

Engineer's Service Manual

Condensing Central Heating Boiler

Titanium Heat

12 - 15 - 18 - 24 - 30

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2. General Description

1. The Potterton Titanium Heat models are gas fired wall mounted powered flue condensing boilers.
2. The boiler modulates automatically to the system load up to the set output. It is designed for use on Natural Gas (G20) only.
3. The two illuminated User Interaction Controller push buttons provide information about the operating condition of the boiler.
4. The boiler is suitable for fully pumped open vented central heating and domestic hot water systems and sealed systems.
5. An information label giving details of the model, serial number and Gas Council number is situated on the front left underside of the outer case and is accessed by pulling forward gently.
6. The boiler data label is positioned on the inside lower right-hand side of the boiler and can be seen when the outer case panel is removed.
7. The boiler is intended to be installed in residential/domestic environments on a governed meter supply only.
8. The boiler is installed with one of the purpose designed flues such as one of the standard telescopic flue kits detailed in the Flue Accessories & Fitting Guide.
9. All systems must be thoroughly cleansed, flushed and treated with inhibitor.
10. This Engineer's Manual should be read in conjunction with the Installation & Service Manual supplied in the Literature Pack.

2.1 Appliance Alpha Codes

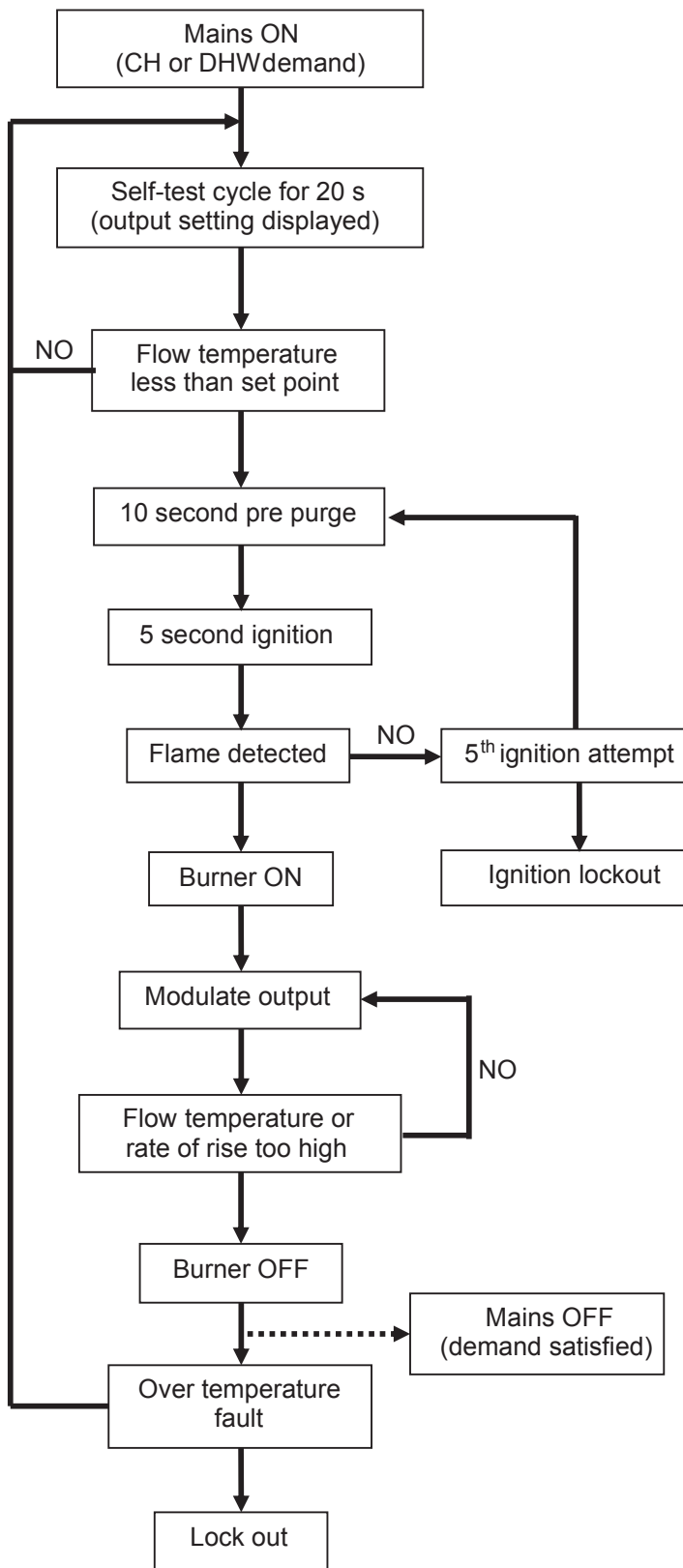
Code Number	Model	Alpha Code	Gas Council Number
7668920	Potterton Titanium 12 Heat	RWW	41-592-61
7668922	Potterton Titanium 15 Heat	RXE	41-592-62
7668923	Potterton Titanium 18 Heat	RXF	41-592-63
7668924	Potterton Titanium 24 Heat	RXM	41-592-64
7668925	Potterton Titanium 30 Heat	RXX	41-592-65

2.2 Main component parts

The Potterton Titanium Heat models use the following component parts:

Burner	Premix
Heat Exchanger	Aluminium
Gas Valve	SIT 848 1:1 ratio
PCB	SIT-R
Fan	Natalini DC

3. Sequence of Operation



1. Switched Live On: When the boiler switched live turns on the boiler, a 20 second check cycle takes place. If the flow temperature is less than the boiler set-point temperature the ignition cycle will start. Pre-purge, Ignition and Burner on.

2. Fan Pre-Purge: The boiler has a 10 second pre-purge (Fan On, Spark Generator and Gas Valve off) before the start of the ignition sequence.

