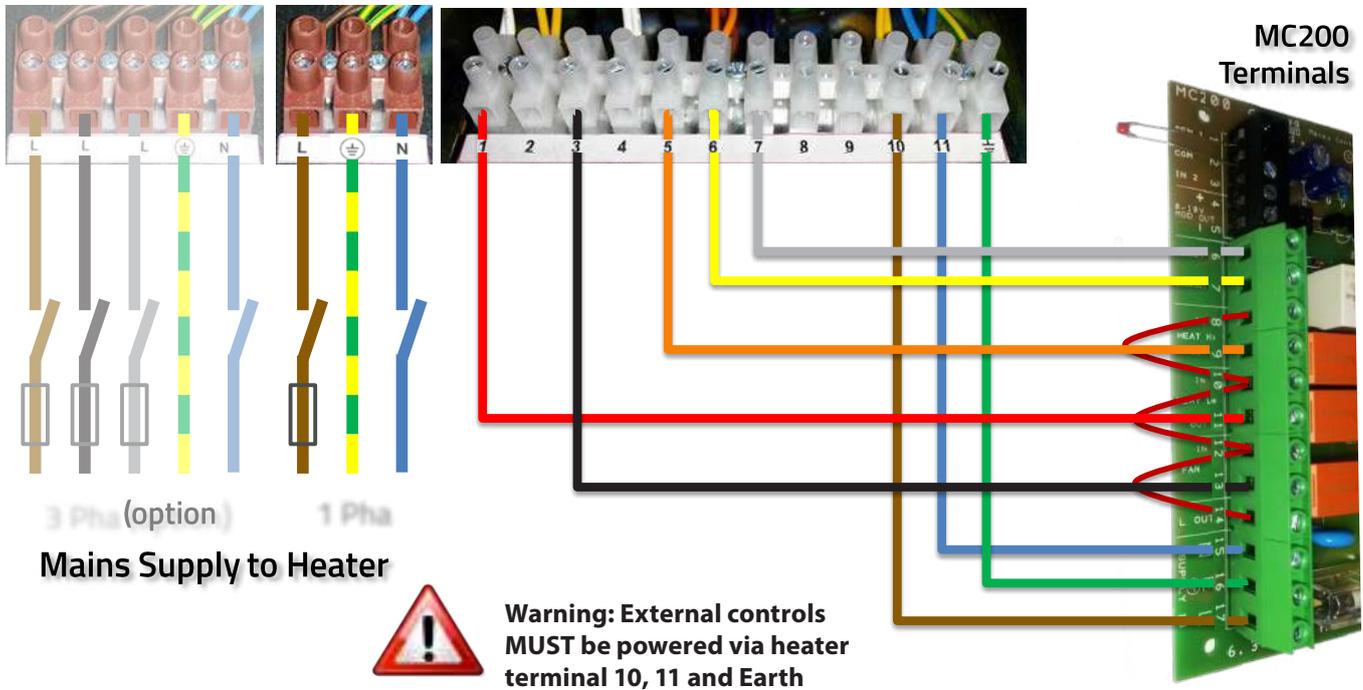
* when used

Heat On Signal 230V	Fan Only Signal 230V	Output 230V	Input 230V	Lockout Signal 230V	*Lockout Reset (Switched Neutral)	*Modulating signal 0-10Vdc	*Modulating signal 0Vdc	Live Output	Neutral	Earth
		High Fire Circuit						230V Supply for Controller		

