REZNOR®

NATURAL GAS (G20, G25 & G25.3), PROPANE GAS (G31)

PVE GAS FIRED FLOOR STANDING HEATER

INSTALLATION/ COMMISSIONING/SERVICING

CE

EU)2016/426(GAR),2009/125/EC(ErP), 2014/35/EU(LVD),and2014/30/EU(EMC)
Regulations and Directives.
The following harmonised standards have been applied:
EN 1020, EN 60335-1, EN 60335-2-102, EN 55014-1, and EN 55014-2

Please read this document carefully before commencing installation, commissioning and/or servicing.
Leave it with the end user/site agent to be placed in their premises technical file after installation.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death.
All work must be carried out by appropriately qualified persons.
The manufacturer does not take any responsibility in the event of non-observance of the regulations concerning the connection of the apparatus causing a dangerous operation possibly resulting in damage to the apparatus and/or environment in which the unit is installed.

Manual Part No. D301113 Issue C

NORTEK™ GLOBAL HVAC

Contents

General health and safety

WARNING

Warning is used when failure to heed or implement the instruction(s) can lead to not only component damage, but also to a hazardous situation being created where there is a risk of personal injury.

CAUTION

Caution is used when failure to follow or implement the instruction(s) can lead to premature failure or damage to the heater or its component parts

Gas leak emergency

If you can smell gas from or near the heater:

- **Do not try to light any appliance**
- **Do not smoke or light matches**
- **Do not turn electrical switches on or off**
- **Open doors and windows, to air the room**
- **Close the fuel control to the device**
- **If you still smell gas turn off the the supply at the meter unless the meter is in the cellar**
- **Raise the alarm and evacuate all personnel to a safe place**
- **Promptly Call your Gas Emergency number**

Enter your gas emergency number below

- Do not store or use petrol or other flammable vapours and liquids in the vicinity of the appliance.
- In case of persisting problems, contact your distributor

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury, or death.

Read the installation, operation, and maintenance instructions thoroughly before installing or servicing this equipment.

Do not use this appliance if any part has been immersed in water. Immediately call a qualified service technician to inspect the appliance and replace any gas control that has been immersed in water.

Gas-fired appliances are not designed for use in hazardous atmospheres containing flammable vapours or combustible dust, in atmospheres containing chlorinated or halogenated hydrocarbons or in applications with airborne silicone substances.

Should overheating occur, or the gas supply fail to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.

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

Carry out a risk assessment for the task to be carried out and ensure the correct use of any Personal Protective Equipment.

Any obligations arising from Health and Safety regulations or relevant codes of practice.

In addition the installation must be carried out in accordance with national or local regulations and any other relevant Codes of Practice by a qualified installer. Isolate all electrical supplies to the heater & controller before proceeding.

Warranty

The unit was test operated and inspected at the factory prior to packing for dispatch and was in proper operating condition. If the heater has incurred damage in shipment, document the damage with the transport company and contact your supplier.

The heater is supplied with a 1 year parts and labour warranty and a further year on all parts excluding consumables.

The warranty commences from the date of dispatch from the manufacturer, and is subject to the terms detailed within the Manufactures 'conditions of business'.

Warranty is void if:

- Wiring is not in accordance with the diagram provided with the heater.
- The unit is installed without proper clearances required regardless of the material being combustible.
- A fan model is connected to a duct system or if the air delivery system is modified.

Location/Positioning

Under no circumstances should any item be placed on or above any part of the heater, whether it is being used or not.

All basic criteria must be satisfied prior to commencing the installation and commissioning process.

The heater must be positioned and installed to comply with all relevant standards and guidelines. And should also meet the local and national fire regulations and insurance criteria. carefull consideration should be taken when in close proximity to high risk areas.

Gas-fired appliances are not designed for use in hazardous atmospheres containing flammable vapours or combustible dust, in atmospheres containing chlorinated or halogenated hydrocarbons or in applications with airborne silicone substances.

Should overheating occur, or the gas supply fail to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.

General

This manual is an integral part of the heater, therefore it should always be carefully kept and it should always be provided together with the heater, if it is transferred to another owner or user. If this manual is damaged or lost, a new one should be requested from the installer or from the manufacturer. After unpacking the product, please check the contents to ensure all components are present. If not, please contact your supplier.

The installation must be carried out by suitably qualified personnel who, at the end of the work, will commission the appliance and issue to the owner a copy of the commissioning report, which also confirms that the installation is carried out in accordance with regulations & standards applicable to the country of use and in accordance with the manufacturers instructions.
or premises by incorrect installation, settings, maintenance or by improper use of the heater is excluded.

This appliance has been manufactured specifically for room heating and must be used for this purpose. Contractual liability of the manufacturer in respect of damages caused to people, animal or premises by incorrect installation, settings, maintenance or by improper use of the heater is excluded.

During the initial start-up, there may be the formation of odours and fumes due to the evaporation of the oil added to protect the heat exchanger during storage; this is normal and will disappear after a short period. It is recommended to ensure suitably ventilation for room.

If the appliance is to remain unused for long periods, it is recommended that the following operations are carried out:

- Turn the appliances' electrical supply off via the local isolator.
- Close the main fuel supply valve
- If there is a long period of time between operation, it is recommended that you contact your installer to carry out the new start-up.

The heater shall be fitted with approved accessories only. The manufacturer is not liable for damages arising from the improper use of the heater or from the use of non-original materials or accessories. References to Laws, Regulations, Directives and Technical Rules mentioned in this manual are provided only for information purposes and are in force when the manual is printed.

The introduction of new provisions or amendments to current laws does not represent an obligation of the manufacturer towards third parties. Repairs or maintenance are to be performed by trained personnel only.

Do not modify or tamper with the appliance, the manufacturer will not be held responsible for any third party modifications to the heater.

The services that are to be connected (fuel pipes, power supply, etc.) must be suitably secured and must not be dangerous with the risk of tripping.

The manufacturer is responsible for the product compliance with Laws, Directives or Construction Rules in force when the product is marketed. The knowledge and observance of the laws and standards regarding plant design, installation, operation and maintenance are the sole responsibility of the designer, installer and user.

The manufacturer shall not be held responsible for failure to comply with the instructions of this manual, for the consequences of any operations carried out and not specifically provided for or for translations open to misinterpretation.

The electrical system must feature suitable individual and independent electrical protection for each appliance which, in case of accidental failure, will be activated on the single appliance without prejudice to the proper operation of the other units present on the installation.

Note:
The appliance is designed to be operated with the heating capacity and the air flow rate specified in the Data Sheet. If the heating capacity is too low and/or the air flow rate is too high, combustion products may condensate, resulting in the irreparable corrosion of the heat exchanger. If the heating capacity is too high and/ or the air flow rate is too low, overheating of the heat exchanger may occur, resulting in the activation of the high temperature safety devices and could cause damage to the exchanger

Disposal instructions

Disposing of the appliance must be done by an authorised company and in compliance with the applicable laws. Before taking waste to Authorised Collection Centres, dismantle and separate the various materials that compose it which in summary are

- Ferrous materials
- Aluminium and copper
- Electrical wiring
- Seals and insulating materials
- Plastic materials
- Electronic cards

Compliance notices

The heater range detailed herewith are manufactured within a strictly controlled quality environment within the parameters of ISO 9001.

These instructions are only valid if the following country code is on the appliance GB. IE. If this code is not present on the appliance, it is necessary to refer to the technical instructions which will provide the necessary information concerning the modification of then appliance to the conditions of use for the country.

The manufacturer has taken reasonable and practical steps to ensure that all heaters are safe and without risk when properly used. These heaters should therefore only be used in the manner and purpose for which they were intended, and in accordance with the recommendations detailed herewith.

The manufacturer supports all new products being supplied to their customers with a comprehensive information pack; this clearly defines mandatory instructions for the safe installation, use, and maintenance, of the appliance(s).

Where proprietary items are incorporated into any of the heaters, detailed information and instructions are also provided as part of the information pack. It is the responsibility of the installer, owner, user, or hirer of the heater to ensure that they are familiar with the appropriate information/manuals supplied by the manufacturer and the safety instructions.

In addition, operators must be suitably trained in the use of the appliance so as to ensure its continued safe and efficient use.

The manufacturer has a commitment to continuous improvement and therefore reserve the right to amend or change the specification.

The heater range conforms to the following standards:

EN 1020
Requirements for non domestic gas fired forced convection air heaters for space heating incorporating a fan to assist transportation of combustion air and/ or combustion products.

EN - ISO 12100-1 & EN - ISO12100-2
Safety of Machinery - Basic Concepts, General Principles for Design Part 1 & Part 2

EN 60204 - Part 1
Safety of Machinery - Electrical Equipment for Machines Specification for General Requirements

EN 60335 - Part 1
Safety of Household and Similar Electrical Appliances General Requirements

EN 55014
Limits and methods of measurement of radio disturbance characteristics of electrical motor-operated and thermal appliances for household and similar purposes, electrical tools and similar electric apparatus

EN 50165
Electrical Equipment of non-electric heating appliances for household and similar purposes, safety requirements
The PVE range of gas unit heaters meet with the governments criteria in respect of the Enhanced

The PVE heaters detailed here are manufactured for heating within a strictly controlled environment within the parameters of ISO9001.
These instructions are only valid for applications designed to operate in Europe

If the country code and gas category on the appliance data label does not match the country of installation or the country codes and gas category's as shown in this instruction manual, it will be necessary to contact the distributor or manufacturer to provide the necessary information for the modification of the appliance to the conditions of use for the country of installation

Directives applied

- Gas Appliance Regulations (EU) 2016 / 426.
- Machinery Directive (2006 /42 / EC)
- Low Voltage Directive (2014 / 35 / EU)
- Electromagnetic Compatibility Directive (2014 / 30 / EU)
- Product Liability Directive (85 / 374 / EEC)
- Eco-Design Directive (2009 / 125 / EC)

General product information

There are six PVE models with outputs ranging from 29.4 kW to 144.0 kW.
PVE heaters are suitable for operation on Natural gas (G20), Natural gas (G25), Natural Gas (G25.3) or L.P.G (Propane G31)

The PVE range are available for floor mounting only.

PVE heaters have been approved for alternative flue discharge arrangements but each heater must be connected to its own individual open flue these are detailed in the section flue installation

Cabinet

Manufactured from electro-zinc coated steel, finished in a durable stove enamelled polyester powder paint.

Heat Exchanger

This heater is equipped with a patented T-CORE2® heat exchanger

Flue/Combustion Air Spigot

Each heater is fitted with two spigots both of which are located on top of the appliance. One of the pair is for connection for the flue whilst the other is a screened combustion air intake see section: Flue installation

Burner Control

The heaters are fitted with automatic ignition for all models within the range

Exhaust Fan

Combustion gases are evacuated to atmosphere via an in built power flue venter fan, which is safety interlocked to the gas valve via an air pressure proving device

Air Movement Fan

PVE heaters are supplied with Centrifugal fans suitable for ducted or free blowing

