

Keston
BY IDEAL HEATING

INSTALLATION & SERVICING

COMBI²
C30 C35


When replacing any part on this appliance, use only spare parts that you can be assured conform to the safety and performance specification that we require. Do not use reconditioned or copy parts that have not been clearly authorised by Keston.

For the very latest copy of literature for specification and maintenance practices visit our website keston.co.uk where you can download the relevant information in PDF format.



ERP DATA

	SYMBOL	UNITS	MODEL		
			30 kW	35 kW	
Condensing Boiler	n/a	n/a	yes	yes	
Low Temperature Boiler	n/a	n/a	no	no	
B1 Boiler	n/a	n/a	no	no	
Cogeneration Space Heater	n/a	n/a	no	no	
Equipped with a Supplementary Heater	n/a	n/a	no	no	
Combination Heater	n/a	n/a	yes	yes	
Nominal Heat Output for Space Heating					
Full Load	P4	kW	24.3	24.3	
Part Load	P1	kW	8	8	
Auxiliary Electricity Consumption					
Full Load	elmax	kW	0.028	0.028	
Part Load	elmin	kW	0.009	0.026	
Standby	PSB	kW	0.003	0.002	
Seasonal Space Heating Energy Efficiency					
Full Load	η_4	%	90	90	
Part Load	η_1	%	98.6	98.6	
Standby Loss	Pstby	kW	0.05	0.05	
Ignition	Pign	kW	0	0	
Emissions					
	NOx (Gross)	NOx, pond Hs	mg/kWh	25	30
Annual Energy Consumption	QHE	GJ	75	75	
Sound Power Level, Indoors	LWA	dB	46	46	
Domestic Hot Water					
Domestic Hot Water	Qelec	kWh	0.133	0.137	
Water heating energy efficiency (Eco) Tapping Profile L	η_{WH}	%	81	79	
Daily fuel consumption 24hr (GCV) Actual measured	Qfuel	kWh	14.84	15.14	
Annual electricity consumption	AEC	kWh	28	29	
Annual fuel consumption	AFC	GJ	11	11	



WEEE DIRECTIVE 2012/19/EU
Waste Electrical and Electronic Equipment Directive

- At the end of the product life, dispose of the packaging and product in a corresponding recycle centre.
- Do not dispose of the unit with the usual domestic refuse.
- Do not burn the product.
- Remove the batteries.
- Dispose of the batteries according to the local statutory requirements and not with the usual domestic refuse.



The code of practice for the installation, commissioning & servicing of central heating systems



PRODUCT FICHE

KESTON COMBI² Ideal Heating ERP DATA

	SYMBOL	UNITS	MODEL	
			30 kW	35 kW
Condensing boiler			Yes	
Seasonal space heating efficiency class			A	
Rated heat output		kW	24	
Seasonal space heating energy efficiency	η_s	%	94*	
Annual energy consumption	Q_{HE}	GJ	75	
Sound power level, indoors	LWA	dB	46	46
Water heating energy efficiency class			A	

Seasonal Space Heating Energy Efficiency of the Boiler								94% ^{*/%}	A
Temperature control (from fiche of temperature control)								%	B
<i>Class I</i>	<i>Class II</i>	<i>Class III</i>	<i>Class IV</i>	<i>Class V</i>	<i>Class VI</i>	<i>Class VII</i>	<i>Class VIII</i>		
1%	2%	1.5%	2%	3%	4%	3.5%	5%		

Solar Contribution (from fiche of solar device)

Collector Size
(in m²)

Tank Volume
(in m³)

Collector Efficiency
(in %)

Tank rating
A* = 0.95
A = 0.91
B = 0.86
C = 0.83
D-G = 0.81

= ('III' x + 'IV' x) x 0.9 x (/ 100 x) = % **C**

Seasonal Space Heating Energy Efficiency of Package

TOTAL: A+B+C=

%

Seasonal Space Heating Energy Efficiency Class of Package

<input style="width: 30px; height: 30px;" type="checkbox"/>	<input style="width: 30px; height: 30px;" type="checkbox"/>	<input style="width: 30px; height: 30px;" type="checkbox"/>	<input style="width: 30px; height: 30px;" type="checkbox"/>	<input style="width: 30px; height: 30px;" type="checkbox"/>	<input style="width: 30px; height: 30px;" type="checkbox"/>	<input style="width: 30px; height: 30px;" type="checkbox"/>	<input style="width: 30px; height: 30px;" type="checkbox"/>	<input style="width: 30px; height: 30px;" type="checkbox"/>	<input style="width: 30px; height: 30px;" type="checkbox"/>
G	F	E	D	C	B	A	A+	A++	A+++
< 30%	≥ 30%	≥ 34%	≥ 36%	≥ 75%	≥ 82%	≥ 90%	≥ 98%	≥ 125%	≥ 150%

*The energy efficiency of the package of products provided for in this document may not correspond to its actual energy efficiency once installed in a building, as the efficiency is influenced by further factors such as heat loss in the products in relation to the building size and its characteristics

NOTES FOR THE INSTALLER

For any technical queries please ring the Keston installer helpline : 01482 443005

BOILER RESTART PROCEDURE -

Press the RESTART button. The boiler will repeat the ignition sequence if a heat demand is present.

DEFINITIONS



WARNING: Risk of injury or death



CAUTION: Risk of damage to objects



IMPORTANT: Important information

Table of Acronyms

CH - Central Heating

DHW - Domestic Hot Water

TRV - Thermostatic Radiator Valve

PRV - Pressure Relief Valve

IE - Ireland

ETCI - Electro-Technical Council of Ireland

BS - British Standard

WRAS - Water Regulations Advisory Scheme

SAP - Standard Assessment Procedure

IEE - Institution of Electrical Engineers

UKCA - UK Conformity Assessed

RHS - Right Hand Side

LHS - Left Hand Side

PCB - Printed Circuit Board

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Section 1 - General

Table 1 General Data

		30 kW	35 kW
Gas Supply		2H - G20 - 20 mbar	
Gas Supply Connection		15 mm copper compression	
Injector Size	mm	4.65	4.9
Inlet Connection	Cold Water	15 mm copper compression	
Outlet Connection	Cold Hot Water	15 mm copper compression	
Flow Connection	Central Heating	22 mm copper compression	
Return Connection	Central Heating	22 mm copper compression	
Flue Terminal Diameter	mm	50	
Average Flue Temp-Mass Flow Rate	DHW	68°C - 13g/s	73°C - 15g/s
CO2 Content (± 0.7)	Max. DHW	9.3%	9.7%
	Min. CH	8.5%	8.8%
Maximum Working Pressure (Sealed Systems)	bar (psi)	2.5 (36.3)	
Maximum Domestic Hot Water Inlet Pressure	bar (psi) [kPa]	10.0(145)[1000]	
Minimum Domestic Hot Water Inlet Pressure*	bar (psi) [kPa]	1.3(18.9) [130]	1.3(18.9)**[130]
Minimum DHW Inlet Pressure to Operate at 0.6 bar System Pressure		All Model Sizes 0.5 bar	
Electrical Supply		230 V ~ 50 Hz	
Power Consumption	W	93	110
Fuse Rating		External : 3 A Internal : T4A HRC L250 V	
Water Content	Central Heating litre (gal)	1.2 (0.26)	
	Domestic Hot Water litre (gal)	1.0 (0.22)	
Packaged Weight	kg	32.9	32.9
Lift Weight	kg	28.6	28.6
Boiler Casing Size	Height mm	700	
	Width mm	395	
	Depth mm	278	

*Required for maximum flow rate. Boiler operates down to 2 L/min DHW delivery ** In areas of low water pressure the DHW restrictor can be removed

Table 2 Performance Data - Central Heating

Boiler Input:		Max	Min	
			30 kW	35 kW
Gross CV	kW	24.3	6.1	7.1
	kW	27	6.7	7.9
Gas Consumption	m ³ /h	2.512	0.627	0.734
	(ft ³ /h)	(89)	(22)	(25.9)
Boiler Output :				
Non Condensing 70°C Mean Water Temp.	kW	24.2	6.1	7.1
Condensing 40°C Mean Water Temp.	kW	25.6	6.4	7.5
Seasonal Efficiency* SEDBUK 2005			91.10%	91.10%
Seasonal Efficiency* SEDBUK 2009/2012			89.60%	89.60%
SEAI HARP*			91.10%	91.10%
NOx Classification			CLASS 6	

Note. Gas consumption is calculated using a calorific value of 38.7 MJ/m³ (1038 Btu/ft³) gross or 34.9 MJ/m³ (935 Btu/ft³) nett.

To obtain the gas consumption at a different calorific value:

- For l/s - divide the gross heat input (kW) by the gross C.V. of the gas (MJ/m³)
- For Btu/h - multiply the gross heat input (kW) by 26.8
- For ft³/h - divide the gross heat input (Btu/h) by the gross C.V. of the gas (Btu/ft³)
- For m³/h - multiply l/s by 3.6

Table 3 Performance Data - Domestic Hot Water

Maximum DHW Input:		30 kW	35 kW
Nett CV	kW	30.4	35.4
	kW	33.7	39.3
Gross CV	m ³ /h	3.135	3.657
	ft ³ /h	111	129
Maximum DHW Output	kW	30.3	35.3
DHW Flow Rate At 35°C Temp. Rise	l/min	12.4	14.5
	gpm	2.8	3.2
DHW Specific Rate	l/min	14.5	16.9
	gpm	3.2	3.7

* The value is used in the UK Government's Standard Assessment Procedure (SAP) for energy rating of dwellings. The test data from which it has been calculated, has been certified by a notified body.

** The value is used in the Irish Government's Dwelling Energy Assessment Procedure (DEAP) for energy rating of dwellings. The test data from which it has been calculated have been certified by a notified body.

C13 C33 C53 = A room sealed appliance designed for connection via ducts to a horizontal or vertical terminal, which admits fresh air to the burner and discharges the products of combustion to the outside through orifices which, in this case, are concentric. The fan is up stream of the combustion chamber.

I_{2H} = An appliance designed for use on 2nd family gas, Group H only.

II_{2H/3P} = An appliance designed for use on 2nd or 3rd family gases, Group H or P.

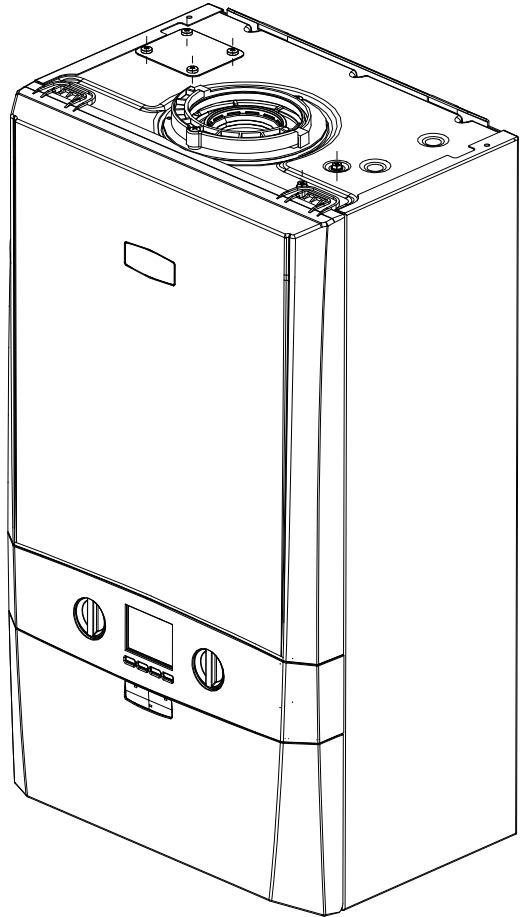
Section 1 - General

KESTON COMBI² C

Natural Gas Only

BOILER SIZE kW	G.C. Appliance No (Benchmark No.)
30	47-930-09
35	47-930-10

Destination Country: GB, IE, RO



For UK installations, to comply with Building Regulations Part L1 (Part 6 in Scotland), the boiler should be fitted in accordance with the manufacturer's instructions. Self-certification that the boiler has been installed to comply with Building Regulations can be demonstrated by completing and signing the Benchmark Commissioning Checklist.

Before installing this boiler, read the Code of Practice sheet at the rear of this book.

BENCHMARK COMMISSIONING CHECKLIST DETAILS

Boiler	Page	Page
Make and model.....	7	
Appliance serial no. on data badge	Front Cover	
SEDBUK No. %.....	6	
Controls		
Time and temperature control to heating	28	
Time and temperature control to hot water	n/a	
Heating zone valves.....	13	
TRVs	13	
Auto bypass	13	
Boiler interlock.....	13	
For all boilers		
Flushing to BS.7593.....	13	
Inhibitor	13	
<i>Central heating mode</i>		
Heat input.....	to be calculated	
		Burner operating pressure n/a
		Central heating flow temp. measure and record
		Central heating return temp. measure and record
		For combination boilers only
		Scale reducer
		13
		<i>Hot water mode</i>
		Heat input..... to be calculated
		Max. operating burner pressure..... n/a
		Max. operating water pressure..... measure & record
		Cold water inlet temp
		measure & record
		Hot water outlet temp
		measure & record
		Water flow rate at max. setting..... measure & record
		For condensing boilers only
		Condensate drain.....
		23-24
		For all boilers: Complete, sign & hand over to customer

NOTE TO THE INSTALLER: COMPLETE THE BENCHMARK COMMISSIONING CHECKLIST AND LEAVE THESE INSTRUCTIONS WITH APPLIANCE



For assistance call
Technical Helpline
01482 443005

Section 1 - General

1.1 INTRODUCTION

The **Keston Combi**² range of boilers are wall mounted, condensing, combination gas boilers.

Features:

- High efficiency
- Full sequence
- Automatic spark ignition
- Low water content
- Fanned flue

The boiler is supplied fully assembled with a DHW plate heat exchanger, diverter valve, circulating pump, pressure gauge, PRV and CH expansion vessel.

Variable CH and DHW temperature controls are fitted on the user control and the boiler features a DHW preheat facility.

The boiler includes as standard:

- Automatic boiler bypass
- Boiler frost protection
- Daily pump and diverter valve exercise

The boiler casing is of white painted mild steel with a white polymer front panel.

The boiler temperature controls are visibly located in the control panel on the front of the boiler.

The heat exchanger is manufactured from cast aluminium.

The boiler is suitable for connection to fully pumped, sealed heating systems ONLY. Adequate arrangements for completely draining the system by provision of drain cocks MUST be provided in the installation pipework.

Pipework from the boiler is routed downwards.

Data Plate

The boiler model and serial number are shown on the data label which can be located on the bottom of the boiler casing, shown in - Water & Gas Connection Diagram.

Refer to Section
1.14

1.2 OPERATION

With no demand for CH, the boiler fires only when DHW is drawn off, or periodically for a few seconds without any DHW draw-off, in order to maintain the DHW plate heat exchanger in a heated condition. This only occurs if the "PREHEAT" button is pressed and the display reads "PREHEAT ON or PREHEAT TIMED".

When there is a demand for CH, the heating system is supplied at the selected temperature of between 30°C and 80°C, until DHW is drawn off. The full output from the boiler is then directed via the diverter valve to the plate heat exchanger to supply a nominal DHW draw-off of:

30 kW 12.4 l/min at 35°C temperature rise.

35 kW 14.5 l/min at 35°C temperature rise.

The DHW draw off rate specified above is the nominal that the boiler flow regulator will give. Due to system variations and seasonal temperature fluctuations DHW flow rates/temperature rise will vary, requiring adjustment at the draw off tap.

At low DHW draw-off rates the maximum temperature may exceed 65°C.

The boiler features a comprehensive diagnostic system which gives detailed information on the boiler status when operating, and performance of key components to aid commissioning and fault finding.

1.3 SAFE HANDLING

This boiler may require 2 or more operatives to move it to its installation site, remove it from its packaging base and during movement into its installation location. Manoeuvring the boiler may include the use of a sack truck and involve lifting, pushing and pulling.

Caution should be exercised during these operations.

Operatives should be knowledgeable in handling techniques when performing these tasks and the following precautions should be considered:

- Grip the boiler at the base.
- Be physically capable.
- Use personal protective equipment as appropriate, e.g. gloves, safety footwear.

During all manoeuvres and handling actions, every attempt should be made to ensure the following unless unavoidable and/or the weight is light.

- Keep back straight.
- Avoid twisting at the waist.
- Avoid upper body/top heavy bending.
- Always grip with the palm of the hand.
- Use designated hand holds.
- Keep load as close to the body as possible.
- Always use assistance if required.

1.4 OPTIONAL ACCESSORIES

Please visit keston.co.uk to access the optional accessories for this boiler.

1.5 SAFETY

Current Gas Safety (installation and use) regulations or rules in force:

The appliance is suitable only for installation in the UK and should be installed in accordance with the rules in force.

In the UK, installations must be carried out by a Gas Safe Registered Engineer. It must be carried out in accordance with the relevant requirements of the:

- Gas Safety (Installation and Use) Regulations.
- Appropriate Building Regulations, either The Building Regulations, The Building Regulations (Scotland), Building Regulations (Northern Ireland).
- Water Fittings Regulations or Water byelaws in Scotland.
- Current I.E.E. Wiring Regulations.

Where no specific instructions are given, reference should be made to the relevant British Standard Code of Practice.

Section 1 - General

In IE , the Installation must be carried out by a Registered Gas Installer (RGI) and installed in accordance with the current edition of I.S.813 "Domestic Gas Installation", the current Building Regulations and reference made to the current ETCI rules for electrical installation.

The Boiler has been tested and certified to:

BSEN 15502-1, BSEN 15502-2, BSEN 15502-2-1, BSEN 60335-1, BSEN 60335-2-102, BSEN 55014-1 and BSEN 55014-2 for use with Natural Gas & Propane.