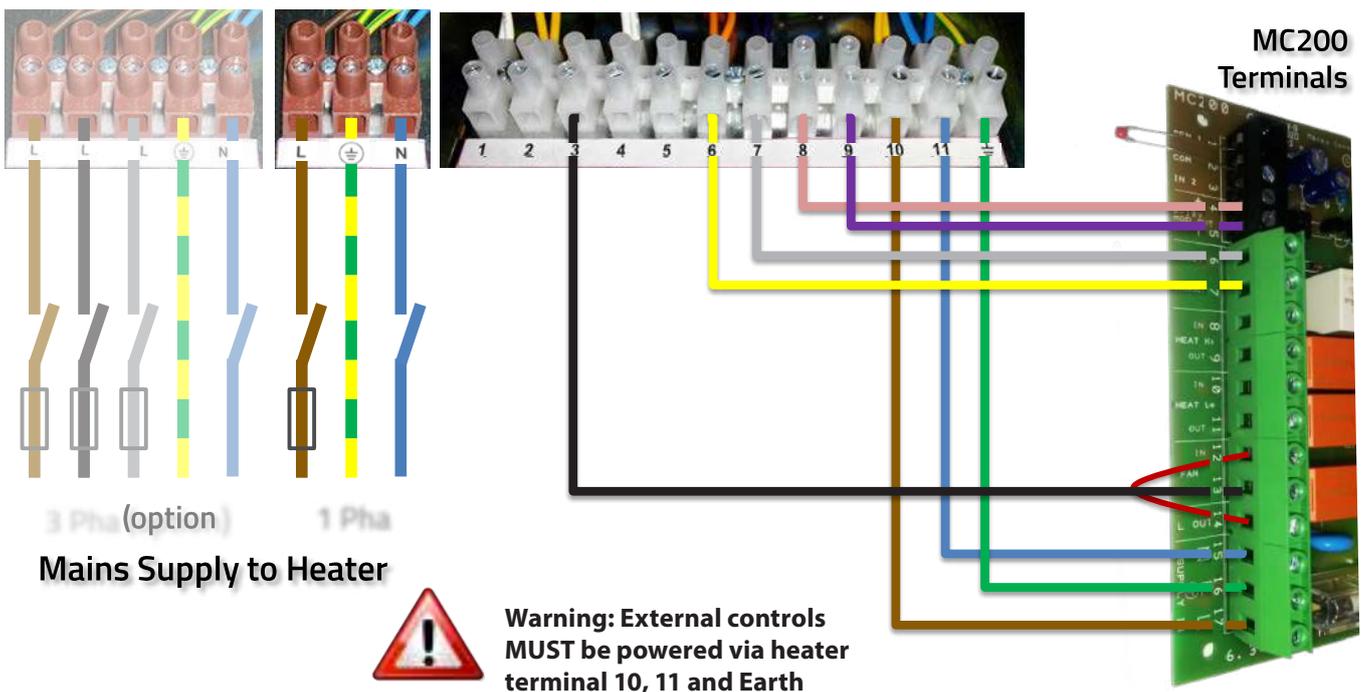
2.4 Electrical Cable Installation

2.4.6. Interconnecting Wiring:

2.4.6.1. VPx High / Low to Remote MC200

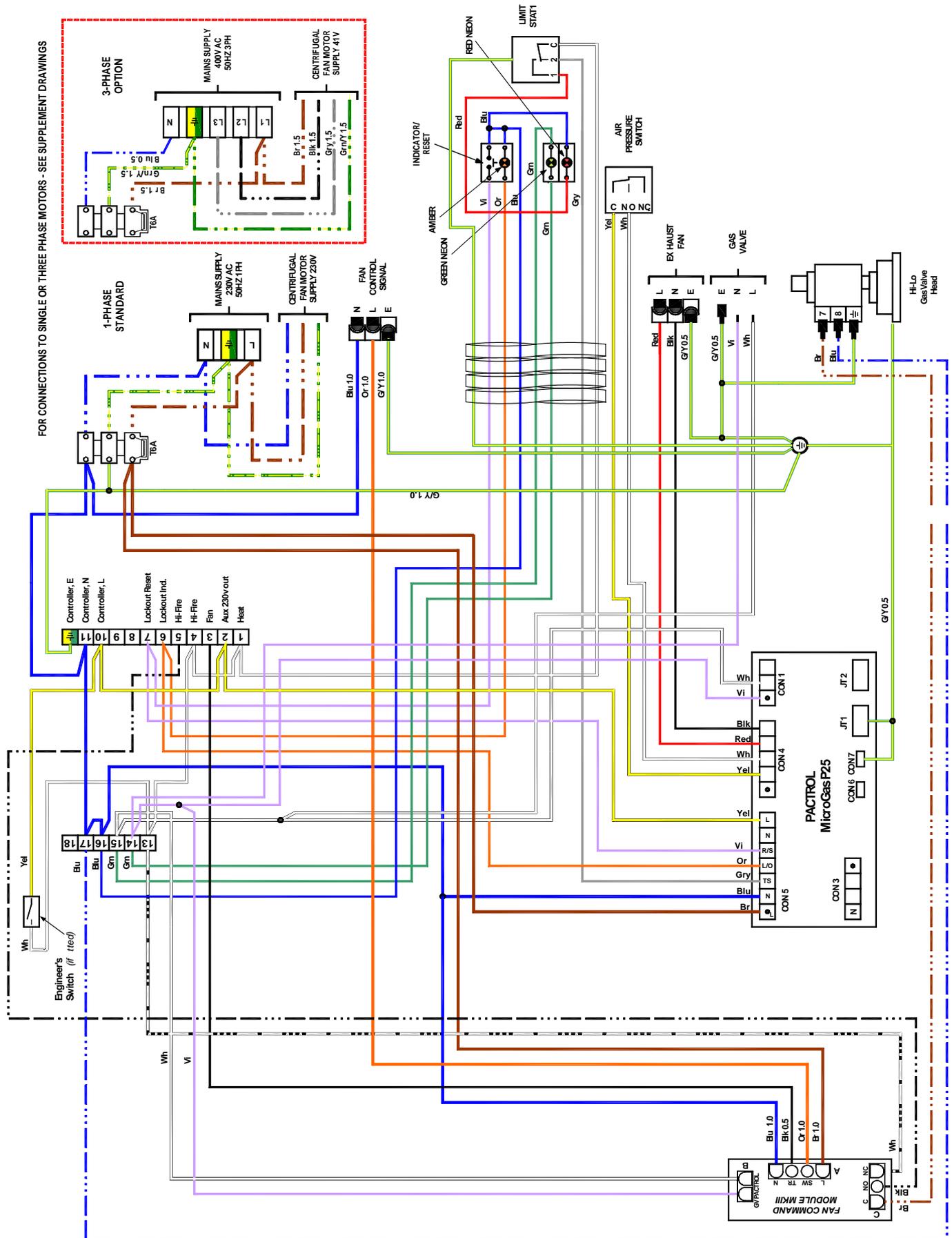


2.4.6.2. VPx Modulation to Remote MC200



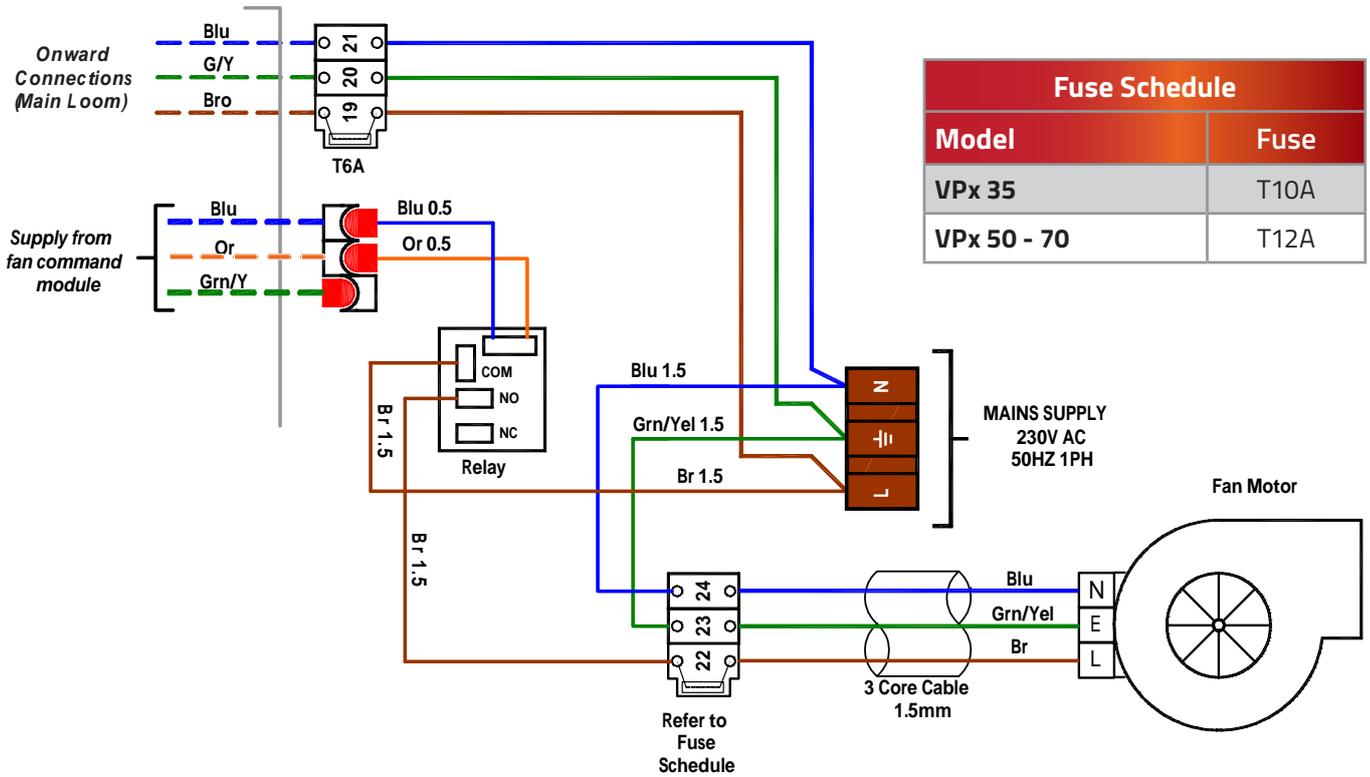
2.5 Wiring Diagrams

VPx High / Low Internal Wiring

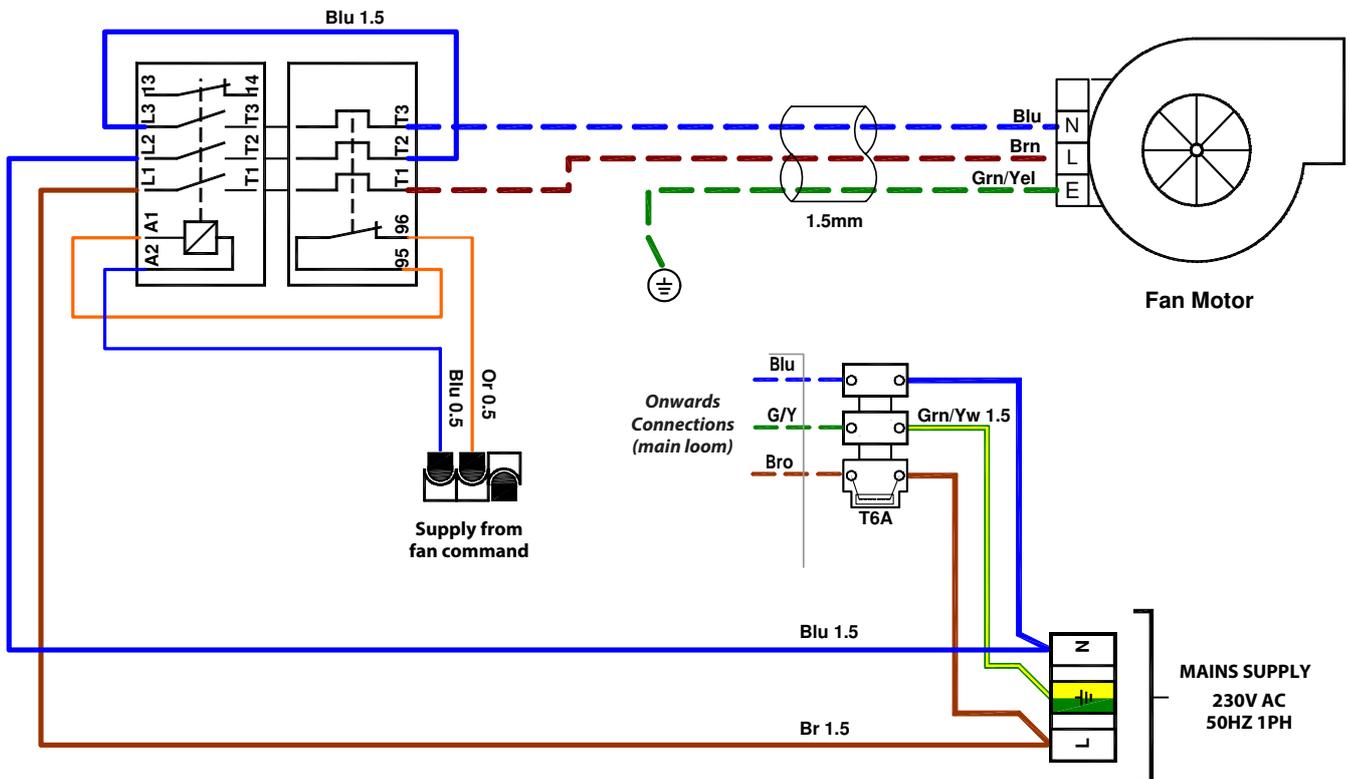


2.5 Wiring Diagrams

VPx35 to 70 Single Phase Motor Control Supplementary Wiring



VPx90 to 140 Single Phase Motor Control Supplementary Wiring



2.6 Commissioning and Testing

Gas Safety (Installation & Use) (Amendment) Regulations



It is law that all gas appliances are installed, adjusted and, if necessary, converted by qualified persons* in accordance with the current issue of the above regulations.

Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

* Gas Safe Registered Engineer

2.6.1. Electrical Installation

Checks to ensure electrical safety must be carried out by a qualified person.

2.6.2. Gas Installation

For new installations, the whole of the gas installation, including the meter, should be inspected and tested for soundness and purged in accordance with the recommendations of IGE/UP/1 (Edition 2) or IGE/UP/2A as appropriate.

2.6.3. Air Distribution System

The system should be checked to ensure that the installation work has been carried out in accordance with the design requirements.

Particular attention should be given to the correct arrangement of delivery ducts and registers, return air ducts and grills and general adequacy of return air paths.

Ensure that the duct work is balanced so that the specified motor running currents are achieved See section 1.2

2.6.4. Checks before Operating the Air Heater

The following preliminary checks should be made before lighting the heater(s)

- Ensure that the ELECTRICAL supply to the heater is switched OFF.
- Check that all warm air delivery outlets are open.
- Check that all external controls are calling for heat.
- If an MC200 or MC300 is being used ensure that the control is set to winter operation.

2.6.5. Operating the Air Heater



NOTE: On initial lighting of the heater(s), it may take some time to purge the internal pipe work of air.