3. Ignition: The boiler has a 5 second ignition period (Fan, Spark Generator and Gas Valve on) and burner on occurs when a flame is detected. If a flame is not detected within the 5 second ignition period then 4 more ignition attempts are made. If a flame is not detected after the 5 ignition attempts the boiler goes to an ignition lock-out and an error light is displayed.

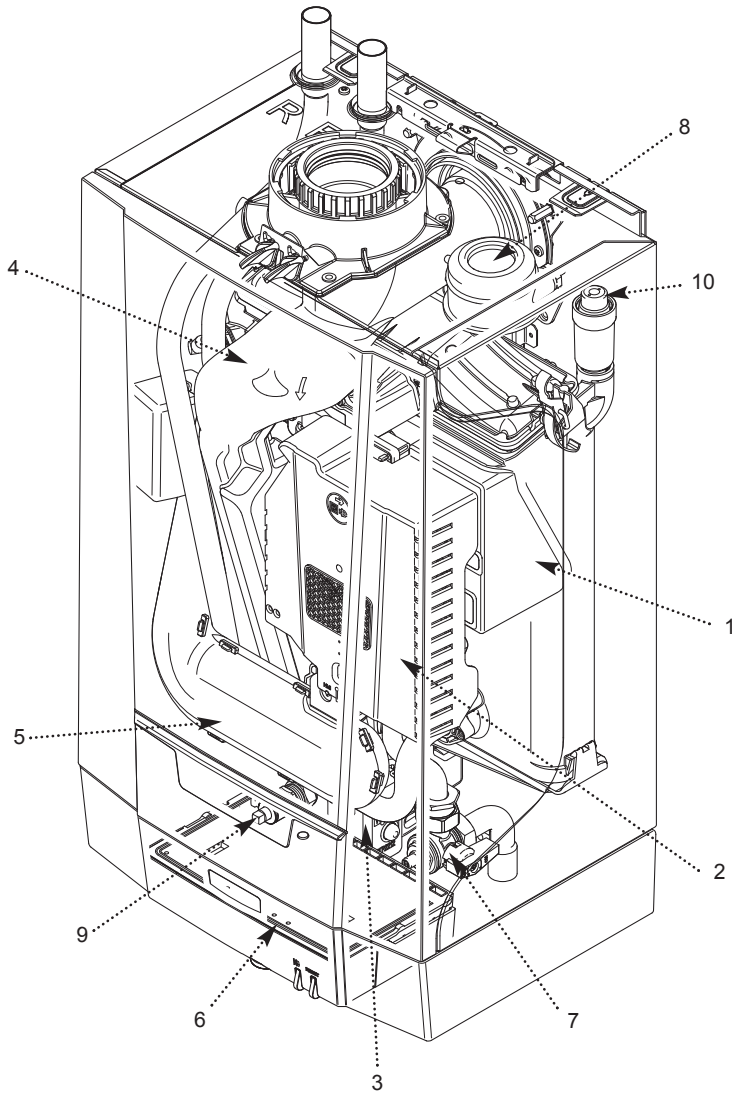
4. Burner on: After a successful ignition, Burner on occurs (Fan and Gas Valve on, Spark Generator off). The boiler flow temperature is controlled by varying the fan speed (and thereby the gas rate) to achieve the optimum boiler operation. If the boiler flow temperature exceeds the boiler set-point, the burner will turn off (Fan and Gas Valve off).

5. Over temperature: If a boiler over temperature event occurs (triggering the safety thermostat) the burner shuts down (Fan off and Gas Valve off). A locking signal is generated and an error light is displayed. 6. Lockout: If a lock-out error is displayed (Fan, Spark Generator and Gas Valve off) the boiler can only be reset by manually pressing the reset button. If 5 lock-outs are reset within a 1 hour period then a hard reset is required see section 8.1.3

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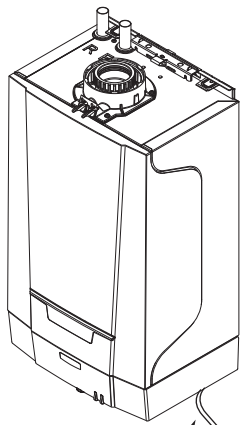
4. Boiler Layout

Potterton Titanium Heat main components



1. Heat Exchanger
2. Combustion Control Unit
3. Condensate Trap
4. Exhaust Tube
5. Inlet Silencer
6. User Interaction Controller
7. Gas Cock
8. Air Pressure Switch (24 & 30 model only)
9. System Drain Cock
10. Air Vent

6.0 Electrical Connections



3 Core Cable - 1 metre supplied connected to boiler

The boiler is supplied with 1 metre of 3 core cable connect- ed to the boiler.

Switched live must be connected to the brown (live) wire of the 3 core cable.

Connecting External Devices:

This boiler operates on a switched live only.

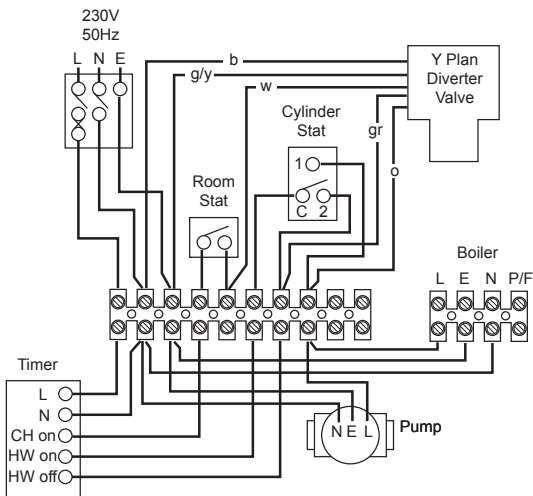
To comply with Part L1 of the Building Regulations the heating system into which the boiler is installed should include the following:

- a) Zone Controls
- b) Timing Controls
- c) Boiler Control Interlocks (Room & Cylinder Thermostats)

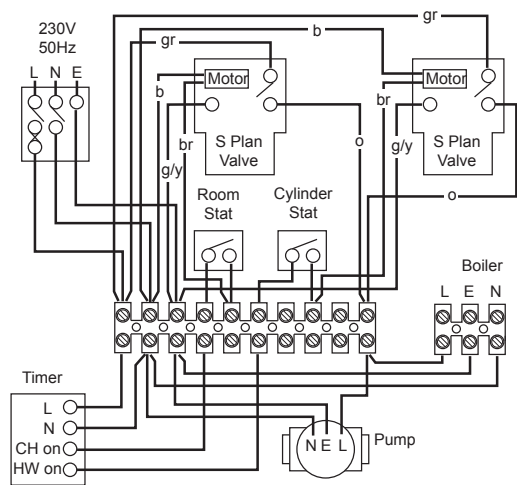
Such a system needs to be fully pumped and must provide independent temperature and time control to both the heating and hot water circuits.

Connection diagrams for Y and S plan systems are shown below.

6.1 Wiring Diagrams



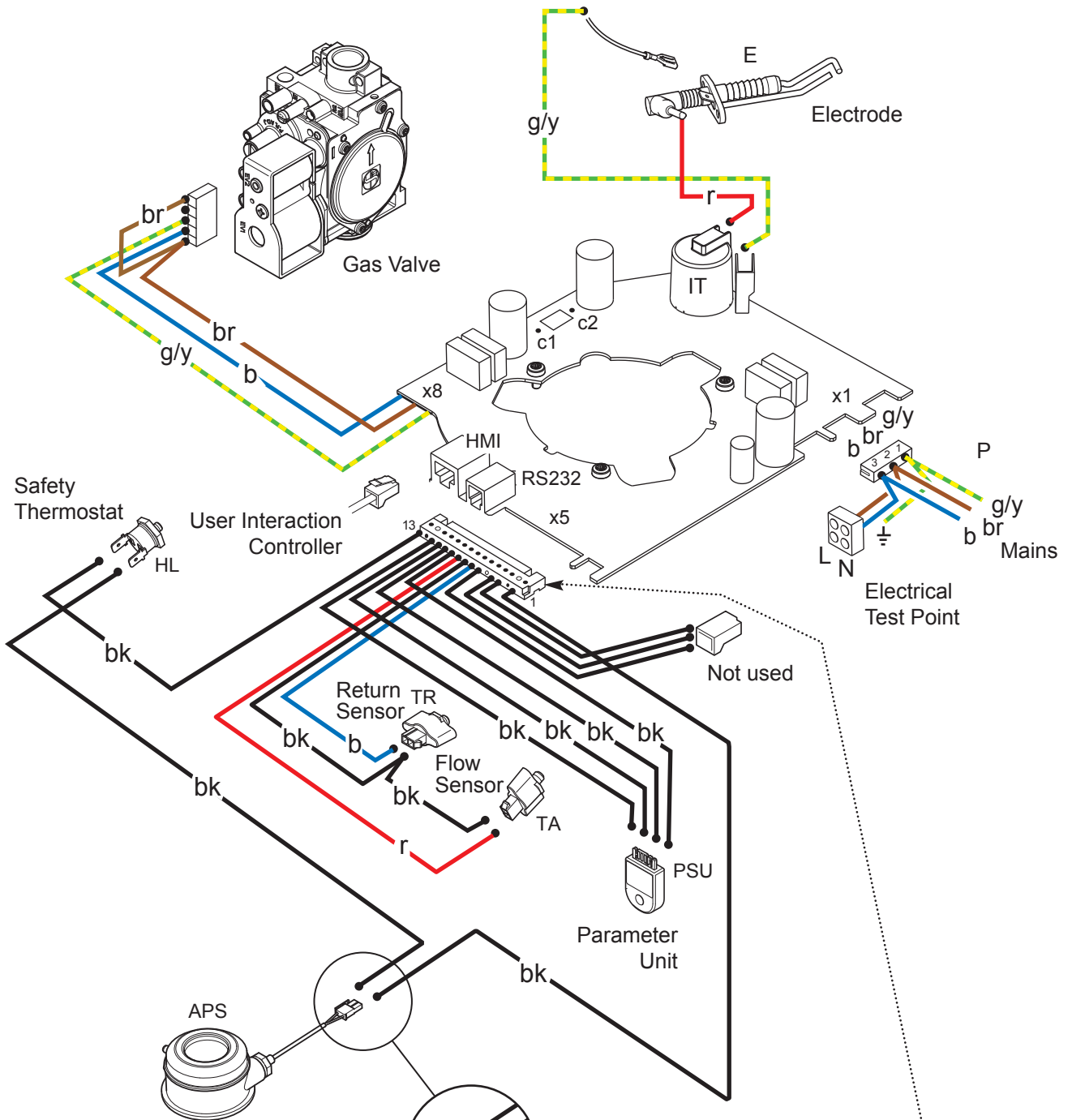
'Y' Plan, Room Thermostat System, CH Interlocked by Room Thermostat. At least the Radiator(s) near the Room Thermostat without TRVs. Pump runs from Switched Live.



'S' Plan, Room Thermostat System, CH Interlocked by Room Thermostat. At least the Radiator(s) near the Room Thermostat without TRVs. Pump runs from Switched Live.

