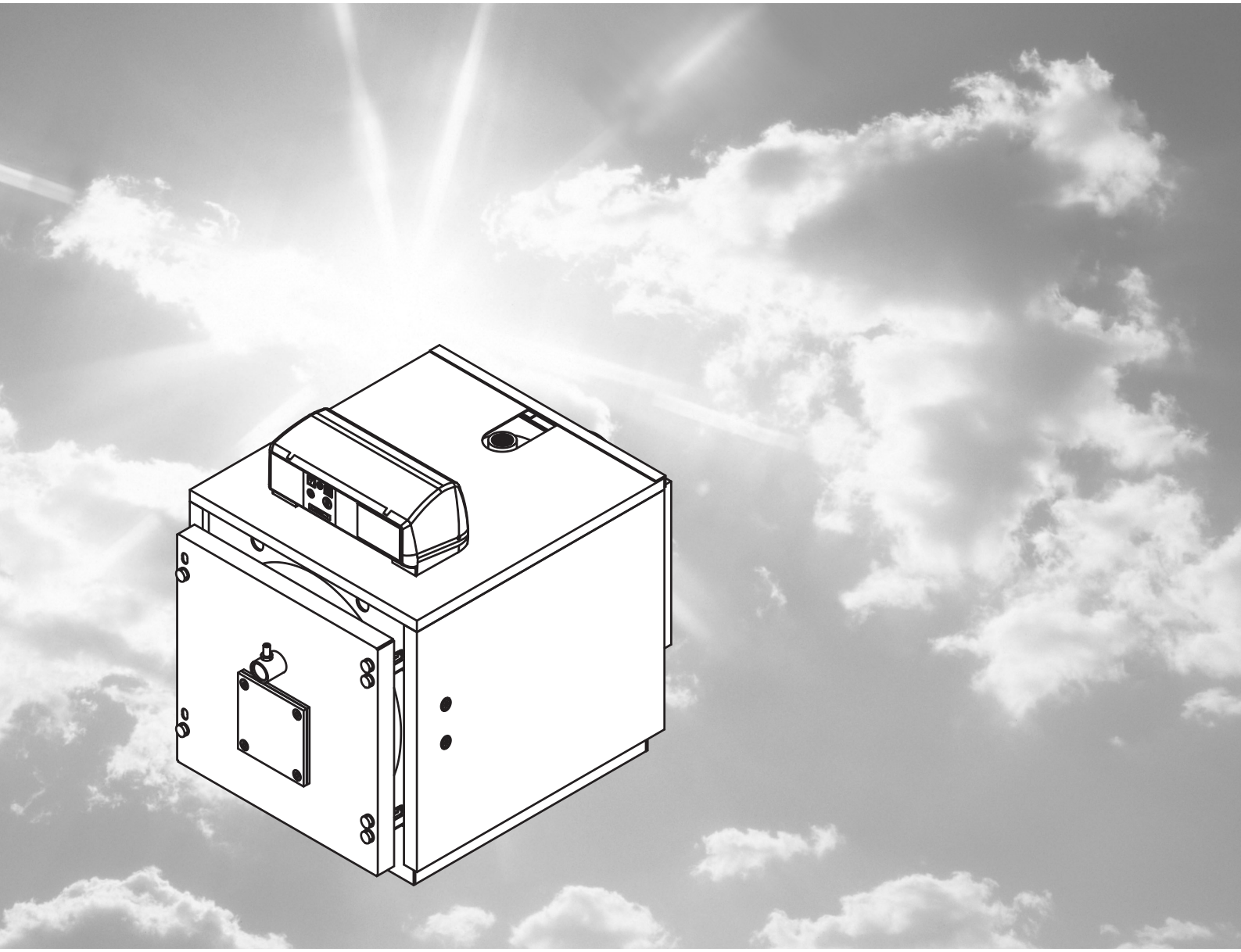
To be kept by the user

Jan 2010

Arizona

99 – 930kW

Installation, operation & maintenance manual



Working towards
a cleaner future

POTTERTON COMMERCIAL

heating specialists

WARNING

When the boiler is operated with a pressure jet gas burner, because it does not belong to any of the categories among those listed in the Annexe II to the Directive 97/23/CE (regarding pressure equipment) and being, furthermore, mentioned in the Directive 90/396/CE (Gas Appliance Directive) to which the art. 1, clause 3, paragraph 6.5 makes reference, it is excluded from the scope of the Directive.

GENERAL INFORMATION

Introduction

This manual supplies a summary of what has to be followed during the installation, use and servicing of the POTTERTON COMMERCIAL boilers, ARIZONA range. **Choice of the boiler**

For a correct choice and application of the ARIZONA boilers it is necessary to follow the instructions given in this manual.

Installation

The installation of the boilers and the auxiliary equipment, related to the heating system, must be in conformity with all the regulations and rules in force.

It is law that all the gas appliances are installed, commissioned and serviced by a registered installer in accordance with the regulations below. Failure to install appliances correctly could lead to prosecution. It is in your own interest to ensure the law is complied with. The following must be complied with:

Current Building Regulations and Clean Air Act.
Water Authority Regulations.
Local Authority Regulations and Regional By-laws.
Gas Safety Regulations.
Any special regional requirements of local Electricity and Gas undertaking.
Fire Service and Insurance Company requirements.

Commissioning

The main purpose of the commissioning is to verify the correct operation of all the safety and control devices.

Before leaving the installation the commissioning engineer has to control the operation of the boiler for, at least, a complete working cycle.

Guarantee

The boiler guarantee is bound to the compliance of the the requirements stated in this manual, and any non-fulfilment or modification will make it void.

Normative

It is the responsibility of the installer to fulfil all the regulations concerning the boiler house, the safety devices, the flue, the fuel supply lines, the electrical installations and all the other local requirements and safety instructions.

Approvals

The POTTERTON COMMERCIAL boilers, ARIZONA range, have been tested and CE certified for the gas operation by GASTEC ITALIA, who has recognised to these boilers the conformity certificate according to the following directives:

- Gas Appliances Directive (90/396 CE), compulsory as per 1st January 1996;
- Efficiency Directive (92/42 CE), compulsory as per 1st January 1998;
- The conformity to the Low Voltage Directive (73/23 CE), compulsory as per 1st January 1997 has been verified and ascertained by GASTEC ITALIA.

The conformity to the EMC (Electro Magnetic Compatibility 89/336 CE), compulsory as per 1st January 1996, is not applicable to the ARIZONA boilers because they do not have electronic components.

For the time being there are no European Directives covering the oil fired boilers, except the Efficiency Directive (92/42 CE).

Data plate and Serial No.

The data plate, supplied in a separate envelope with the relevant documents, makes reference to a serial No, embossed in an aluminium plate riveted to the front tube plate in the lower RH side corner.

GAS SAFETY (INSTALLATION AND USE) REGULATIONS, 1994

It is law that **all** gas appliances are installed and serviced by a CORGI registered installer in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution.
It is in your own interest, and that of safety, to ensure the law is complied with.
The installation of the boiler MUST also be in accordance with the latest I.E.E. Wiring Regulations, local building regulations, by-laws of the local water authority, the building regulations and the Building Standards (Scotland) and any relevant requirements of the local authority.

Detailed recommendations are contained in the following
British Standard Codes of Practice:

BS 6891	Low pressure installation pipes.
BS 5449	Forced circulation hot water systems.
BS 5546	Installation of gas hot water supplies for domestic purposes (2nd Family Gases).
BS 6644	Ventilation (for gas appliances of rated input exceeding 60 kW).