Heater model examples

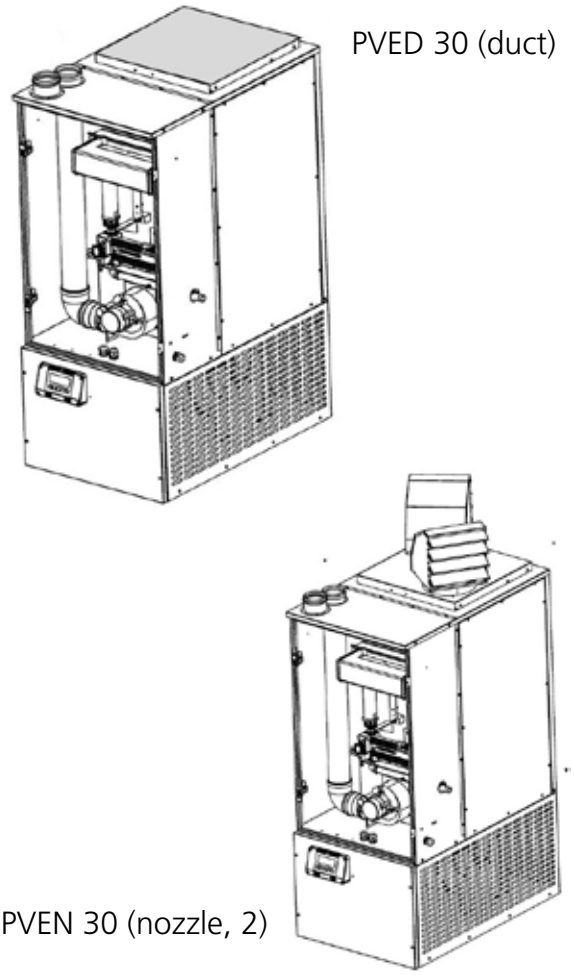


Figure 1 Model recognition

Heater dimensions

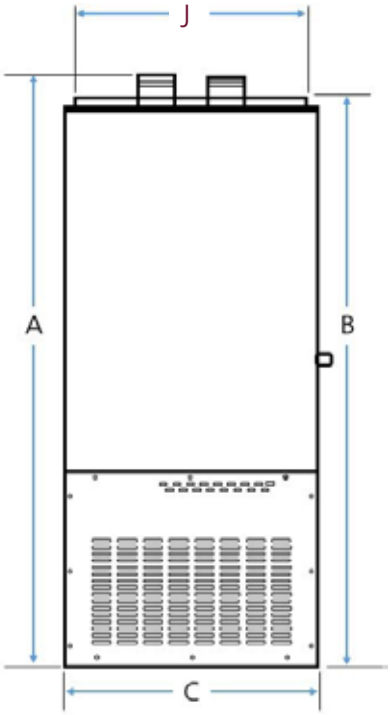


Figure 2a Unit front view PVED

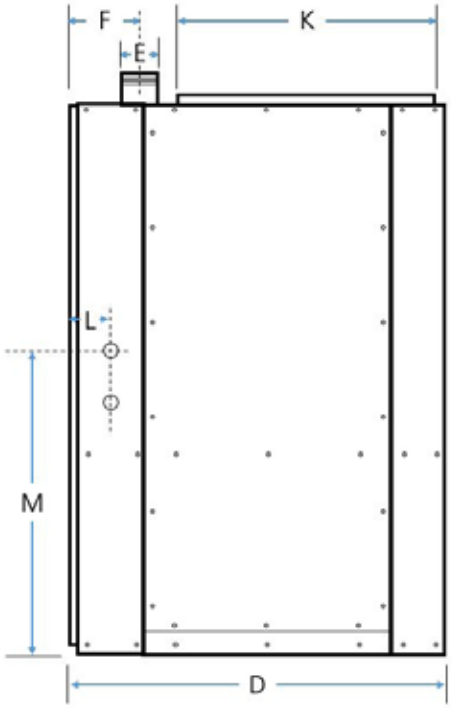
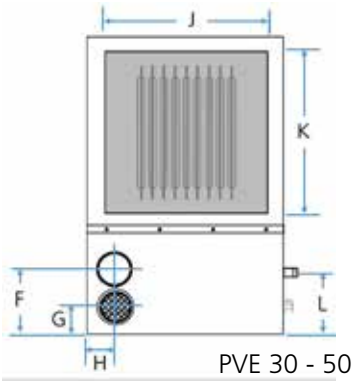
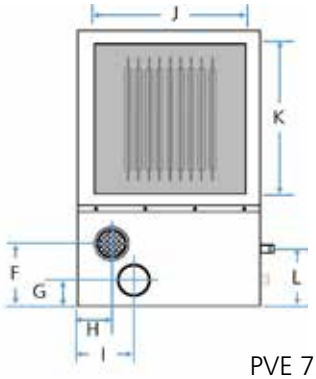


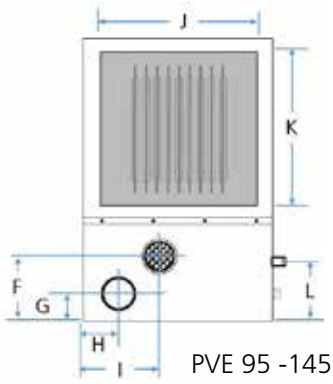
Figure 2b Unit side view PVED



PVE 30 - 50



PVE 72



PVE 95 -145

Figure 2c Top view PVED

Model		30	50	72	95	120	145
Overall height PVED	A	1810	1810	1890	1990	2041	2040
Unit height	B	1625	1625	1705	1805	1856	1855
Unit width	C	697	697	864	864	1346	1347
Unit depth	D	1079	1079	1232	1232	1242	1242
Flue diameter	E	100	100	130	130	130	130
Flue connection	F	240	240	283	272	260	261
	G	100	100	111	100	101	102
	H	95	95	115	155	101	221
	I	n/a	n/a	259	300	381	380
Duct outlet PVED	J	577	577	772	722	772	772
	K	577	577	791	791	1218	1218
Gas connection point	L	232	232	232	232	262	262
	M	831	831	908	1171	979	979

Table 1: Heater dimensions

Nozzles (Optional Extra)

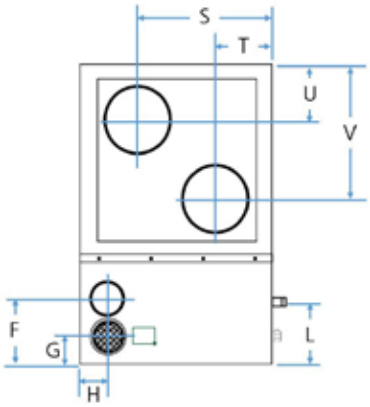


Figure 3a : PVEN 30 - 50

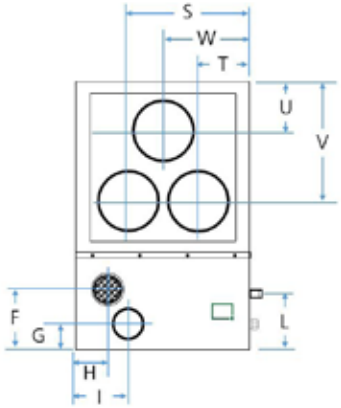


Figure 3b : PVEN 72

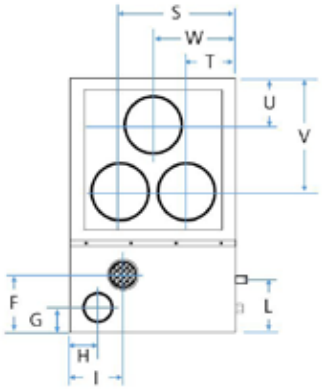


Figure 3c : PVEN 95

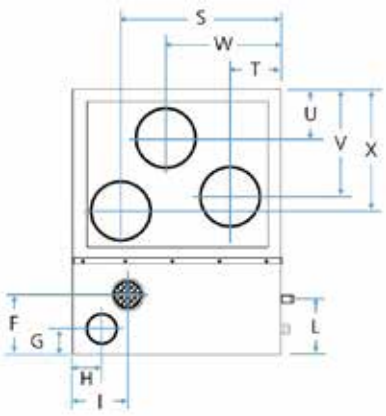


Figure 3d : PVEN 120

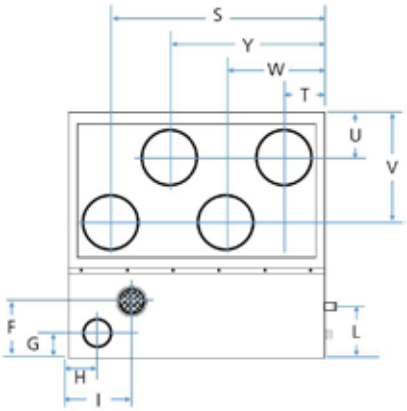


Figure 3e : PVEN 145

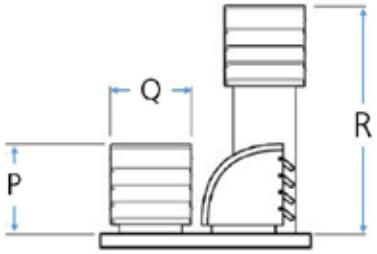


Figure 4 Nozzle louvres

Units with more than two nozzles are to be supplied as standard with height extensions for rear nozzles. Standard nozzles may be specified for height sensitive applications or installations where cabinets are located centrally within the space.

Model		30	50	72	95	120	145
Nozzle outlet PVEN	P	285	324	352	352	410	410
	Q	280	280	314	314	355	355
	R	n/a	n/a	677	677	815	815
Nozzle plate centre line of the nozzle mounting hole	S	492	492	659	659	1075	1110
	T	208	208	209	209	281	242
	U	197	197	235	235	222	236
	V	481	481	645	645	596	646
	W	n/a	n/a	434	434	757	536
	X	n/a	n/a	n/a	n/a	642	n/a
	Y	n/a	n/a	n/a	n/a	n/a	816

Table 2: Nozzle dimensions

Model		30	50	72	95	120	145
Installation clearance in mm	Front	700	700	840	840	840	840
	Side	150	150	150	150	150	150
	Rear	400	400	400	400	400	400

Table 3: Installation clearances

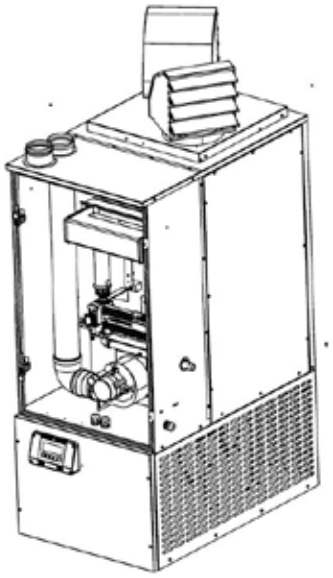


Figure 5a : PVEN 30 - 50

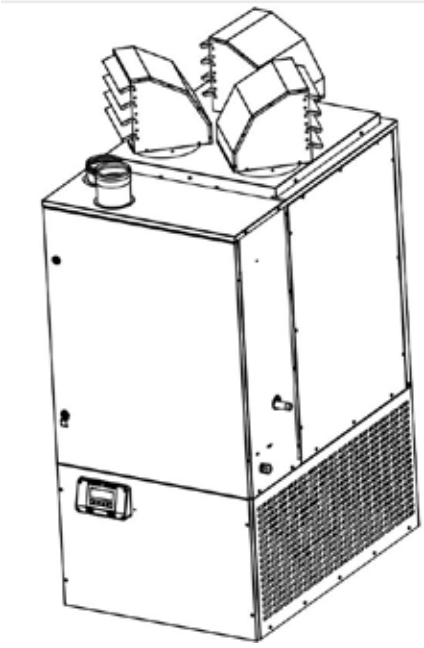


Figure 5b : PVEN 72 - 120

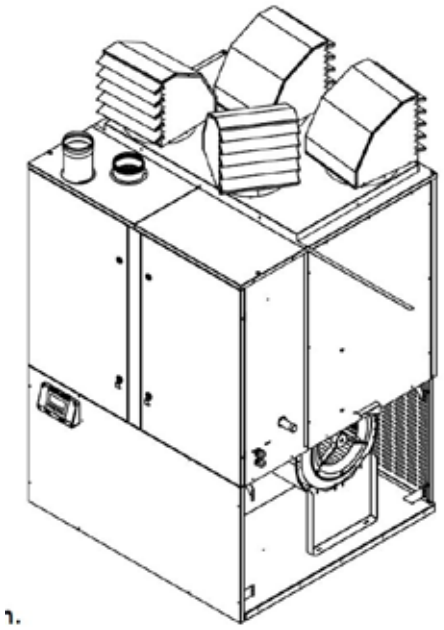


Figure 5c : PVEN 145

Model		30	50	72	95	120	145
Overall height with nozzles	mm	1991	1991	2101	2201	2301	2301
Nozzles	QTY	2	2	3	3	3	4

Table 4 : Overall height when fitted with standard nozzles

Prior to installation the following points are to be considered.