IMPORTANT: The internal pipe work of the appliance has been tested for soundness before leaving the factory. After establishing the main burners test round the gas inlet connection using a leak detection fluid.

- Switch on the electrical supply at the isolator.



NOTES: If the red indicator illuminates, remove the adjacent black cap and press the High Limit Reset button. If the amber rocker switch illuminates, depress the switch for 2 seconds to reset the burner lockout.

- The ignition sequence should now commence. After a delay of approximately 45 seconds the ignition spark will be generated and the main gas valves energized. The burners will then light.
- If the burners fail to light the control box will complete a further four ignition attempts. If at the end of five attempts the burners have still not lit the control box will go to lockout and the amber rocker switch will be illuminated. To restart the ignition sequence depress the illuminated reset button for about 1-2 seconds.
- SHUT OFF Set the external controls to OFF or MIN.

2.6.6 Adjustments

2.6.6.1. Burner Gas Pressures

This is set for the required heat input before despatch. High and low pressures should be checked in the following manner:

2.6.6.1.1. High/Low Regulation

- Set external controls to ensure the main burner is off. Open the side access panel. Connect a pressure gauge to the burner pressure test point on the multifunctional control.
- Set external controls to turn on the main burner and maintain high fire. Compare the measured burner gas pressure to that stated on the data plate. In addition it is advisable to check the gas rate using the gas meter

2.6 Commissioning and Testing

dial pointer ensuring that no other appliances supplied through the meter are in operation.

3. Repeat 2 above with external controls set to maintain low fire.

4. If it is necessary to adjust either the high fire or low fire pressures proceed as follows after levering off the plastic cover from the High/Low regulator.



Note: High fire setting must be adjusted first after which the low fire setting can be set. Any adjustment of the high fire setting alters the minimum setting.

2.6.6.1.1.1. SIT Sigma 843 Adjustment

Maximum Setting.