HEALTH & SAFETY DOCUMENT No. 635

The Electricity at Work Regulations, 1989.

The manufacturer's notes must NOT be taken, in any way, as overriding statutory obligations.

IMPORTANT. These appliances are CE certificated for safety and performance. It is, therefore, important that no external control devices, e.g. flue dampers, economisers etc., are directly connected to these appliances unless covered by these Installation and Servicing Instructions or as other-wise recommended by POTTERTON COMMERCIAL in writing. If in doubt please inquire.

Any direct connection of a control device not approved by POTTERTON COMMERCIAL could invalidate the certification and the normal appliance warranty.

Notes.
To obtain the gas consumption:-

a. For l/s divide the gross heat input (kW) by C.V. of the gas (MJ/m^3).
b. For ft^3/h divide the gross heat input (Btu/h) by C.V. of the gas (Btu/ft^3).

1 CONSTRUCTIONAL-DIMENSIONAL TECHNICAL CHARACTERISTICS

1.1 - CONSTRUCTION OF THE ARIZONA BOILERS

The construction completely satisfies the requirements of the EN 303- part 1.
The sheet metal parts of the pressure vessel are manufactured of certified carbon steel, type S235JRG2, according to EN 10025, with melting certificate 3.1.B, according EN 10024; whereas the pipes are of steel ST 37.0 according to DIN 1626.
The welders and the WPS (Welding Procedures Specifications) have been approved according to EN 287 and EN 288 by TUEV (DE).
The boilers are equipped with a reversible hinged door, which can be opened, from L.H. or R.H. side.
The outer shell is insulated with a glass wool mattress, 60 mm thick, protected by a textile in mineral fibre.
The upper part of the outer shell is equipped with uplift hook(s).
The boilers are provided with two 1/2" bulb holders with inner diameter of 15 mm (for 3 bulbs each), suitable to locate the thermostats and thermometer bulbs.
The casing side panels are provided with holes for the cables of the electrical supply, of the pumps, of the burner and any other auxiliary equipment.
Note:The ARIZONA boilers are to be equipped with ON/OFF burner; alternatively they can be equipped with a two stage or modulating burner, provided the minimum reachable heat input is not lower than the figure shown on the data plate for the fuel used on site.

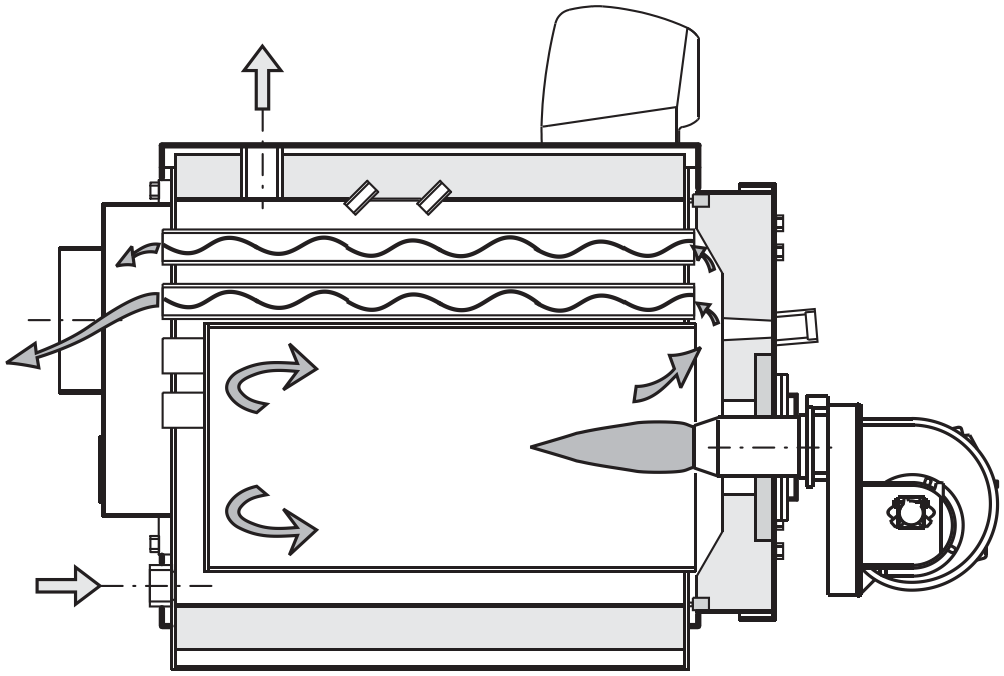
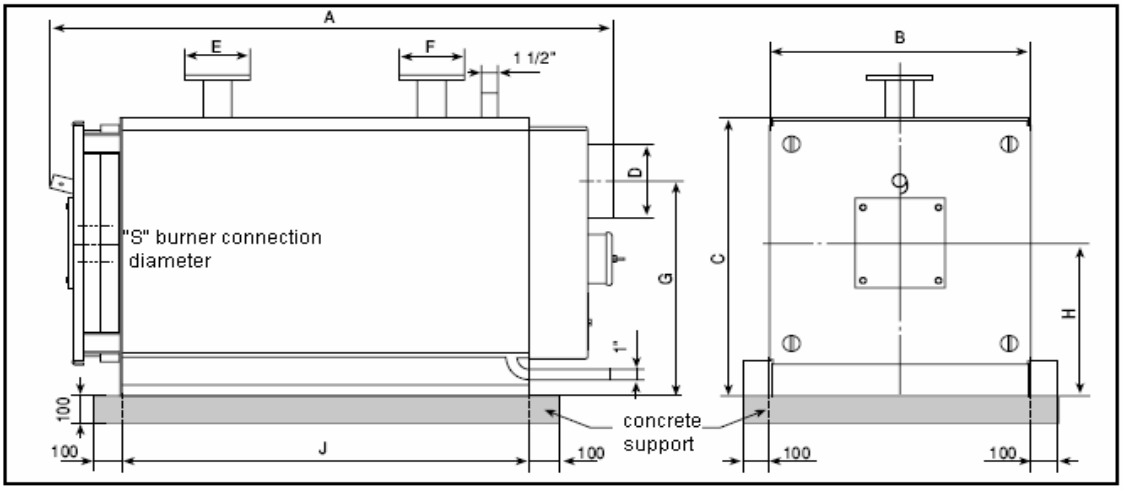