Key to colours					
b	Blue	br	Brown	w	White
o	Orange	gr	Grey	g/y	Green & Yellow

6.2 Boiler Electrical Diagram



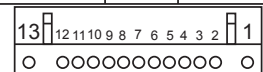
Pressure Switch
Titanium Heat 24 & 30 Models only



Key To Wiring Colours

- b - Blue
- r - Red
- br - Brown
- g/y - Green/Yellow
- bk - Black

FROM	TO	COLOUR	LINK
1	HIGH LIMIT	BLACK	PRESSURE SWITCH
2	FLOW SENSOR	BLACK	COMBI ONLY
3	FLOW SENSOR	BLACK	COMBI ONLY
4			
5	FLOW SENSOR	BLACK	COMBI ONLY
6	RETURN TEMP	BLUE	
7	RETURN TEMP	BLACK	FLOW TEMP
8	FLOW TEMP	RED	
9	PSU	BLACK	
10	PSU	BLACK	
11	PSU	BLACK	
12	PSU	BLACK	
13	HIGH LIMIT	BLACK	PRESSURE SWITCH



6.3. Useful Electrical Checks

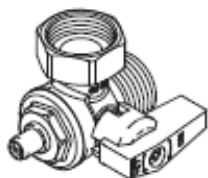
RS232	Computer connection	TR	Return sensor
IT	Ignition transformer	TA	Flow sensor
E	Ignition/ionisation electrode	PSU	Storage parameter
P	Power supply	HMI	Connection box
HL	Safety thermostat	APS	Air pressure switch

Plug	Function	Pins	Colours	Voltage	Resistance
X1	Mains	1 – 2	G/Y – Br	240v AC	N/A
		1 – 3	G/Y – B	0 -15v AC	N/A
		2 – 3	Br – B	240v AC	N/A
X5	Flow Thermistor	7 – 8	Bk – R		12kΩ @ 25°C
	Return Thermistor	6 – 7	B – Bk		12kΩ @ 25°C
	Safety Thermostat / Air Pressure Switch	1 – 13	Bk – Bk		Closed circuit under 110°C
X8	Gas Valve	L – N	Br – B	240v AC	780Ω
		N – E	B – G/Y	0 -15v AC	N/A
		L – E	Br – G/Y	240v AC	N/A
	Fan Part Load	C1 – C2	Y – Y	124 – 129v AC	75Ω
	Fan Max CH Load	C1 – C2	Y – Y	238 – 243v AC	
	Fan Max HW Load	C1 – C2	Y – Y	263 – 265v AC	

6.4. Checking the Operational (Working) Gas Inlet Pressure

Ensure that all controls are calling for heat and maximum load is applied to the system see ‘Chimney Sweep’ mode (see section 7)

2. With the boiler operating in the maximum rate condition check that the operational (working) gas pressure at the gas cock in accordance with B.S. 6798 & B.S. 6891.
3. Ensure that the 20mbar inlet pressure can be obtained with all other gas appliances in the property working.



Gas inlet pressure point

6.5. Measuring the gas rate

With any other appliances & pilot lights turned OFF the gas rate can be measured(see chart below).

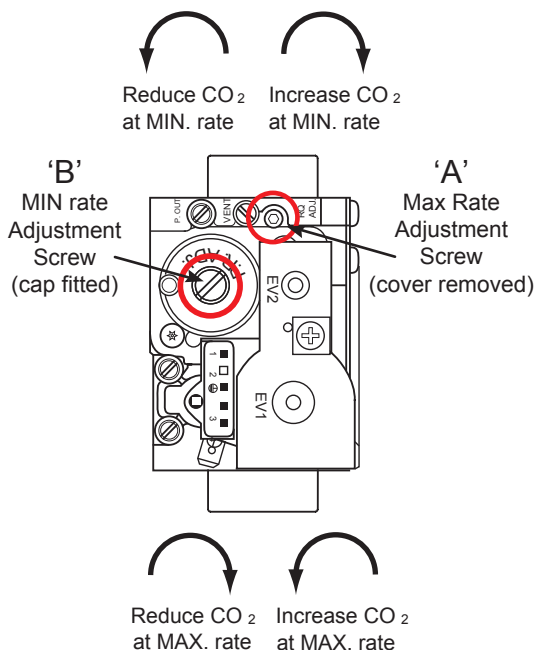
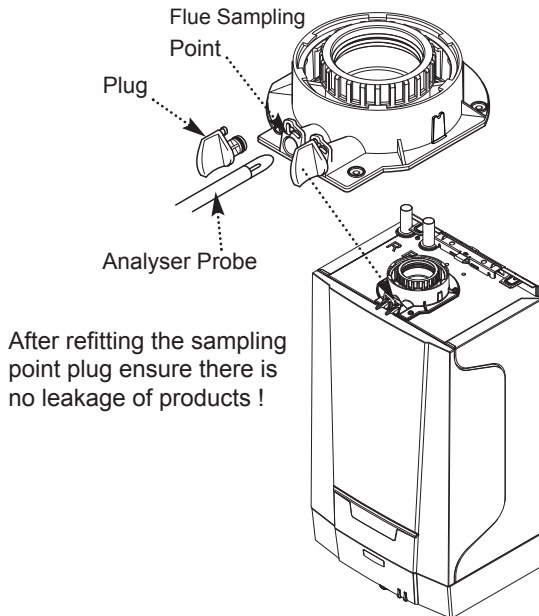
U6 Gas rate = $100.8 \div \text{Time in sec for } 1\text{ft}^3 \text{ of gas} = \text{_____ M}^3/\text{hr}$

E6 Gas rate = Two minutes of gas x 30 = _____ M³/hr

Model	m ³ /hr
12	1.42
15	1.75
18	2.07
24	2.73
30	3.27

7.0 Setting and checking the air/gas ratio

7.1 Setting the boiler to full load & part load



WARNING!

The full load value must be at least 0.4% higher than the part load value. If this gap has not been achieved the values must be reset.

Use this procedure when Commissioning, Servicing & Replacing the Gas valve.

The full load status can only be reached via the part load status.

1. Press the Chimney Sweep button for around 3 seconds. The status signal for the Chimney Sweep button is orange and flashes green briefly; Part load is selected.