With the controls set to high fire, use an adjustable or 10mm spanner to screw the adjustment nut in to increase and out to decrease, until the required pressure is obtained.

Turn the burner On and OFF several times to check the pressure setting and then turn off.

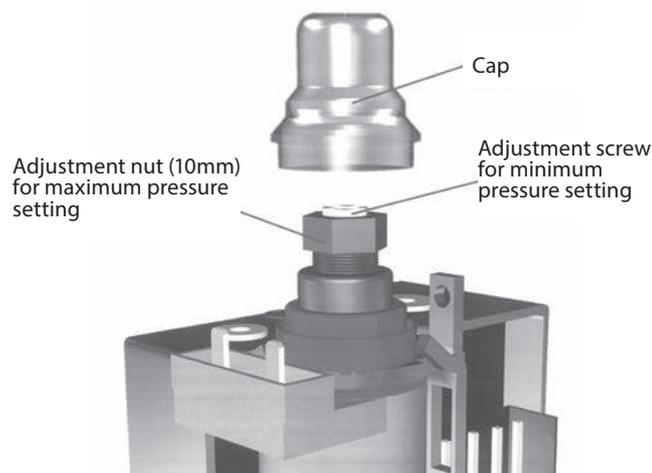
Minimum Setting.

Disconnect electrical connection to the regulator and turn the burner back on and wait until the burner pressure has stabilised.

Keeping the nut stationary, use a 6 x 1 screwdriver to turn the slotted adjustment screw clockwise to increase and counter-clockwise to decrease, until the required pressure is obtained.

Reconnect high/low regulator and check high fire pressure.

Repeat both steps if necessary and then replace cover cap



5. Turn off the main burner, disconnect the pressure gauge and replace the sealing screw.

2.6.6.1.1.2. Honeywell V4336 Adjustment

Maximum Setting

With the controls set to high fire, use an adjustable or 8mm spanner to turn the adjustment screw, clockwise to increase and counter-clockwise to decrease, until the required pressure is obtained

Turn the burner On and OFF several times to check the pressure setting and then turn off.

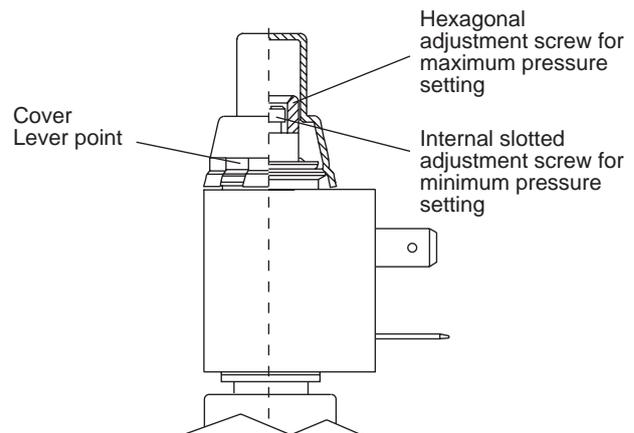
Minimum Setting

Disconnect electrical connection to the regulator and turn the burner back on and wait until the burner pressure has stabilised.

Use a screwdriver to turn the slotted adjustment screw clockwise to increase and counter-clockwise to decrease, until the required pressure is obtained.

Reconnect high/low regulator and check high fire pressure.

Repeat both steps if necessary and then replace cover cap.



5. Turn off the main burner, disconnect the pressure gauge and replace the sealing screw.

2.6.6.1.2. Modulating Regulation

1. Set external controls to ensure that the main burner is off. Open the side access panel. Connect a pressure gauge to the burner pressure test point on the multifunctional control.

2. Set external controls so as to turn on the main burner and maintain high fire. Compare the measured burner gas pressure to that stated on the data plate. In addition it is advisable to check the gas rate using the gas meter dial pointer ensuring that no other appliances supplied through the meter are in operation.

2.6 Commissioning and Testing

3. Repeat 2 above with external controls set to maintain low fire.

4. If it is necessary to adjust either the high fire or low fire pressures proceed as follows after removing the plastic cover from the Modulating regulator.



Note: Minimum fire setting must be adjusted first after which the high fire setting can be set. Any adjustment of the minimum fire setting alters the maximum setting.

Minimum Setting.

Disconnect electrical connection of modulating regulator and turn burners back on and wait until the burner pressure has stabilised.

Turn 9mm adjustment nut for low fire pressure clockwise to increase and counter-clockwise to decrease until the required pressure is obtained.

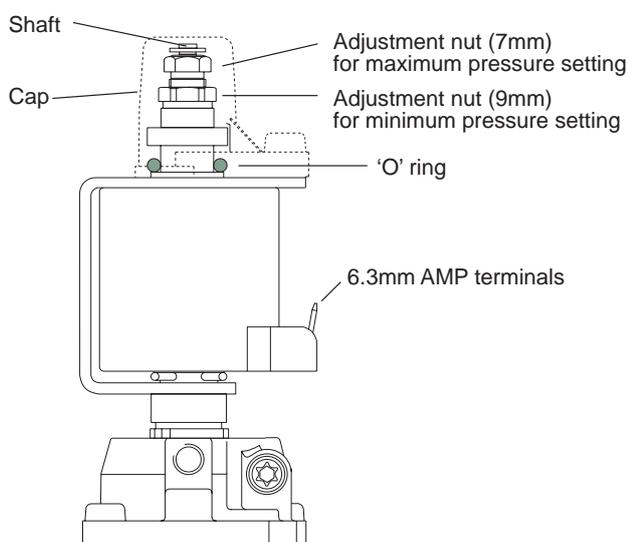
Reconnect modulating regulator and check high fire pressure, readjust if necessary.

Maximum Setting.

Disconnect electrical connection of modulating regulator and turn burners back on and wait until the burner pressure has stabilised.

Push shaft gently downwards to the maximum adjustment screw and hold there. Turn 7mm adjustment nut for high fire pressure, clockwise to increase and counter-clockwise to decrease, until the required pressure is obtained. Release shaft.

Repeat both settings if necessary and then replace cover cap.



5. Turn off the main burner, disconnect the pressure gauge and replace the sealing screw.

2.6.6.1.3. Modulating Control Board

For Modulation a modulating control board is fitted (which also includes the fan command outputs). The board interfaces between a 0-10VDC control signal and the modulating regulator.

Basic operation method

1. With the 0 to 10 signal at 0, the gas valve drive signal will be de-energised.
2. When the input control signal goes to >2V, the gas valve drive output will be at its maximum output value for a preset 2 minutes.
3. An input signal from the burner controller - when received by the board continually for more than 30 seconds - will switch an output to the main heater fan.
4. After the preset 2 minutes of maximum output, the 0 to 10V input signal will take control of the gas valve drive.
5. When the 0 to 10V signal drops below 1V the signal will drop to zero and the gas valve drive signal will be de-energised.
6. The fan output will continue for a further 2.5 minutes.