fig. 1

1.2 - DIMENSIONS AND HYDRAULIC CONNECTIONS OF THE ARIZONA BOILERS



Model	Input	Output	Low level Ventilation	High level ventilation	Fuel Consumption *	Maximum pressure	Minimum Pressure	dry weight	Water Content	Dimensions mm								
	kW	kW	cm	cm	m^3/hr	bar	bar	kg	lit	a	b	c	d	e	f	g	h	j
99	110	99	440	220	11.41	3	1	298	105	1370	700	815	217	R1 1/2"	R1 1/2"	605	440	845
120	129	120	516	258	13.4	3	1	380	120	1520	720	815	247	65	65	605	440	990
145	160	145	640	320	16.74	3	1	380	120	1520	720	815	247	65	65	605	440	990
175	194	175	776	388	20.19	3	1	433	186	1550	740	890	247	65	65	680	500	1030
210	231	210	924	462	24.1	3	1	433	186	1550	740	890	247	65	65	680	500	1030
235	256	235	1024	512	26.74	3	1	520	250	1760	800	930	247	80	80	720	512	1210
260	282	260	1128	564	29.37	3	1	520	250	1760	800	930	247	80	80	720	512	1210
290	320	290	1280	640	33.39	3	1	520	250	1760	800	930	247	80	80	720	512	1210
325	358	325	1432	716	37.39	3	1	665	320	1995	850	950	296	80	80	740	510	1460
350	384	350	1536	768	40	3	1	665	320	1995	850	950	296	80	80	740	510	1460
410	446	410	1784	892	46.51	3	1	665	320	1995	850	950	296	80	80	740	510	1460
465	509	465	2036	1018	53.03	3	1	945	565	2070	1020	1105	296	80	80	850	595	1487
585	633	585	2532	1266	65.97	3	1	1087	635	2070	1125	1200	346	100	100	890	640	1487
640	695	640	2780	1390	72.4	3	1	1087	635	2070	1125	1200	346	100	100	890	640	1487
700	756	700	3024	1512	78.8	3	1	1087	635	2070	1125	1200	346	100	100	890	640	1487
815	880	815	3520	1760	91.72	3	1	1339	690	2350	1125	1200	346	100	100	890	640	1725
930	1006	930	4024	2012	104.92	3	1	1339	690	2350	1125	1200	346	100	100	890	640	1725

2 INSTALLATION

2.1 - PACKAGING

The ARIZONA boilers are supplied complete with door and combustion chamber already fitted, whilst the casing with the insulation mattress are
contained in separate cardboard packaging(s). The panel board and the accessories are inside the combustion chamber.
Before starting the installation make sure that the length and the width of the boiler body received correspond to the dimensions of the ordered boiler, shown in the previous tables and that the cartons, containing the casing, or part of it, are marked with the same model. In addition to the a. m. panel board, packed in its own carton, in the combustion chamber, as accessories, there are also:

- a carton containing the flanges for flow, return and safety connections (if applicable) with relevant gaskets and bolts, the cylindrical brush for the cleaning of the flue ways.
- cleaning brush handle extension.
- turbulators extractor.
- ceramic fibre rope for the insulation between the door and burner blast tube.

2.2 - HANDLING

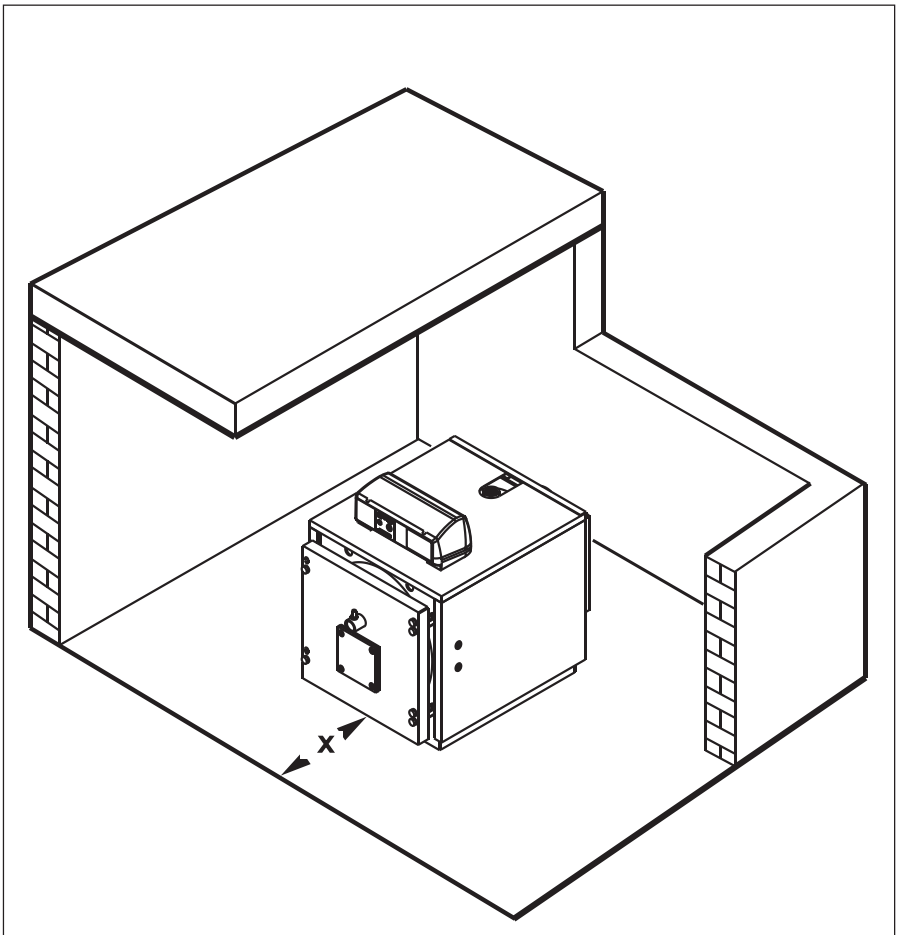
The boiler can be moved into position by lifting, through the upper hook(s), or by the use of rollers placed under the strong L profiles of the base.

If necessary, due to the dimensions of the boiler, it is possible to remove the front door and the combustion chamber to facilitate the introduction in the boiler house.

2.3 - POSITIONING IN THE BOILER HOUSE

The installation of the boiler must be in accordance with the relevant requirements of the Gas Safety Regulations, current I.E.E. Regulations, local water authority by-laws and it should also comply with any relevant requirements of the local gas supplier, local authority and the relevant Standard Codes of Practice and building regulations.
The boiler must be positioned so that there is enough space available for the following:
- Access around the boiler for servicing
- Space to open the boiler front door
- Space to access the burner.

The installation of the boiler as close as possible to the flue position is highly recommended.
To allow the cleaning of the flue ways, in front of the boiler a clearance equal to the length of the boiler, has to be available.
With the boiler door opened at 90°, the distance between the front of the door and the adjacent wall must be equal, at least, at the length of the burner.
The boiler must stand on a non-combustible floor (i.e. concrete or brick), which must be flat, level and of a suitable load bearing capacity to support the weight of the boiler (when filled with water) and any ancillary equipment.
Once the installation has been made the boiler must be perfectly horizontal and well stable (to avoid vibrations and noise).



x = not shorter than the boiler body

fig. 5

2.4 - CASING ASSEMBLY

N.B. It is suggested to verify that the boiler is positioned in its final place and that all the hydraulic connections are made correctly before starting the casing assembly.
Before opening the casing carton(s) make sure they are stamped with the right boiler model, corresponding to the boiler to be installed.

N.B.: The packaging containing the panel board is delivered inside the combustion chamber, as well as the documents and the guarantee certificate.

Refer to diagram fig. 6 & 7 for details

A. Fit the insulation blanket (1) onto the boiler shell and secure it in to place using the elasticated straps (2) provided, ensuring that the metal clips grip in to the external surface of the insulation.
B. Locate the side panels (3) and (4) with the lower bend inside the bottom L profiles and the upper bend in the seats of front and rear tube plates.
To determine which is the left and right panel ensure that the cable glands are positioned facing toward the front edge.
C. After removal of the two side screws from the panel board rotate its cover frontwards. Fit the panel board to the upper panel (5) and after having passed the cables (mains, room thermostat, burner etc.) through the cable glands fitted to the side panel insert these cables and the capillaries of thermometer and thermostats through the slots on its base. Fit the casing upper panel, complete with the panel board, to the side panels (3 & 4), directing the capillaries of thermostats and thermometer to the bulb holder.
D. Insert the thermometer and thermostat bulbs in the bulb holders as shown in fig. 7 and connect the mains, the burner, the pump(s) and any ancillary equipment to the panel board.
Close the panel board.
E. Fit the upper panel rear reinforcement (6).
F. Remove the protective paper film from data plate and ventilation requirement label (7) and fit them at the top front corner of the most accessible side panel after removal of dust from the surface.
The data plate and label are in the documents envelope.