2. Press the Chimney Sweep button again twice. The status signal for the Chimney Sweep button is orange and goes off briefly twice; Full load is selected.

3. Remove the plug of the flue gas measurement point.

4. Insert the probe for the flue gas analyser into the measurement opening. See Fig for the position of control screw A for full load adjustment.

5. Check the CO₂ is 9.3% ± 0.1% (Case OFF). If the CO₂ is too low, turn the screw A anticlockwise to increase (2.5mm Allen key). If the CO₂ is too high, turn the screw A clockwise to decrease. Now part load needs to be selected

6. Press the Chimney Sweep button again to return to part load. The status signal for the Chimney Sweep button is orange and flashes green briefly; Part load is selected. See drawing for the position of control screw B for part load.

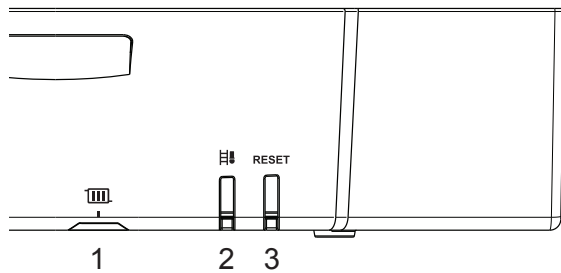
7. Check the CO₂ is 8.9% ± 0.1% (Case OFF). If the CO₂ is too high, turn the screw B anticlockwise to reduce (4mm Allen key). If CO₂ is too low, turn the screw B clockwise to increase.

8. Briefly press the RESET button to return the boiler to normal operating status.

9. Remove the probe for the flue gas analyser from the measurement opening.

10. Refit the plug of the flue gas measurement point.

8.0 Error Codes



- 1 Heating water temperature rotary knob
- 2 Chimney Sweep button and Status signals
- 3 RESET-button and on/off signal

The status signal for the 'Chimney Sweep' button can flash in a range of colours and at different frequencies. The meaning of these signals can be found below.

8.1 Shutdowns and lock-outs

8.1.1 Blocking

A (temporary) blocking mode is a boiler operating function caused by an unusual situation. The boiler control will try to re-start several times. The boiler will start up again after the blocking conditions have been eliminated. In the event of a shutdown, the status signal for the 'Chimney Sweep' button flashes green. The meaning of the shutdown codes can be found in the table below.

Status signals	Description
Shutdown code 1 (1 times green signal)	Temperature protection
Shutdown code 2 (2 times green signal)	Blocking input
Shutdown code 3 (3 times green signal)	Flame loss
Shutdown code 4 (4 times green signal)	Communication error
Shutdown code 5 (5 times green signal)	Parameter or identification fault
Shutdown code 6 (6 times green signal)	Miscellaneous

Table of blocking signals

Blocking	
█	Temperature protection
█ █	Blocking input
█ █ █	Flame loss
█ █ █ █	Communication error
█ █ █ █ █	Parameter error
█ █ █ █ █ █	Miscellaneous

8.1.2. Lock-out

If the blocking conditions still exist after several start up attempts, the boiler will switch into locking mode (fault). The boiler will only start operating again once the cause of the lock-out has been rectified and after pressing the RESET button. In the event of a fault, the status signal for the 'Chimney Sweep' button flashes red. The description of the error code is given in the error table.

Status signals	Description
Error code 1 (1 times red signal)	Sensor error
Error code 2 (2 times red signal)	Maximum security
Error code 3 (3 times red signal)	Ignition fault
Error code 4 (4 times red signal)	Fan fault
Error code 5 (5 times red signal)	Parameter error
Error code 6 (6 times red signal)	Miscellaneous

Table of Lock-out Signals

8.1.2 Lock-out (continued)

Blocking																
█																Sensor error
█	█															Maximum security
█	█	█														Ignition fault
█	█	█	█													Fan fault
█	█	█	█	█												Parameter error
█	█	█	█	█	█											Miscellaneous
█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	Reset
█		█	█		█	█	█	█	█	█	█	█	█	█		Working to reset

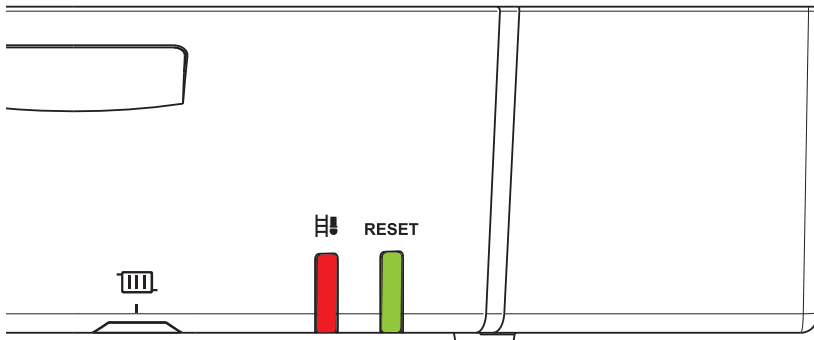
Press the RESET key for 5 seconds: The status signals will flash red quickly and the boiler will start its reset procedure. If the error code continues to display, search for the cause in the error table and apply the solution.