2.6.6.2. Final Adjustments

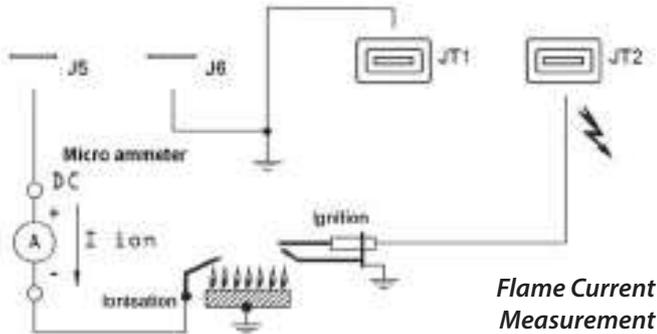
1. In addition it is advisable to check the gas rate using the gas meter dial pointer. Ensure that no other appliances supplied through the meter are in operation.
2. If required, after checking or setting the burner pressures, the CO₂ content in the flue gases can be checked by sampling in the first section of flue fitted to the flue outlet of the unit. Nominal CO₂ values are given for guidance in the table at the bottom of the previous page.
3. Turn on the main burner as before and test for gas soundness around pressure test joint using a leak detection fluid e.g. soap solution. Replace access panel.

2.6.6.3. Flame Current

1. To measure the flame current connect a multimeter capable of measuring micro amps as shown in the following diagram.

2.6 Commissioning and Testing

Model		35	50	70	90	120	140
High Fire CO2	%	8.02	8.60	7.20	7.47	8.37	8.77
FGT (nominal)	°C	128.7	154.5	145.0	131.6	131.5	128.0
Low Fire CO2	%	4.76	4.92	4.40	4.52	5.00	5.29
FGT (nominal)	°C	104.0	117.4	107.6	102.3	103.0	110.0



2. Minimum current reading is 0.5µA and normal value should be 1.5µA or higher.

2.6.6.4. CCF Adjustments

Using a clamp meter around the fan power cable and with all side panels closed, check the running current of the centrifugal fan once the heater is running and compared with the table below.

Model	Pha	Motor kW	Typical Running Current	Max Running Current
VPx35	1	1.1	4.7A	8.0A
VPx50	1	1.4	7.6A	9.8A
VPx70	1	1.4	11.0A	12.0A
VPx90	1	1.5	9.8A	10.0A
VPx120	1	1.5	9.8A	10.0A
VPx140	1	2.2	13.1A	14.0A



WARNING: Exceeding the MAX running current will cause the fan's thermal overload to trip!

Adjust the balancing dampers within the airflow ductwork system to achieve a current suitable for the model in question.

2.6.6.5. Limit Thermostat

Limit Thermostat settings:-

VPx (all except 35) = 110°C

VPx35 = 120°C



Note: VPx90 - 140 units have two limit thermostats whereas all other units have only one. The second stat is at the opposing side of the heater to the burner/controls end. The limit thermostats are wired in series (either thermostat will shut down the burner).

2.6.7. Air Heater Controls

1. Close the gas service tap and ensure that the gas valve is heard to close within 1 second and that the lockout light is illuminated. Note that the heater may attempt five re-ignitions before going to lockout. Open the gas service tap and reset the unit from lockout.

2. Check that the room thermostat and all automatic controls are operating satisfactorily.

2.6.8. Handing over the Air Heater

Hand these instructions to the user or purchaser for retention and instruct in the efficient and safe operation of the air heater and associated controls. Adjust the automatic controls to those values required by the User.

Finally, advise the user or purchaser that, for continued efficient and safe operation of the air heater, it is important that servicing is carried out annually.

In the event that the premises are not yet occupied turn off the gas and electricity supplies and leave instructional literature adjacent to gas meter.

2.7 Servicing

Gas Safety (Installation & Use) (Amendment) Regulations



It is law that all gas appliances are installed, adjusted and, if necessary, converted by qualified persons* in accordance with the current issue of the above regulations.

Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

* Gas Safe Registered Engineer



WARNING: Always switch off and disconnect electricity supply and close the gas service valve before carrying out any servicing work or replacement of failed components.



NOTE: If a suspended air heater is to be serviced do not lean ladders against the heater.

Ensure that an access tower or equivalent is used.



NOTE: The access door to the controls section may be removed to improve access.

Open the door to 90°, remove the earth cable at the bottom, and then lift the door vertically upwards to disengage the hinge plates.

Refit in reverse order. Ensure that the earth cable is refitted.

2.7.1. General

Full maintenance should be undertaken not less than once per year by a qualified person.

No 'specialised' tools will be required to carry out this service.

A fault finding guide is given in section 3.1 to aid servicing.

After any servicing work has been complete, or any component replaced, the air heater(s) must be fully commissioned and tested for soundness as described in Section 2.6.

To commence servicing, firstly open the side access door by rotating the quarter turn screw(s).

2.7.2. Main Burner Assembly Removal

1. Ensure that the gas service valve is turned OFF and then unscrew the union nut situated immediately downstream of it.

2. Disconnect the spark and rectification leads from the control box and remove the electrical plug connections from the top of the gas control valve assembly.

3. Remove the burner heat shield, 3 screws.

4. Release the inlet connection flange from the gas valve by removing the four screws.

5. If required remove the manifold by removing the four screws securing it to the burner assembly.

6. Remove the two screws that secure the top of the burner assembly to the bulkhead and lift out burner assembly.

7. Using a stiff brush, not a wire brush, brush the burners to dislodge accumulated deposits. Inspect the burners both internally and externally to ensure that they are clean. Examine the injectors and if damaged or deteriorated, replace with new ones of the correct size and marking. If deemed necessary, clean the injectors. Do not broach out with wire.

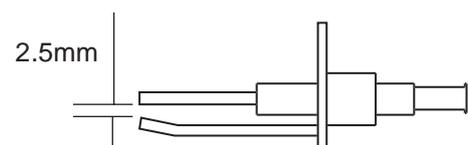
8. Reassemble the injectors, manifold and burners in reverse order to that above.

2.7.3. Ignition and Rectification Electrodes



Note: The ignition electrode is located at the bottom of the burner assembly, the rectification electrode is located at the top of the burner assembly.

Inspect the electrodes, making sure that they are in a sound and clean condition. In particular check that the ignition electrode is clean and undamaged. Check that the spark gap is 2.5mm and that the rectification probe is 10 - 12mm forward of the burner.



Ignition Electrode Spark Gap

2.7.4. Exhaust Fan

1. Remove the four screws securing the flue outlet socket.

2. Disconnect the fan electrical connections from the main

2.7 Servicing

terminal strip

3. Remove the screws securing the fan mounting box to the exhaust header plate.

4. Clean impeller by brushing with a stiff brush.

5. Re-assemble using a new sealing gasket to the fan mounting box. Use silicon sealant around the joints.

2.7.5 Heat Exchanger

Whilst the main burner assembly is removed from the unit, check that the primary sections that the burners fire into are clean.