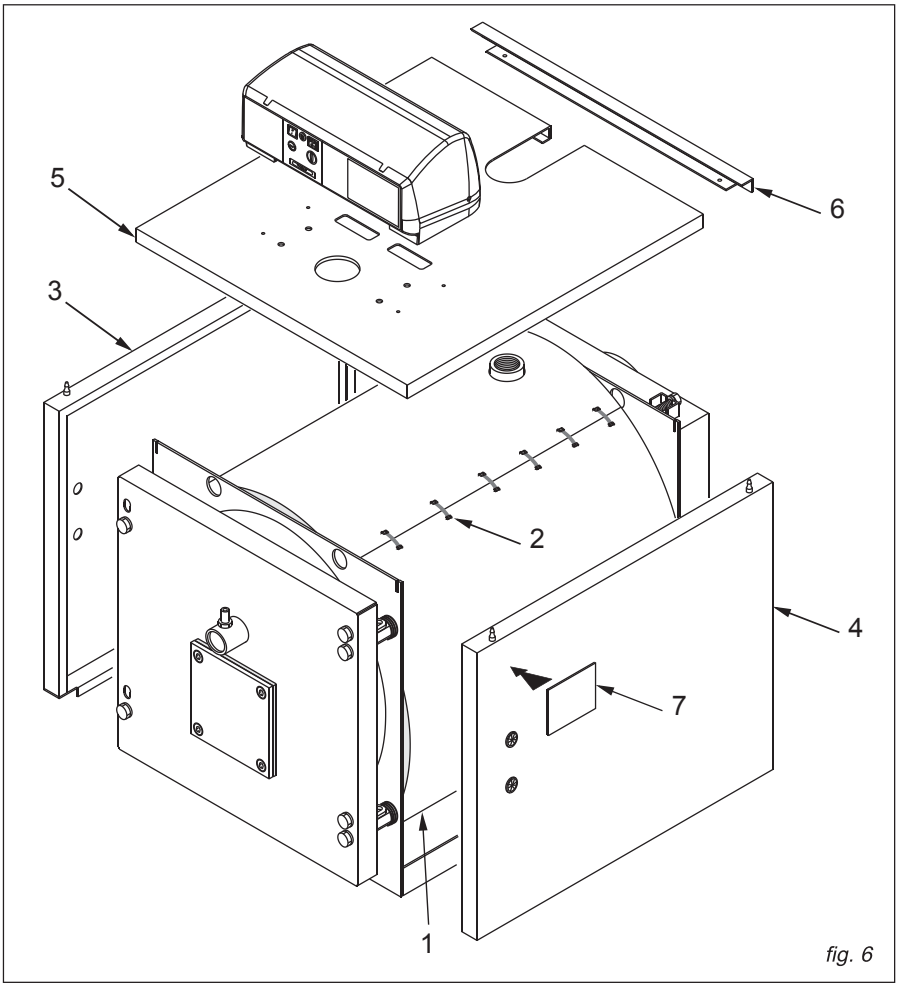
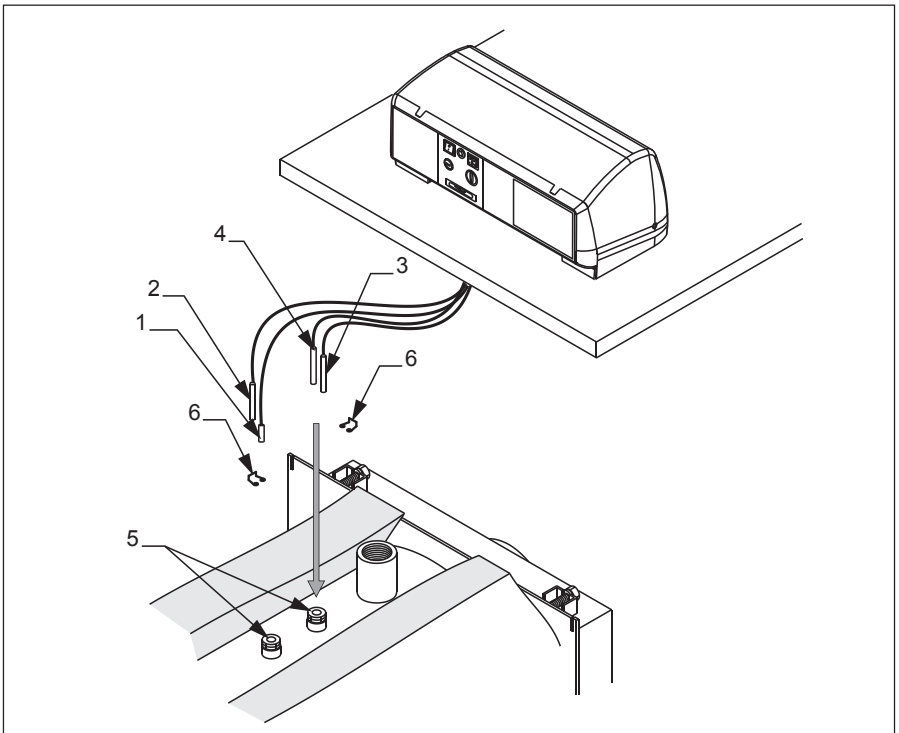


fig. 6



1 Thermometer bulb
2 Working thermostat bulb
3 Safety thermostat bulb
4 Minimum thermostat bulb
5 Bulb holders
6 Bulb retaining clip

fig. 7

2.5 - CONNECTION TO THE FLUE

The flue has a fundamental importance for the good operation of the boiler.
Due to the low temperature of the flue gases during the intermittent operation, it is necessary that the flue can withstand the corrosive nature of the condensate products and to be manufactured from corrosion resistant materials.

The different connections must be sealed with an approved sealant so that the inlet of fresh air, with consequent increase of the possibility of condensate formation, is avoided. Furthermore the possible condensate or rain water coming from the flue must be avoided from entering the combustion chamber of the boiler.

The flue design must comply with the relevant regulations.
In the connection between the boiler and the flue, convenient sampling points for flue gas temperatures and combustion products analysis must be provided.

2.6 - BOILER PROTECTION

The provision of pump overrun by a time delay relay or a thermostat situated in the flow pipe close to the boiler is essential to remove residual heat from the boiler.

Unions and isolating valves should be fitted to the flow and return manifolds so that the boiler can be isolated from the system if the need arises. Your legal obligations must be adhered to (i.e. appropriate safety valves must be fitted).

2.7 - SYSTEM WATER QUALITY

High efficiency boiler systems require the water quality of the system water to be controlled by the use of inhibitors to maintain a neutral Ph and inhibit corrosion. Additionally the water system should be free of leaks to prevent raw water make up which will dilute any inhibitors, promote corrosion and form lime scale.

Existing Systems

On existing systems where boilers are being replaced due to failure then the cause should be investigated before installing new boilers. This can normally be achieved by cutting open a failed boiler section and examination for system debris or contamination.

Lime scale is a positive indicator of continuous system water make up due to water loss. Evidence of magnetite (black sludge) in the system and the formation of gas in radiators causing air locking is a positive indicator of corrosion.