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

- BS5440:1** Flues (for gas appliances of rated input not exceeding 70 kW).
- BS5440:2** Ventilation (for gas appliances of rated input not exceeding 70 kW).
- BSEN12828** Heating Systems in buildings: Design for water based heating systems.
- BSEN12831** Heating Systems in buildings: Method for calculation of the design heat load.
- BSEN14336** Heating Systems in buildings: Installation and commissioning of water based heating systems.
- BS5546** Installation of gas hot water supplies for domestic purposes (2nd Family Gases)
- BS6798** Installation of gas fired hot water boilers of rated input not exceeding 70 kW.
- BS6891** Installation and maintenance of low pressure gas installation pipework.
- BS 7593:2019** Code of practice for the preparation, commissioning and maintenance of domestic central heating and cooling water systems.

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: This appliance is UKCA/CE certificated for safety and performance. Do not connect external control devices directly to this appliance unless recommended in this manual or by **Keston** in writing. If in doubt, please enquire.

Unapproved control devices could invalidate the warranty of this appliance and infringe the Gas Safety Regulations.

1.6 SAFE HANDLING OF SUBSTANCES

No asbestos, mercury or CFCs are included in any part of the boiler or its manufacture.

1.7 LOCATION OF BOILER

The boiler must be installed on a flat and vertical internal wall, capable of adequately supporting the weight of the boiler and any ancillary equipment.

The boiler may be fitted on a combustible wall and insulation between the wall and the boiler is not necessary, unless required by the local authority.

WARNING: Rear access to the boiler is not permitted.

CAUTION: Do not fit the boiler outside.

Timber Framed Buildings

Boilers installed in a timber-framed building must comply with IGE/UP7 +A 2008.

High Rise Installations

Installations in England above 18 meters requires a High Rise Flue Kit. This adheres to the new building regulations. (ADB_Vol1_Dwellings_2019_edition_inc_2020_amendments).

Installations in Scotland above 11 meters requires the High Rise Flue Kit. This adheres to the new building standards technical handbook 2020: Domestic Buildings (April 2021 Addendum).

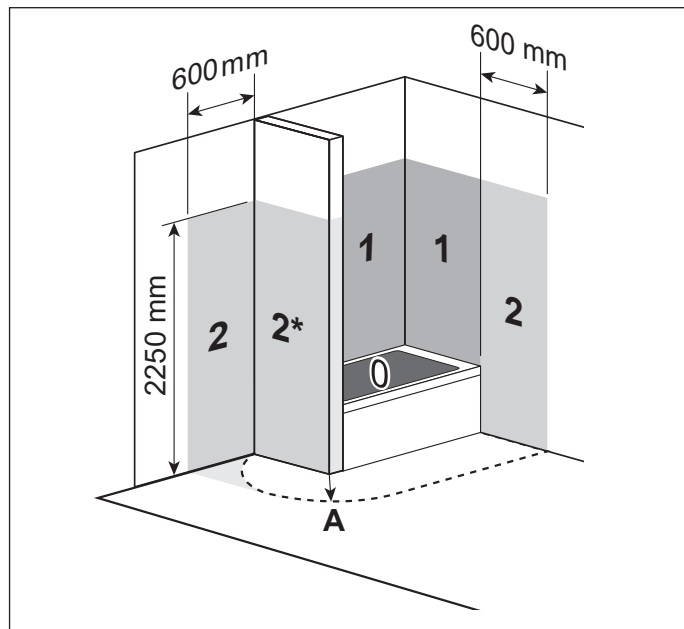
Bathroom Installations

CAUTION: This appliance is IP20 rated, do not clean with jets of water.

You may install the boiler in any internal space. The installation must comply with the current IEE (BS 7671) Wiring Regulations and the electrical regulations applicable in Scotland.

For IE, reference should be made to the current ETCI rules for electrical installations and I.S.813

If the appliance is to be installed in a room containing a bath or shower then the appliance must be installed beyond Zone 2, as detailed in BS7671.



Bathroom Installations

[0] Zone 0

[1] Zone 1

[2] Zone 2

[2*] Without the end wall, zone 2 must extend 600 mm from the bath

[A] 600 mm radius from the bath or shower

Section 1 - General

Compartment Installations

A boiler installed in a compartment does not require ventilation. However, a boiler installed in a compartment must provide adequate clearances for servicing. The compartment should also be fitted with a suitable label in accordance with current standards.

Refer to Section
1.14

1.8 AIR SUPPLY

It is not necessary to have an air vent in the room or internal space where the boiler is installed.

1.9 GAS SUPPLY

Consult the local gas supplier to establish an adequate supply of gas. Do not use existing service pipes without consulting the local gas supplier.

The gas supply must be governed with a meter.

A gas meter can only be connected by the local gas supplier or by a Gas Safe Registered Engineer or in IE a Registered Gas Installer.

An existing meter should be checked, preferably by the gas supplier, to ensure that the meter is adequate to deal with the required gas supply rate.

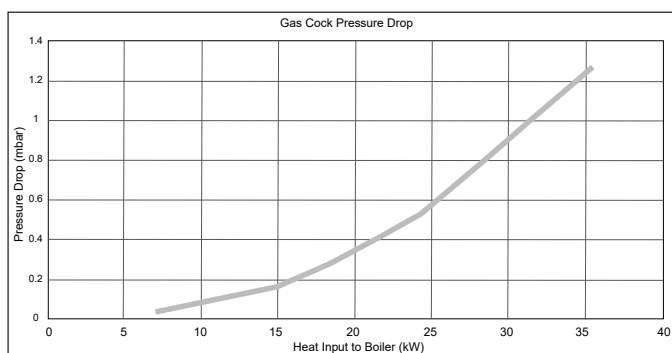
It is the responsibility of the Gas Installer to size the gas installation pipework in accordance with BS6891.

Whilst the principle of the 1:1 gas valve ensures the Keston range is able to deliver its full output at inlet pressures as low as 14 mb, other gas appliances in the property may not be as tolerant. When operating pressures are found to be below the minimum meter outlet of 19 mb these should be checked to ensure this is adequate for correct and safe operation.

Allowing for the acceptable pressure loss of 1mb across the installation pipework, it can be assumed that a minimum permitted operating pressure of 18mb will be delivered to the inlet of the appliance.

(Reference BS6400-1 Clause 6.2 Pressure Absorption).

The external gas cock could further reduce the operating pressure when measured at its test point. The pressure drop is relative to the heat input to the boiler (kW), refer to graph below.



IMPORTANT: Ensure all gas valve connections are gas tight with a gas soundness check up to the gas control valve. Installation pipes must be fitted in accordance with BS6891.

The complete installation MUST be tested for gas tightness and purged as described, for the majority of installations the appropriate standard is IGEM/UP/1B [23], but alternatively IGEM/UP/1 [21] or IGEM/UP/1A [22], as appropriate, can be utilized.

1.10 WATER CIRCULATION SYSTEM

IMPORTANT: A minimum length of 1 metre of copper pipe MUST be fitted to both flow and return connections from the boiler before connection to any plastic piping.

The central heating system should be in accordance with BS6798 and, in addition, for smallbore and microbore systems, BS EN 12828:2012+A1:2014.

Water treatment is covered later in these instructions.

Refer to Section
1.18

1.11 BOILER CONTROLS

Install CH controls to ensure that the boiler has no demand when there is no requirement from the system.

Heating systems with TRVs in individual rooms must include a thermostat to control the temperature in rooms without TRVs.

At least 10% of the minimum boiler heat output should be achieved using a room thermostat. A bypass circuit with an automatic bypass valve must be fitted to systems with TRVs or two-port valves on all the radiators to ensure water flow.

1.12 ELECTRICAL SUPPLY

WARNING: This appliance must be earthed.

Wiring external to the appliance MUST be in accordance with the current I.E.E. (BS7671) Wiring Regulations and any local regulations which apply.

For IE, reference should be made to the current ETCI rules for electrical installations.

The mains supply to the boiler and system wiring centre shall be through one common fused double pole isolator and for new heating systems, and where practical replacement installations, the isolator shall be situated adjacent to the appliance.

1.13 CONDENSATE DRAIN

The condensate drain provided must be connected to the drainage point on site. All condensate drainage pipework and fittings must be made of plastic.

IMPORTANT: The condensate drain pipework should be installed in accordance with BS6798.

The drain outlet on the boiler is sized for standard 21.5 mm overflow pipe. It is a universal fitting to allow use of different brands of pipework.

Refer to Section
2.16

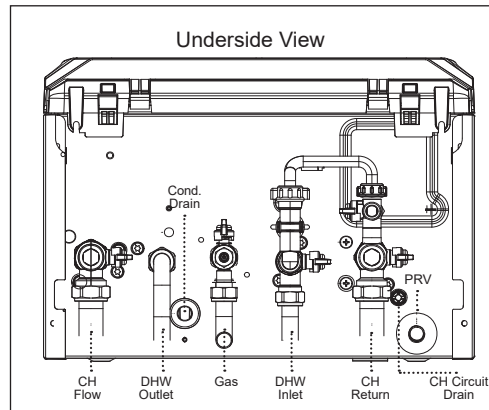
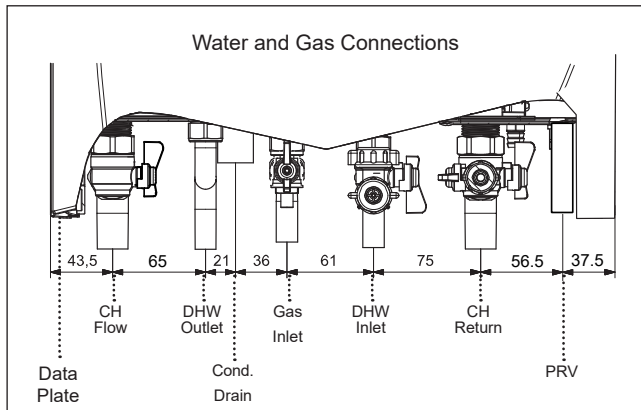
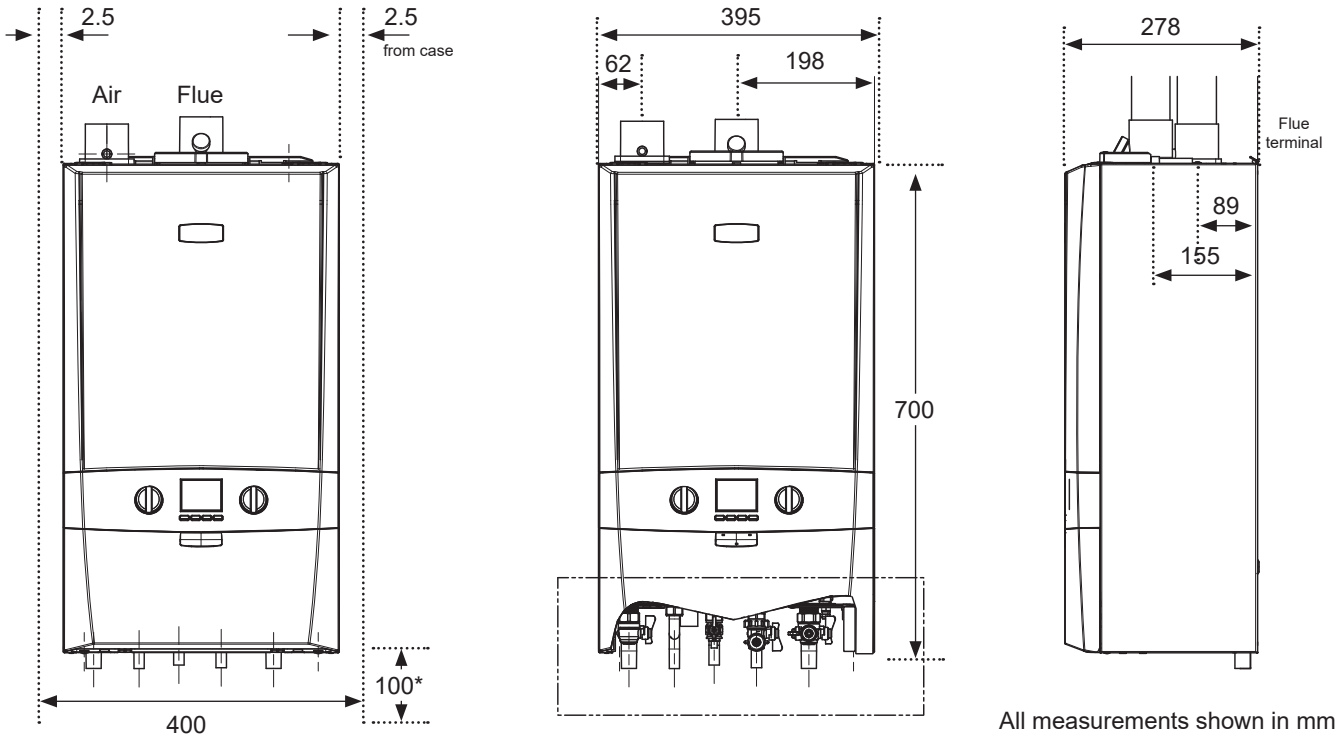
1.14 BOILER DIMENSIONS, SERVICES & CLEARANCES

Refer to Section 2.18

The boiler connections are made on the boiler connection tails.

The following minimum clearances must be maintained for operation and servicing.

Additional space will be required for installation, depending upon site conditions.



Front Clearance

The minimum front clearance when built in to a cupboard is 5 mm from the cupboard door but 450 mm overall clearance is still required, with the cupboard door open, to allow for servicing.

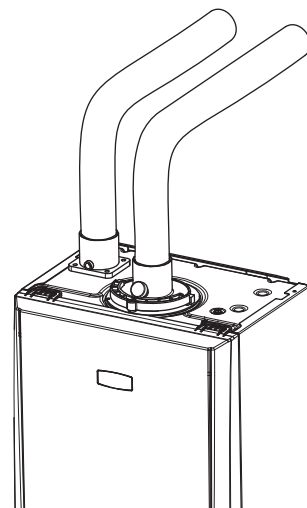
* Bottom Clearance

Bottom clearance after installation can be reduced to 15 mm.

This must be obtained with an easily removable panel to provide the 100 mm clearance required for servicing.

For easy access to the pressure gauge a bottom clearance of 15 mm is required for a partial open door.

IMPORTANT: Please ensure there is sufficient clearance either side and below the boiler, particularly from door hinges and the base of a cupboard, to allow the door to be opened to allow the pressure gauge to be checked.



1.15 SYSTEM REQUIREMENTS - CENTRAL HEATING

- a. The method of filling, refilling, topping up or flushing sealed primary hot water circuits from the mains via a temporary hose connection is only allowed if acceptable to the local water authority.
- b. Antifreeze fluid, corrosion and scale inhibitor fluids suitable for use with boilers having aluminium heat exchangers may be used in the central heating system.

General

1. The installation must comply with national and local regulations.
2. Design the system for flow temperatures up to 80°C.
3. The system components must be suitable for an operating pressure of 3 bar and a maximum temperature of 110°C.

The following components are incorporated within the appliance:

- a. Circulating pump.
- b. PRV, with a non-adjustable preset lift pressure of 3 bar.
- c. Pressure gauge, covering a range of 0 to 4 bar.
- d. An 8 litre expansion vessel, with an initial charge pressure of 0.75 bar.

4. Makeup Water

One of the following provisions must be made for replacing system water loss:

- a. Manually filled vessel
The vessel must:
 - Have a visible water level
 - Be mounted at least 150 mm above the system's highest point
 - Connect through a non-return valve to the system
 - Be at least 150 mm below the makeup vessel on the return side of the radiators
- b. System prepressurisation.
The efficiency of the expansion vessel will be reduced in a pressurised system; a larger vessel or smaller system volume may be necessary. If the vessel's capacity is not sufficient, an additional vessel must be installed on the return to the boiler.

If the system is not pressurised, the cold water capacity must not exceed 143 litres.

Guidance on vessel sizing is given in Table 4.

Water Flow Rate and Pressure Loss

Max CH Output	kW	24.2
Water Flow Rate	l/min	17.3
	(gal/min)	(3.8)
Temperature Differential	°C	20
Head available for System	m.w.g.	3.4
	(ft.w.g.)	(11.1)

Table 4 Vessel Sizing

PRV setting	bar	3.0	
Vessel charge pressure	bar	0.5 to 0.75	
System pre-charge pressure	bar	None	1.0
System volume (litres)		Expansion vessel volume (litres)	
25		1.6	1.8
50		3.1	3.7
75		4.7	5.5
100		6.3	7.4
125		7.8	9.2
150		9.4	11.0
175		10.9	12.9
190		11.9	14.0
200		12.5	14.7
250		15.6	18.4
300		18.8	22.1
For other system volumes multiply by the factor across		0.063	0.074

5. Filling

The system may be filled by the following method:

Where the mains pressure is excessive, a pressure reducing valve must be used to facilitate filling.

- a. Thoroughly flush out the whole system with cold water.
- b. Fill and vent the system until the pressure gauge registers 1 bar and examine for leaks.

Refer to Section 2.18

- c. Check the operation of the PRV by raising the water pressure until the valve lifts. This should occur within 0.3 bar of the preset lift pressure.
- d. Check no escape of water occurs except at the discharge point
- e. Release water from the system until the minimum system design pressure is reached; 1.0 bar if the system is to be pre-pressurised.

1.16 SYSTEM REQUIREMENTS - DHW

Domestic Hot Water

1. The DHW service must be in accordance with BS.5546 & BS6700.
2. Refer to Table 1 for minimum and maximum working pressures. In areas of low mains water pressures the domestic hot water regulator may be removed from the DHW flow turbine cartridge. The boiler will require the flow rate to be set to obtain a temperature rise of 35°C at the tap furthest from the boiler.

Refer to Section
3.20

3. The boilers are suitable for connection to most types of washing machine and dishwasher appliances.
4. If the shower/mixer valve does not incorporate non-return valves the following must be followed:
 - a. The cold inlet to the boiler is fitted with an approved anti-vacuum or syphon non-return valve.

- b. Hot and cold water supplies to the shower are of equal pressure.

5. Hard Water Areas

Where the water hardness exceeds 200 mg/litre (200 ppm), it is recommended that a proprietary scale reducing device is fitted into the boiler cold supply within the requirements of the local water company.