2.7.5 Main Fan Assembly

1. Remove section side panel(s) and inspect the fan blades for any damage or excessive buildup of deposits that could give rise to an imbalance. Remove the assembly for cleaning as follows.

2. Slacken the cable gland on the casing through which the fan electrical cable passes.

3. Disconnect the fan leads from the electrical terminals in the contactor enclosure.

4. Withdraw cable through entry grommet.

5. Remove the complete fan assembly by removing the fixings securing the fan to the base rails.

6. Reassemble in reverse order.

2.7.6. Replacement of Faulty Components

Only parts supplied via or authorised by Powrmatic should be used. A short list of parts and part numbers are detailed in section 3.2 of this manual. If in doubt, please contact Powrmatic.

2.7.6.1 Multifunctional Control

1. Ensure that the gas service valve is turned OFF. If a flexible gas connection has been used go to step 2 otherwise unscrew the union nut situated immediately downstream of the gas service valve.

2. Remove the electrical plug connections from the top of the multifunctional control.

3. Release the flanged connections at the inlet and outlet of the multifunctional control and remove the multifunctional control.

4. Reconnect the new valve in the reverse order to that above ensuring that the valve is correctly orientated. Renew the sealing 'O' rings if necessary.

2.7.6.2. Burners

1. Remove the burner assembly as described in Section 2.7.2.

2. Remove the end plates of the burner assembly and the central burner support plate.

3. Exchange burners as required and reassemble components in reverse order.

4. Re-commission the appliance as described in Section 2.6.

2.7.6.3. Electrode Assemblies

1. Disconnect the electrode leads from the control box as appropriate.

2. Remove the screw securing the electrode assembly to the burner assembly side plate and withdraw the assembly.

3. Fit replacement and reassemble in reverse order. Check that the spark gap is 2.5mm (See section 2.7.3) and the rectification electrode is 10 - 12mm forward of the burner.

2.7.6.4. Limit Thermostat

NB. Ensure that the thermostats are set correctly before fitment. Limit Thermostat settings:-

VPx (all except 35)	= 110°C
VPx35	= 120°C

1. Remove the screws securing the thermostat phial mounting plate to the inner bulkhead*, withdraw assembly and unclip the phial.

2.7 Servicing

2. Remove the electrical connections from the limit thermostat.
3. Remove the securing nut and remove thermostat from the front panel.
4. Fit replacement thermostat in reverse order.



Note*: VPx35 & 90 - 140 units have a second limit stat at the opposing end of the heater to the burner/controls. Remove the two small cover plates and replace as above.

2.7.6.5. Exhaust Fan

1. Remove the four screws securing the flue outlet socket.
2. Disconnect the fan electrical connections from the main terminal strip
3. Remove the screws securing the fan mounting box to the exhaust header plate.
4. Remove fan assembly.
5. If needed, transfer the fan mounting box to the replacement fan.
6. Fit replacement exhaust fan, using new gaskets and silicon sealant as necessary, and reassemble in reverse order.

2.7.6.6. Air Pressure Switch

1. Remove the two screws securing the cover and remove cover.
2. Disconnect electrical connections.
3. Pull off the sensing tube from the air pressure switch.
4. Remove the screws fixing the air pressure switch and remove switch.
5. Fit replacement in reverse order refitting the sensing tube to the negative (- or L) tapping on the pressure switch.
6. Adjust pressure switch set point to that shown in the following table:

Model	Pressure Switch	Setting (Pa)
LNVx35	146522176	180
LNVx50		180
LNVx70		200
LNVx90	146522177	300
LNVx120		350
LNVx140		330

2.7.6.7. Control Box

1. Unplug all the electrical connections.
2. Remove the two screws that secure the control box in place.
3. Fit replacement in reverse order.

2.7.6.8. Fan Command Module

1. Unplug all the electrical connections by squeezing each side to release.
2. Using a small flat screwdriver push on the locking tab of each PCB mount and gently ease the board upwards to release.
3. Fit replacement in reverse order.