Where an old system shows evidence of contamination then system cleaning should be carried out before installation of new boilers. The heating system should be chemically flushed to remove any lime scale or corrosion and a corrosion and lime scale inhibitor added. Lime scale descalers if incorrectly used could cause any remaining system debris to continue to breakdown and contaminate the new boiler causing boiler failure.

Advice on system cleaning and suitable products should be sought from specialist suppliers of system cleaners such as Fernox or Sentinel.

It is important to note that corrosion inhibitor can only be used in an attempt to prevent corrosion from occurring, where a system has an existing corrosion problem, inhibitors will be ineffective and the system requires cleaning.

On existing systems where comprehensive descaling and de-sludging cannot be carried out then consideration should be given to separating the new boiler system from the existing system pipe work by the use of plate heat exchangers.

New Systems

New pipe work systems should be thoroughly flushed with a suitable cleaning agent to remove debris and flux residues before filling. The system water should be dosed with a suitable corrosion and lime scale inhibitor.

System Water Monitoring

The system water should be monitored as part of a maintenance programme to ensure the following.
Raw water make up is not occurring.
Corrosion and lime scale inhibitors are still active.
Water Ph is below Ph 8.5 other wise on systems with aluminium content, component failures may occur.

Sealed Systems

General

Potterton Commercial boilers are suitable for use on sealed systems designed in accordance with BS 6644 - 2005 and BS 6880 Part 2. In addition, reference should be made to the Health & Safety Executive guidance note PM5 “Automatically Controlled Steam & Hot Water Boilers”.

2.8 - SHUNT PUMP

The ARIZONA boilers must always operate in forced circulation hot water systems and with a minimum return temperature of 55 °C. So, it is suggested to adopt a shunt pump, installed between the flow and return connections, upstream an eventual 3 or 4 way mixing valve.
This pump will be sized according to the following formula:

Q = P x 22

where **Q** = Water flow rate in litre/h
P = Boiler nominal output in kW
and the manometric head 1-2 m w.c.

2.9 - CHOICE OF THE BURNER

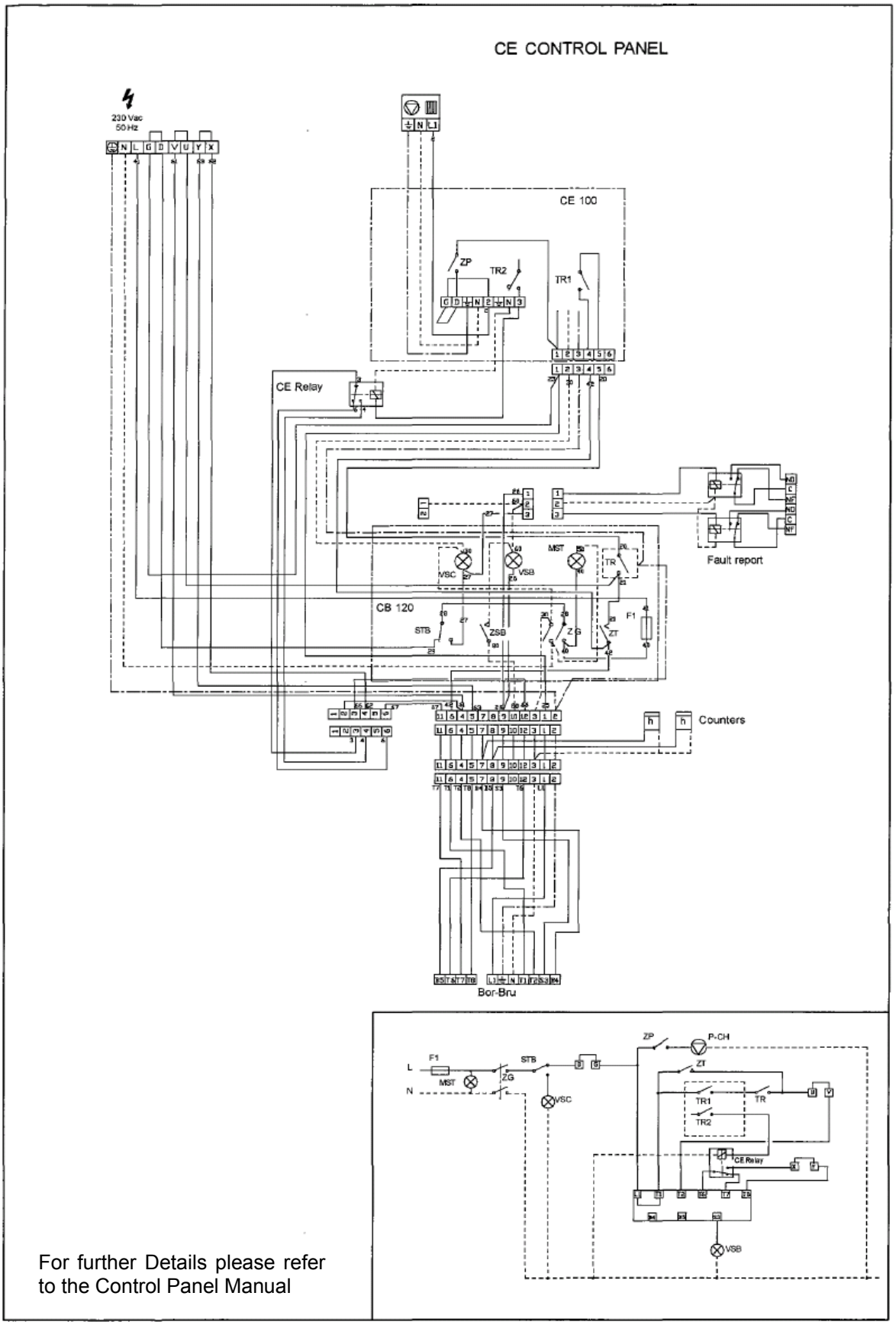
The correct choice and the adjustment of the burner are fundamental for the best operation of the boiler and then they shall be accurate and not under evaluated.
The burner will be selected by verifying that its working diagram (fuel flow rate - pressure in the furnace) is compatible with the same features declared for the boiler.
Remember that the flue side resistance, i.e. the counter-pressure in the furnace, are referred to "0" draught at the flue base. It is also convenient that the burner blast tube have its length not shorter than that shown in table 8 and that the flame have a shape suitable to the characteristics of the ARIZONA furnace.

To gain more heat from the reversed flame furnace it is necessary to use burners capable to guarantee a long and narrow flame at all operating conditions or also at minimum input in case of two stage or modulating burners.

Too short flames can cause a localized overheating of the front part of the furnace, and the combustion products, not sufficiently cooled down, entering the flue ways at a too high temperature, can cause important damage to the boiler.
The burner manufacturing companies are able to supply the flame dimensions developed by their burners.
More information are given in the paragraph "Commissioning".