- Check the rating plate for the gas and electrical specifications of the heater to be sure that they are compatible with the gas and electric supplies at the installation site.
- The position of the heater for the optimum efficient distribution and circulation of warm air.
- The position of the heater relative to the route of the flue
- The position of the heater relative to the supply of fuel
- The position of the heater relative to the electrical services, and if appropriate, any additional controls.
- The position of the heater relative to the supply of fresh air
- The position of the heater so the burner will not be adversely affected by high winds or draughts.
- The height if applicable at which the heater is to be mounted and potential stratification /circulation problems.
- The position of the heater relative to service and maintenance requirements
- Ensure that the heater has adequate fixings and flat level flooring to securely fasten in its final mountain position
- The flooring is made from non-combustible material, sufficiently robust to withstand the weight of the heater and any ancillary equipment
- The location must also allow for adequate clearance for the air supply, return air circulation, gas supply and electrical supply, whilst also providing good and safe working access

Technical data

Gas type	Model	30	50	72	95	120	145
Heat output (G20)	kW	35.2	49.3	73.4	95.4	128.5	136.7
Heat input nett (G20)	kW	37.7	52.8	79.3	104.5	140.0	150.0
Efficiency nett	%	93.4	93.3	92.6	91.3	91.8	91.2
Efficiency low nett	%	91.7	90.3	89.7	88.5	89.9	89.4
Heat output low fire	kW	20.7	23.8	35.6	46.2	75.5	80.5
Heat input nett low fire	kW	22.6	26.4	39.7	52.3	84.0	90.0
Gas connection	Inch	¾"				1"	
Nominal inlet pressure G20 natural gas	mbar	20					
Burner pressure G20 natural gas	mbar	8.4	8.5	12.4	7.3	7.7	10.7
Burner pressure G20 low natural gas	mbar	3.1	2.1	4.1	1.8	2.8	4.0
Main injector G20 natural gas	mm	5.75	6.8	7.4	10.0	8.0	7.4
Natural gas G20 consumption	m³/h	3.99	5.59	8.39	11.06	14.81	15.87
Nominal inlet pressure G25 natural gas	mbar	25					
Burner pressure G25 natural gas	mbar	12.3	12.3	18.8	10.5	11.1	15.1
Burner pressure G25 low natural gas	mbar	4.5	3.1	4.7	2.6	4.2	5.5
Main injector G25 natural gas	mm	5.75	6.8	7.4	10.0	8.0	7.4
Natural gas G25 consumption	m³/h	4.64	6.50	9.76	12.86	17.23	18.46
Nominal inlet pressure G25.3 natural gas	mbar	25					
Burner pressure G25.3 natural gas	mbar	12.0	12.3	17.8	10.3	10.6	14.6
Burner pressure G25.3 low natural gas	mbar	4.5	3.1	4.5	2.6	4.0	5.4
Main injector G25.3 natural gas	mm	5.75	6.8	7.4	10.0	8.0	7.4
Natural gas G25.3 consumption	m³/h	4.64	6.50	9.76	12.86	17.23	18.46
Nominal inlet pressure G31 LPG gas	mbar	37					
Burner pressure G31 LPG gas	mbar	36.0	35.8	35.0	34.8	35.3	13.4
Burner pressure G31 low LPG gas	mbar	13.4	12.9	12.6	12.7	17.6	5.0
Main injector G31 LPG gas	mm	3.1	3.7	4.5	5.2	4.15	5.6
LPG gas G31consumption	kg/h	2.94	4.12	6.18	8.14	10.89	11.68
Nominal inlet pressure G31(NL) LPG gas	mbar	30					
Burner pressure G31(NL) LPG gas	mbar	28.9	29.0	27.8	27.6	28.5	13.4
Burner pressure G31(NL) low LPG gas	mbar	10.5	10.4	10.0	9.9	10.4	5.0
Main injector G31(NL) LPG gas	mm	3.3	3.8	4.8	5.6	4.4	5.6
LPG gas G31(NL) consumption	kg/h	2.94	4.12	6.18	8.14	10.89	11.68
Propane restriction	mm	40.0	N/A	N/A	N/A	N/A	N/A

Table 5: Gas pressures

Country code	Approved gas category
FR	I2Esi
BE	I2E(R)B
AT,CH,CZ,DK,EE,ES,FI,GB,GR,IE,IT,BGIS,LT, LV,NO,PT,RO,SE,SI,SK,TR,CY,HR	I2H
PL,LU,DE,RO	I2E
DE	I2ELL
NL	I2Ek
BE,CZ,FR,IE,IT,ES,CH,GB, SI,LU, SK,PT,PL,TR,GR,HR	I3P (37)
NL	I3P (30)

Table 6 : Approved gas categories

	Model	30	50	72	95	120	145
Restriction	mm	70	80	67	78	130	130
Flue diameter	mm	100	100	130	130	130	130
Supply voltage		1*230V N					
Power absorption	kW	1.25	1.90	1.85	2.90	3.10	3.40
Gross flue temperature	°C	100	120	140	145	140	140
Nett weight	kg	205	221	277	324	409	444
Electrical protection	IP	IP20					
Appliance type		B22 C32 C12					
Temperature rise	°C	36	38	40	34	34	30
Air flow	m³/s	0.8	1.05	1.5	2.3	3.05	3.66
Centrifugal static pressure	Pa	250	325	150	250	100	50
Sound level (3m)	dBA	63	67	64	74	74	76
NOx class		3	3	3	3	3	3
Minimum location/room temperature	°C	+5					
Maximum location/room temperature	°C	+35					

Table 7: Flue and electrical data

Electrical supply

Ensure the supply is in accordance with the manufacturer's recommendations and is as stated on the appliance data plate.

The main electrical supply must not be switched off or disconnected as a method for stopping the heater, the exception to this is in an emergency, or during servicing, where the heat exchanger has been given sufficient cooling time to prevent damage from occurring.

Wiring external to the heater must be installed in accordance with any local, national, and European regulations.

The means of connection to the main electrical supply must allow for complete electrical isolation of the heater, furthermore, in the

case of a unit wired for a three phase supply, the supply should only be used to serve the heater itself and no other plant or equipment. The position of the isolation switch must be such that it is adjacent to the heater and easily accessible at all times. In addition, the isolator itself must have a contact separation of not less than 3mm.

The Control fuse ratings are detailed on the appliance data plate.

Ensure that wiring cannot make contact with any surfaces liable to be subject to high temperatures or where the insulation of the wiring could be impaired as a result of such contact

Pre installation

Delivery

The heater is supplied wrapped in heavy duty protective polythene, mounted on a pallet.

On receipt of the heater, the following checks should be carried out;

- The model is as per order.
- That it is undamaged.
- That it is suitable for the gas supply and pressure.
- That it is suitable for the electrical supply.

If any of these points are not satisfied then contact should be made with the Sales Office of the manufacturer as soon as possible.

In the case of claims for damage, this must be reported in writing within 24 hours of delivery, in order to comply with insurance criteria.

Packaging

The heater will usually be supplied wrapped in heavy gauge polythene, non assembled parts will be supplied separately.

Prior to installation, the assembly of the heater should be completed, it is advisable that this is undertaken in the area where the heater is to be sited obey the clearances in table 3 .

It is strongly advised that when positioning the heater the lifting eyes are used, thereby reducing the risk of inadvertent damage being caused to the heater.

Flooring

The heater must be installed on a level non-combustible surface capable of supporting the weight of the heater and any ancillary equipment.

Electrical Installation/connection

The electrical supply must be as specified and suitable for the heater, and must be run within conduit to a point adjacent to the heater, and be terminated to provide an isolation point that will prevent remote or inadvertent activation.

Cables, conduit, and fittings that are used to make the connection between the isolator and the heater must conform to the appropriate local and national regulations.

Final connections for any additional external controls must be completed on site, and must be carried out according to local and national regulations. Separate user information is provided for the time control unit and the burner, and forms part of the product information pack which accompanies every heater when despatched.

Always isolate from the mains electrical supply before commencing work on the heater.

Always ensure that the appropriate personal protective equipment is used.

Consideration

Any combustible material adjacent to the heater or flue system must be so placed or shielded so that its surface temperature does not exceed 65°C.

PVE free blowing heaters are at their most effective when located as close to the working area as possible. However care should be exercised to avoid directing the discharged air directly onto the occupants of the area to be heated
If the heater is positioned to discharge towards or across the cold air source then a distance of 1.5m - 6m is recommended dependent upon the size of the entrance and the air throw characteristics

Warm air circulation

The air heater should be positioned to enable maximum circulation of discharged warm air within the area to be heated, whilst taking account of personnel within the area, sources of cold air ingress, and obstructions.

The air temperature rise on passing the heat exchanger is typically around 33°C.

A full and unobstructed return air path to the air heater must be provided.

Where the heater is positioned to deliver blown air through an opening in a wall, return air intakes should be located so that they cannot become blocked.

Similarly these intakes must be positioned so as not to draw in odours, fumes, hazardous vapours or particles.

Air supply for combustion and ventilation

Consideration must be given to the provision of air for the purposes of combustion and ventilation of the heated space, plant room or enclosure where the heaters are to be installed.

Ensure combustion and ventilation air is provided in accordance with the regulations and rules in force

In areas where it is proposed that more than one heater is to be installed, a general scheme of circulation should be drawn up and maintained, thereby offering the best heat distribution.

Air pressure within the area heated and the outside air pressure must remain the same, factors influencing this would be the presence of extraction systems, ventilation systems, and various types of process plant.

Heaters installed within the heated space

Where the heaters are installed within the heated space (e.g. not a plant room , or enclosure) then:

Combustion air or heater related ventilation air will not be required if:

The heaters are installed in room sealed mode (ie with a positive connection to atmosphere of both flue and combustion air). Or

If the design air change rate of the heated space is 0.5 air changes per hour or greater. The design air change rate may be satisfied by natural infiltration or by mechanical ventilation.

Combustion air ventilation will be required if:

The heater(s) are installed with flue only (ie without the positive connection to atmosphere of a combustion air duct). And

The design air change rate of the heated space is less than 0.5 air changes per hour.

Where heater(s) are installed without the positive connection of combustion ductwork within a heated space where air change rate of that heated space is less than 0.5 air changes per hour then it will be necessary to provide either natural ventilation openings to the heated space see section Natural ventilation openings to the heated space or the mechanical ventilation of the heated space see section Mechanical ventilation to the heated space

Natural ventilation openings to the heated space

When the heater(s) are to be installed in a heated space with an air change of less than 0.5 / hour and without the connection of combustion ductwork. Then provision for low level natural ventilation will be necessary.

The minimum free area of the low level natural ventilation opening shall be

2 cm^2 for each kW of rated heat input

The low level natural ventilation opening should be situated on an external wall and be within 1000 mm of floor level for natural gas and ideally at floor level for L.P.G gas installations but in any event no higher than 250 mm.

Model	High cm^2	Low cm^2
30	None	64
50	None	107
72	None	158
95	None	211
120	None	263
145	None	315

Table 8 : Minimum Free Area Of Natural Ventilation Opening (heated space)

When the heater(s) are to be installed in a heated space with an air change of less than 0.5 / hour and without the connection of combustion ductwork.

Using a mechanical ventilation system, rather than ventilation openings then

- The heated space needs to be mechanically ventilated so that the air change is equal or greater than 0.5/hour.
- ONLY USE input type mechanical ventilation with a natural or mechanical extraction system
- DO NOT use mechanical extraction with a natural inlet
- It is necessary to provide an automatic means to safely inhibit heater(s) operation should mechanical air supply fail for any reason

Heaters installed within a plant room or enclosure.

For plant room applications the minimum free area of ventilation opening will depend upon whether the heater(s) is installed in room sealed mode (ie with a positive connection to atmosphere of both flue and combustion air).

Or with flue only (e.g. without the positive connection to atmosphere of a combustion air duct)

Where the heater(s) is installed in a plant room and in room sealed mode (e.g. with a positive connection to atmosphere of both flue and combustion air) the minimum free area of ventilation opening needs to be

- At high level 5 cm^2 for each kW of rated heat input.
- At low level 5 cm^2 for each kW of rated heat input

The high level ventilation opening should be sited on an external wall and positioned as high as is practical and always within the top 15% of the wall height.

The low level natural ventilation opening should be situated on an external wall and be within 1000 mm of floor level for natural gas and ideally at floor level for L.P.G gas installations but in any event no higher than 250 mm.

Model	High cm^2	Low cm^2
30	160	160
50	267	267
72	394	394
95	527	527
120	656	656
145	787	787

Table 9 : Minimum Free Area Of Natural Ventilation Opening (room sealed heaters)

Natural ventilation openings to plant rooms for flued heaters

Where the heater(s) is installed in a plant room and in flue mode (ie without a positive connection to atmosphere of combustion air ductwork) the minimum free area of ventilation opening needs to be -

- At high level 2 cm^2 for each kW of rated heat input.
- At low level 4 cm^2 for each kW of rated heat input.

The high level ventilation opening should be sited on an external wall and positioned as high as is practical and always within the top 15% of the wall height.

The low level natural ventilation opening should be situated on an external wall and be within 1000 mm of floor level for natural gas and ideally at floor level for L.P.G gas installations but in any event no higher than 250 mm.

Model	High cm^2	Low cm^2
30	64	128
50	107	214
72	158	316
95	211	422
120	263	525
145	315	630

Table 10 : Minimum Free Area of Natural Ventilation Openings for flued heaters.

Natural ventilation openings to enclosures for room sealed heaters

For enclosure applications the minimum free area of ventilation opening will also depend upon whether the heater(s) is installed in room sealed mode (e.g. with a connection to atmosphere of both flue and combustion air).