IMPORTANT Provision must be made to accommodate the expansion of DHW contained within the appliance. If the DHW inlet contains a back flow prevention device or non-return valve, e.g. a water meter, then a mini expansion vessel should be fitted between the device and the boiler in the cold inlet pipe.

Cold water, rising main and pipework in exposed areas need to be suitably lagged to prevent freezing.

Note DHW Expansion Vessel kit available from Keston.

1.17 SYSTEM BALANCING

Refer to Section
1.11

The boiler does not normally need a bypass but at least some radiators on the heating circuit, of load of at least 10% of the minimum boiler output, must be provided with twin lockshield valves so that this minimum heating load is always available.

Note. Systems incorporating zone valves which could completely cut off the flow through the system must also include a bypass.

Balancing

1. Set the programmer to ON.

2. Close the manual or thermostatic valves on all radiators, leaving the twin lockshield valves (on the radiators referred to above) in the OPEN position.
3. Turn up the room thermostat and adjust the lockshield valve to give an uninterrupted flow through the radiator. These valves should now be left as set.
4. Open all manual or thermostatic radiator valves and adjust the lockshield valves on the remaining radiators, to give around 20°C temperature drop at each radiator.
5. Adjust the room thermostat and programmer to NORMAL settings.

1.18 WATER TREATMENT

CAUTION: Do not fill the heating system with softened water. Softened water could enhance corrosion.

Central Heating

The Keston Combi² range of boilers have an ALUMINIUM alloy heat exchanger.

IMPORTANT The application of any other treatment to this product may render the guarantee of Keston invalid. The Keston System Filter will aid against the build up of iron oxide debris, however the below water treatment is also recommended by Keston.

Keston recommend Water Treatment in accordance with the Benchmark Guidance Notes on Water Treatment in Central Heating Systems.

If water treatment is used, **Keston Heating** recommend only the use of SCALEMASTER SM-1 PRO, FERNOX MBI, ADEY MC1, SENTINEL X100 or CALMAG CM100 inhibitors and associated water treatment products, which must be used in accordance with the manufacturers' instructions.

1. It is most important that the correct concentration of the water treatment products is maintained in accordance with the manufacturers' instructions.
2. If the boiler is installed in an existing system any unsuitable additives **MUST** be removed by thorough cleansing. BS7593:2019 details the steps necessary to clean a domestic heating system.
3. In hard water areas, treatment to prevent lime scale may be necessary - however the use of artificially softened water is **NOT** permitted.
4. Under no circumstances should the boiler be fired before the system has been thoroughly flushed.

For further information contact:

Fernox www.fernox.com Tel: +44 (0) 3301 007750

Sentinel Performance Solutions
www.sentinelprotects.com Tel: +44 (0) 1928 704330

Scalemaster Water Treatment Products
www.scalemaster.co.uk Tel: +44 (0) 1785 811636

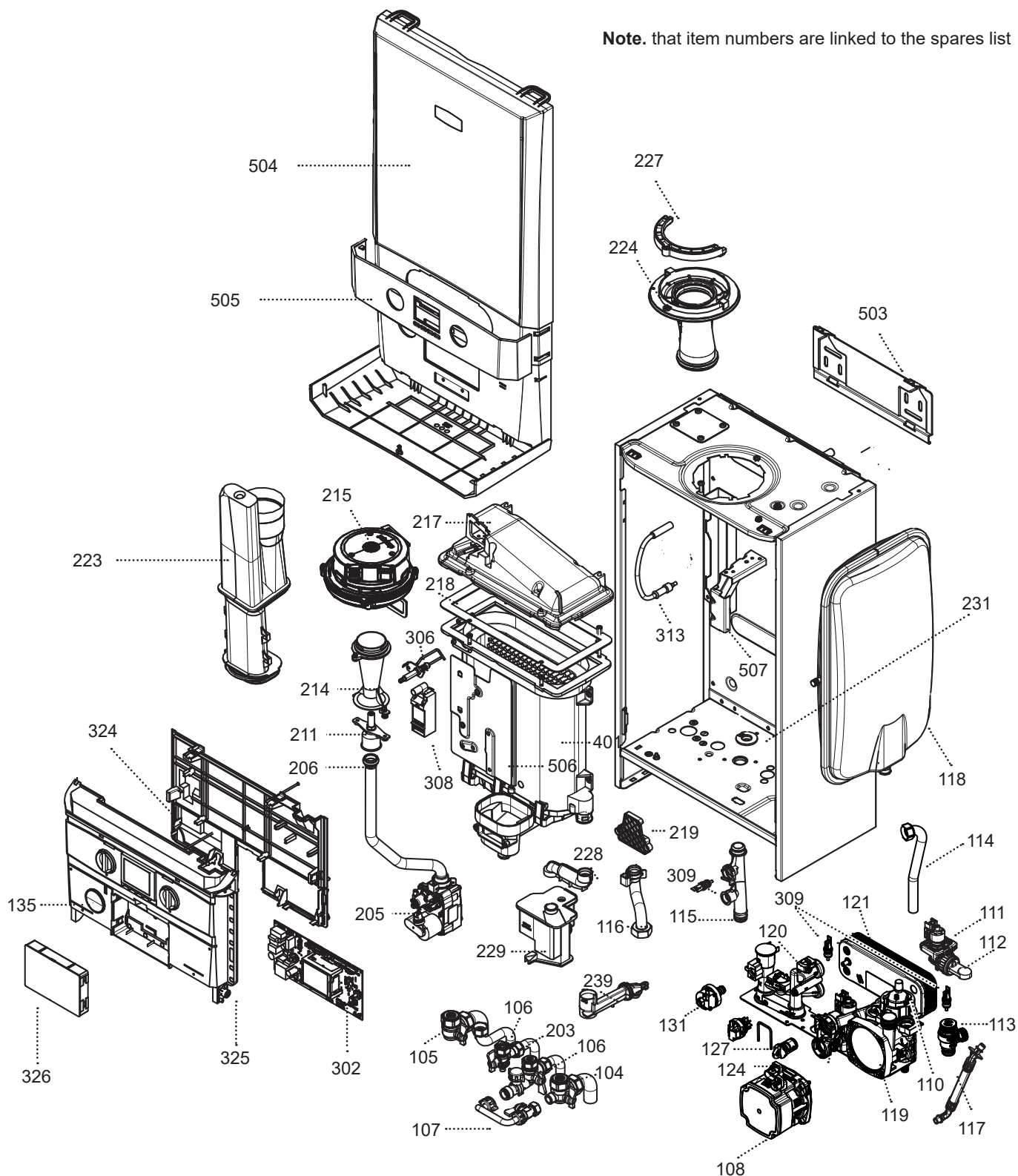
Calmag Ltd.
www.calmag Ltd.com Tel: +44 (0) 1535 210320

Adey www.adey.com Tel: +44 (0) 1242 546700

2.1 BOILER ASSEMBLY - EXPLODED VIEW

- | | | | |
|----------------------------------|---------------------------|----------------------------------|--------------------------------|
| 104 CH Return Valve | 118 Expansion Vessel | 215 Fan | 308 Ignitor Unit |
| 105 CH Flow Valve | 119 Return Group Manifold | 217 Burner | 309 Thermistor |
| 106 DHW Inlet & Outlet | 120 Flow Group Manifold | 218 Gasket - Burner | 313 Ignition Lead |
| 107 Filling Loop Pipe | 121 Plate Heat Exchanger | 219 Sump Clean Out Cover | 324 Control Box Lid |
| 108 Pump Head | 124 Flow Regulator | 223 Flue Manifold | 325 Control Box Front |
| 110 Auto Air Vent | 127 Flow Sensor/Turbine | 224 Flue Manifold Top | 326 Blank Insert |
| 111 Diverter Valve Motor | 131 Water Pressure Switch | 227 Clamp Retaining Flue Turret | 401 Heat Engine |
| 112 Diverter Valve Body & Paddle | 135 Pressure Gauge | 228 Hose Condensate Internal | 503 Wall Mounting Bracket |
| 113 Pressure Relief Valve | 203 Gas Cock | 229 Condensate Trap | 504 Front Panel |
| 114 Pipe - PRV Outlet | 205 Gas Valve | 231 Condensate Outlet Connection | 505 Fascia |
| 115 Pipe - Flow | 206 Pipe - Gas Injector | 239 Condensate Drain Tube | 506 Bracket - Spark Generator |
| 116 Pipe - Return | 211 Injector Assy | 302 PCB | 507 Bracket - Expansion Vessel |
| 117 Pipe - Expansion Vessel | 214 Venturi | 306 Ignition/Detection Electrode | |

Note. that item numbers are linked to the spares list



2.2 UNPACKING

The boiler is supplied fully assembled in Pack

Pack A Contents

1. Boiler
2. Hardware Pack Box
3. Wall Mounting Plate
4. These Installation/Users Instructions
5. Boiler Warranty
6. Wall Mounting Template
7. PRV Pipe

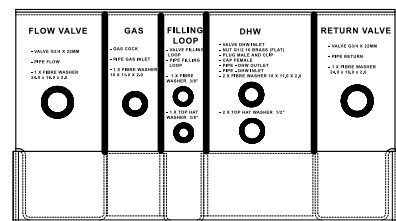
Hardware Pack

Box Contents

7. 1x HP Box Dividers - 289 x 111 x 57.5 mm
8. 1x Plug Male and Clip
9. 1x Pipe DHW Outlet
10. 1x Pipe Filling Loop
11. 1x Valve DHW Inlet
12. 2x Pipe CH Flow/Return
13. 1x Valve Filling Loop
14. 1x Valve CH G³/₄ x 22 mm Filling Loop
15. 1x Cap Female
16. 1x Valve CH G³/₄ x 22 mm
17. 1x Pipe DHW Inlet
18. 1x Nut G¹/₂ x 16 Brass (Flat)
19. 1x Gas Cock
20. 1x Coupling

Accessory Bag Contents

21. 9x Washers*
22. 2x Wall Plugs
23. 2x Screws
24. 1x Flue Clamp Screw

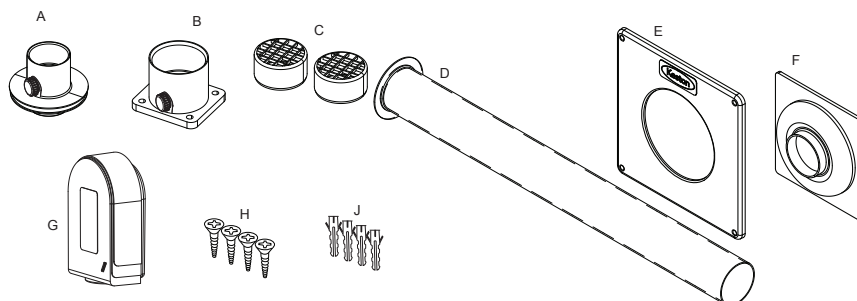
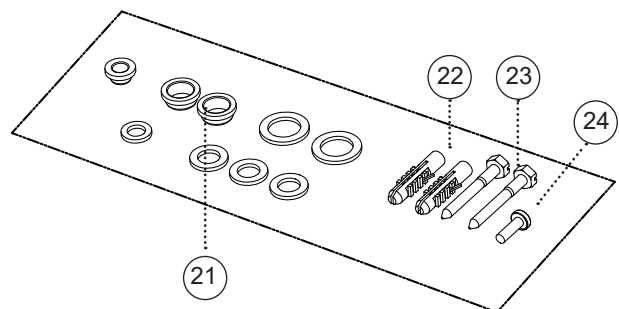
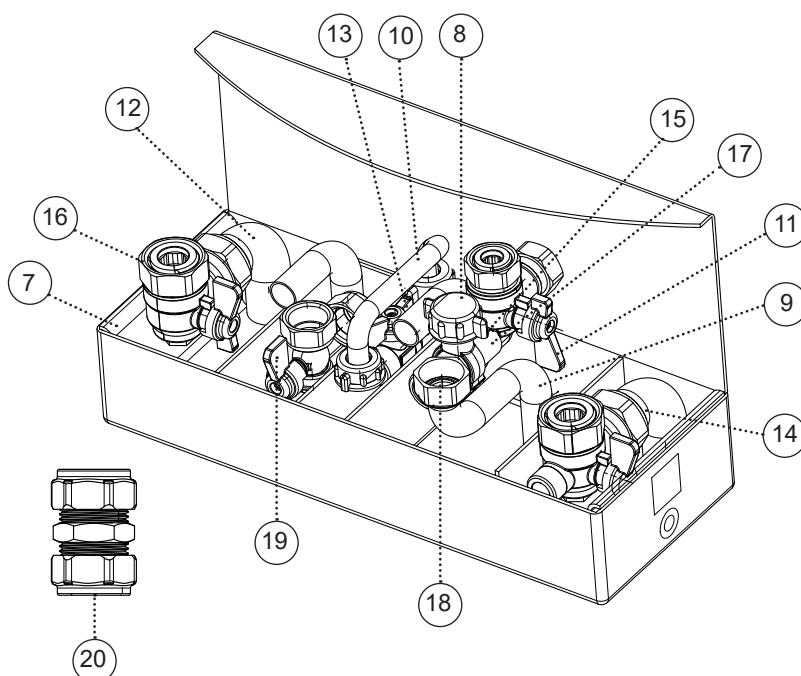
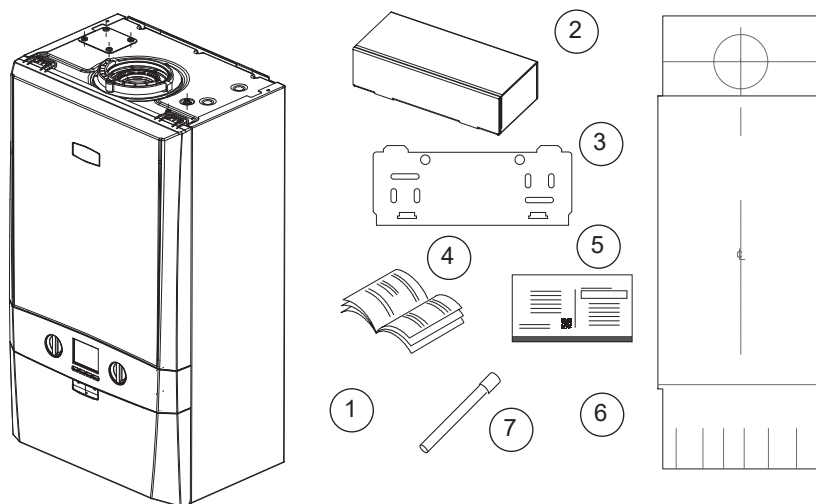


*Refer to Valve Washer Template inside box lid.

FLUE PACK CONTENTS

- A Flue Adaptor
- B Air Spigot
- C Terminals - 2 off
- D Flue Sleeve
- E Wall Plate
- F Wall Seal
- G Outside Sensor
- H Screws - 4 off
- J Wall Plugs - 4 off

Unpack and check the contents



2.3 WALL MOUNTING TEMPLATE

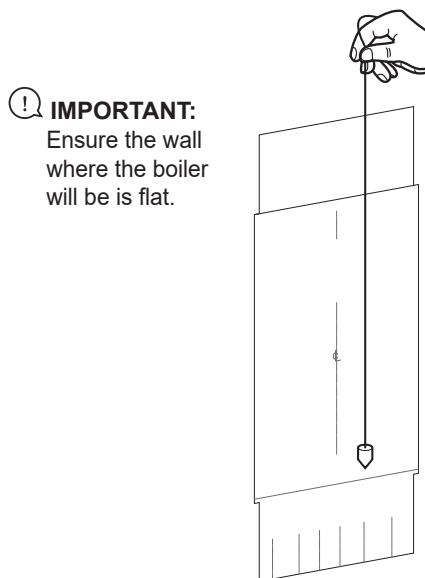
The wall mounting template is located on the internal protective packaging.

Note. The template shows the positions of the fixing holes and the position of the air and flue connections. Care **MUST** be taken to ensure the correct holes are drilled.

1. Tape template into the selected position. Ensure squareness by hanging a plumbline as shown.
2. Mark onto the wall the following:
 - a The wall mounting plate screw positions (choose one from each group).
 - b The position of the air and flue when exiting straight out of the wall where the boiler is mounted.

Note. Mark the centre of the hole as well as the circumference.

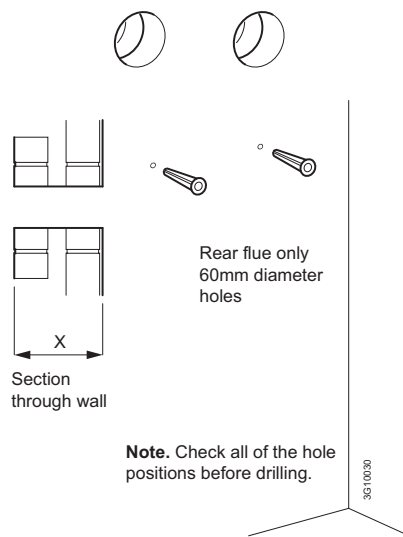
3. Remove the template from the wall.



2.4 PREPARING THE WALL

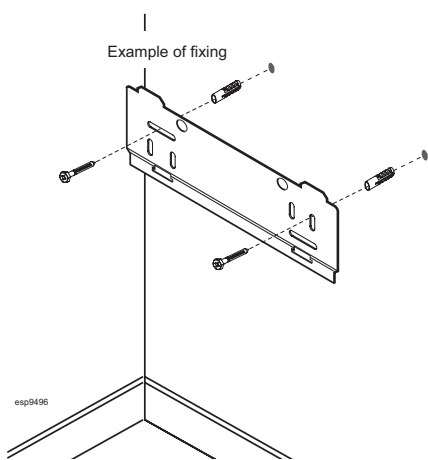
WARNING Ensure that, during the cutting operation, masonry falling outside of the building does not cause damage or personal injury.