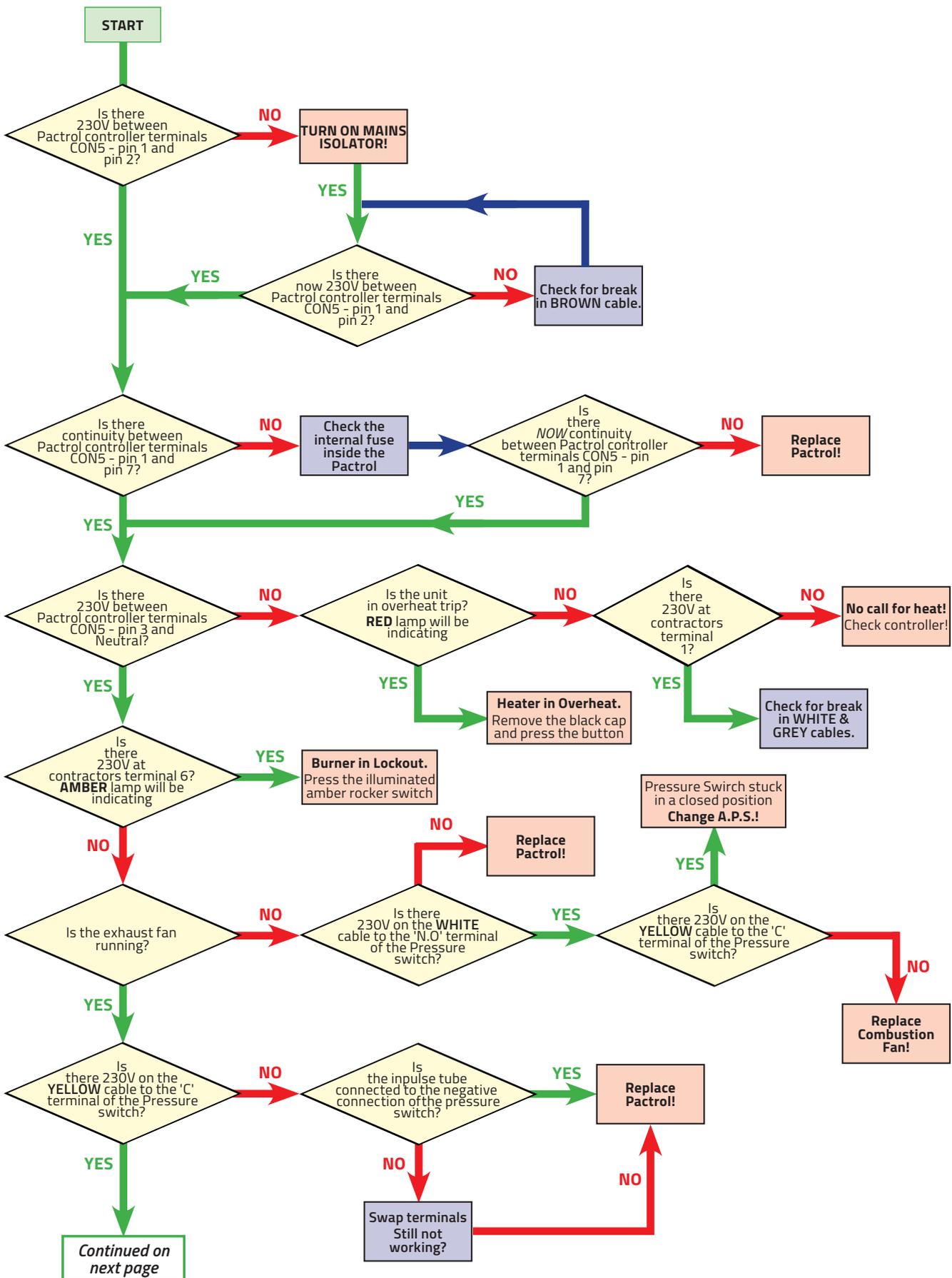
2.7.6.9. Centrifugal Fan/Motor

1. Disconnect the electrical connections to the centrifugal fan section.
2. Remove the side panels of the section for access to the fan and motor.
3. Fit replacements as appropriate and reassemble in reverse order.

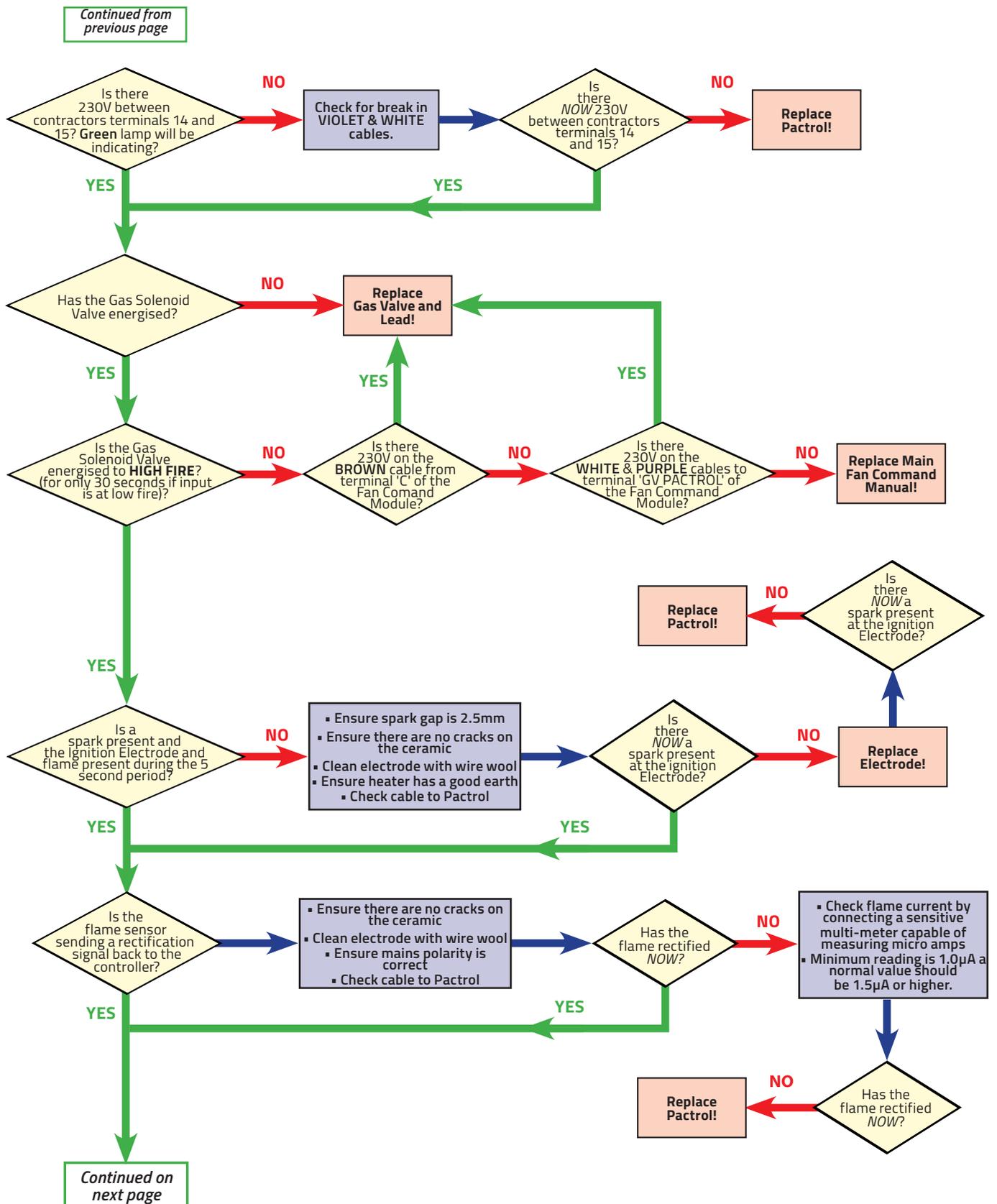


Note: If a 3ph motor is being replaced ensure that the direction of rotation is correct. If it is not interchange any two of the three phases connected to the motor.