Or with flue only (ie without the connection to atmosphere of a combustion air duct)

Where the heater(s) is installed in a plant room The maximum temperature within the plant room should not exceed 32°C and in room sealed mode (ie with a connection to atmosphere of both flue and combustion air) the minimum free area of ventilation opening needs to be.

- At high level 5 cm^2 for each kW of rated heat input
- At low level 5 cm^2 for each kW of rated heat input.

The high level ventilation opening should be sited on an external wall and positioned as high as is practical and always within the top 15% of the wall height.
The low level natural ventilation opening should be situated on an external wall and be within 1000 mm of floor level for natural gas and ideally at floor level for L.P.G gas installations but in any event no higher than 250 mm.

Model	High cm^2	Low cm^2
30	160	160
50	267	267
72	394	394
95	527	527
120	656	656
145	787	787

Table 11 : Minimum Free Area of Natural Ventilation Openings to enclosures for room sealed heaters

Natural ventilation openings to enclosures for flued heaters

Where the heater(s) is in an enclosure and in flue only mode (ie without a positive connection to atmosphere of combustion air ductwork) the minimum free area of ventilation opening needs to be:

- At high level 5 cm^2 for each kW of rated heat input
- At low level 10 cm^2 for each kW of rated heat input

The high level ventilation opening should be sited on an external wall and positioned as high as is practical and always within the top 15% of the wall height

The low level natural ventilation opening should be situated on an external wall and be within 1000 mm of floor level for natural gas and ideally at floor level for L.P.G gas installations but in any event no higher than 250 mm.

Model	High cm^2	Low cm^2
30	160	320
50	267	533
72	394	788
95	527	1053
120	656	1312
145	787	1574

Table 12: Minimum Free Area of Natural Ventilation Openings to enclosures for flued heaters

Flue requirements

IMPORTANT :
The flue must be installed in accordance with national and local regulations. Failure to provide proper flueing could result in death, serious injury and/or property damage. The air heater must be installed with a flue to the outside of the building. Safe operation of any power vented gas apparatus requires a properly operating flue system, correct provision for combustion air and regular maintenance and inspection.

PVE heaters may be installed as Type-B and Type-C installations.
Flue must be in accordance with codes of practice and relevant standards. Local requirements may apply in addition to national requirements. These unit heaters are designed to operate safely and efficiently with either a horizontal or vertical flue system when installed with the specific requirements and instructions

If this heater is replacing an existing heater, be sure that the flue is sized properly for the heater being installed and that the existing flue is in good condition. A properly sized flue system is required for safe operation of the heater.

An improperly sized flue system can cause unsafe conditions and/or create condensation.

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

All products of combustion must be flued to outdoor atmosphere

Each heater installed as a type B appliance must be fitted with an individual flue pipe and the combustion air inlet opening is provided with a protection grill. Each heater installed as a type C appliance must be fitted with an individual combustion air/ flue pipe system. Type C2 appliances with single-duct system for supply of combustion air and evacuation of flue gasses are not allowed.

Flue pipe diameters and maximum pipe lengths in Table 12 apply to both horizontal and vertical systems. Add all straight sections and equivalent lengths for elbow.

The total combined length must not exceed the maximum flue length.

PVE		30-50	72-145
Heater socket and pipe diameter (mm)	Flue pipe/inlet pipe	100	130
Maximum straight length (with wall/roof terminal) (m)	Flue pipe/inlet pipe	9*	
Equivalent length of 45° elbow (m)	Flue pipe/inlet pipe	0.75	
Equivalent length of 90° elbow (m)	Flue pipe/inlet pipe	1.5	

Table 13: : Maximum flue system pipe lengths

Use only one flue pipe diameter on an installation.
Recommended minimum flue is 1m.
* Mentioned lengths apply only when :

- No elbow installed immediately after flue and inlet
- Successively installation of several elbows without straight pipe

Flue outlet

Venter outlet attachment requirements: Depending on the size of flue pipe as determined in Table 12, attach either the flue pipe directly to the collar or a taper-type connector.

Single wall flue pipe exposed to cold air or run through unheated areas should be insulated to avoid condensation. Provision must be made for the condensation to flow freely to a point to which it can be released, i.e. a drain or gully. The condensation drain from the flue must be constructed from non-corrodible material not less than 20 mm diameter. Copper or copper based alloys must not be used for condensation drains

For testing, the flue pipe should include a sealable test port. Ideally the test port should be at least 450 mm away from the air heater flue connection socket. However if a concentric flue fitting is attached directly to the connection sockets then the combustion should be tested through the flue outlet collar via a drilled test port which must be securely plugged on completion.
Follow the flue pipe manufacturers installation instructions for making joints, including connections to the air heater, for passing through a building element and for support requirements.

Gasket sealed single wall flue seamless aluminium or stainless steel pipes are required. All joints must be sealed to prevent products of combustion from leaking into the building. If the flue passes through a combustible element of the building it must be enclosed by a sleeve of non-combustible material and separated from the sleeve by a minimum of 25 mm air break. The temperature of any combustible material near to the flue must not exceed 65°C when the heater is in operation. The flue must be at least 150 mm away from any combustible material.

FLUES FOR POWER VENTED INSTALLATIONS (type B appliances)

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

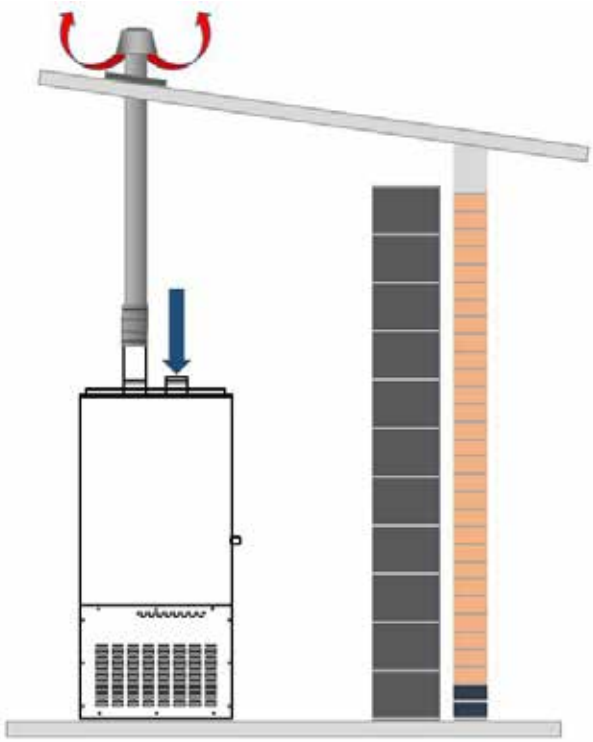


Figure 6a : Type B appliance : roof

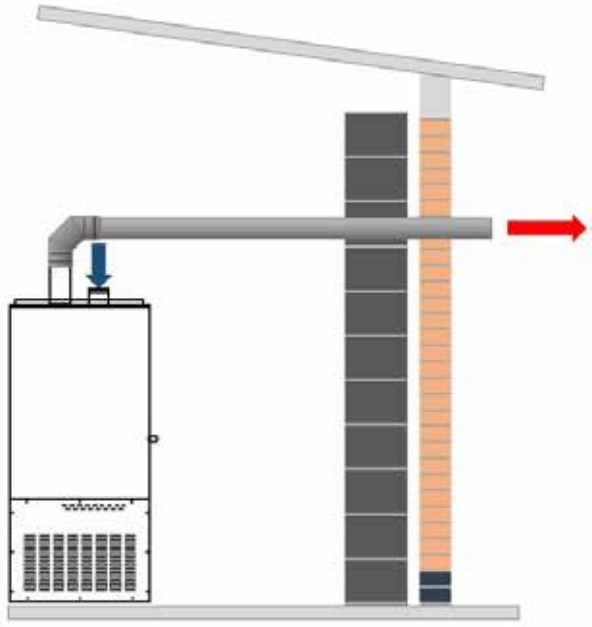


Figure 6b : Type B appliances : wall

Air supply

When these air heaters are installed in type B applications, designed to take air for combustion from the space in which it is installed. Do not restrict the combustion air intake.

It is important to ensure that there is an adequate air supply at all times for both combustion and heating requirements. Modern buildings involve greater use of insulation, improved vapour barriers, and weather proofing. These practices mean that buildings are sealed much tighter than in the past.

Proper combustion air supply for a power vented Type B installation requires ventilation of the heated space. Natural infiltration of air may not be adequate. Use of exhaust fans aggravates this situation. It is important to ensure that there is adequate combustion air supply at all times. Reliance on doors and windows is not allowed.

Always ensure that adequate combustion air is provided to suit the total installation of all combustion equipment in accordance with codes of practice and relevant standards, as appropriate.

Ensure that the air combustion inlet opening at the top of the unit cannot be obstructed..

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

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

Type C2 appliances must not be applied !

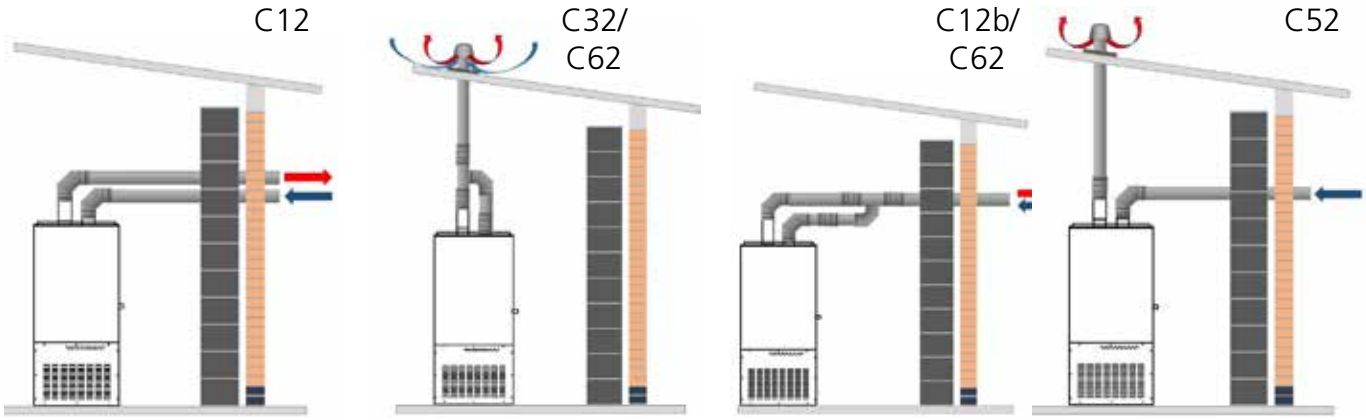


Figure 7 : Approved appliances type C

Location of the heater

If touched, the vent pipe and internal heater surfaces that are accessible from outside the heater will cause burns.

Note: Flue requirements may affect the heater location. Consult the flue requirements section prior to making a final decision on the location.

For best results, the heater should be placed with certain rules in mind.

- Always ensure that minimum clearances are maintained.
- When possible, heaters should be arranged to blow toward or along exposed wall surfaces.
- Care should be exercised to avoid directing the discharged air directly on to room occupants.
- Partitions, columns, counters, or other obstructions should be taken into consideration when locating the unit heater so that a minimum quantity of airflow will be deflected by such obstacles.

When units are located in the centre of the space to be heated, the air should be discharged toward the exposed walls. In large areas, units should be located to discharge air along exposed walls with extra units provided to discharge air in toward the centre of the area. For optimum results heaters are best used in conjunction with recirculating air fans suspended at high level.

Do not locate the heater where it may be exposed to water.

Hazards of Chlorine - apply to the location of the combustion air inlet. The presence of chlorine vapours in the combustion air of gas-fired heating equipment presents a potential corrosion hazard.

Chlorine is usually found in the form of Freon or degreaser compounds when exposed to a flame will precipitate from the compound, and go into solution with any condensation that is present in the heat exchanger or associated parts.

The result is hydrochloric acid which readily attacks all metals. Care should be taken to separate these vapours from the combustion process.

This may be done by wise location of the unit flue and combustion air terminals with regard to exhauster's or prevailing wind directions.

Chlorine is heavier than air. Keep this fact in mind when determining installation location of the heater in relation to building exhaust systems.

Gas piping and pressures

All piping must be in accordance with requirements outlined in the National Gas Codes (different for each country). Gas supply piping installation should also conform with good practice and any local codes. Support gas piping with pipe hangers, metal strapping, or other suitable material. Do not rely on the heater to support the gas pipe.

All sealing products shall be resistant to the action of liquefied petroleum gas or any other chemical constituents of the gas being supplied.

Install a ground joint union and manual shut off gas valve upstream of the unit control system.