1. Cut the flue and air holes (preferably with 60mm core bore tool) ensuring the holes are square to the wall.
2. Drill 2 holes with a 7.5mm / 8mm masonry drill and insert the plastic plugs, provided, for the wall mounting plate.
3. Locate 2 No.14 x 50mm screws in the wall mounting plate (one at each side, in any of the 3 holes provided at each side) and screw home.



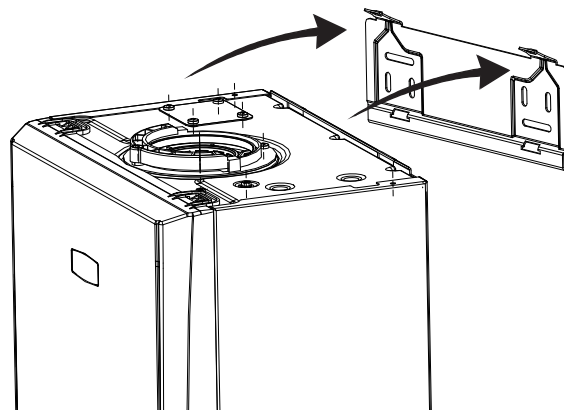
2.5 FITTING THE WALL MOUNTING PLATE

1. Screw the wall mounting plate to the wall using 2 wall plugs fitted previously with the 2 screws provided.
2. Choose one of the 2 sets of slots in left and right bank. Ensure that at least one of the screws is fitted into a top slot and the mounting bracket is level.



2.6 MOUNTING THE BOILER

1. Lift the boiler onto the wall mounting plate and locate it over the 2 tabs.



2.7 FLUE SYSTEM

! IMPORTANT

When installing a replacement boiler a new flue system is recommended. However re-using the existing boiler flue installation is acceptable if the installer checks and confirms:

- The flue pipe is the approved Marley/Polypipe/Terrain/Wavin 50mm muPVC solvent weld flue system
- The flue installation is upgraded to the most recent flue standards taking particular care to comply with flues in voids
- A risk assessment is conducted to confirm the effectiveness of the flue
- The existing flue will last the lifetime of the new appliance

The following pipe and fittings are approved.

Polypipe System 2000 muPVC Solvent Weld System (50mm)	
Polypipe Code	
MU 301	4m length muPVC wastepipe 5/225
MU 313	50mm x 45 deg muPVC obtuse bend
MU 314	50mm x 92.5 deg muPVC swept bend
MU 310	50mm muPVC straight coupling
MU 316	50mm x 92.5 deg muPVC swept tee

Marley muPVC Solvent Weld System (50mm)	
Marley Code	
KP 304	50mm x 4m double spigot pipe
KP32	50mm x 45 deg bend
KSC3	50mm straight coupling
KB3	50mm x 88.5 deg bend
KT3	50mm swept tee

DESIGN

Individual air supply and flue outlet pipes are used as standard.

The material approved for this application which **MUST** be used are:

- Marley muPVC Solvent Weld System (50mm)
- Polypipe System 2000 muPVC solvent weld (50mm)
- Polypipe Terrain 200 muPVC Solvent Weld System (50mm)
- Wavin OSMA PVC-C Solvent Weld System (50mm)

to BS5255 and/or BSEN1566-11 and BSEN1329, are the only systems approved for this application.

Polypipe Terrain Solvent Weld System (50mm)	
Polypipe Code	
200.2.40	4m length muPVC wastepipe
201.2.135	50mm x 135 deg muPVC bend
200.2.91	50mm x 91 1/4 deg muPVC swept bend
210.2	50mm muPVC straight coupling
204.2.135	50mm muPVC swept tee

Wavin OSMA PVC-C Solvent Weld System (50mm)	
Wavin Code	
2M073	3M length waste pipe 50mm
2M163	50mm x 45 deg bend
2M161	50mm x 87.5 deg bend
2M104	50mm double socket
2M190	50mm x 8.75 tee

Consideration **MUST** be given to expansion and contraction of the flue. Refer to Assembly Practice (Section 2.13) in this installation and Servicing Instructions for further guidance.

2.8 FLUE SYSTEM - CONTINUED

Termination of the flue and air

The flue and air pipes may terminate independently through any external walls within the same dwelling except on opposing walls, within the maximum lengths shown in graph below. (Alternatively a vertical flue pipe termination is acceptable.)

The air pipe must have an elbow and 150 mm length of pipe directed downwards with a termination grill fitted (unless adequately sheltered i.e. on a balcony).

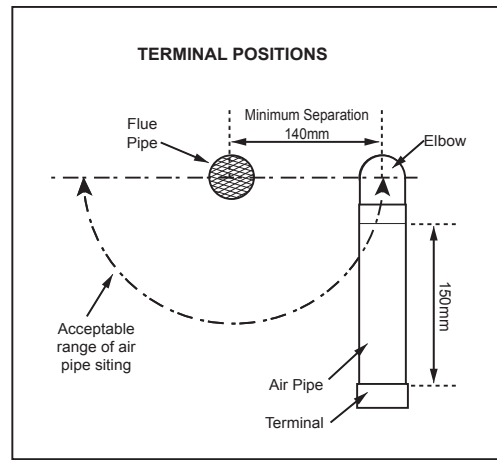
The air pipe can be situated at the side or beneath the flue pipe to a minimum dimension of 140 mm (see diagram right). It must not be sited above the flue pipe.

The flue and air pipes must extend by at least 40mm from the wall surface.

Condensing boilers emit a visible plume of water vapour from the flue terminal, this is normal. It is the responsibility of the installer to judiciously select a terminal location that does not cause a nuisance.

If either the flue or air terminal is below a height of 2 m from ground level a terminal guard must be fitted.

Notes. Installations in England above 18 meters requires a High Rise Flue Kit. This adheres to the new building regulations. (ADB_Vol1_Dwellings_2019_edition_inc_2020_amendments).



Installations in Scotland above 11 meters requires the High Rise Flue Kit. This adheres to the new building standards technical handbook 2020: Domestic Buildings (April 2021 Addendum).

Installations using the approved stainless steel 45° elbow on the air intake must achieve a minimum separation of 300 mm horizontally or below the flue pipe. Please refer to instructions provided with the kit.

Any vertical termination **MUST** have the terminals fitted and the air intake comply with the dimensions above.

Maximum lengths

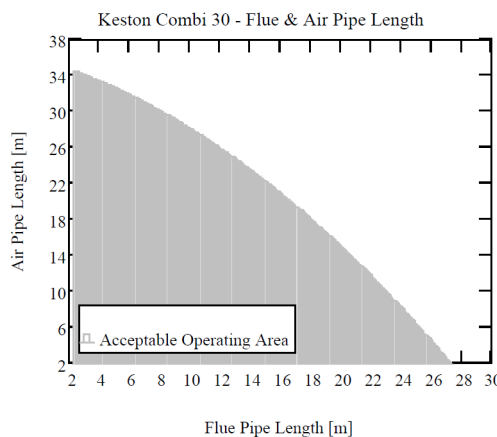
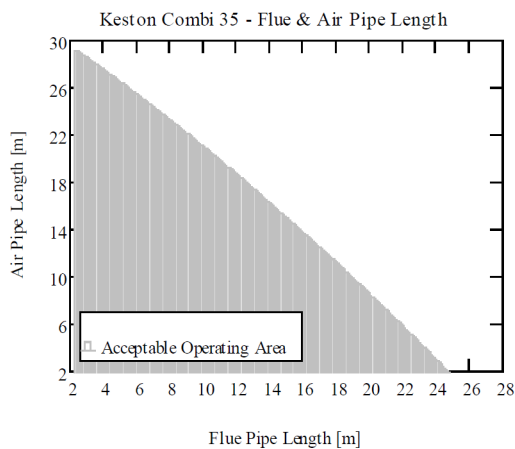
Due to the resistance presented by extended flue length a slight reduction in maximum boiler output will occur where combined flue and air lengths in excess of 18.0 m and 16.0 m (50 mm muPVC) are used. In such cases the boiler output will be reduced by 0.6% and 0.8% per additional metre.

The maximum lengths of both air inlet pipe and flue outlet pipe, when no bends are used, are as detailed in graphs below.

However, each bend used has an equivalent length that must be deducted from the maximum straight length stated in graphs below. Knuckle bends must not be fitted.

A 92.5° swept elbow is equivalent to 1.0 m straight length. A 45° bend is equivalent to 0.5 m straight length.

It is possible to have variable flue and air lengths as described within the shaded area of graphs below.

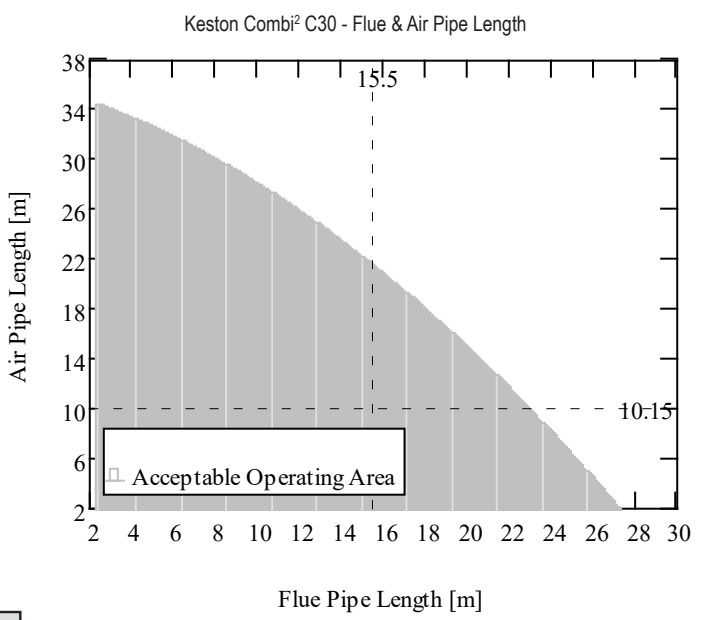
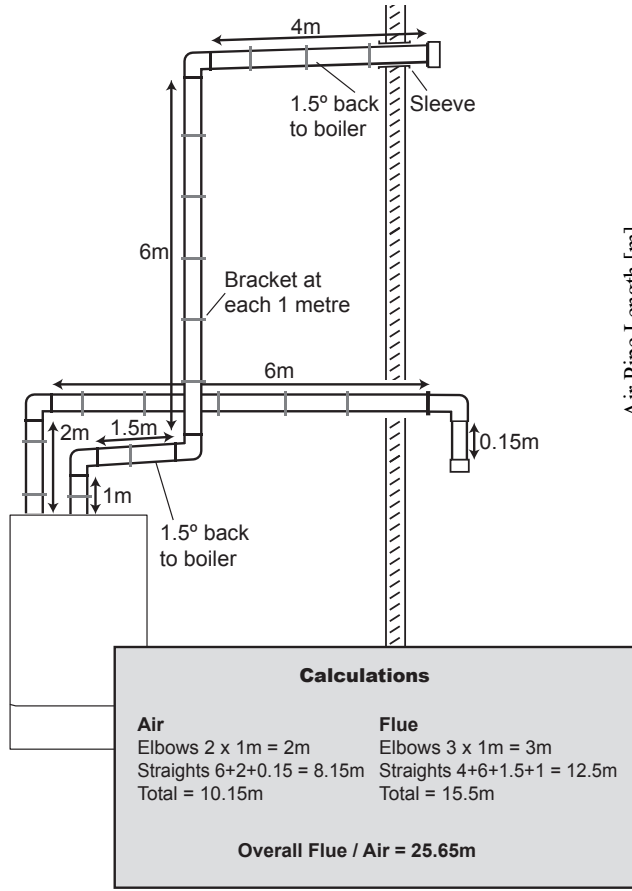


Slope

'Horizontal' flue outlet pipework **MUST** slope at least 1.5 degrees (26 mm per metre run) downwards towards the boiler. Pipework can be vertical. Only swept elbows can be used.

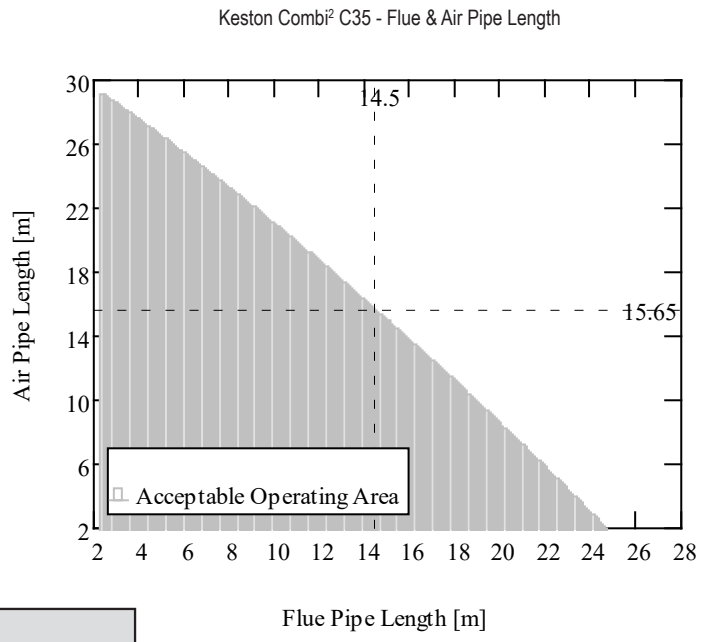
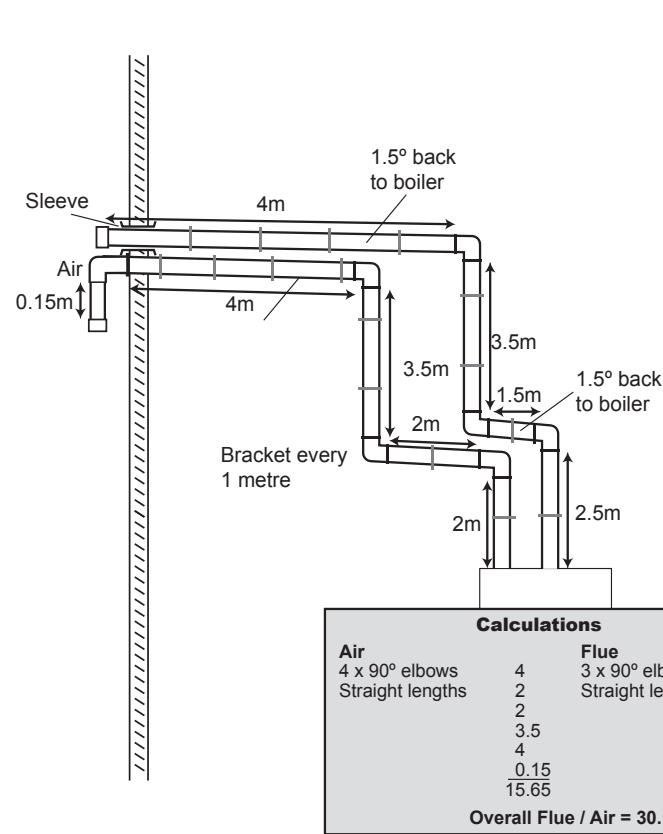
Air inlet pipework can be truly horizontal or vertical, or sloping in a downward direction towards the boiler but in each case rain, etc., **must** be prevented from entering the pipe. There must be no troughs in any of the pipework, whether it be air inlet or flue outlet.

2.9 FLUE INSTALLATION EXAMPLE KESTON COMBI² C30



Calculations	
Air	Flue
Elbows 2 x 1m = 2m	Elbows 3 x 1m = 3m
Straights 6+2+0.15 = 8.15m	Straights 4+6+1.5+1 = 12.5m
Total = 10.15m	Total = 15.5m
Overall Flue / Air = 25.65m	

2.10 FLUE INSTALLATION EXAMPLE KESTON COMBI² C35



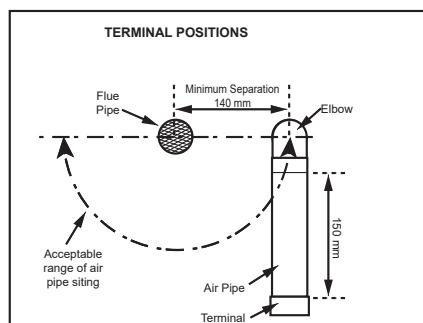
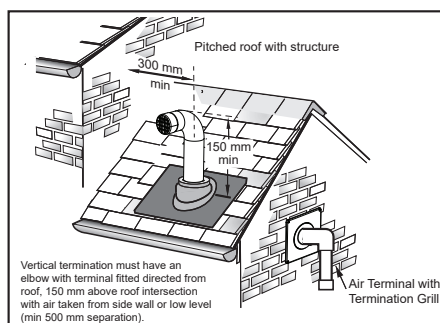
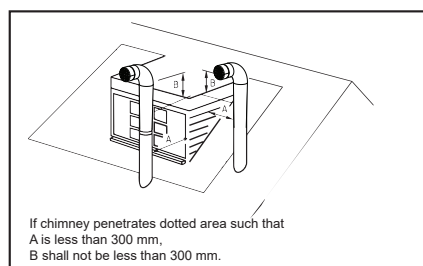
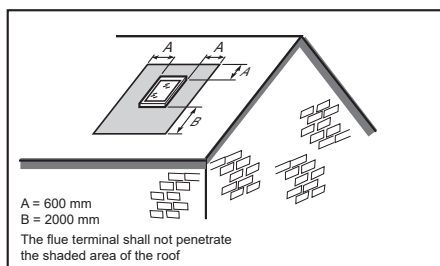
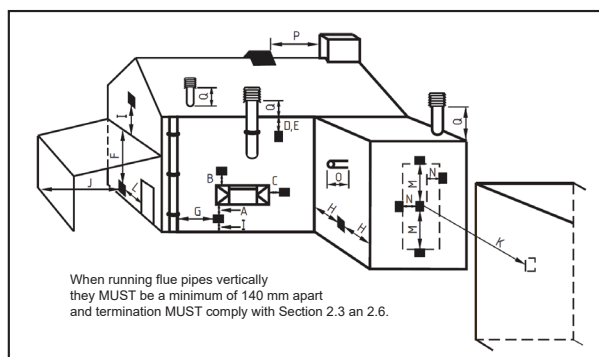
Calculations			
Air	Flue		
4 x 90° elbows	4	3 x 90° elbows	3
Straight lengths	2	Straight lengths	2.5
	2		1.5
	3.5		3.5
	4		4
	0.15		14.5
	15.65		
Overall Flue / Air = 30.15m			