Lock-out (Status signals)

Status signals	Description	Probable causes	Checking/solution
Error Code 1 (1 x red signal)	Sensor fault, temperature fault or flow fault	Sensor not or badly connected Bad connection Non-existent or insufficient circulation Water circulation direction reversed Sensor fault	Check the wiring. Check that the sensors are operating correctly Check that the sensor has been correctly fitted Vent the air in the heating system Check the water pressure Check the cleanliness of the heat exchanger Check the circulation (direction, pump, valves) Replace the sensor if necessary
Error Code 2 (2 x red signal)	Maximum temperature of heat exchanger or control unit exceeded	Non-existent or insufficient circulation Sensor not or badly connected Bad connection Sensor fault No air supply or insufficient air supply No flue gas flow or insufficient flue gas flow Circulation	Vent the air in the heating system Check the water pressure Check the cleanliness of the heat exchanger Check the circulation (direction, pump, valves) Check the wiring Check that the sensors are operating correctly Check that the sensor has been correctly fitted Replace the sensor if necessary Check air supply Check flue gas flow Replace seals
Error Code 3 (3 x red signal)	Ignition fault: 5 burner start-up failures False flame signal 5x Flame loss	No ignition Ignition arc, but no flame formation Presence of the flame but insufficient ionization (<1µA)	Check the wiring Check breakdown to earth Check the condition of the burner set Check the earthing Check that the gas valve is fully opened Check the supply pressure Purge the gas supply to remove air Check the operation and setting of the gas valve unit Check that the air inlet and flue gas discharge flues are not blocked Replace the ionization/ignition electrode
Error Code 4 (4 x red signal)	Fan fault	External draught over the boiler Defective gas/air unit	Check for adequate draw on the chimney connection Replace the gas/air unit
Error Code 5 (5 x red signal)	Parameter error	Bad connection Safety parameters not found	Check the wiring
Error Code 6 (6 x red signal)	Miscellaneous	Several possible causes	The fault codes can be read with a suitable controller or the service tool

8.1.3 Hard Reset.

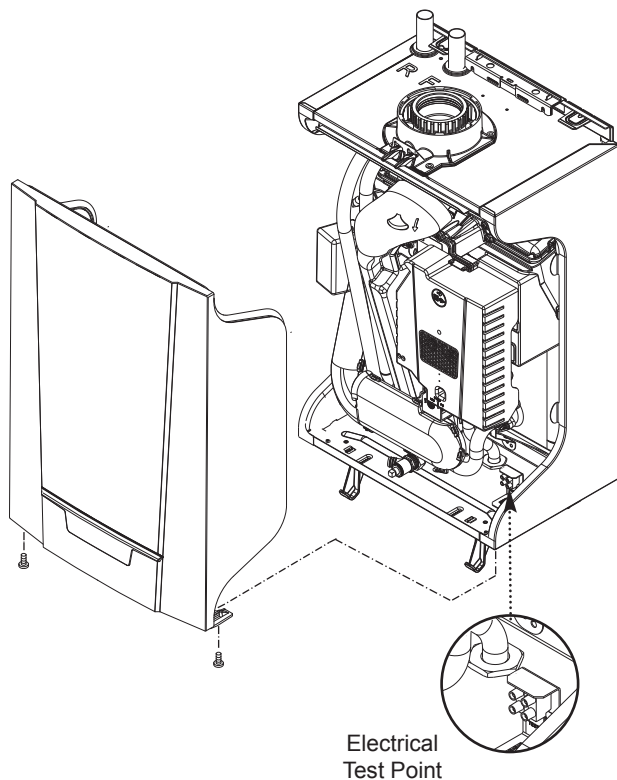
Note: a lock-out condition can be re-set up to 5 times within one hour using the reset button. If a more than 5 resets have been carried out the boiler will require a 'Hard Reset'. This will be indicated by the 'Chimney Sweep' (red) and 'Reset' (green) buttons being illuminated.



To perform a 'Hard Reset' turn the power of to the boiler for 30 seconds.

9 Maintenance

9.1 General



WARNING

- When changing components ensure that both the gas and electrical supplies to the boiler are isolated before any work is started. Use the electrical test point to confirm safe isolation.
- When a component has been changed recommission the boiler as described in the Installation & Service Manual. The Case Front Panel **MUST** seal effectively against the boiler side panels.
- For reasons of safety and economy, it is recommended that the boiler is serviced annually. Servicing must be performed by a competent person in accordance with B.S. 7967-4.
- After servicing, complete the relevant Service Interval Record section of the Benchmark Commissioning Checklist at the rear of this publication.
- During routine servicing, and after any maintenance or change of part of the combustion circuit, the following must be checked:-
 - The integrity of the complete flue system and the flue seals by checking air inlet sample to eliminate the possibility of recirculation. $O_2 \geq 20.6\%$ & $CO_2 < 0.2\%$
 - The integrity of the boiler combustion circuit and relevant seals.
 - The operational gas inlet pressure and the gas rate.
 - The combustion performance as described in 'Check the Combustion Performance' below.

3. Competence to carry out Checking Combustion Performance

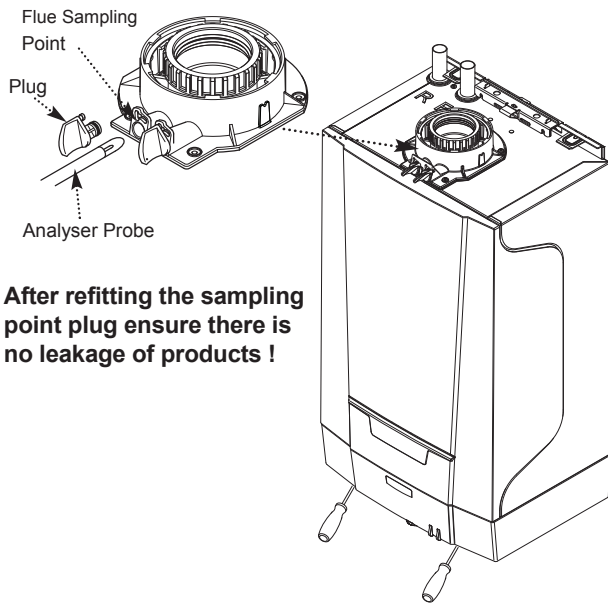
B.S. 6798 'Specification for Installation & Maintenance of Gas Fired Boilers not exceeding 70kWh' advises that:-

The person carrying out a combustion measurement should have been assessed as competent in the use of a flue gas analyser and the interpretation of the results.