All components of a gas supply system must be leak tested prior to placing equipment in service.
NEVER TEST FOR LEAKS WITH AN OPEN FLAME. Failure to comply could result in personal injury, property damage or death.
This appliance is equipped for a maximum gas supply pressure of 50 mbar.

Pressure testing supply piping
Test pressures above 50 mbar : Disconnect the heater and manual valve from the gas supply line which is to be tested. Cap or plug the supply line. Test pressures below 50 mbar : Before testing, close the manual valve on the heater. Leak test all connections by brushing on a leak detecting solution.

Do not over tighten and do not rotate the gas valve inside the heater control compartment

PVE Model	Natural gas/propane connection (Inches)
30 - 95	3/4
120 - 145	1

Table 13: : Diameter gas connection

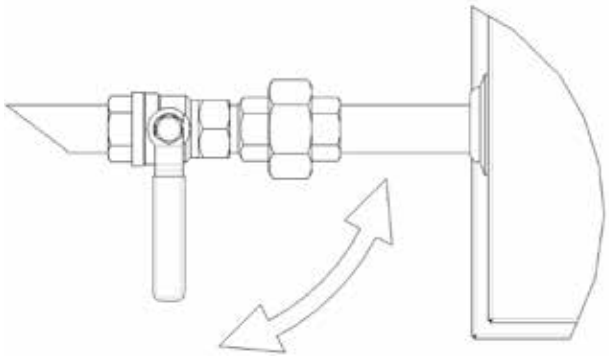


Figure 8 : Gas connection

Electrical connections

THIS APPLIANCE MUST BE EARTHED.

The electrical installation may only be carried out by an appropriately qualified person. The supply line to the heater should include a main switch. The minimum clearance distance between the contacts must be more than 3 mm.

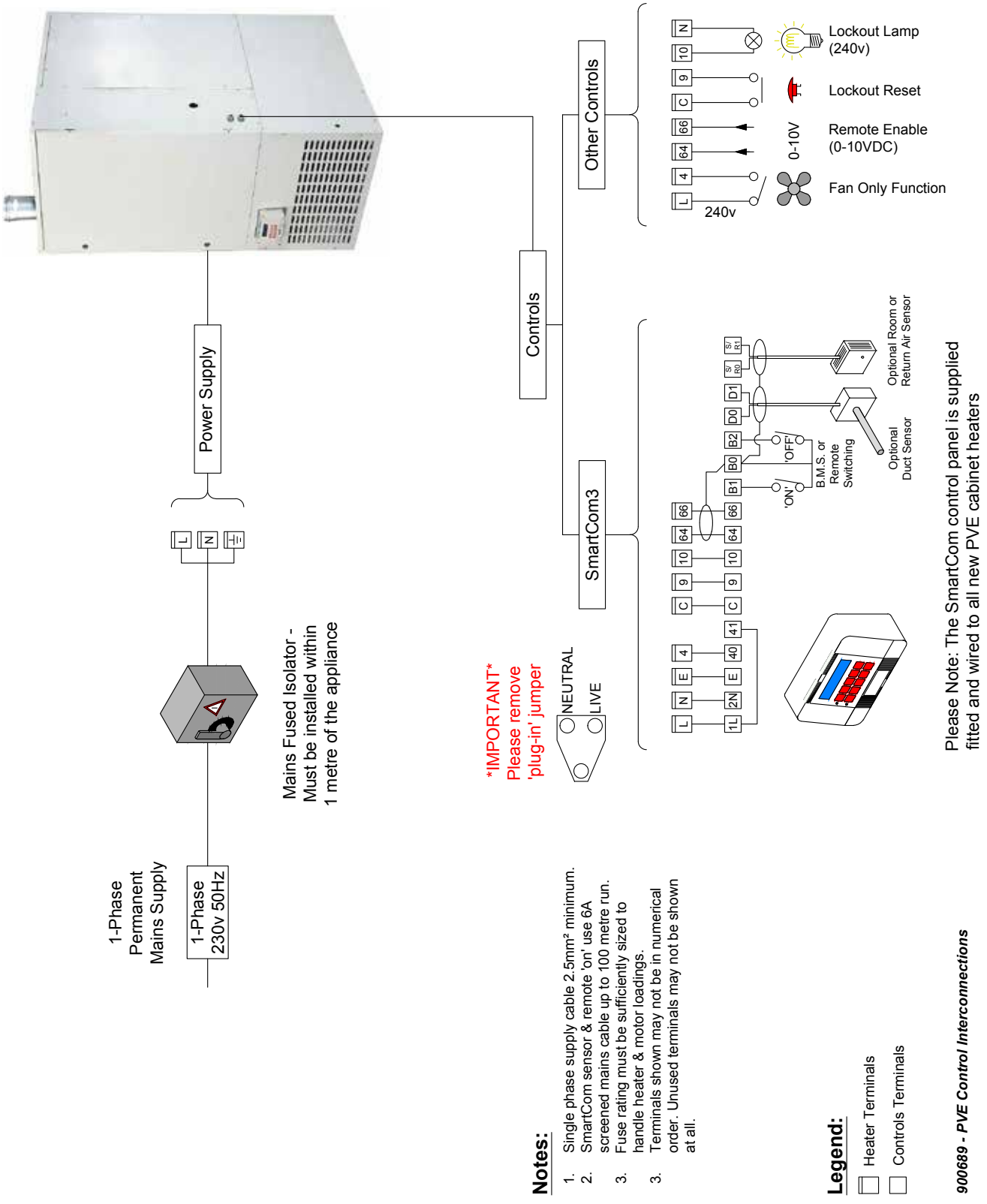
All electrical connections should be made in the heater control compartment. Screw type terminals are provided. Connections should be in accordance with the terminal markings and the wiring diagram affixed to the air heater. Attention: Serious damage can occur to burner relay when faulty connection of thermostat, reset switch or burner failure lamp.

Switching of wires for reset switch and flame failure (e.g.in a remote control box) will destroy the burner relay.

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

A burner reset switch with red indicator light is fitted on the heater. To add a remote reset button, make connections to the terminals in the electric box as indicated on the wiring diagram

Interconnection wiring diagram



Notes:

1. Single phase supply cable 2.5mm² minimum.
2. SmartCom sensor & remote 'on' use 6A screened mains cable up to 100 metre run.
3. Fuse rating must be sufficiently sized to handle heater & motor loadings.
3. Terminals shown may not be in numerical order. Unused terminals may not be shown at all.

Legend:

- Heater Terminals
- Controls Terminals

900689 - PVE Control Interconnections

Note: If the reset button requires activating for any reason, the cause must be determined. After determining and correcting the problem, restart the heater and monitor long enough to ensure proper operation (approximately 5 minutes).

An orange indicator light is fitted on the heater to signify when the burner is on.

Ensure that all cables are fixed and that they do not touch the combustion collector box.

Start up

1. Check installation prior to start up
2. Check Unit must be secure. Verify that no other parts are fitted which are not individually supported and secured.
3. Check clearances from combustibles.
4. Check vent system to be sure that it is installed according to the instructions in flue requirements.
5. Check piping for leaks and proper gas line pressure. Bleed gas lines of trapped air.
6. Check electrical wiring and ensure that wiring conforms with the wiring diagram. Be sure all wire sizes meet requirements.
7. Check polarity. Verify that line voltage exists between the black "L1" and earth ground.
8. Verify that the appliance is earthed by conducting an earth continuity test.

For your safety, follow the instructions exactly otherwise damage or injury could occur.

- This heater does not have a pilot flame. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
- Ensure that all pressure test points (on the gas valve and manifold) along with the pilot outlet plug (see Figures 9 and 10, item 6) are fully closed and gas tight.
- Before operating, smell all around the heater area for gas. Be sure to smell next to the floor because propane gas is heavier than air and will settle near the floor.
- Do not use this appliance if any part has been subjected to water ingress. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control.
- When overheating occurs or when gas supply is not turned off, shut the manual gas tap before turning off the electric power.

Operating

Operating sequence

1.Set SmartCom3 to the lowest temperature setting.

2.Turn off all electric power to the heater.

3.Shut the gas cock at the inlet of the unit.

4.Wait five minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, stop immediately and follow the steps in the warnings in GAS LEAK EMERGENCY section . If you do not smell gas, proceed to the next step.

5.Turn on the electric power to the heater.

6.Open the gas cock at the inlet of the unit.

7.Ensure that the SmartCom3 is set to an 'ON' period.

8.Adjust the SmartCom3 temperature to the required setting (must be above current room temperature).

If the appliance does not operate, follow the instructions "To turn off gas supply at the appliance" printed and call your service technician.(In the next section)

9.SmartCom3 calls for heat, energising the venter motor.

10.When adequate air flow for combustion is proven by an air proving switch and a pre-purge period has elapsed, the integral igniter and multifunctional gas control operate. The ignition spark ignites the gas creating the burner flame.

11.Burner flame is sensed by a flame rod sensor and when the heat exchanger is warmed up (+/- 30 seconds) and the fan control relay closes, the fan motor is energized.

12.If the flame is extinguished during the main burner operation, the integrated control system closes the main valve and attempts to relight the burner. The unit will attempt 5 ignitions before entering a "lock out" mode.

Lock out is indicated by the red warning light on the heater. To end this mode on the SmartCom3, press and release the LOCKOUT button. After 10 seconds the controller will return to normal operation. The lockout warning and LED will continue to display

13.To turn the heater 'OFF' for short periods adjust the SmartCom3 temperature to its lowest setting or 'OFF'. The fan will continue to run to cool the heater and then switch off automatically.

14.To turn the heater 'OFF' for long periods, see 'To turn off gas supply at the appliance' in the next section.

To turn off gas supply at the appliance

1.Set SmartCom3 temperature to the lowest possible setting or 'OFF' position.

2.Shut off the gas tap when the fan has stopped.

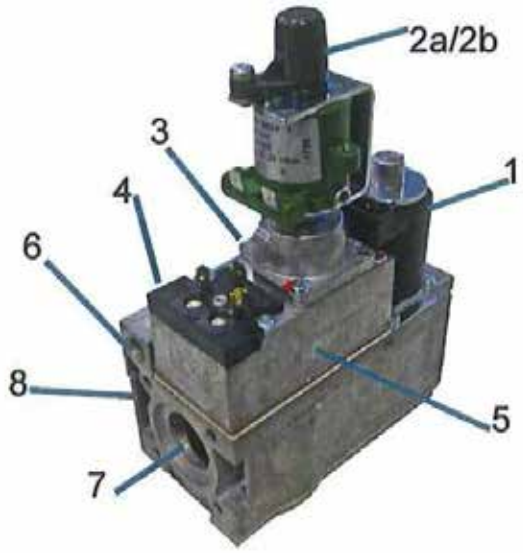
3.Switch off electric power to the appliance

- Check gas pressure as described in detail below.
- Turn the unit off and on, pausing 2 minutes between each cycle. Observe for smooth ignition.
- Place this booklet and any control or optional information in an accessible location near the heater or give this information to the end user.

Burner gas pressure adjustment

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

- Ascertain from the heater's data plate the correct operating gas pressure;
- Turn the SmartCom3 control to its lowest setting;
- Remove the screw from the burner pressure test point of the multi-functional control valve. Connect a manometer to the test point.
- Adjust the SmartCom3 to call for heat i.e. above the room ambient temperature;
- Observe the burner gas pressure on the manometer and compare to the required pressure If necessary, adjust the burner gas pressure. Remove the cover from the regulator. Turn the regulator screw anti-clockwise to decrease pressure or clockwise to increase pressure.
- Set SmartCom3 to lowest setting to turn OFF the burners. Replace the test point screw/cap and with the main burner OFF, test for gas soundness using a leak detector fluid.
- Reset temperature control/SmartCom3 to a comfortable operating level.



Legend
1 Shut off solenoid valve EV1
2a Adjustment HIGH fire (big nut)
2b Adjustment LOW fire (small nut)
3 Inlet pressure test point
4 Outlet pressure test point
5 Shut off solenoid valve EV2
6 Pilot outlet
7 Main gas outlet
8 Holes (M5) for fixing flange

Figure 9 : Gas valve

Instructions for gas conversion: To convert the heater to/from natural gas (G20) or to/from propane (G31), refer to burner gas pressure adjustment (above) and perform the following steps:

- Using hex wrench, adjust burner jet to corresponding burner diameter listed in Table 14
- Adjust burner pressure to corresponding burner pressure listed in Table 15
- Check inlet pressure as listed below

Injector size (mm)			
Model	**G20/G25/G25.3**	**G31**	**G31 (NL)**
PVE30	5.75	3.1	3.3
PVE50	6.8	3.7	3.8
PVE72	7.4	4.5	4.8
PVE95	10.0	5.2	5.6
PVE 120	8.0	4.15	4.4
PVE 145	7.4	5.6	5.6

Table 15: injectors

Burner pressure (mbar)					
Model	**G20**	**G25**	**G25.3**	**G31**	**G31 (NL)**
PVE30	8.4	12.3	12.0	36.0	28.9
PVE50	8.5	12.3	12.3	35.8	29.0
PVE72	12.4	18.8	17.8	35.0	27.8
PVE95	7.3	10.5	10.3	34.8	27.6
PVE120	7.7	11.1	10.6	35.3	28.5
PVE145	10.7	15.1	14.6	13.4	13.4

Table 16 : Burner jets and pressures

Ignition system

This heater is equipped with a direct spark integrated control relay. The control relay monitors the safety devices and controls the operation of the venter motor and the gas valve between heat cycles. The time line below illustrates a normal heat cycle.