FLUE OUTLET

Section 2 - Installation

2.11 FLUE TERMINATION POSITION

Twin Flue Positions		When Flue & Air Terminals are less than 500 mm apart		When Flue & Air Terminals are more than 500 mm apart	
		Flue min. spacing	Air min. spacing	Flue min. spacing	Air min. spacing
A	Below an opening (1)	300 mm	50 mm	300 mm	50 mm
B	Above an opening (1)	300 mm	50 mm	300 mm	50 mm
C	Horizontally to an opening	300 mm	50 mm	300 mm	50 mm
D	Below gutters, soil pipes or drain pipes	75 mm	75 mm	75 mm	75 mm
E	Below eaves	200 mm	50 mm	200 mm	50 mm
F	Below balcony or car port roof	200 mm	50 mm	200 mm	50 mm
G	From a vertical drain pipe or soil pipe	150 mm	50 mm	150 mm	50 mm
H	From an internal or external corner or to a boundary alongside the terminal (2)	200 mm	50 mm	200 mm	50 mm
I	Above ground, roof or balcony level	300 mm	100 mm	300 mm	100 mm
J	From a surface or boundary facing the terminal	600 mm	100 mm	600 mm	100 mm
K	From a terminal facing a terminal	1200 mm	1200 mm	1200 mm	1200 mm
L	From an opening in the car port into the building	1200 mm	100 mm	1200 mm	100 mm
M	Vertically from a terminal on the same wall	1500 mm	1500 mm	1500 mm	1500 mm
N	Horizontally from a terminal on the same wall	300 mm	300 mm	300 mm	300 mm
O	From the wall on which the terminal is mounted	40 mm	40 mm	40 mm	40 mm
P	From a vertical structure on the roof	NA	NA	300 mm	NA
Q	Above intersection with roof	NA	NA	150 mm	NA
(1)	In addition, for temperature and structural reasons, the terminal should not be nearer than 150 mm (fanned draught) to an opening in the building fabric formed for the purpose of accommodating a built-in element such as a window frame				
(2)	The reference to external corners does not apply to building protrusions not exceeding 450 mm, such as disused chimneys on external walls for: fanned draught appliances				



2.12 FLUE TERMINATION POSITION - CONTINUED

General Installations

All parts of the system must be constructed in accordance with BS 5440 Part 1, except where specifically mentioned in these instructions.

All pipe work must be adequately supported.

All joints other than approved push-on or plastic compression connectors must be made and sealed with solvent cement suitable for muPVC pipes.

Consideration must be given to Corgi/Gas Safe bulletin TB200/TB008 regarding flues in voids.

The boiler casing must always be correctly fitted to the boiler when leaving the appliance operational.

External wall faces and any internal faces of cavity walls must be good.

Air Supply

The Keston Combi² is a room-sealed appliance and therefore does not require purpose provided ventilation to the boiler room for combustion air.

Compartment installation

Due to the low casing temperatures generated by the boiler, no compartment ventilation is required. However, the cupboard or compartment must not be used for storage.

Installations in England above 18 meters requires a High Rise Flue Kit. This adheres to the new building regulations. (ADB_Vol1_Dwellings_2019_edition_inc_2020_amendments).

Installations in Scotland above 11 meters requires the High Rise Flue Kit. This adheres to the new building standards technical handbook 2020: Domestic Buildings (April 2021 Addendum).

2.13 ASSEMBLY PRACTICE

Remove all plastic debris and burrs when installing air intake piping. Plastic fillings caused by cutting muPVC pipe must not be allowed to be drawn into the combustion air blower. Prevent dust entering the air intake when cutting on building sites. Blower failure which is determined to be caused by plastic filings or other debris will not be covered by guarantee.

INSTALLING FLUE AND AIR PIPES

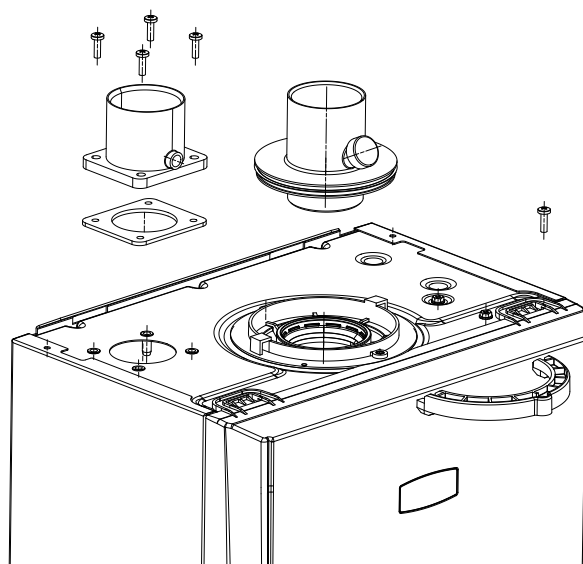
! IMPORTANT - When installing a replacement boiler, a new flue system is recommended.

However re-using the existing boiler flue installation is acceptable if the installer adheres to Section 2.3 Flue System - Important, and also checks and confirms the following:

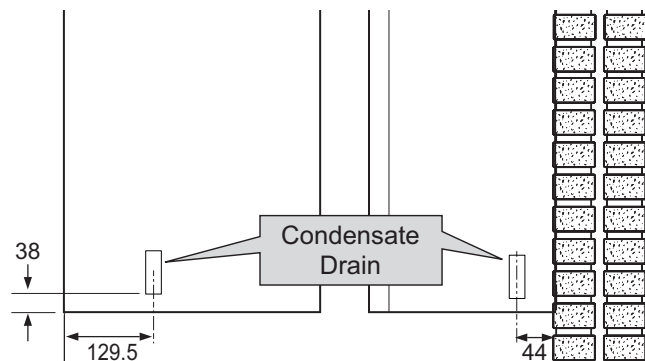
- Remove the flue adaptor and air spigot from the flue pack supplied with the boiler.
 - Remove boiler front panel - Section 3.2.
 - Remove air intake blanking plate by unscrewing 4 x M5 screws and put to one side, leaving sponge gasket in place.
 - Fix air spigot to boiler using the 4 M5 screws, see diag. below. Ensure sponge gasket is in place and not damaged.
 - Ensure the condense trap/siphon is filled with water.
 - Insert the flue adaptor into the flue manifold on the top of the boiler and secure using the clamp provided in the packaging box, see diagram below.
 - Measure, cut and check the air and flue pipes to pass to the exit from the wall(s) or ceiling.
 - Always thoroughly deburr all pipes and most important, remove shavings from within the pipe.
 - Assemble, using solvent weld cement, the pipework from the boiler connections to the exit from the first wall/ceiling, (remount the boiler if removed). When pushing pipe through walls, ensure grit and dust is not allowed to enter the pipe.
- Ensure pipes are fully engaged into sockets and solvent welded with no leaks.**
- Using the same methods drill any further holes (always covering existing pipework), cut and assemble the pipework.
 - From outside, complete the two terminations - See Section 2.3 Flue System and make good all holes. (Wall sealing collars are available to make good hole areas on the wall face (part number C.08.0.00.07.0).
 - Support any pipes whose route could be displaced either of its own accord or by accident. Any horizontal run over

- 1 m or vertical runs of any length must always be supported. Brackets should be placed at intervals of approximately 1 m. Brackets should be loose enough on the pipe to allow thermal expansion and contraction movement.
- Flue pipework through walls **MUST** be sleeved to allow thermal expansion and contraction movement.
- Boilers installations in England above 18 meters require a high rise flue kit which converts the flue from MUPVC to stainless steel using an adapter to conform with new building regulations. For Scotland the kit will be required for installations above 11 meters.
- Check all connections for security and re-seal any joints using solvent cement where soundness may be in doubt.

Note. It is equally important to seal the air inlet with solvent cement as the flue outlet pipe joints.



2.16 CONDENSATE DRAIN



All measurements shown in mm

This appliance is fitted with a siphonic 75 mm condensate trap system that requires filling before operating the appliance for the 1st time or after maintenance.

All condensate pipework should conform to the following:

- Where a new or replacement boiler is being installed, access to an internal 'gravity discharge' termination should be one of the main factors considered in determining boiler location.
- Plastic with push fit or solvent connections.
- Internal plastic pipe work a minimum of 19 mm ID (typically 22 mm OD).
- External plastic pipe must be a minimum of 30 mm ID (typically 32 mm OD) before it passes through the sleeved wall.
- All horizontal pipe runs must fall a minimum of 52 mm per metre away from the Boiler.
- External & unheated pipework should be kept to a minimum and insulated with Class "O" waterproof pipe insulation through freezing or otherwise.
- All installations must be carried out in accordance to the relevant connection methods as shown in the "Condensate installation diagrams" & BS6798.
- Pipework must be installed so that it does not allow spillage into the dwelling in the event of a blockage (through freezing).
- All internal burrs should be removed from the pipe work and any fittings.

In order to minimise the risk of freezing, terminate the condensate drainage pipe using one of the following methods:

Internal Drain Connections

Route the condensate pipe by gravity to an internal, foul water discharge point.

Refer to Fig.
1 & 2

Condensate Pump

When it is not practical to terminate the condensate pipe to an internal foul water discharge point using gravity, use a suitable pump recommended by the boiler or pump manufacturer.

Refer to Fig.
3

External Drain Connections

The use of an externally run condensate drainage pipe should only be considered after exhausting all internal termination options as described previously. An external system must terminate at a suitable foul water discharge point or purpose designed soakaway. If an external system is chosen then the following measures must be adopted:

The external pipe run should be kept to a minimum using the most direct and "most vertical" route possible to the discharge point, with no horizontal sections in which condensate might collect.

- For connections to an external soil/vent stack. Insulation measures as described should be used.

Refer to Fig.
4

- When a rainwater downpipe is used, an air break must be installed between the condensate drainage pipe and the downpipe to avoid reverse flow of rainwater into the boiler should the downpipe become flooded or frozen.

Refer to Fig.
5

- Where the condensate drain pipe terminates in a purpose designed soakaway (see BS 6798) any above ground condensate drain pipe sections should be run and insulated as described above.

Refer to Fig.
6

- Where the condensate drain pipe terminates over an open foul drain or gully, the pipe should terminate below the grating level, but above water level, to minimise "wind chill" at the open end. The use of a drain cover (as used to prevent blockage by leaves) may offer further prevention from wind chill.

Unheated Internal Areas

Internal condensate drain pipes run in unheated areas, e.g. lofts basements and garages, should be treated as external pipe.

Ensure the customer is aware of the effects created by a frozen condensate and is shown where this information can be found in the user manual.

Note. Please check current HHIC condensate discharge guidance available via the Gas Safe Registered Technical Bulletins List.

2.17 CONDENSATE DRAIN - CONT.

Figure 1 - Connection of Condensate Drainage Pipe to Internal Soil & Vent Stack

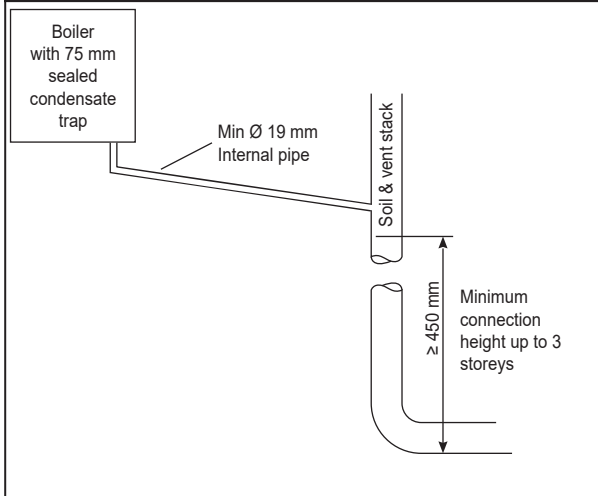


Figure 2 - Connection of a Condensate Drainage Pipe Downstream of a Sink, Basin, Bath or Shower Water Trap to Internal Soil Vent Stack

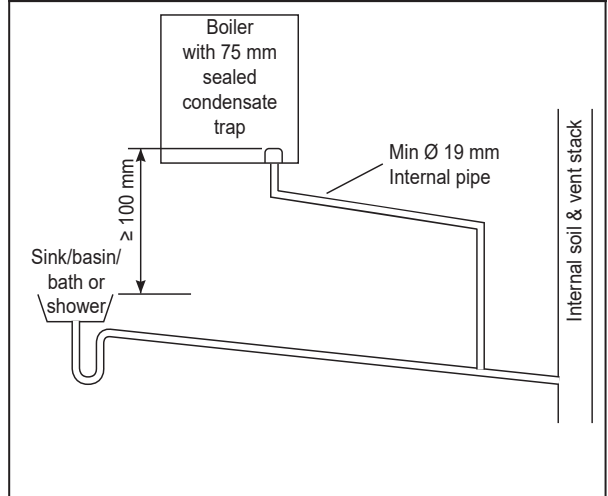


Figure 3 - Connection of a Condensate Pump Typical Method (see manufacturer's detailed instructions)

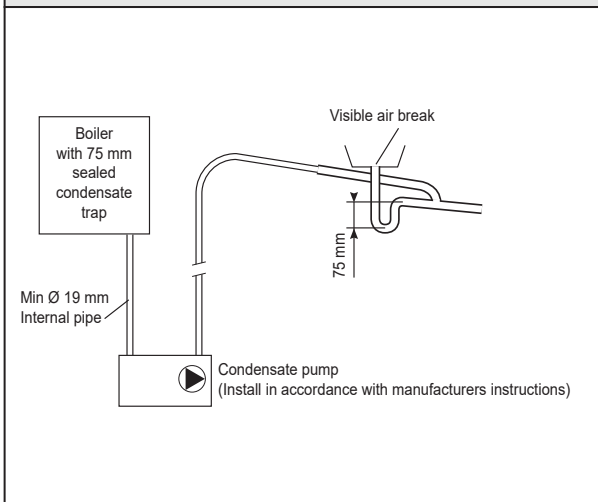


Figure 4 - Connection of Condensate Drainage Pipe to External Soil & Vent Stack

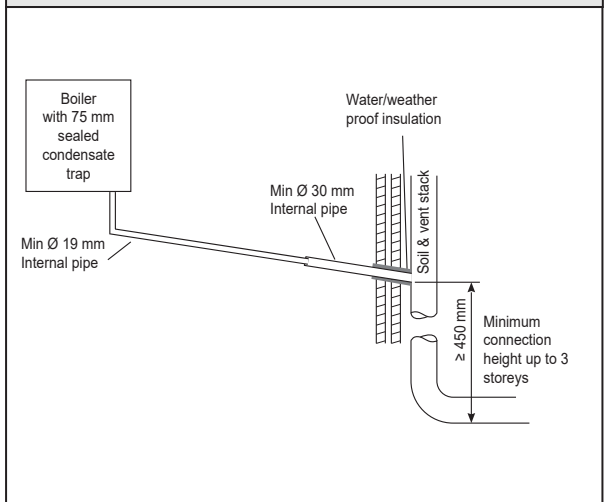


Figure 5 - Connection of a Condensate Drainage Pipe to an External Rainwater Downpipe (only combined foul/rainwater drain)

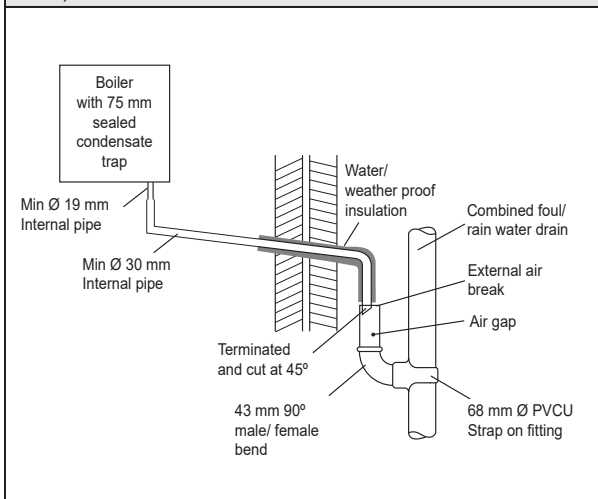
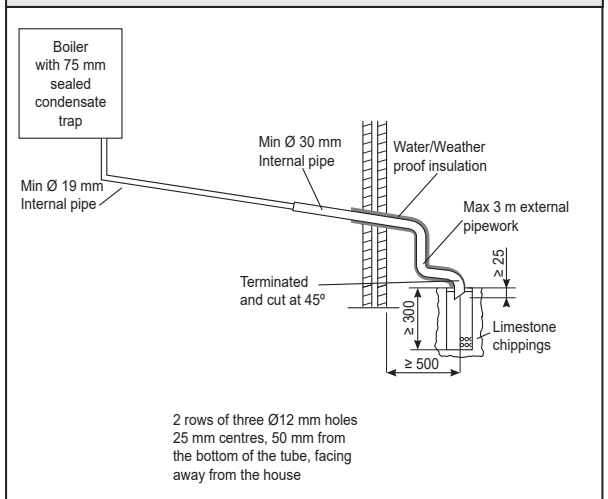


Figure 6 - Connection of a Condensate Drainage Pipe to an External Purpose Made Soakaway.



2.18 CONNECTIONS & FILLING

CAUTION: Heating the isolation valves may damage the fibre seals

Fit each union with the fibre seals provided.

WATER CONNECTIONS CH

1. Connect the CH flow service valve (black handle) and copper tail provided in the hardware pack to the threaded boss connection provided at the lower rear of the boiler.
2. Connect the CH return valve (black handle) and copper tail.