3 ELECTRICAL

3.1 - WIRING DIAGRAM FOR SINGLE PHASE BURNER AND PUMP

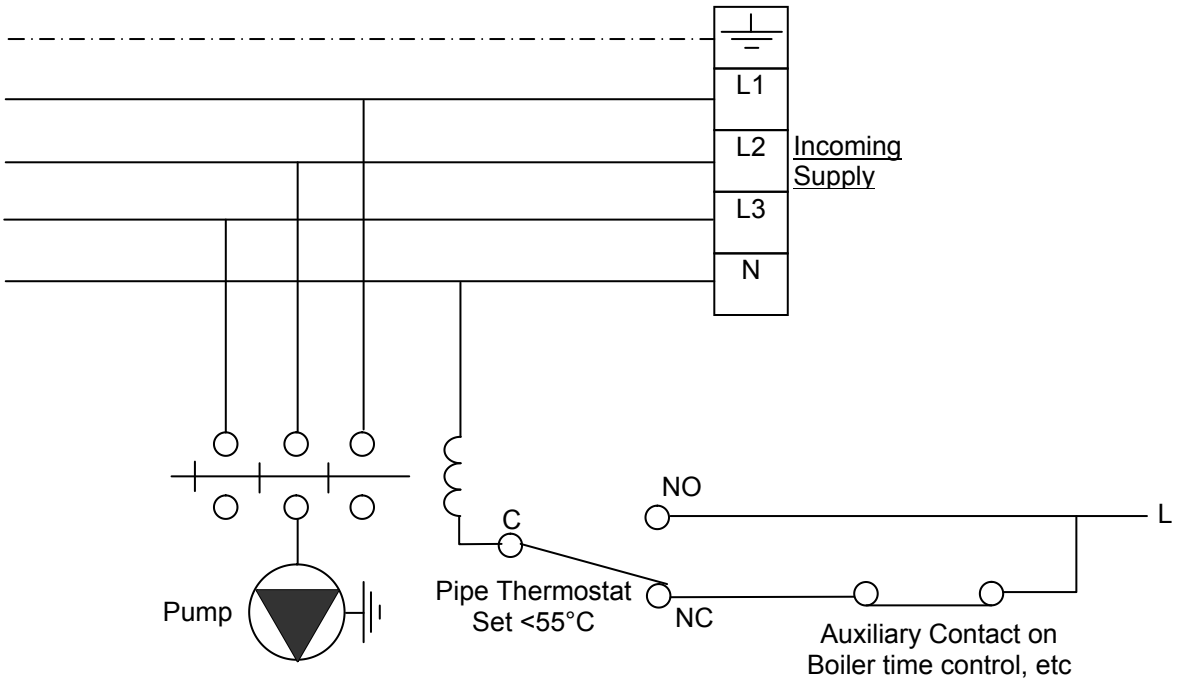


For further Details please refer to the Control Panel Manual

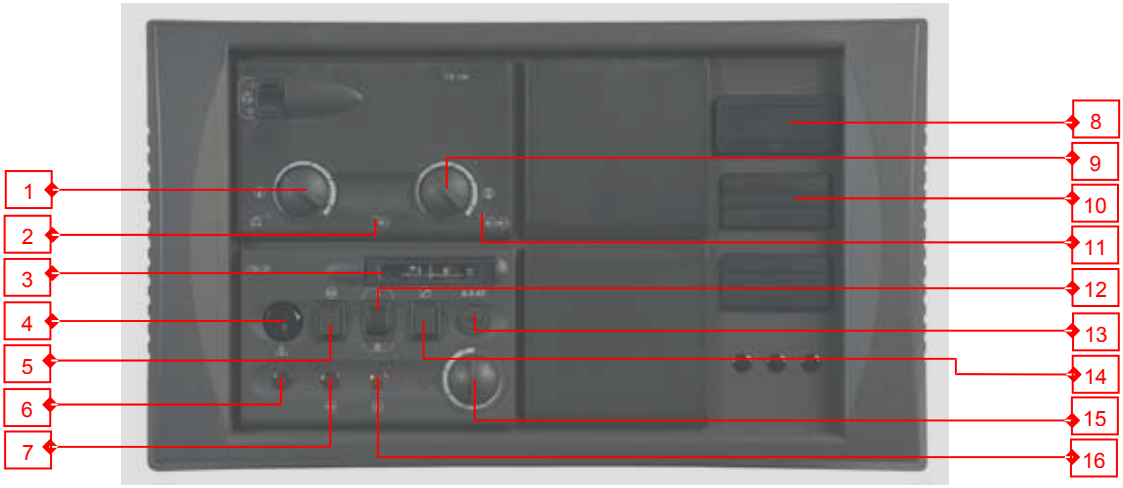
Wiring Diagram – Legend

Legend:	STB	-	Overheat thermostat
	ZSB	-	Burner reset
	ZT	-	Burner test switch
	F1	-	Fuse
	VSC	-	Overheat indicator light
	MST	-	Mains indicator light
	TR	-	Safety mode thermostat
	TR1	-	1st stage regulation thermostat
	TR2	-	2nd stage regulation thermostat
	ZP	-	Pump switch (not used)
	L	-	Live
	N	-	Neutral
	ZG	-	On/Off switch
	BRU	-	Burner connections
	H	-	Hours run counters
External Interlocks:	DG	-	External interlock
	UV	-	Safety interlock
	XY	-	Safety interlock
	Relays	-	Overheat & Fault

3.2 - PUMP OVERRUN USING CHANGEOVER PIPE THERMOSTAT

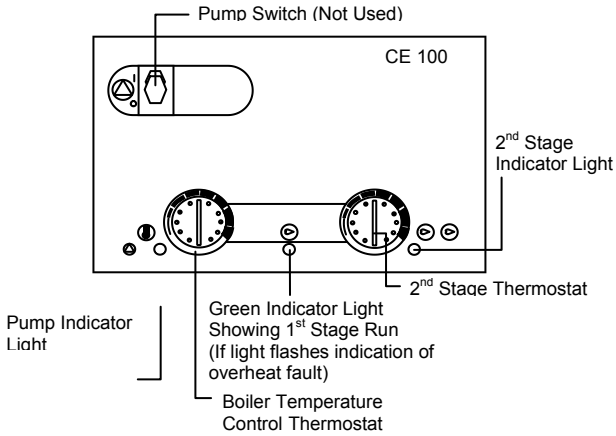


3.3 - CONTROL PANEL CONFIGURATION



1	Control thermostat	9	2nd stage time delay
2	1st Stage indication light	10	1st stage hours run meter
3	Boiler thermometer	11	2nd stage indication
4	Overheat thermostat	12	On/off switch
5	Reset button	13	6.3 amp fuse
6	Overheat indicator	14	Over-ride button for safety checks
7	Lockout indicator	15	Over-ride thermostat
8	Flue gas thermometer	16	Mains supply indicator

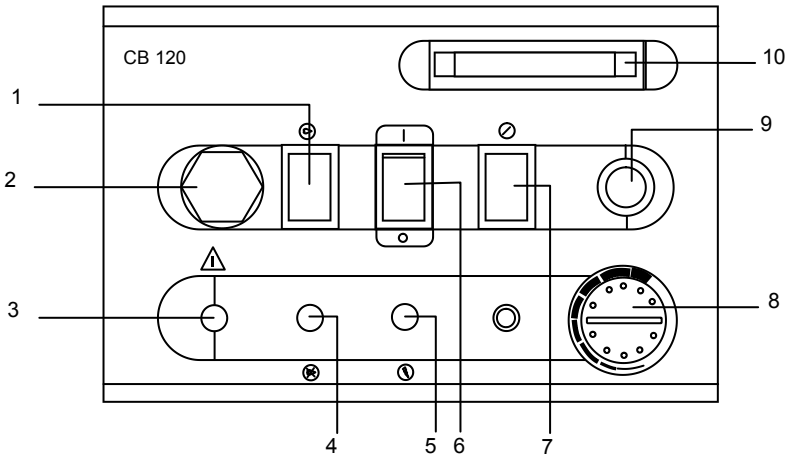
3.4 - CONTROL PANEL OPERATION



The CE 100 module provides the following functions

- Operation at 1st Stage
- Detection of boiler overheat, ionisation probe fault
- Ability to restrict max boiler temperature using jumper at back of module
- Indication of the operation mode of the boiler
- Operation of 2nd Stage operation

3.5 - CB 120 MODULE



The CB 120 module provides the following functions:

1 **Reset button** – if during normal operation the flame is lost then the boiler will proceed to go to a lockout condition to reset the lockout press this button. For repeated lockouts please contact your service agent.