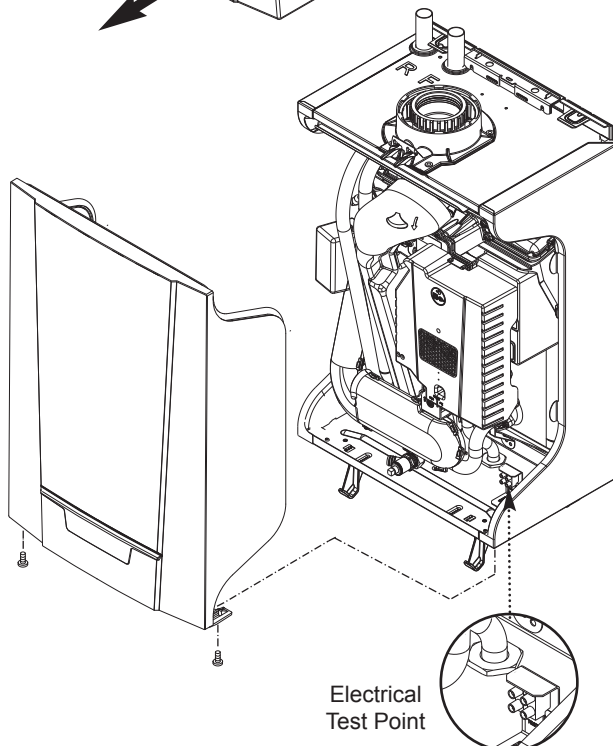
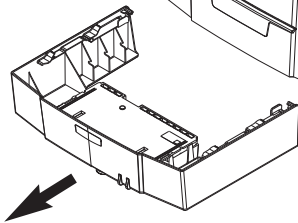
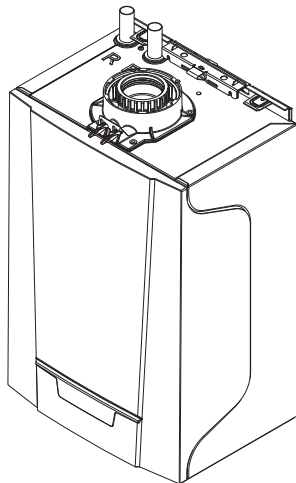
The flue gas analyser used should be one meeting the requirements of BS7927 or BS-EN50379-3 and be calibrated in accordance with the analyser manufacturer's requirements.

Competence can be demonstrated by satisfactory completion of the CPA1 ACS assessment, which covers the use of electronic portable combustion gas analysers in accordance with BS 7967, Parts 1 to 4.

9.2 Standard Inspection and Maintenance Operation



After refitting the sampling point plug ensure there is no leakage of products !



Check the Combustion Performance (CO/CO₂ ratio)

- Set the boiler to operate at maximum rate as described in Section 7.

- Remove the plug from the flue sampling point and insert the analyser probe and obtain the CO/CO₂ ratio. This must be less than 0.004. If the combustion reading (CO/CO₂ ratio) is greater than this, and the integrity of the complete flue system and combustion circuit seals has been verified, and the inlet gas pressure and gas rate are satisfactory the 'Standard Inspection and Maintenance' below & re-check.

- Perform 'Setting the Gas Valve' (Section 7) & re-check.

- Replace and set the gas valve as described in the Installation & Service Manual (Sections 10.3.10 & 13) & re-check.

WARNING

- Ensure that the boiler is cool.
- Ensure that both the gas and electrical supplies to the boiler are isolated.
- Use the electrical test point to confirm safe isolation.

CAUTION

- Always examine any seals or gaskets, replacing where necessary. Where a seal or gasket is supplied with a spare part it should be used, irrespective of the condition of the original.

- Use only original spare parts that are intended for use with this type of boiler.

- When performing any inspection or maintenance personal protective equipment must be used where appropriate.

- Unscrew the two screws located on the lower front panel.

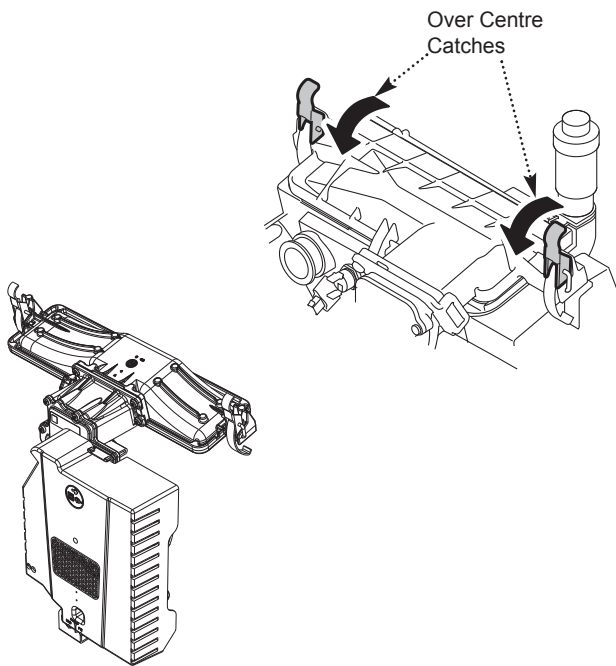
- Slide the lower front panel forward and hinge down to remove.

- Unscrew the two securing screws on the front panel. Remove the front panel.

- Visually check for debris/damage and clean or replace the following if necessary:

- Check the water pressure (sealed systems)
- Check the flue pipes and air supply pipes for leaks
- Check and clean (if necessary) the condensate trap
- Check the ignition electrode (replace if necessary)
- Check the combustion
- Complete the relevant Service Interval Record section of the Installation & Service Manual and then hand it back to the user
- Check and clean the Air Inlet Deflector if necessary.