IMPORTANT Install the Keston system filter according to system filter installation and maintenance guide. Failure to install the system filter correctly will affect boiler warranty.

WATER CONNECTIONS DHW

1. Fit the DHW inlet service valve (blue handle) and copper tail to the threaded boss connection ensuring the seal provided is correctly located.
2. Fit the DHW outlet pipe tail to DHW outlet connection, ensuring the seal provided is correctly located.
3. Fit the filling loop provided between the DHW inlet valve and the CH return valve.

The domestic hot water flow rate is automatically regulated to a maximum:

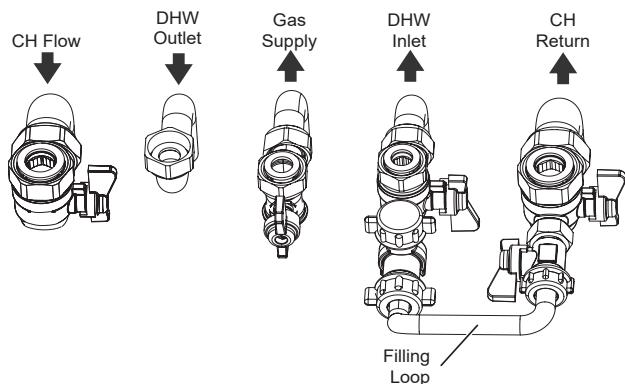
kW	L/m	g/m
30	12.4	2.8
35	14.5	3.2

GAS CONNECTION

CAUTION: The gas service cock is sealed with a non-metallic blue fibre washer, which must not be overheated when making capillary connections.

For details of the position of the gas connection:

Refer to Section 1.14 Refer to Gas Supply 1.9

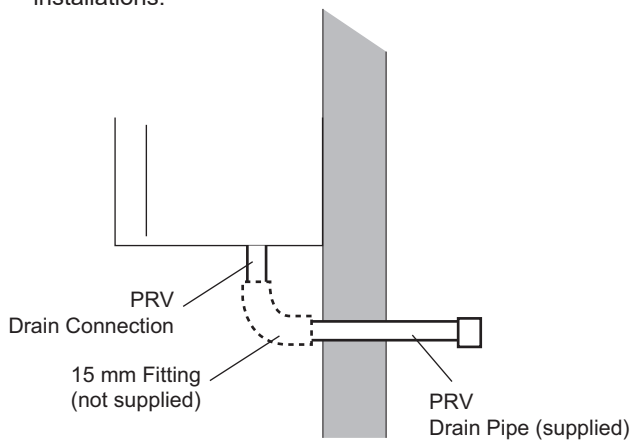


PRV DRAIN

The PRV connection, located at the bottom right-hand side of the boiler comprises an open ended 15 mm pipe. A 15 mm compression coupling is supplied to assist in removal of pipework if required.

WARNING: Make sure that the water or steam (from the boiler) is discharged safely. Hot water or steam is dangerous and can cause serious injury, and damage to electrical systems.

A purpose made PRV drain pipe is provided with the boiler to allow safe discharge through a wall to the outside of the building. This is particularly relevant to 'high rise' installations but can be used for all installations.



2.19 CONNECTIONS & FILLING CONT.

FILLING

WARNING: Protect electrical connections from water

1. Connect the filling loop, ensuring the washers are in place.
2. Loosen the auto air vent dust cap.

Refer to Section 3.23
3. Check the following isolation handles on water connections are in the horizontal filling position (blue handle on DHW inlet ^(A) and black handle on CH return ^(C)).
4. Position the CH flow isolation valve handle in the vertical position to enable filling.
5. Slowly turn the filling loop handle (green ^(B)) to the horizontal open position until the pressure gauge reads between 1 to 1.5 bar.
6. Turn the filling loop handle (green ^(B)) back to the closed (vertical) position.
7. Turn the CH Return handle (black ^(C)) and the DHW Inlet handle (blue ^(A)) to the open (vertical) position.
8. Disconnect the filling loop from the DHW Inlet valve and fit the grey cap to the open end.
9. Fit the Plug to the free end of the filling loop.

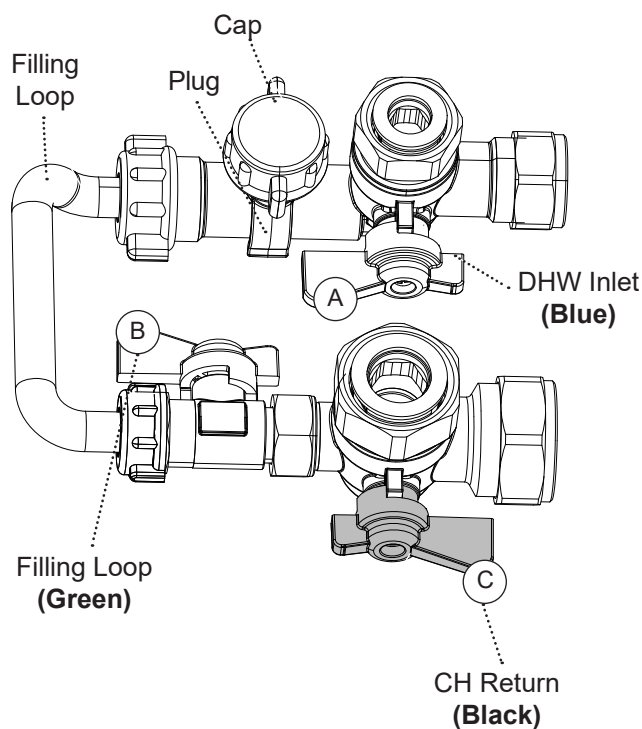
Top Up

1. Connect the filling loop, ensuring the washers are in place.
2. Loosen the auto air vent dust cap.

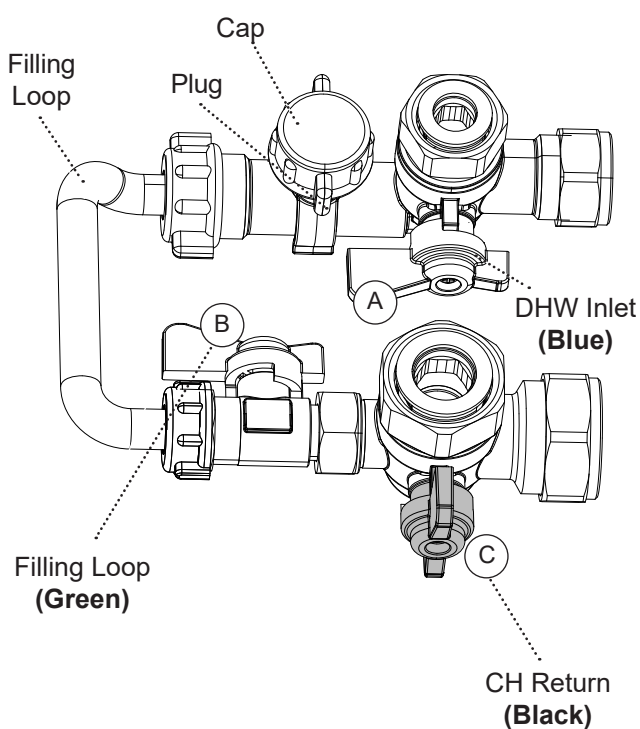
Refer to Section 3.23
3. Turn the DHW Inlet handle (blue ^(A)) to the horizontal position.
4. Slowly turn the filling loop handle (green ^(B)) to the horizontal open position until the pressure gauge reads between 1 to 1.5 bar.
5. Turn the handle (green ^(B)) on the filling loop back to the closed (vertical) position.
6. Turn the DHW Inlet handle (blue ^(A)) to the open (vertical) position.
7. Disconnect the filling loop from the DHW Inlet valve and fit the grey cap to the open end.
8. Fit the Plug to the free end of the filling loop.



Filling System Positions shown



Top Up Pressure Positions shown



2.20 ELECTRICAL CONNECTIONS

⚠ WARNING: This appliance must be earthed

A mains supply of 230 V ~ 50 Hz is required.

3 A fuse required. All external controls and wiring must be suitable for mains voltage.

Wiring external to the boiler must follow current I.E.E (BS7671) wiring regulations and local regulations.

For IE reference should be made to the current ETCI rules for electrical installations

Wiring should be 3 core PVC insulated cable, not less than 0.75 mm² (24 x 0.2 mm), and to BS EN 50525-1:2011 Table 16.

Connection must be made in a way that allows complete isolation of the electrical supply. The means of isolation must be accessible to the user after installation.

2.21 INSTALLER WIRING

⚠ WARNING: Ensure the supply cord is not damaged

The boiler must be connected to a permanent live power supply.

Accessing the installer wiring

1. Isolate the mains supply from the boiler.
2. Remove the front panel.

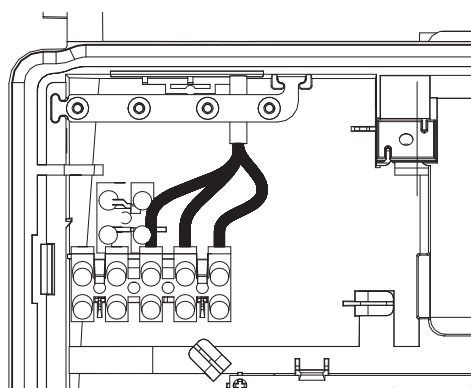
Refer to Section 3.4
3. Swing down the control box into the service position, unclip and swing back the installer wiring cover and latch into the retaining clips.

4. Carefully pierce the grommet, release the cable clamp via the screws and pull wiring through.
5. Connect external wiring to the appropriate connections securely and then refit the cable clamp.

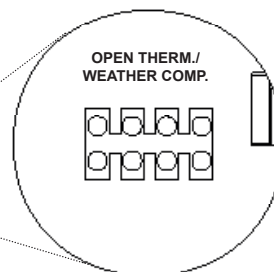
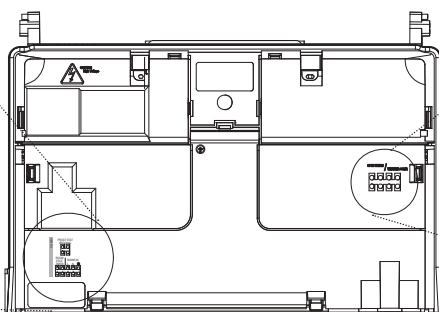
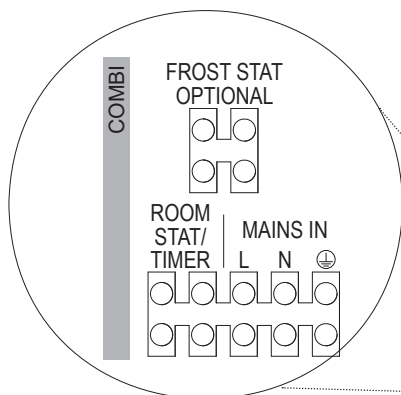
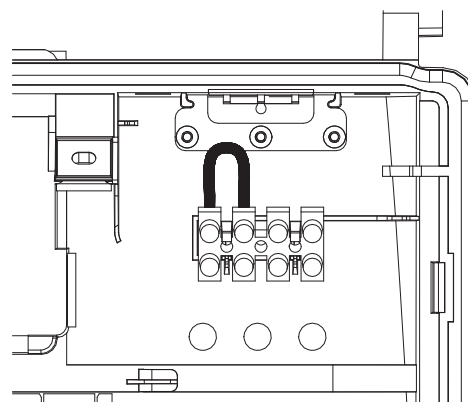
Once any wiring is completed, to secure the boiler, reverse the order above.

The link wire on the 230 V installer room stat/timer connection gives a demand in conjunction with the timer option plug inside the timer option cover. This is located on the front of the control box.

Installer Connections (LHS)



Installer Connections (RHS)



2.22 EXTERNAL WIRING

External Controls – 230 V 50 Hz

Wiring a 230 V Programmable Room Stat (Diagrams A & C) or 230 V Timer & Room Stat (Diagram B).

1. Remove the link wire from the room stat/timer connection.
2. Connect the external cable from the room stat/timer across this connection. If a general live connection is used for the room stat or timer then connect this to the fused spur, on the load side (see Diagram C).
3. If the room thermostat has compensation and requires a neutral connection, make this connection to the fused spur, on the load side.

Optional External Controls – Extra Low Voltage

Wiring OpenTherm Programmable Room Stat (Diagram D).

1. Remove the timer link plug inside the timer option cover, located on the front of the control box.
2. Unclip the timer link socket from the aperture on the rear of the control box, locate the plug on the same harness branch and connect these together.
3. Using the rubber bung located adjacent to these connections, insert it into the open aperture.
4. Connect the external cable from the OpenTherm Programmable Room Stat on the RHS of the boiler installer connections, labelled OpenTherm.

Frost Protection

If parts of the pipework run outside the house or if the boiler will be left off for more than a day or so then a frost thermostat should be wired into the system.

This is usually done at the programmer, in which case the programmer selector switches are set to OFF and all the other controls MUST be left in the running position.

The frost thermostat should be sited in a cold place, but where it can sense heat from the system.

Wiring a system frost thermostat, see diagrams E. Wire the frost thermostat across the two connections as shown.

If the boiler is installed in a garage it may be necessary to fit a pipe thermostat, preferably on the return pipework.

Diagram A: 230 V Programmable Room Stat

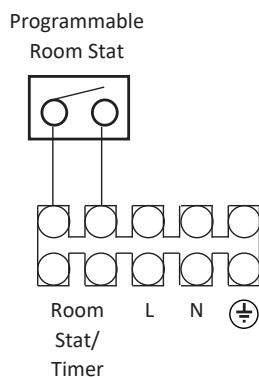


Diagram B: 230 V Timer & Room Stat

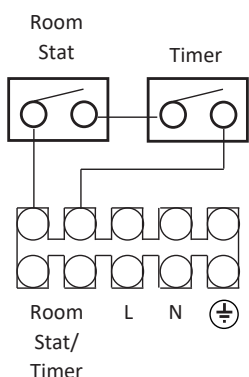


Diagram C: 230 V Programmable Room Stat Use of Live from Isolator

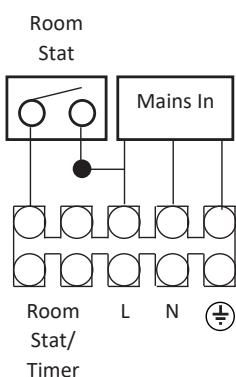


Diagram D: OpenTherm Programmable Room Stat

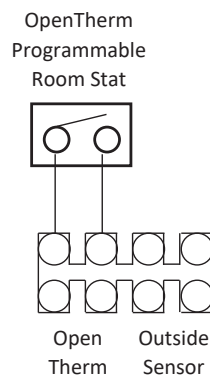
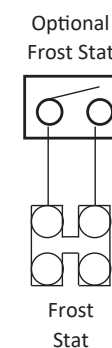
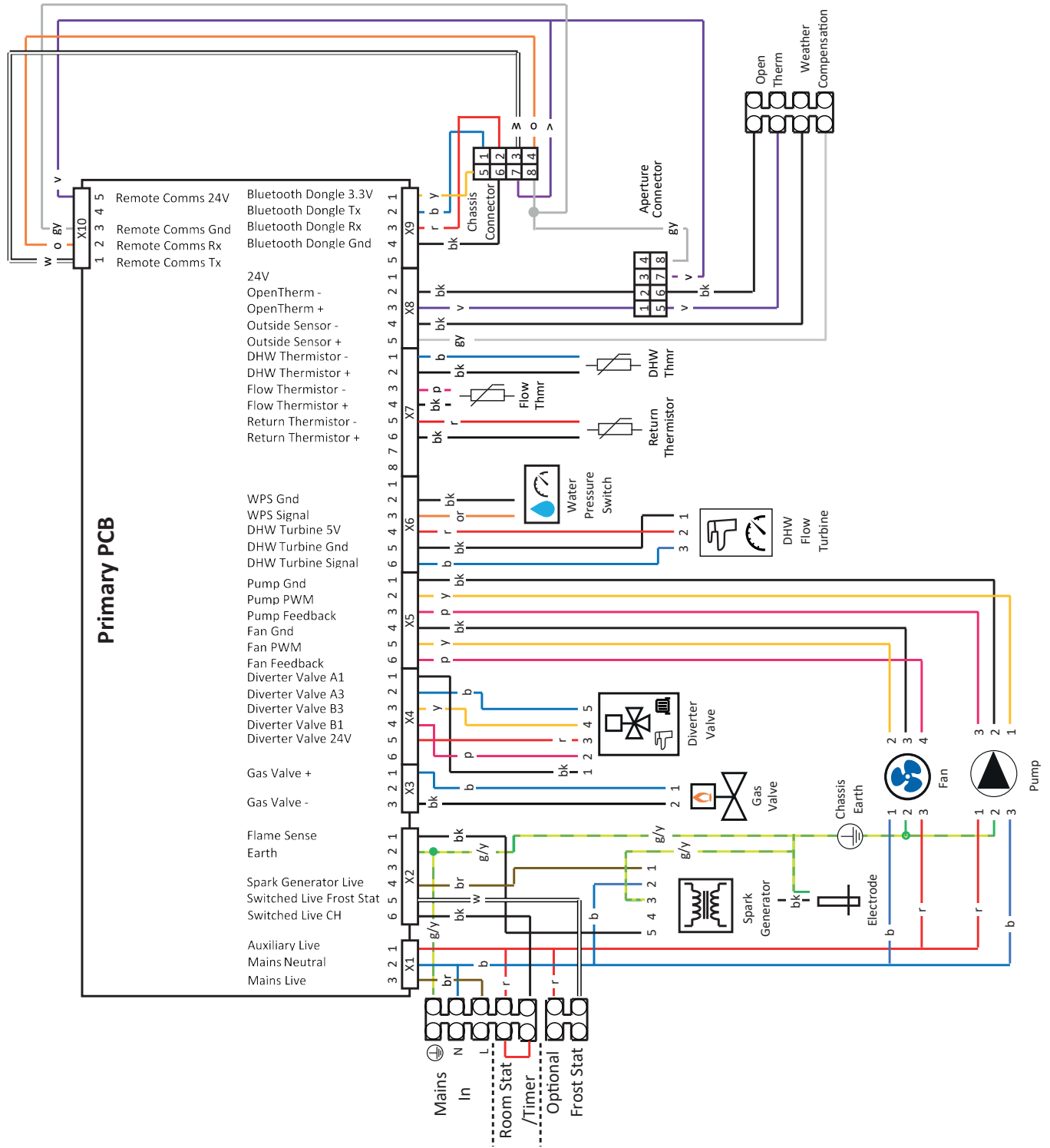


Diagram E: 230 V Optional Frost Stat



2.23 WIRING DIAGRAM

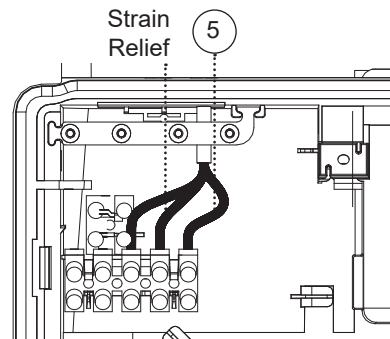


- Key**
- bk: Black
 - gy: Grey
 - r: Red
 - g: green
 - b: blue
 - br: brown
 - g/y: green/yellow
 - o: orange
 - p: pink
 - v: violet
 - y: yellow
 - w: white

2.24 REPLACING PRE-FITTED MAINS CABLE

If it is necessary to use an alternative mains cable to the one pre-fitted then use the following guide.