2 **Overheat thermostat** – if overheat indicator light is illuminated then the overheat thermostat needs to be re-set, this is achieved by removing the hexagonal cap and pressing the reset. The overheat thermostat will operate at 110°C, investigation into the reason of lockout should be carried out.

3 **Overheat indicator** – the indicator light will illuminate to inform you the boiler has gone to an overheat condition and will not re-start until a manual reset has taken place as described above.

4 **Lockout indicator** – if during the burner lighting sequence the control box fails to detect the pilot flame or it goes out during operation then the burner will go to lockout and the light will be illuminated.

5 **Mains supply indicator** – indicates that the power has been turned on to the boiler.

6 **On/Off switch** – turns the burner On or Off. **This is not a boiler isolator switch**, components are still live even when the switch if off (mains inlet to the boiler still requires a suitable 3-pole isolator).

7 **Over-ride button for safety checks** – if this button is depressed it bypasses the control and high/low thermostats and fires the boiler on high fire, it is used to check the operation of the overheat thermostat.

8 **Over-ride thermostat** – (set to the right (maximum position) allowing control by the 1st stage and 2nd stage thermostats.

9 **6.3 Amp Fuse**

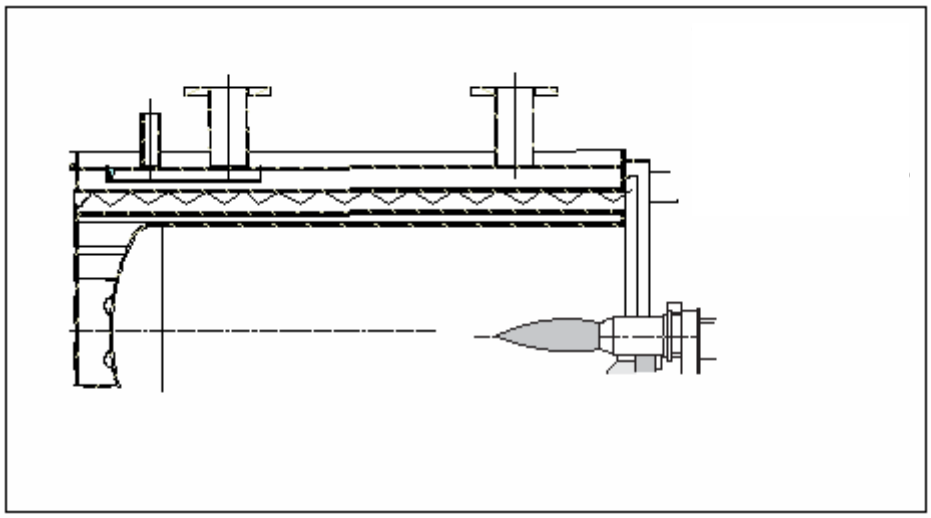
10 **Boiler thermometer** – indicates the current boiler temperature.

Also supplied are a 1st Stage & 2nd Stage hours run meters for indication purposes. A flue gas thermometer is also supplied for indication of the flue gas temperature, to fit the flue gas thermometer drill a 7.5mm diameter hole, preferably vertically, in the flue between the flue hood and the stack, insert the thermometer and clip.

4 COMMISSIONING AND OPERATION

4.1 - ASSEMBLY OF TURBULATORS

All turbulators must be located into pipe (see figure below) and located into length of pipe until they reach the stop.



4.2 - PRELIMINARY CHECK

Once all the hydraulic, electrical and fuel connections have been made, before starting the boiler you must check that:

- The expansion vessel and the pressure relief valve are correctly connected.
- The bulb of thermometer, working, high limit and minimum thermostats are well secured into their proper bulb holder.
- The turbulators are correctly fitted in all the flue ways.
- The C.H. circuit has been thoroughly flushed with clean water.
- The C.H. circuit is filled with water and has been completely purged of air.
- The pumps operate properly.
- The flow switch, the pressure relief valve, and the overheating discharge valve, if any, are adjusted at the right value.
- The fuel, hydraulic, electrical and safety connections are to be connected according to regulations.
- There are no water leaks.
- The burner has been fitted according to the instructions of the burner manufacturer.
- The mains voltage and frequency are compatible with the burner and the electrical equipment of the boiler.
- The burner is adjusted for the fuel type, among those listed in the burner data plate, available on the installation site, and the burner output range is compatible with the boiler output.
- In the boiler house there are also the burner instructions.
- The C.H. pipes are properly insulated.
- The C.H. system is capable to absorb the heating quantity produced at the first start of the burner, during the test period.

4.3 - POTTERTON COMMERCIAL CUSTOMER COMMISSIONING CHECKLIST

The items listed below have been put together as a guide to what actions should be completed before the commissioning of a boiler takes place.

1 Site access available for persons carrying out the proposed work.

2 Site Managers/Personnel aware that work will be taking place.

3 Boilers correctly erected and cased.

4 Risk assessments carried out on possible risks which may affect the persons carrying out the proposed work.

5 Site wiring complete to boilers.

6 Boilers filled and vented.

7 Controls connected, operable and calling for heat.

8 Sufficient system heating load available to run the boilers in order to complete combustion checks.

9 All system pumps operational and available.

10 Gas supply completed, purged and ready for use (if applicable).

11 Oil supply completed, bled and ready for use (if applicable).

12 Flue system complete, adequate and fully functional.

13 Permanent ventilation complete and adequate.

14 All safety systems fitted and fully operational (e.g. safety valves, fuel shut off devices, flue fans interlocked, etc.)

15 Safe working environment provided.

Contravention of Regulations

PLEASE NOTE THAT SHOULD ANY ITEMS BE INSTALLED ON A TEMPORARY BASIS, E.G. VENTILATION, FLUES ETC, THEN THE COMMISSIONING ENGINEER WILL NOT BE ABLE TO LEAVE THE BOILERS RUNNING UPON COMPLETION OF COMMISSIONING. THE BOILERS WILL NEED TO BE SHUT DOWN MAKING THEM INOPERABLE AND SHUT DOWN AND WARNING NOTICES WILL BE ISSUED.

Boiler Commissioning

A lifetime guarantee is available on this boiler when erection and commissioning is carried out by the Potterton service department. Please refer to our standard terms and conditions for further details.

IMPORTANT: The boiler must be commissioned following completion of the installation. Operation of an uncommissioned appliance may cause injury to personnel and damage to the boiler/burner unit and could invalidate the manufacturers' warranties.

Commissioning should only be carried out by personnel approved and competent to do so. This facility is available from Potterton Commercial service offices at the addresses as listed on the back page of this manual.

Commissioning of the burner unit should be carried out in accordance with the burner manufacturers handbook provided with combustion adjustments in accordance with the Potterton burner card also provided.

Before commencing to commission the burner check the following.

1 Electrical supply is of correct voltage and polarity and earthing is available with certification that all electrical checks have been carried out.