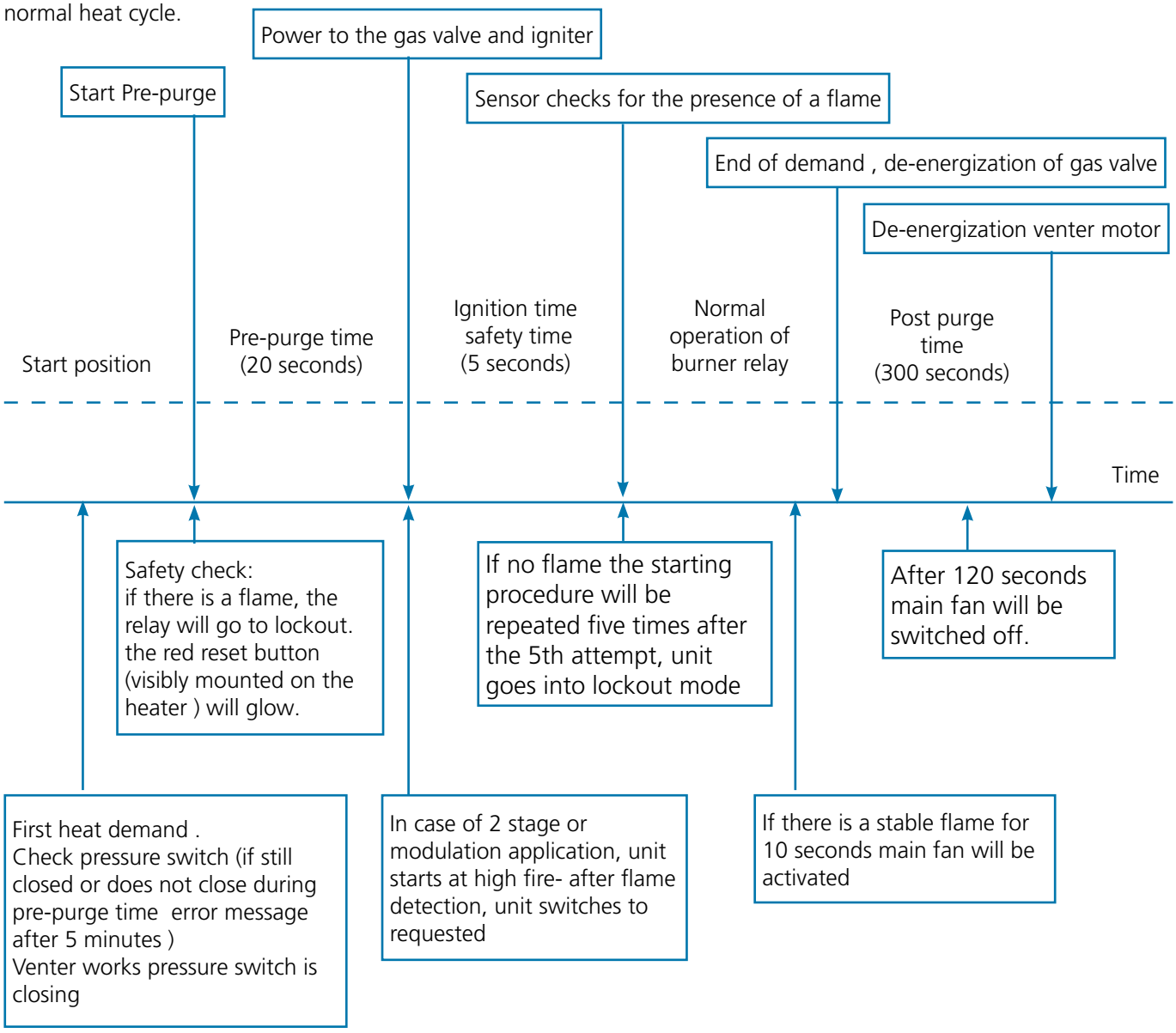


Figure 10 : Time line

Definitions

Start position: The system is not in lock-out position and can proceed with the start-up sequence upon a demand for heat.

Pre-purge time: This is a period of 20 seconds during which the combustion fan (venter) operates prior to activation of the ignition device.

Safety time: The safety time is the delay between the gas valve being energised and the flame sensor checking for the presence of a flame
This is a period of 5 seconds.
Note: If no flame is sensed, the burner relay will attempt ignition 5 times before going into lock-out mode.

Post-purge time This is the time of 5min. between burner shut-down and the moment the combustion fan (venter) is de-energized

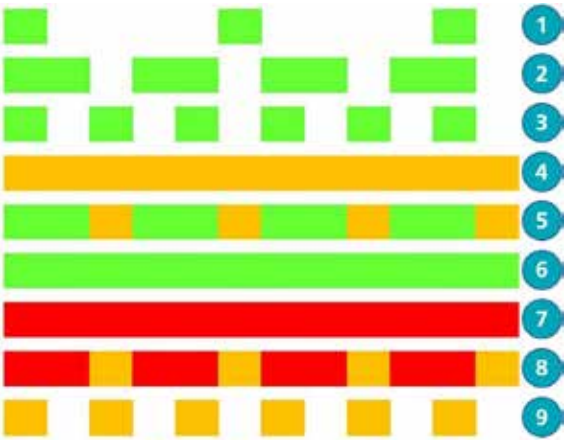


Figure 11 : Control LED Status

1) Stand-by
2) APS stuck (before the pre-purge)
3) Pre-purge
4) Ignition
5) First running stage (RP1)
6) Second running stage (RP2)
7) General lockout
8) Lockout due to over temperature (LC3)
9) Extraneous light / LC1 open

Maintenance and service

If you turn off the power supply, always turn off the gas.

The material contained in the maintenance and service section of this manual is designed to aid a qualified service technician in maintaining and servicing this equipment. This heater will operate with a minimum of maintenance.

To ensure long life and satisfactory performance, a heater that is operated under normal conditions should be inspected and cleaned at the start of each heating season (**inspection and maintenance at least once a year)**. If the heater is operating in an area where an unusual amount of dust or other impurities are present in the air, more frequent maintenance is recommended.

When any service work is completed, be careful to correctly reassemble to ensure that no unsafe conditions are created.
When starting the heater, always follow the lighting instructions

NOTE: If replacement parts are required, use only factory-authorized parts

- Check the vent or vent/combustion air system for soundness. Replace any parts that do not appear sound.
- Check the wiring for any damage. Replace damaged wiring.
- Clean all dirt, lint, and grease from the fan blade, fan guard, and motor.
- Check the heat exchanger both internally and externally for evidence of physical damage.
- Check the burner for scale, dust, or lint accumulation. Clean if required

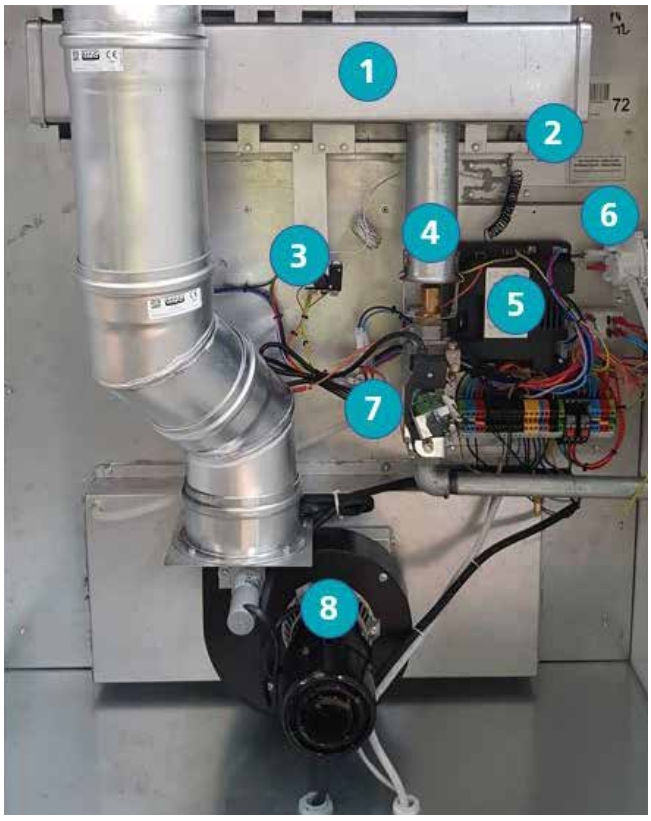


Figure 12 : Location of controls

1) Burner
2) Flame sensor
3) LC3 Limit control
4) Spark ignitor
5) Control Panel
6) Air pressure switch
7) Gas valve
8) Venter motor assembly

Figure 13 : Control panel assembly located on a removable bracket

Heat exchanger maintenance

Remove any external dirt or dust accumulation. Visually check the heat exchanger for cracks and holes. If a crack or hole is observed, replace the heat exchanger.

Burner maintenance

The heater has a unique one-piece T-CORE2® burner assembly that has been designed to provide controlled flame stability without lifting or flashback. The burner can be removed as a unit for inspection or service : see removal instructions.

Inspect the burner/control compartment annually to determine if cleaning is necessary. If there is an accumulation of dirt, dust, and/or lint, clean the compartment and follow the instructions below to remove and clean the burner

Instructions for burner removal

- Outside the cabinet, shut the gas supply off at the manual valve ahead of the union
- Turn off the electric supply.
- Disconnect the gas supply at the union outside of the cabinet.
- Open the access door.
- Remove the Manifold
- Undo the gas pipe connection.
- Remove the manifold fixing screws.
- Remove the manifold and injector assembly from the right hand side of the heater.
- Check that the manifold is straight, the injectors are correctly aligned, and that they are clean, and that there are no contaminates restricting the orifices, if necessary clean carefully with compressed air and or lint free cloth and acetone.

The injector orifice is precision machined to fine tolerances, do not clean with hard sharp or abrasive instruments. If the injectors have been removed from the manifold, when they are replaced, and care should be taken not to over tighten. Ensure all joints are gas tight.

- At the gas valve, mark and disconnect the connector. Carefully remove the burner orifice and orifice adapter locking nut. Slide the orifice adapter out through the bracket on the burner. Remove burner
- Locate the burner body front support. Remove the screws that attach it to the secondary air shield.
- Holding the venturi tube, slide the entire burner slightly to the right to disengage the burner from the supports on the left. Then rotate the open end of the venturi
- Tube outward away from the heater.
- Carefully pull the burner assembly out of the cabinet.

Inspect and clean the burner

With the burner assembly removed, shine a flashlight on the burner ribbons. Look for carbon build-up, scale, dust, lint, and/or anything that might restrict flow through the spaces between the burner ribbons. Holding the burner assembly so that any

foreign material will fall away from the burner, use a stiff bristle brush to loosen and remove any foreign material(s). If the burner is excessively dirty, remove one of the burner end caps.

Figure 14 : Burner cleaning

Remove the four screws that hold the end cap to the burner housing. Lightly tap the end cap to remove it.

Clean all foreign material from the burner and venturi. After the burner is thoroughly clean, replace the end cap making certain that it is tight against the burner housing.

Note: If any of the burner components are damaged or deteriorated, replace the burner assembly.

Inspect the Internal Portion of the Heat Exchanger (with burner assembly removed)

At the burner flame entrance of each tube, shine a bright light into each heat exchanger section. With the light shining into the heat exchanger, observe the outside surface of the tube where discolouration is evident. Be sure to repeat this procedure with each heat exchanger tube. If any light is observed in these high temperature regions, replace the heat exchanger.

Reinstall the burner

Repeat 'Burner removal' steps in reverse order

Burner orifice

The burner orifice will normally need to be replaced only when a change in gas is made. When ordering a replacement injector, provide (MJ/m3) heating value and specific gravity of gas, as well as the model and serial number of the unit.