3.1 Fault Finding

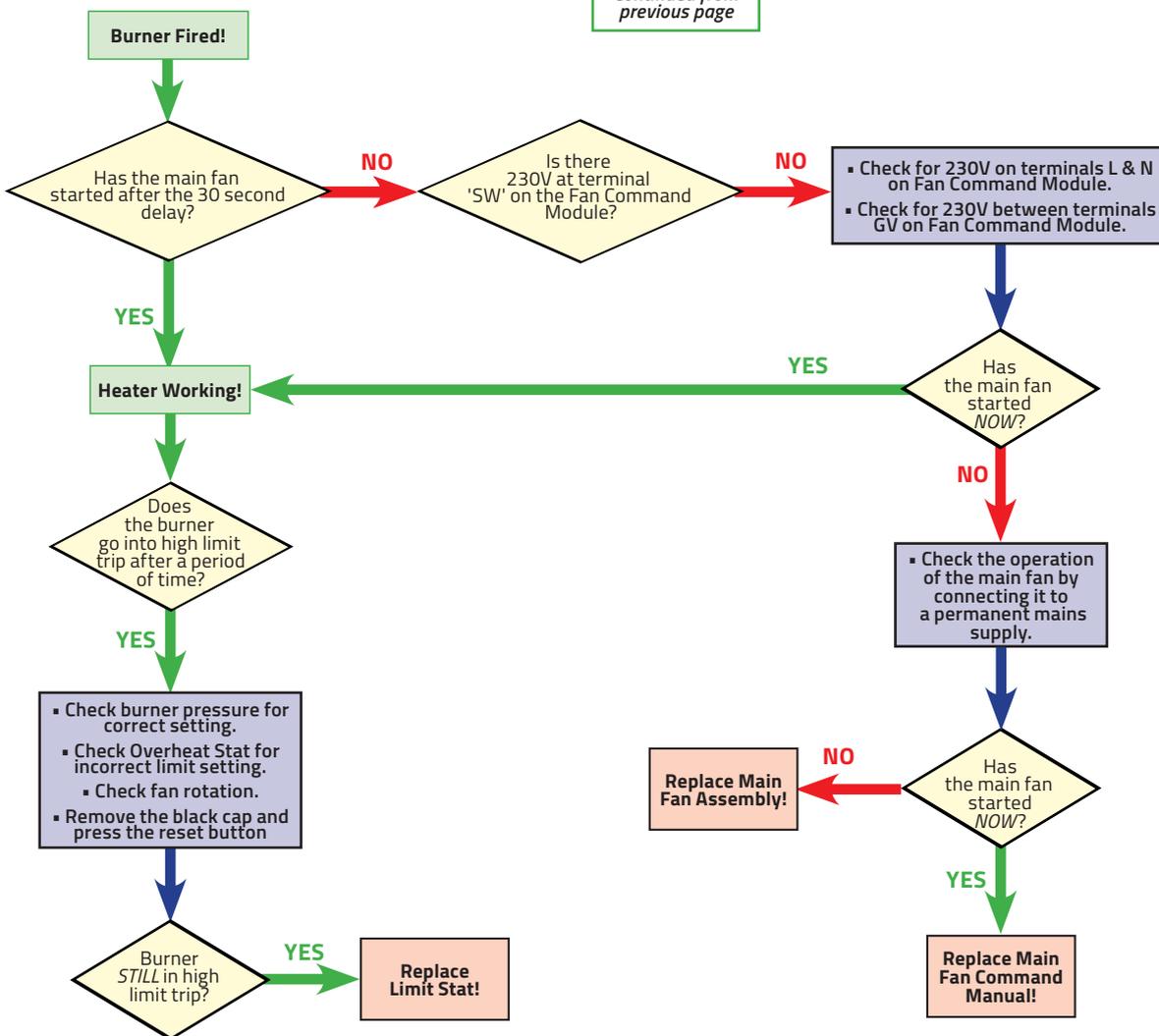


3.1 Fault Finding



3.1 Fault Finding

Continued from previous page



3.1.1 Modulation Driver LED Indication

The unit will have a single LED indicator and will provide the following information :-

Steady on LED

Unit in standby mode (all outputs off)

1 LED Blink

Summer fan "ON" mode active.

2 LED Blinks

DC control signal received >2V, Heating mode gas valve drive at maximum.

3 LED Blinks

Fan output on, (heating mode) Heating mode gas valve drive follows DC input.

4 LED Blinks

DC control signal <2V. Heating mode now off but fan in overrun mode (2.5 mins max)

Slow on off @ 50%

Auto Time Out has occurred. (i.e. DC control signal received >2V but no trigger from sequence controller within 5 mins.



3.2 List of Parts

Item	Description	Usage	Part No.
	Gas Valve SIGMA 843	35-50	145035208HL-SIT/KIT
	Gas Valve VK4105A	35-50	145035208HL/KIT
	Gas Valve VR4605AB	70-90	145035204HL/KIT
	Gas Valve V425AB	120/140	141378715HL/KIT
	Ignition Electrode	35-70 90-140	142423010 142423004
	Rectification (Flame Sensor) Probe	All	142423003
	Burner	35-70 90-140	142400240 142400241
	Limit Stat	All	142403609
	Control Box (Sequence Controller)	All High/Low All Modulation	145030846 145030847
	High/Low Governor Head	35-140 -/HL	142466402
	Modulation Governor Head	35-140 -/MOD	142466403

3.2 List of Parts



Fan & Modulation Burner Controller	35-140 -/MOD	142400303M
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Lockout Reset Switch	All	143070276
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Fan Command Module MkIII	All (except /MOD)	142403603
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Pressure Switch HUBA 604	All	146522177
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Exhaust Fan	35-70	140201505
Exhaust Fan c/w Mounting Brackets	50-70	VPX3570EXH/SP



Exhaust Fan	90-140	140201506
Exhaust Fan c/w Mounting Brackets	90-140	VPX90140EXH/SP



Direct Drive Centrifugal Fan Blower	35 1PH	1402CFAN210/T/15
	50 1PH	1402CFAN560/T/15
	70 1PH	1402CFAN580/T/15



Contactor	90-140 1PH	143000600
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Overload	90 1PH	143000800B
	120/140 1PH	143000800



Belt Driven Centrifugal Fan Blower	90-140 1PH	1402CFAN240/ T/2DECK
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Blower Motor	90 1PH	140001908
	120 1PH	140001908
	140 1PH	140001998

3.2 List of Parts



Motor Pulley

90 1PH
120 1PH
140 1PH

142000340
142000916
142000601



Fan Pulley

90 1PH
120 1PH
140 1PH

142001761
142001825
142001675



Belts

90-140 1PH

142109604

Appendices

Information required for ecodesign (ErP) Directive 2009/125

Model			35	50	70
Rated Heat Capacity		kW	36.5	54.4	74.0
Low Heat Input	Nett CV	kW	26.1	37.4	51.6
Minimum Heat Capacity		kW	23.8	33.9	46.7
Useful Efficiency	High Fire	%	93%	93%	92%
	Low Fire	%	91%	91%	90%
Electrical Power Consumption*	High Fire	kW	0.07	0.06	0.06
	Low Fire	kW	0.07	0.06	0.06
	Standby	kW	<0.01	<0.01	<0.01
	Ignition	kW	0.00	0.00	0.00
NOx Seasonal (Gross)		mg/kWh	<96.0	<96.0	<96.0
Envelope Loss Factor		%	N/A	N/A	N/A
Emission Efficiency		% η_s , flow	94%	94%	93%
Seasonal Space Heating Energy Efficiency		% $\eta_{s,h}$	74%	72.8%	72.1%

Model cont.			90	120	140
Rated Heat Capacity		kW	97.5	126.8	146.1
Low Heat Input	Nett CV	kW	71.7	90.8	101.2
Minimum Heat Capacity		kW	65.3	83.5	93.3
Useful Efficiency	High Fire	%	92%	93%	94%
	Low Fire	%	81%	92%	92%
Electrical Power Consumption*	High Fire	kW	0.06	0.06	0.06
	Low Fire	kW	0.06	0.06	0.06
	Standby	kW	<0.01	<0.01	<0.01
	Ignition	kW	0.00	0.00	0.00
NOx Seasonal (Gross)		mg/kWh	<96.0	<96.0	<96.0
Envelope Loss Factor		%	N/A	N/A	N/A
Emission Efficiency		% η_s , flow	93%	93%	93%
Seasonal Space Heating Energy Efficiency		% $\eta_{s,h}$	72.1%	73.7%	73.7%

TESTED

STAGE 1 Full mechanical, construction, assembly and electrical sequence check

STAGE 2 Full functional test in accordance with Quality System Procedures

Heater Model _____

Heater Serial No. _____

Type of Gas _____

Final

Getting In Touch

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