Replacement wiring should comply with notes and be carried out by a qualified person.



Refer to Section 2.21

1. Isolate the mains supply to the boiler.
2. Remove the front panel.
3. Swing the control box down into the service position, unclip and swing back the installer wiring cover to latch into the retaining clips.
4. Unscrew the L N & E connections & remove wires from connector.
5. Remove the mains cable by pulling back through the grommet.
6. Route the replacement through the grommet and re-fit.
7. Close the installer wiring cover ensuring that it is located correctly and that the cable is retained into the strain relief as shown.

8. Swing the control box back up into the operating position and re-fit the front panel ensuring a good seal is made.

The earth connection should be longer than the current carrying connections. If the cord anchorage slips, the current carrying wires become taut before the earth.

2.25 COMMISSIONING AND TESTING

A. Electrical Installation

WARNING: Electrical safety checks should be carried out by a qualified person.

Complete preliminary electrical system checks.

General

The combustion for this appliance has been checked, adjusted and preset at the factory for operation on the gas type defined on the appliance data plate.

Do not adjust the air / gas ratio valve.

Check the following:

1. The boiler has been installed in accordance with these instructions.
2. The integrity of the flue system and the flue seals, as described in the Flue Installation Section.

Proceed to put the boiler into operation as follows:

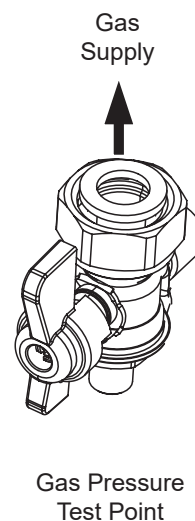
1. Check the operational gas inlet pressure.
2. Set up the boiler to operate at maximum rate by opening hot tap to maximum flow.
3. With the boiler operating in the maximum rate condition, check that the operational gas pressure at the inlet gas pressure test point complies with the requirements.
4. Ensure that this inlet pressure can be obtained with all other gas appliances in the property working.

Refer to Gas Supply page 10

B. Gas Installation

WARNING: Open windows, doors and extinguish flames before starting the next steps. Do not smoke.

1. The whole of the gas installation, including the meter, should be inspected and tested for tightness and purged in accordance with the recommendations of BS.6891.
2. Purge air from the gas installation by the approved methods only.



IMPORTANT: A condition of the manufacturer's warranty is that Benchmark commissioning process is completed. The flow chart is provided on page 67.

2.26 CH OPERATION

The ON and OFF time control of central heating should be controlled by a separate timer.

During programmed ON times the Central Heating Radiator Flow Temperature is controlled by the boiler relative to the Outside Temperature as shown in the diagram.

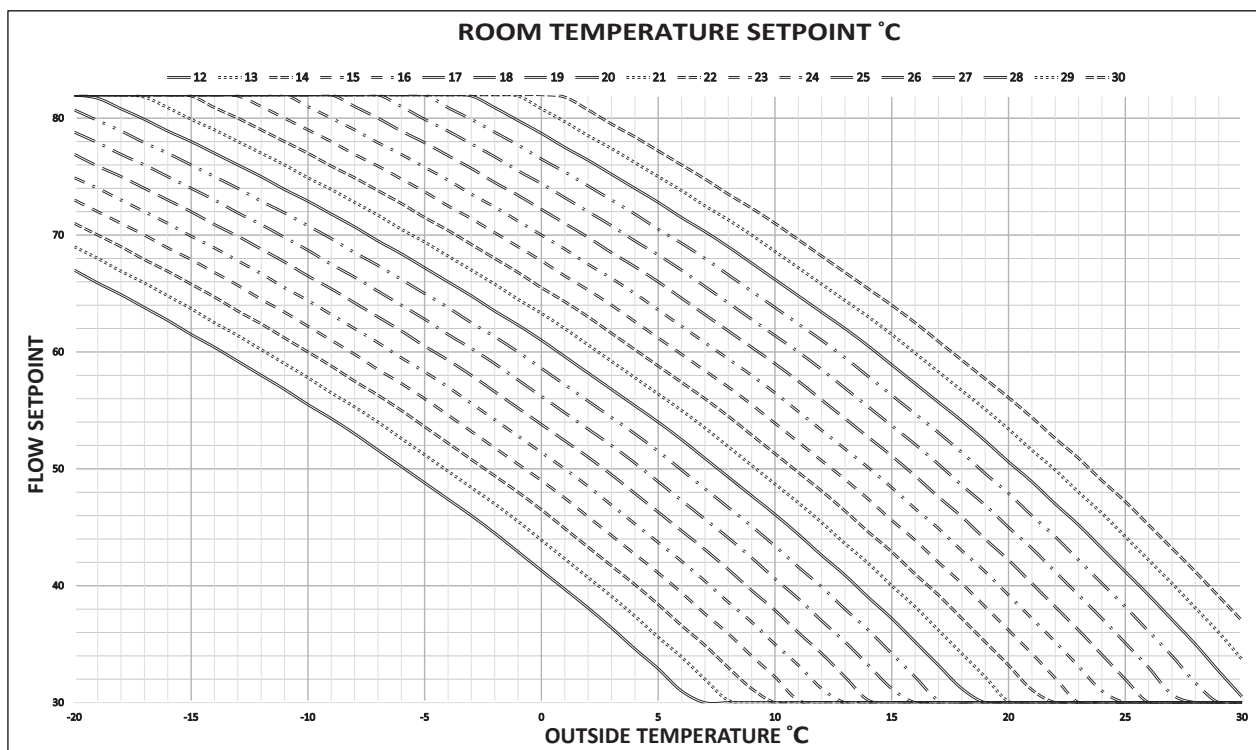
The Room temperature can be adjusted using the Central Heating Temperature Control Knob on the boiler as follows. Essentially rotating the knob clockwise increases the room temperature and rotating the knob anti-clockwise decreases the room temperature.

The Room Temperature Setpoint in the associated graph is not directly related to the Actual Room Temperature but is the Desirable Room Temperature during a programmed CH period.

This can be adjusted between 5 and 30 degrees by the CH Potentiometer Knob on the Boiler when the Outside Temperature Sensor is connected. The graph only shows temperatures between 12 and 30 degrees for clarity.

Examples:

1. If the CH Potentiometer Knob is set to display 22°C on the Boiler Display the Room Temperature Setpoint will be 22°C and the curve 22 will be followed, indicated by 11th curve in from the left hand side. So as the outside temperature varies, the Flow Setpoint to the CH circuit will increase and decrease proportionally.
2. If the CH Potentiometer Knob is rotated fully clockwise, the Boiler Display will read 30°C and the Room Temperature Setpoint will be 30°C hence the curve 30 will be followed.
3. If the CH Potentiometer Knob is rotated fully anticlockwise, the Boiler Display will read 5°C and the Room Temperature Setpoint will be 5°C. This is an unrealistic Room Temperature Setpoint for a CH period during an ON time, but it is calculated internally for managing Frost Protection for the system based upon Outside Temperature.



2.27 THE WEATHER COMPENSATION KIT - SUPPLIED AS STANDARD

This kit provides the facility to apply outside air temperature control to the boiler water flow temperature which provides energy savings. The outside sensor provided measures outside air temperature and sends a signal to the boiler, which adjusts the maximum boiler flow temperature in response. If outside air temperature is greater than the system design temperature, the boiler flow temperature is reduced providing running cost savings. The boiler will operate in the condensing mode more frequently increasing savings.

Once the sensor is fitted it is automatically detected.

The sensor operation may be configured by adjustment of the boiler operating parameters, if necessary.

Fitting the Kit

Note. A timer should be fitted to the system so that CH will be switched off when appropriate.

Fitting the sensor:

The air sensor should be located on an external wall of the building to be heated. Fix the sensor to a north/north-east facing wall to avoid direct radiation from the sun. The air sensor should be located to avoid any heating effect from the boiler flue.

To fix the air sensor to the wall, unscrew the sensor box plastic cover and screw/plug the sensor body to the wall.

Wire a twin core 0.5 mm² cable from the sensor to the boiler through an RH grommet located on the underside of the boiler. Cable length between sensor and boiler should be no greater than 20 m. Note that this connection is safety extra low voltage. It is not necessary for the person carrying out the wiring to be approved to Part P of the Building Regulations.

Avoid running this cable alongside mains voltage cables.

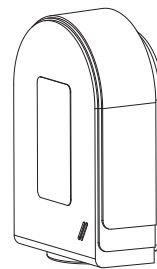
Wiring the Weather Compensation Kit to the Keston Combi².

1. Isolate the electricity supply to the boiler.
2. Remove the boiler front panel (Refer to boiler installation instructions).
3. Swing the control box down into the service position, unclip and swing back the installer wiring cover to latch into the retaining clips. Refer to Section 3.8.
4. Connect the sensor wiring into the RHS of the 4 way terminal block and secure with the strain relief.
5. Re-assemble in reverse order.

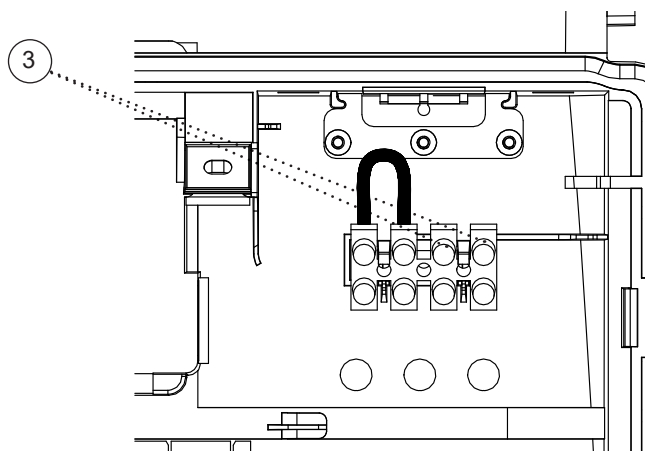
Note. If fitting this with the boiler, then please complete product Fiche system label, adding % efficiency. This is a Class II Control (2%).

Kit Contents

- A. Outside Air Sensor



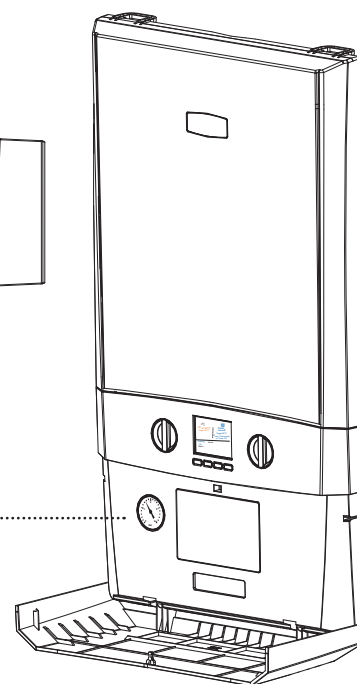
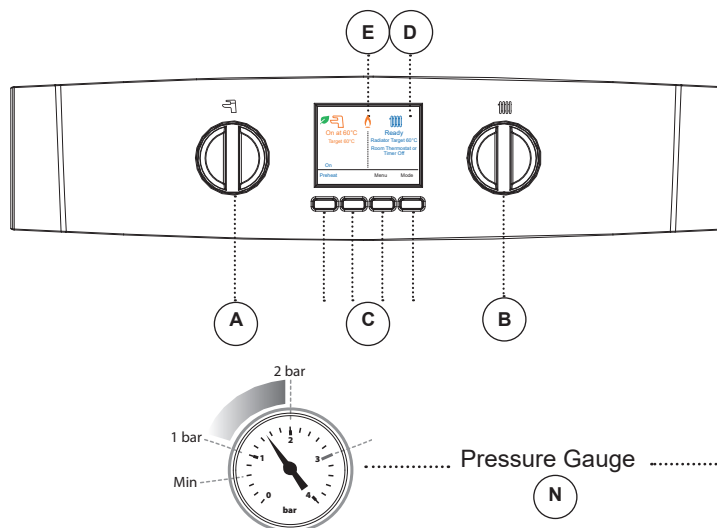
Installer Connections (RHS)



2.28 INITIAL LIGHTING

Legend

- A. Domestic Hot Water Temperature Knob
- B. Central Heating Temperature Knob
- C. Hot Keys
- D. Boiler Status Display
- E. Burner On indicator
- G. CH Flow Isolating Valve
- H. Gas Inlet Pressure Test Point
- I. Gas Service Cock
- J. DHW Inlet Valve
- K. CH Return Isolating Valve
- L. DHW Outlet
- M. Filling Loop Valve
- N. Pressure Gauge



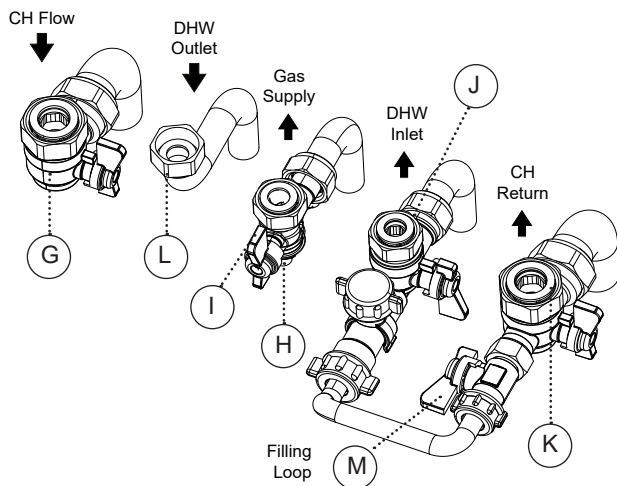
CAUTION: Do not operate the appliance before it has been fully vented of air. If it is necessary to operate the pump, do so with the gas service cock turned off.

The boiler incorporates a fan overrun cycle which must not be interrupted by isolation of electricity supply.

1. Check that the system has been filled and that the boiler is not airlocked.
2. Ensure the automatic air vent cap is OPEN.
3. Refit the boiler front panel.

Refer to Section 3.4

4. Check that the drain cock is closed and that the CH and DHW isolating valves (G,K & J) are OPEN.
5. Press the Mode button until a cross is shown going through both tap and radiator icons (boiler off).
6. Switch the electrical supply OFF.
7. Check that the gas service cock (I) is OPEN.
8. Slacken the screw in the inlet pressure test point (H) and connect a gas pressure gauge via a flexible tube.
9. Switch the electricity supply ON and check all external controls are calling for heat.



CENTRAL HEATING

10. Press the Mode Button (C) until there is no longer a cross through the Radiator icon. Turn the Central Heating Temperature Knob (B) clockwise until a target of 80°C is shown. The boiler control will now go through its ignition sequence until the burner is established.
11. If the boiler does not light then after 5 attempts the boiler will lock out and display "Ignition Lockout". Press the Restart Button. The boiler will repeat its ignition sequence. If Restart occurs 5 times within 15 minutes then "Too Many Restarts" will be shown.

When the burner is established the flame symbol (E) will be shown on the display and the current flow temperature will be shown in the large digits underneath the radiator symbol.

DOMESTIC HOT WATER

12. With the boiler firing, rotate the DHW Temp Knob (A) clockwise until a target of 65°C is shown and fully open a DHW tap. The boiler should continue to run and the current DHW temperature will be shown in the large digits underneath the tap symbol.
13. Ensure that with the boiler operating, the dynamic gas pressure is able to obtain maximum output.

Refer to Table 3

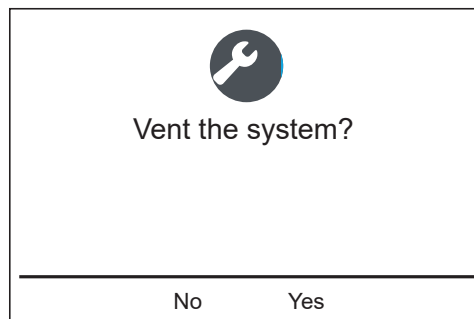
IMPORTANT The gas input to the burner is regulated by the gas valve according to the air flow produced by the fan. It is NOT user-adjustable. Any interference to sealed settings on the gas valve will adversely affect operation and render our warranty void.