When removing or replacing the burner orifice be careful not to damage the venturi tube and/ or the bracket

Figure 15 : Burner orifice

Ignition system

Due to high voltage on the spark wire and electrode, do not touch when energized.

Locate the igniter. Disconnect the wire; remove the screw and igniter, and clean the assembly with an emery cloth. Spark gap must be maintained to 3 mm.

Figure 16 : Igniter showing required spark gap measurement

Note: When reassembling, the wire must remain attached to the igniter.

Flame sensor

Locate the flame sensor. Disconnect the wire, remove the screw and the flame sensor. Clean with an emery cloth.

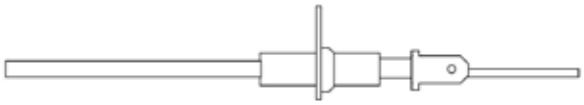


Figure 17 : Flame sensor

Control relay

The electronic burner relay monitors the operation of the heater including ignition. Do not open the control relay. Each heating season check the lead wires for insulation deterioration and good connections. Proper operation of the direct spark ignition system requires a minimum flame signal of 1.0 micro-amps (DC) as measured by a micro-ammeter.

For further information and check out procedure on the direct spark ignition system, refer to Ignition System section and the Troubleshooting Flow Charts.

Fan motor

The fan motor is equipped with thermal overload protection of the automatic reset type. Should the motor fail to run, it may be because of improper voltage characteristics

Make certain that the correct voltage is available at the motor. Remove dirt and grease from the motor, the fan guard, and blades.

Use care when cleaning the fan blades to prevent causing misalignment or imbalance. Check that the hub of the fan blades is secure to the shaft.

Follow these instructions for replacement of the fan guard, fan motor and/or fan blades

- If the heater is installed, turn off the gas and disconnect the electric power.
- Open the access door and disconnect the fan motor wires.
- Remove the fan assembly (fan guard, motor and fan blade).
- Disassemble and replace parts as needed, then reassemble. Be sure the fan blade is in the proper position on the shaft. Position the assembly on the heater and attach the fan guard. Rotate the fan blade by hand to check for adequate clearance. If adjustment is required, loosen the mounting screws, reposition the fan guard, and tighten the screws. Rotate the fan blade and recheck for adequate clearance. Repeat this procedure until the assembly is positioned properly.
- Reconnect the fan motor wires according to the wiring diagram and close the access door.
- Restore power to the heater and turn on the gas. Light, following the instructions on the lighting instruction plate. Check for proper operation.

Figure 18 : Control relay Brahma TC340A

Venter motor & wheel

Remove dirt and grease from the motor casing, the venter housing, and the venter wheel. Venter motor bearings are permanently lubricated.

Follow these instructions for replacement of the venter motor and wheel assembly. Keep all hardware removed to be used in reassembling and installing the replacement parts

- Turn off the gas and disconnect the electric power.
- Open control compartment access door.
- Disconnect the three venter motor wires at the control relay and ground screw (located on the control panel).
- Holding the motor, remove the screws that attach the motor plate to the venter housing. Remove the motor and wheel assembly from the heater.
- Reassemble with the replacement venter motor and wheel assembly.
- Follow the wiring diagram to properly connect the wires.
- Restore power to the heater and turn on the gas. Light, following the instructions on the lighting plate. Check for proper operation. Replace the access door.

Figure 19 : PVE model 30-50 venter

Figure 20 : PVE model 72 -90 venter

Figure 21 : PVE model 120 -145 venter

Combustion air pressure switch

Safe operation of the unit will require a proper venting flow. Do not bypass the combustion air pressure switch or attempt to operate the unit without the venter operating.

The combustion air pressure switch ensures that proper combustion airflow is available. The switch senses the differential pressure between the negative pressure in the flue gas collector box and the pressure in the control section.

On start-up when the heater is cold, the sensing pressure is at the most negative level, and as the heater and flue system warm up, the sensing pressure becomes less negative.

If a restriction or excessive flue pipe length causes the sensing pressure to be below the allowable level, the pressure switch will shut off the main burner

Figure 22a : Huba air pressure switch

Figure 23b : Kromshrode air pressure switch

Operating gas valve

The main operating quick opening gas valve is powered through the burner controller and safety controls. The main control valve is of the diaphragm type providing regulated gas flow and is pre-set at the factory. The gas valve requires no field maintenance except careful removal of external dirt accumulation and checking of wiring connections.

The operating valve is the prime safety shut-off. All gas supply lines must be free of dirt or scale before connecting to the unit to ensure correct sealing.

Limit controls

All units are equipped with temperature activated limit controls. The controls are factory set and non-adjustable. If the set-point is reached, the limit control will interrupt the electric power to the gas valve. These safety devices provide protection in the case of motor failure or lack of airflow due to restrictions.

If a limit control needs replacing, use only the factory authorized replacement part for the size of heater.

Never bypass the limit controls, hazardous conditions could result.

Figure 24 : LC3

Flue & combustion air piping

- Check the complete system annually at the bare minimum. Inspection should include all joints, seams, concentric adapters and the flue terminal cap. Replace any defective or heavily corroded parts.

Flue System

- Check that the flue is in good condition, that it is adequately supported, that there are no blockages or restrictions.
- Check that any joints are properly sealed preventing an escape of products of combustion.
- Check condensate drain if fitted .
- Check for signs of water ingress and any resultant damage.

Flue Venter

- Check that the flue fan is clean and free from any dust deposits

Differential Air Pressure Switch

- Check that the tubes are connected and clear and free from dust.
- Check that they are not kinked or damaged.
- Check electrical connections are intact.
- Fan and Motor complete
- Check that the fan is secure and rotates freely without excessive play in the shaft. The fan blades and motor should be cleaned using a soft brush.
- Check that the bearings do not show signs of excessive wear.

It should be noted that these bearings do not require lubricating.

Main Fan

Remove dust and other foreign matter by blowing off with compressed air or through the use of a soft bristle brush.

- Check that the bearings do not show signs of excessive wear.

It should be noted that these are sealed bearings if they are worn the whole fan assembly will require replacement the following procedure should be carried out.

- Isolate the gas and electrical supplies
- Disconnect electrical connections
- Unbolt and remove the fan from the heater
- Refit fan into heater and bolt in place .
- Turn by hand to ensure free fan rotation.
- Reconnect the electrical connections
- Check fan runs correctly .

Automatic Controls

- Spark Ignition is via an ignition electrode Ensure that the ceramic insulation material is not damaged or cracked.
- Flame supervision is via a flame sensor rod.
- Check the flame sensor rod for signs of pitting or corrosion, ensure that the ceramic insulation material is not damaged or cracked.
- Check connections are secure.

Main Governor

To adjust the main governor, using a screwdriver remove the metal cover to reveal the adjustment screw, and turn as follows:

- Clockwise to increase pressure.

Anticlockwise to decrease pressure.
It should be noted that full clockwise adjustment will result in the valve being closed permanently.

Gas Supply

The gas supply pipe work and fittings should be inspected to ensure they are free from corrosion and that where brackets have been fitted these remain secure and offer adequate support.

The system should be soundness tested in accordance with Institute of Gas Engineers recommendations detailed in Utilization Procedures IGE/ UP-1 and 2

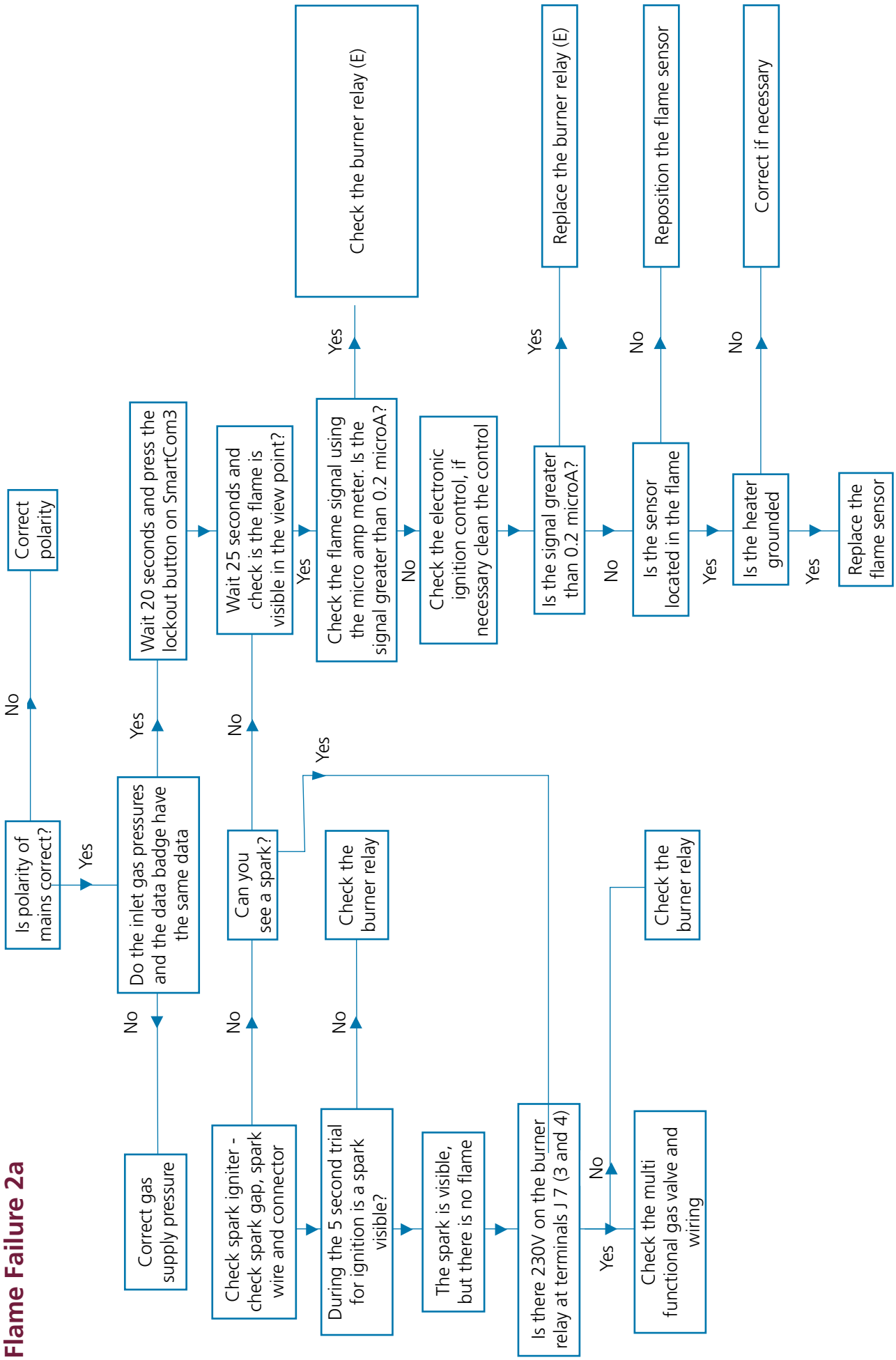
Test

Test and re-commission as per advised in the commissioning section.