2 Fuel supply is tested for leakage and purged of air. Ensure the burner is suitable for the connected fuel supply and pressure, and purging certificates have been filled in.

3 Boiler and system are filled with water and the operating pressure is within the appliance range.

4 Pumps are operational and any flow proving interlocks are functional. The operation of the pump should be checked, particularly on sealed systems, to ensure that operation does not cause a reduction in pressure within the system below the minimum operating pressure.

5 Ventilation is adequate and, in the case of mechanical ventilation systems, operation of the boiler is inhibited unless the ventilation fan is proved.

6 On mechanically assisted flue systems the operation of the boiler plant should be inhibited unless the mechanical flue system is operational and flow proved.

7 The safety valve should be checked to ensure that it is of the correct size and pressure.

8 The cold feed and open vent sizes should be checked.

9 Ensure the burner fitted to the boiler is of the correct specification and size for the boiler and suitable for the fuel supply available (see burner card enclosed with this manual).

10 The burner blast tube has been sealed to the door refractory and the boiler door seal is correct.

Following completion of the above checks the burner should be commissioned in accordance with the burner manufacturers handbook provided with the burner. The commissioning form provided at the back of this manual MUST be completed and returned to Potterton Commercial at the address on the back page.

Typical combustion figures are:

CO_2	-	Gas: 9 – 9.5%	Oil: 12 – 13%
CO	-	Gas: 0 – 100ppm	Oil: 0 – 1 Smoke

Flue gas temperature (taken at 600mm from the flue outlet on a clean boiler) should be within the range of 160 – 200°C.

Important – Safety

It is essential that the following instructions and adjustments are carried out by a qualified engineer who is experienced in blown gas/pressure jet burner commissioning.

In the UK it is a legal requirement that when working on blown gas appliances the engineer must be CORGI registered. The manufacturer cannot be held responsible for any consequential damage, loss or personal injury as a result of customers failing to follow these instructions, or as a result of misuse.

Emergency Instructions

The burners are designed and constructed to meet all of the essential requirements of the GAS APPLIANCE DIRECTIVE 90/396/EEC and under normal circumstances should not give occasion to any hazardous conditions. If such a condition should occur during commissioning or subsequent use of this product, be it

a fault of the burner, the boiler or of any instrument, machine or service in the proximity of the burner thenthe GAS & ELECTRICITY supply to the burner should be **IMMEDIATELY ISOLATED** until such time that the fault has been investigated and rectified.

The commissioning of the appliance can be split into three main categories these being listed below.

Pre-Commissioning Dry Run

This will enable the checks on the safety controls to be done and should include:

Air Control Devices
Control Devices
Control Box

Soundness Testing

This is to check the soundness of the gas train and valves and should include:

Main Gas Pressure Governor
Gas Valve Closure

Commissioning – Live Run

This will enable the burner to be commissioned fully and should include:

Checking Inlet Pressures
Checking Pipework
Checking Pilot Flame
Checking Low/High Flame
Setting Gas Rates
Setting Combustion Figures
Checking Flame Signals
Pressure Switch Settings

IMPORTANT: After each adjustment, gas flow rate and flue gas analysis should be re-checked.

ALWAYS use approved test equipment (continually monitoring electronic equipment is recommended).

NEVER rely on a visual inspection of the flame as a guide to combustion quality.

Following/during commissioning of the burner unit the following additional checks should be carried out.

1 Operation of the control, high/low and high limit thermostats should be checked for correct operation.
2 The flue draught available at the appliance flue outlet should be checked under all operating conditions (hot and cold) and should be within the boiler operating parameters.
3 Checking of lockout of burner on flame failure.
OIL – Cover the photocell.
GAS – Disconnect the ionisation probe in the control box (see manufacturer's instructions).
4 Shut down of the boiler plant by external controls does not cause a hazardous condition and pump overrun is provided to remove residual heat from the boiler.

5 Following commissioning the boiler overheat and control thermostats should be set to the required operating setting.

Additional Checks

Where possible the system should be checked to ensure that following purging of air there is no raw water make-up. In particular, when the system is operated in the hot condition, there should be no discharge of water from the safety valve, open vent or cold feed tank overflow that would otherwise lead to unregulated raw water make-up when the system cools down.

Fault Finding

General fault finding for burner failure should be in accordance with the burner manufacturer's handbook. Set out below are general guidance notes on system fault finding.

Overheat Operation

The boiler control panel has an inbuilt overheat indicator lamp. Operation of the boiler overheat thermostat is associated with a reduction in boiler water flow. Where overheat operation is reported the following should be checked.

a) The boiler/system pump is adequate for the duty.

b) Operation of flow reducing devices, ie, TRVs, compensated mixing valves, etc., do not reduce the water flow rate through the boiler below the minimum flow rate.

c) Pump overrun is incorporated to dissipate residual heat from the boiler on system shut down.

d) The operation of boiler back end valves incorporates a time delay to allow for removal of residual heat from the boiler.

e) The boiler is operating at the correct rate and is not overfired.

The use of a primary loop system is highly recommended to provide a constant boiler flow rate under all operating conditions. For further information please refer to the Potterton Technical Bulletin series.

Burner Lockout

The package burners supplied with the boiler unit have an integral safety system to allow the safe and reliable operation of the burner. Failure of the burner to operate correctly will cause the burner control box to "lockout" and the lockout button on the burner will illuminate to indicate this.
The lockout condition can be manually reset by pushing the reset button and the control box should restart its control sequence in an attempt to light the burner. If the control box lockout will not reset or goes to lockout after being reset then the services of a boiler repair/maintenance company should be sought. This service is available form Potterton Commercial Division service offices at the addresses on the back page of this manual.

WARNING: The lockout reset button should not be repeatedly operated otherwise a hazardous situation may occur.

Should the boiler go to lockout, check the following before attempting to relight the burner.

1 Fuel is available at the burner.

2 The electrical supply to the appliance is of the correct voltage and polarity.

The boiler control boxes in some instances have indicator dials as an aid to fault finding on boiler lockout. In these instances refer to the control box manufacturer's data sheet for fault finding details.

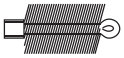
5 MAINTENANCE

5.1 - CLEANING OF THE BOILER

Follow the next sequence:
- Turn off the fuel supply.
- Cooldown the boiler to the ambient temperature.
- Switch Off the electrical supply to the boiler and the burner.
- Open the front door.
- Shake and remove the turbulators every 15-20 days of activity of the boiler.
- Clean the turbulators and the flue ways by brushing them with the brush supplied.
- Reposition the turbulators.
- Remove the cleaning door and all the soot from the combustion chamber.
- Re-fit the cleaning doors.
- Verify the state of the refractory insulation of the combustion chamber door.
- Verify the state of the door sealing rope.
- Close the door of the furnace.

Turbulator *fig. 12*

Brush handle *fig. 14*



Round brush *fig. 13*

Brush handle extension (if applicable) *fig. 15*

5.2 - CHECK OF THE BOILER OPERATION

For a safe operation of the boiler it is necessary to check:
- The good operation of the working thermostat.
- The good operation of the high limit thermostat.
- The adjustment and the good operation of the minimum thermostat.
- The good operation of the shunt system.
- The good operation of the outer compensator (if fitted).
- The good operation of all the other safety and control devices imposed by local requirements.

5.3 - CHECK OF THE BURNER OPERATION

- See the burner instruction manual.
- Follow all the local requirement in terms of burner maintenance .

NOTES

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