9.2 Standard Inspection and Maintenance Operation (cont.)



- An ESD wrist strap should be used when working on these components.

- A T25 screwdriver will be required.

- Remove the air duct by pulling the bottom of the duct forward to disengage it from the gas valve and then sliding the top of the duct left away from the fan.

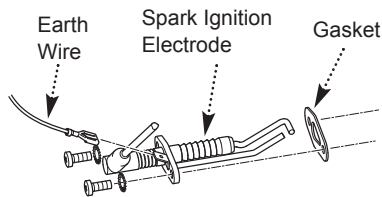
- Disengage the clip at the top of the flue duct, pull the duct forwards and then manoeuvre it out of the heat exchanger sump connection.

- Disconnect the cable from the bottom of the PCB, disengage the fan protective cover securing tab and lower the cover.

- Taking care not to touch the PCB components, disconnect the electrode lead, earth lead, mains power cable and the main sensor harness from the board. Re-engage the fan protective cover.

- Disconnect the plug from the gas valve and undo the nut on the gas inlet pipe at the base of the valve.

- Remove the gas assembly from the boiler by releasing the over-centre catches that secure it to the heat exchanger.



- Remove the ignition electrode and check the condition. Replace if necessary.

- Remove the gasket and burner from the top of the heat exchanger. Use a suitable vacuum cleaner to clean the top part of the heat exchanger.

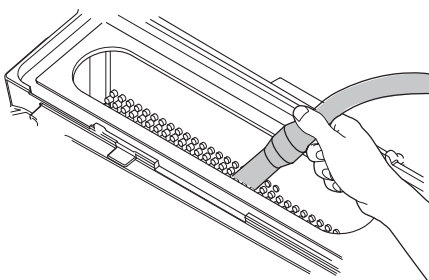
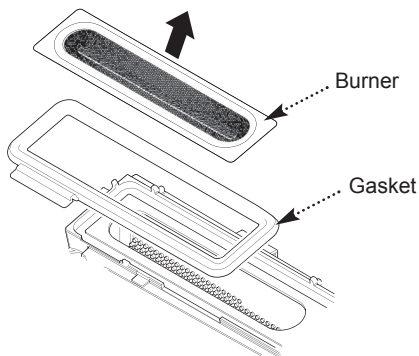
- The burner does not require any maintenance but must be checked for cracks or deterioration and replaced if necessary.

CAUTION

- Ensure that all seals and gaskets are in position.

- Ensure that all connectors are refitted to the PCB.

- Reassemble in reverse order and recommission the boiler.

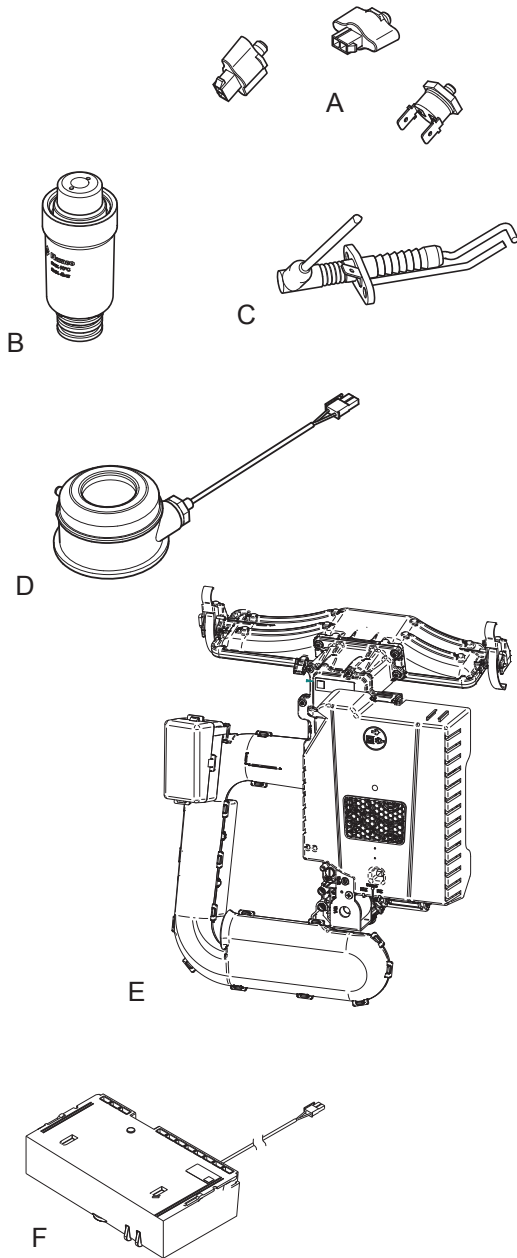


10. Spare Parts - Titanium Heat

10.1 General

1. If, following the annual inspection or maintenance any part of the boiler is found to need replacing, use Baxi Genuine Parts only.

10.2 Spare Parts List



Key Ref	Description	Manufacturer's Part No.
A	Sensor Kit	7216301
B	Automatic Air Vent	7216300
C	Ignition/Sensing Electrode	7216299
D	Pressure Switch (24 & 30 only)	7212522
E	Combustion Control Unit 12	7664628
	Combustion Control Unit 15	7664974
	Combustion Control Unit 18	7664991
	Combustion Control Unit 24	7665026
	Combustion Control Unit 30	7665036
F	User Interaction Controller	7600498

For a full list of all spare parts for these appliances please see the Baxi Parts Arena website:

<http://interpart.partsarena.eu/>

e&oe

All descriptions and illustrations provided in this document have been carefully prepared but we reserve the right to make changes and improvements in our products which may affect the accuracy of the information contained in this leaflet. All goods are sold subject to our standard Conditions of Sale which are available on request.

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