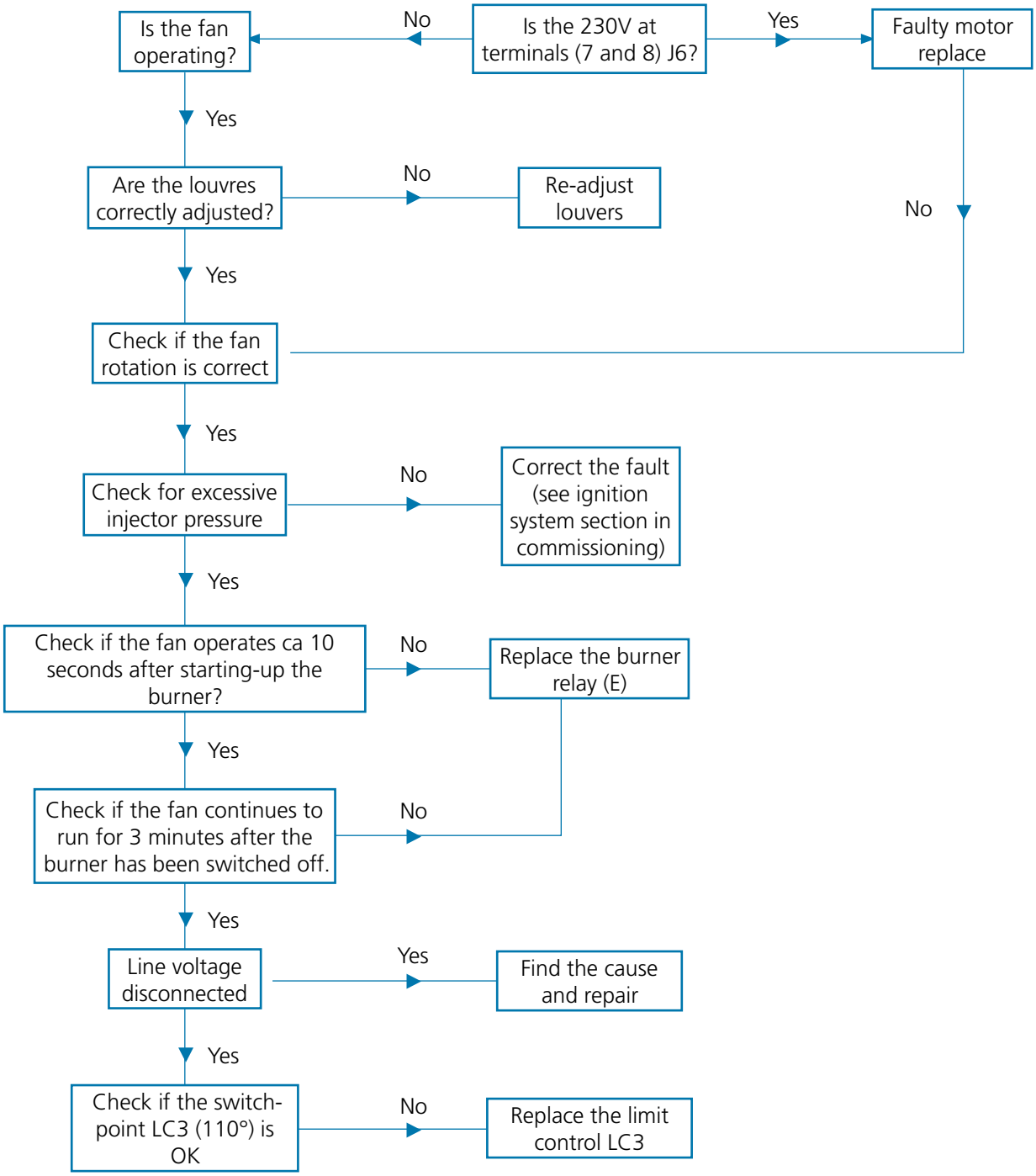
Report

A full and detailed service report should be prepared, it is advised that the report is not completed until the heater has been re-commissioned, where upon the completed report can then be run through with the user.

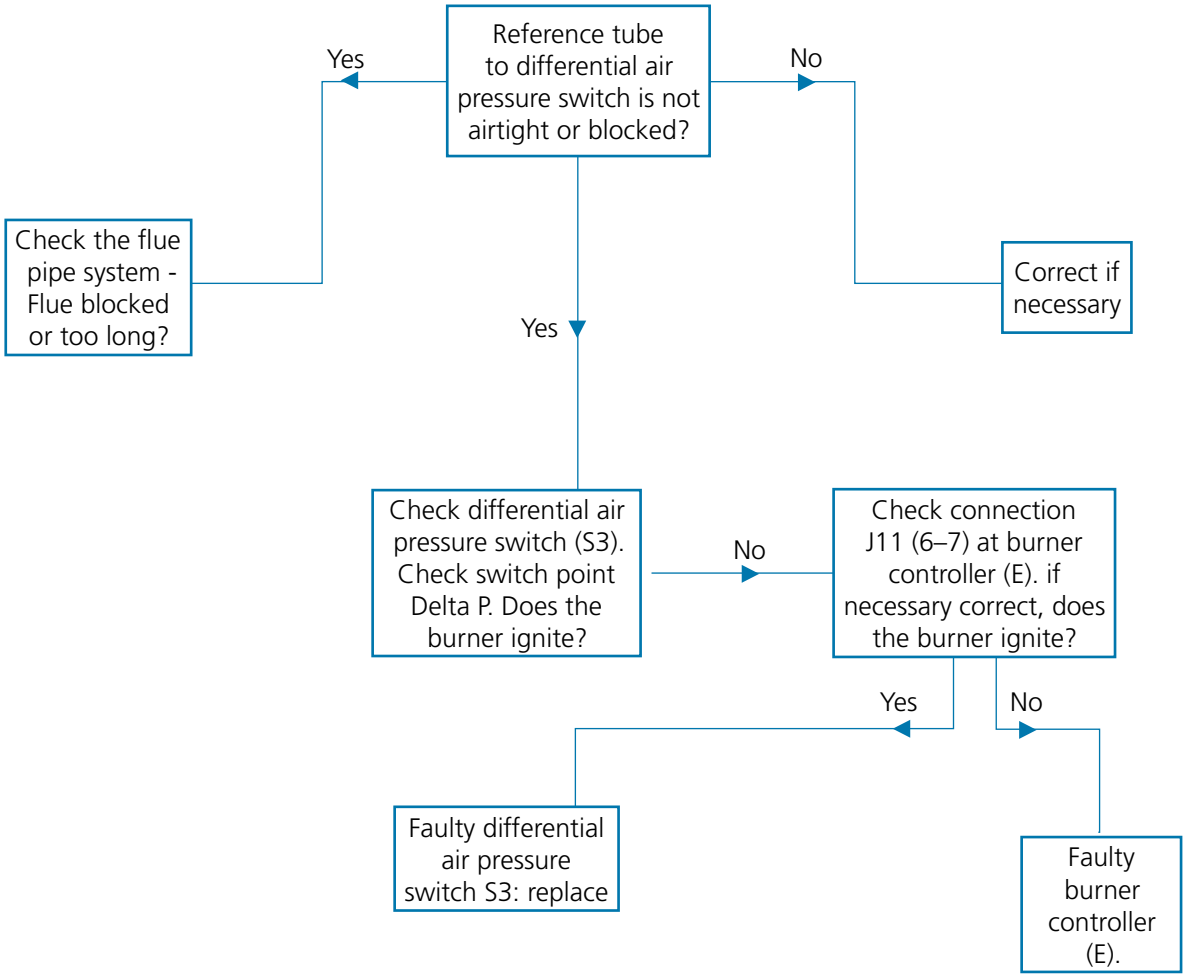
Flame Failure 2a



Limit controls LC3 (manual reset) switch burner off 2b



Faulty differential air pressure switch 2c



Probable Cause	Remedy
Venter motor will not start	
1. No power to unit	Turn on power, check supply fuses or circuit breaker
2. No power to venter motor	Check connections at burner relay and/or venter motor terminals
3. Integrated burner relay defective	Replace burner relay
4. Defective venter motor	Replace venter motor (refer to section 26)
5. Fuse blown (F3.1)	Replace fuse
6. Fuse burner relay blown	Replace fuse
7. LC1 open	Set heater on ventilation until LC1 closes
	Replace LC1
	Check for obstruction at fan side
8. LC3 open	Reset LC3
	Replace LC3
9. Unit in lock-out	Push on reset button
10. Room thermostat open	Set thermostat above room temperature

Table 17a : Trouble shooting

Probable Cause	Remedy
Burner will not light	
1. Main valve not operating	Check voltage on valve during ignition period
	Check connector on main gas valve
	Check connector on burner relay
	Replace valve
2. Air in the gas line	Purge gas line
3. Gas pressure too high or too low	Supply pressure should be 15 mbar for natural gas (UK only) or 37 mbar for propane gas (UK only)
	Obstruction in the gas line
	Gas line connection diameter too small
4. No spark	Check following:
	Ensure that all wire connections are solid
	Maintain spark gap at 3 mm
	Replace worn or grounded spark cable
	Replace ceramic spark electrode if cracked or grounded
	Check burner relay ground wire
	Ensure that unit is properly field grounded (earthed) and properly phased (L1 to hot lead,
	L2 to neutral)
5. Combustion airs pressure switch not closing upon power to venter and reset lamp is burning	If voltage is available to burner relay and all other causes have been eliminated, replace burner relay
	Check following in order:
	Ensure that unit is properly vented
	Remove obstructions from vent
	Replace faulty tubing to pressure switch
Burner cycles on and off	
1. Gas pressure too high or too low	Supply pressure should be 15 mbar for natural gas (UK only) or 37 mbar for propane gas (UK only)
2. Burner relay not grounded	Check burner relay ground wire connection
3. Faulty burner relay	If (220/240) volts is available to burner relay and all other causes have been eliminated, replace burner relay
4. Flame sensor grounded	Ensure that flame sensor lead is not grounded or insulation or ceramic is not cracked;
5. Cracked ceramic at sensor	replace as required
	Replace sensor
6. Incorrect polarity	Check polarity switch and if necessary reverse line voltage wires to terminal block connections
Burner or venter motor turns on and off while burner is operating	
1. Motor internal thermal protection device cycling on and off	Check motor load against motor rating plate; replace motor if needed

Table 17b : Trouble shooting

Parts list

Model/Part	30	50	72	95	120	145
Burner control	03-25321					
Spark ignitor	05-25162					
Flame sensor	SCS43					
Limit control LC3	03-24958	03-24959-03				
Pressure switch	30-60621-120		30-60621-130		30-60617-75 (start) 30-60621-130 (run)	30-60617-75 (start) 30-60617-110 (run)
Burner on indication lamp	60-61997					
Gas valve natural gas with modureg	03-35145					
Gas valve propane gas with modureg	03-35136-M337					
Gas injector natural gas G20 / G25 / G25.3	07-25813-575	07-25813-680	07-25806-740	07-25806-1000	07-25813-800	07-25806-740
Gas injector LPG G31	07-25813-310	07-25813-370	07-25806-450	07-25806-520	07-25813-415	07-25806-560
Gas injector LPG G31 (NL)	07-25813-330	07-25813-380	07-25806-480	07-25806-560	07-25813-440	07-25806-560
Venter motor assembly	36-79094		N/A			
Venter housing	11-44058		N/A			
Venter assembly	N/A		20-25749		20-25745	
Centrifugal fan	01-27201	28-09-005	01-27202	01-27205	01-27202	01-27202
Main relay fan	RK1-2					
Relay 230V 8A DPCO	28-25-029					
Relay base for 28-25-029	28-25-030					
Main wiring harness	06-41852				TBA	

Table 18: Parts list

ErP Data chart

Information requirements for warm air heaters Commission Regulation (EU) 2018								
B1 warm air heater:	[NO]							
C2 warm air heater:	[NO]							
C4 warm air heater:	[NO]							
Type of fuel:	G20							
Model			**PVE 30**	**PVE 50**	**PVE 72**	**PVE 90**	**PVE 120**	**PVE 145**
Item:	Symbol:	Units						
Capacity:								
Rated heating capacity:	Pnom	[kW]	35.2	49.3	73.4	95.4	128.5	136.8
Minimum capacity:	Pmin	[kW]	17.3	23.8	35.6	46.3	62.9	80.5
Electric power consumption:								
At rated heating capacity:	elmax	[kW]	0.08	0.08	0.08	0.08	0.32	0.35
At minimal capacity:	elmin	[kW]	0.08	0.08	0.08	0.08	0.32	0.35
In standby mode:	elsb	[kW]	0.02	0.02	0.02	0.02	0.03	0.03
Useful efficiency:								
Useful efficiency at rated heating capacity:	nth,nom	[%]	84.1%	84.1%`	83.4%	82.3%	782.7	82.2
Useful efficiency at minimum capacity:	nth,nom	[%]	82.6	81.4	80.8	79.7	81.0	80.5
Other items:								
Envelope loss factor:	Fenv	[%]	0.0	0.0	0.0	0.0	0.0	0.0
Flame consumption:	Pign	[kW]	0.0	0.0	0.0	0.0	0.0	0.0
Emissions of nitrogen oxides [input energy (GCV)]:	NOx	[mg/ kWh]	99	97	95	98	96	97
Emission efficiency:	ns,flow	[%]	93.0	92.6	92.3	93.5	93.4	93.3
ErP seasonal space heating energy efficiency:	ns	[%]	74.9	73.9	73.2	73.3	73.8	72.6
Thermal efficiency at rated heating capacity [NCV]:	n	[%]	93.4	93.3	92.6	91.3	91.8	91.2

This document replaces the previous, Manual Part No D301113 Issue C
Current full Part No. **Reznor, PVE, Installation Manual, EN 2019-11, D301113 issue D**

NORTEK GLOBAL HVAC (UK) LTD
Fens Pool Avenue
Brierley Hill
West Midlands DY5 1QA
United Kingdom
Tel +44 (0)1384 489250
Fax +44 (0)1384 489707
reznorsales@nortek.com
www.reznor.eu