Refer to Gas Supply page 10

14. Turn off the DHW tap.
15. Remove gas pressure gauge, tighten inlet pressure test point and check for gas tightness.

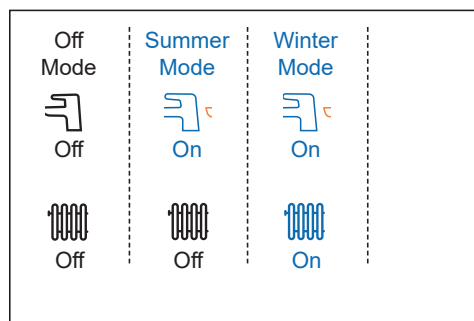
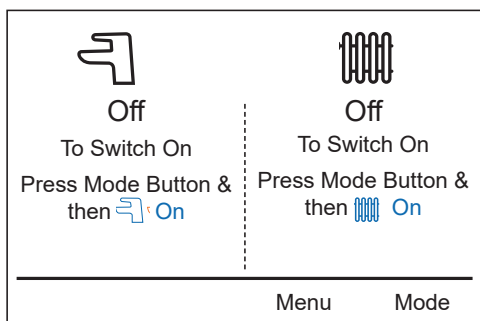
2.29 USER INTERFACE COMMISSIONING

When the boiler is powered up for the first time, you will have the options to set the contact details for boiler servicing and to vent the system.



2.30 CHANGING BOILER OPERATING MODE

The boiler mode is displayed by default, to change the mode, simply press mode and select the desired mode.

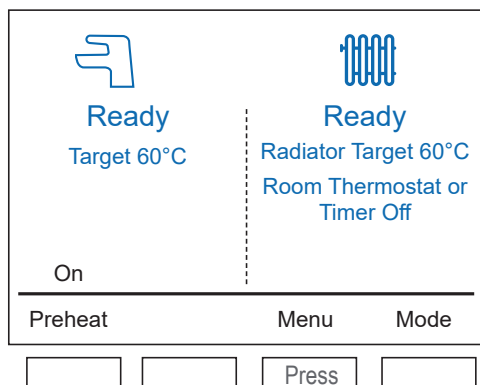


2.31 PREHEAT FUNCTION

Preheating will occur when the flow Temperature drops 15°C below the DHW target.

It will run until the flow temperature reaches 5°C below the DHW target or until 3 minutes has passed.

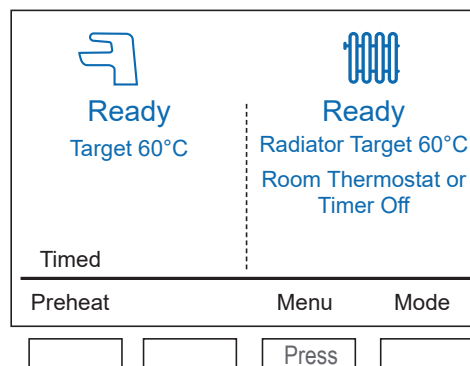
The preheat function will only run for a maximum of once in 30 minutes.



2.32 INTELLIGENT PREHEAT FUNCTION

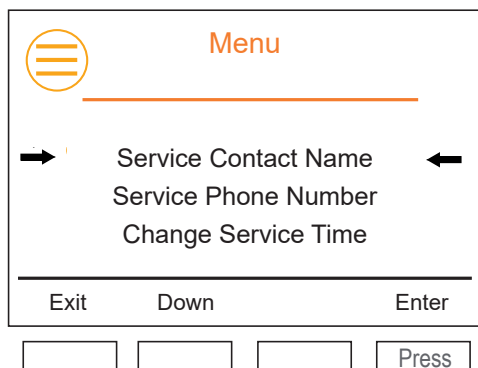
If Preheat is switched to Timed then preheating will only occur when required rather than all the time. The boiler learns the usage pattern for DHW over a week and then times the the DHW preheat to only operate during the usage periods from the previous week.

This improves the speed of response for DHW whilst also reducing the use of gas.



2.33 MENU OPERATION

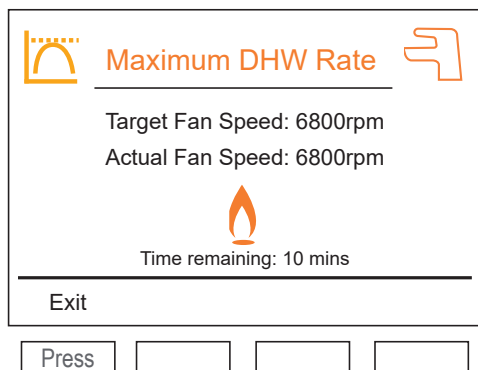
The menu option contains a list of attributes that show the operating state of the boiler. The installer should scroll down the menu and press enter to select the desired option.



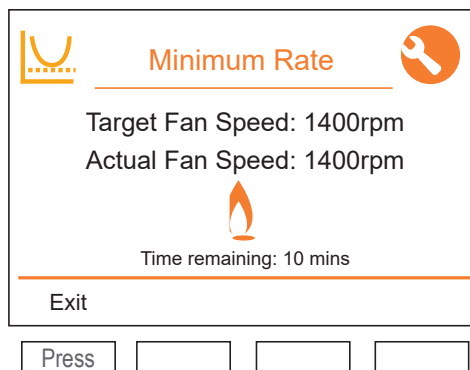
Note. For Diverter Valve Mid Position, press down until mid position highlighted.

2.34 SETTING MAXIMUM AND MINIMUM RATES

Maximum DHW and Minimum Rate can be accessed through the menu option.



The boiler will run at Maximum DHW Rate for 10mins as long as there is sufficient cooling load.



The boiler will run at Minimum Rate for 10mins.

If the return temperature is under 40°C then the fan will run for 30s at maximum rate before ramping down over 60s to minimum rate.

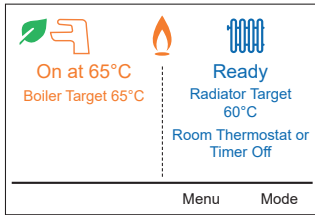
If the return temperature is above 40°C then the fan will ramp down over 60s to minimum rate.

2.35 GENERAL CHECKS

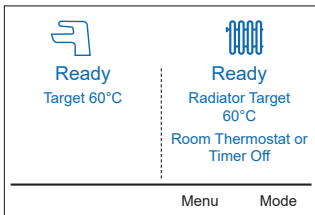
Make the following checks for correct operation in:

1. Fully open all DHW taps in turn and ensure that water flows freely from them.

The display should show:



2. Close all taps except the furthest one from the boiler and check that the boiler is firing at maximum rate. This is factory set to give a DHW temperature rise of approximately 35°C at the flow rate stated on page 8 under "operation".
3. Reduce the DHW draw-off rate to about 3 l/min (0.7 gpm) and check that the boiler modulates to deliver DHW at approximately 65°C.
4. Close the DHW tap and check that the main burner extinguishes. The pump should overrun for 60 seconds. When the pump stops the display should show:

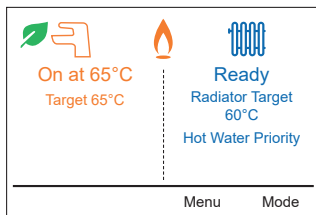


Note. On systems in excess of 2 bar inlet pressure a water pressure governor may be required to prevent water noise.

CH & DHW MODES

1. Ensure that the CH external controls are calling for heat.
2. Fully open a DHW tap and check that hot water is delivered.

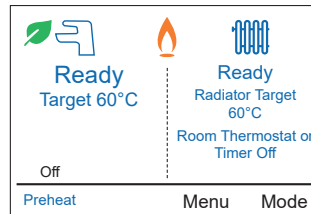
The display should show:



Gas Rate

1. Check the boiler gas rate when the boiler is at full DHW output.
2. Check at the gas meter, with no other appliance in use. Refer to Tables 2 & 3 for gas rates.
3. Close the DHW tap.
4. Set the central heating external controls to OFF. The burner should go off and the pump continue to run for two minutes.

The display should show:



5. Check the correct operation of the timer (if fitted) and all other system controls. Operate each control separately and check that the main burner responds.

WATER CIRCULATION SYSTEM

1. With the system cold, check that the initial pressure is correct to the system design requirements.
For pre-pressurised systems, this should be 1.0 bar.
2. With the system hot, examine all water connections for soundness. The system pressure will increase with temperature rise but should not exceed 2.5 bar.
3. With the system still hot, turn off the gas, water and electricity supplies to the boiler and drain down to complete the flushing process.

Note. A flushing solution should be used during the flushing procedure. Flushing solutions: Fernox Superfloc, Sentinel X300 (new systems) or X400 (existing systems).

Refer to Section 1.18

4. Refill and vent the system, add inhibitor, clear all air locks and again check for water soundness.

Refer to Section 1.10

5. Reset the system initial pressure to the design requirement.
6. Balance the system.

Refer to Section 1.17

7. Check the condensate drain for leaks and check that it is discharging correctly.
8. Finally, set the controls to the User's requirements.

The pump will operate briefly as a self-check once every 24 hours in the absence of any system demand.

WATER TEMPERATURES

Temperatures can be selected using the CH and DHW thermostats.

Temperature Knob Setting	CH Flow Temp °C	DHW Outlet °C
Max	80	65
Min	30	40

Due to system variations and seasonal temperature fluctuations DHW flow rates/temperature rise will vary, requiring adjustment at the draw off tap : the lower the rate the higher the temperature, and vice versa.

2.36 RESTART PROCEDURE

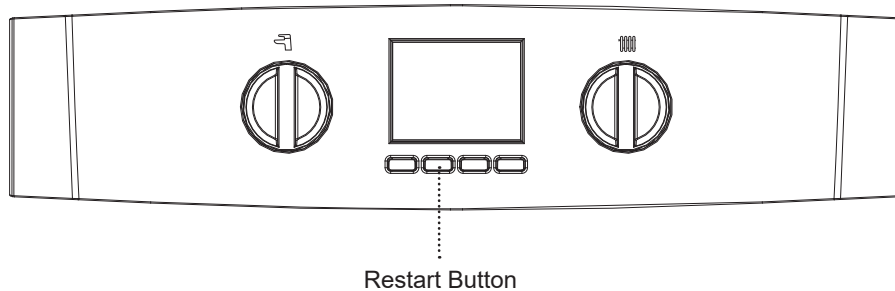
! Ignition Lockout

- 1 Check other gas appliances work.
- 2 Restart boiler.
- 3 If fault persists, contact installer.

Restart Menu

Press

To restart the boiler, press the Restart button.



2.37 HANDING OVER

After commissioning the system, hand it over to the householder by the following actions:

1. Hand the Instructions to the householder and explain their responsibilities under the relevant national regulations.
2. Explain and demonstrate the lighting and shutting down procedures.
3. Explain how to operate the boiler and system controls.
4. Ensure the greatest possible fuel economy is consistent with the household requirements of both heating and hot water consumption.
5. Explain the precautions necessary to prevent damage to the system and to the building, in the event of the system remaining inoperative during frosty conditions.
6. Explain the function and the use of the boiler heating and domestic hot water controls.
7. Explain that due to system variations and seasonal temperature fluctuations DHW flow rates/temperature rise will vary, requiring adjustment at the draw off tap. It is therefore necessary to draw the user's attention to the section in the Users Instructions titled "Control of Water Temperature" and the following statement:

"Additionally, the temperature can be controlled by the user via the draw-off tap: the lower the rate the higher the temperature, and vice versa".
8. Explain the function of the boiler fault mode.
9. Explain and demonstrate the function of timers and temperature controls, radiator valves etc., for the economic use of the system.
10. If a timer is fitted draw attention to the timer Users Instructions and hand them to the householder.

11. Explain that the gauge behind the drop down door, indicates the central heating system pressure and that if the normal COLD pressure of the system is seen to decrease over a period of time then a water leak is indicated. Explain the re-pressurising procedure and if unable to re-pressurise or if the pressure continues to drop, a registered local heating installer should be consulted.

Refer to Section
2.18

12. Explain boiler restart procedure.

Refer to Section
2.36

13. After installation and commissioning please complete the Commissioning Checklist before handover to the customer.

For IE, it is necessary to complete a "Declaration of Conformity" to indicate compliance to I.S.813:2002



Refer to
Page 64

! **IMPORTANT**

14. A comprehensive service should be carried out annually.

Stress the importance of regular servicing by a Gas Safe Registered Engineer.

In IE servicing work must be carried out by a Registered Gas Installer(RGII).
15. Inform the householder of the boiler warranty and the requirement to register it to receive the full benefit.

3.1 SERVICING SCHEDULE



WARNING: Servicing can only be carried out by Gas Safe Registered Engineers. In IE servicing work must be carried out by a Registered Gas Installer (RGI)

Always turn OFF the gas supply at the gas service cock, and switch OFF and disconnect the electricity supply to the appliance before servicing

Combustion testing must be carried out by a competent person using a combustion analyser conforming to BS EN 50379-3:2012.

To ensure the continued safe and efficient operation of the appliance, it is recommended that it is checked at regular intervals and serviced as necessary. The frequency of servicing will depend upon the installation condition and usage but should be carried out at least annually.

For the latest copy of literature, visit our website Keston.co.uk.

PRELIMINARY INSPECTION

1. Light the boiler and carry out a pre-service check, refer to the fault finding chart.
2. Check the flue terminal (and terminal guard if fitted) for damage and obstruction.
3. Check combustion by connecting the flue gas analyser to the flue gas sampling point as shown in the diagram and measure CO and CO₂ at maximum rate. Set the boiler to Maximum and Minimum heat inputs.

Refer to Section
2.34

If the CO / CO₂ ratio is greater than 0.004 please proceed to "Cleaning Procedure".

If the CO / CO₂ ratio is less than 0.004 please proceed to "Check Procedure".

CHECK PROCEDURE

1. Check all water and gas joints for signs of leakage. Remake any suspect joints ensuring a gas tightness check is carried out if applicable and the water system is correctly refilled, vented and re-pressurised.
2. Proceed to "IMPORTANT".

IMPORTANT

1. If, for any reason, the condensate trap has been removed, ensure the trap is refilled with water before re-assembling.
2. After completing the servicing or exchange of components, always ensure all gas valve connections are gas tight with a gas soundness check up to the gas control valve.
3. When work is complete the front panel MUST be correctly refitted, ensuring that a good seal is made.
4. Complete the service section in the Benchmark Commissioning Checklist.

GENERAL

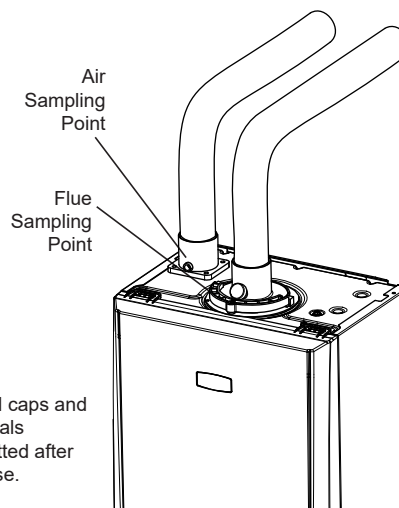
During Servicing, and after any maintenance or change of part of the combustion circuit, the following must be checked:

- The integrity of the flue system and the flue seals.
- The integrity of the boiler combustion circuit and the relevant seals.
- The operational (working) gas inlet pressure at maximum rate.
- The gas rate.
- The combustion performance.

CLEANING PROCEDURE

1. Remove the casing.
2. Visually check the appliance for signs of leakage.
3. Remove the flue manifold.
4. Remove the fan.
5. Remove the burner.
6. Refit the sump outlet cover.
7. Clean the heat exchanger by pouring warm water across the whole heat engine to flush deposits taking care to avoid pouring water over the electrode.
8. Check the electrode for damage and clean using an abrasive cloth. Check and adjust the spark gap. Replace the electrode if damaged.
9. Clean out the sump outlet to ensure any debris is removed.
10. Remove and clean the condensate trap and re- prime the trap before re-installing.
11. Check the DHW filter for blockage.
12. Re-assemble the components in reverse order.
13. Carry out post service checks on the combustion circuit. See General below.
14. Check the system water quality in accordance with BS7593:2019.
15. Complete the service record in the Benchmark section.

Do not operate the boiler if the front panel is not fitted.



Ensure all caps and seals are re-fitted after use.

3.2 REMOVAL / REPLACEMENT OF COMPONENTS

WARNING: Do not operate the boiler without a front panel fitted

When replacing any component.

1. Isolate the electricity supply.
2. Turn off the gas supply.
3. Remove the boiler front panel.

Refer to Section
3.4

4. Swing the control box down into its servicing position.

After removing / replacing any component.

5. Ensure all gas valve connections are gas tight with a gas soundness check up to the gas control valve.
6. Ensure all water connections are tight.
7. Test the appliance for correct and safe operation.

Refer to Section
3.1 (General)

Notes.

1. In order to assist fault finding, the control panel has an LCD diagnostic display. The key to boiler fault conditions is shown in Section 4.
2. In order to replace components in Sections **3.11, 3.14, 3.17, 3.20-3.31**, it is necessary to drain the boiler.

Refer to Section
3.3

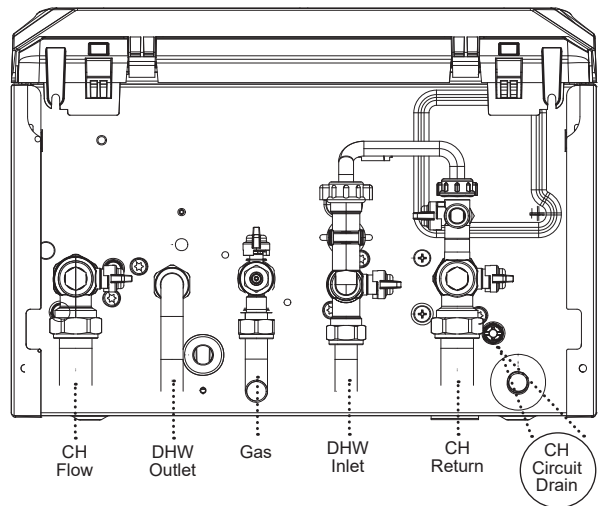
3.3 DRAINING THE BOILER

Refer to Section
3.2

CENTRAL HEATING CIRCUIT

1. Close all the CH water isolating valves on both the flow and return.
2. To drain the primary heat exchanger circuit: Open the drain valve and attach a length of hose to the CH drain point.
3. After replacing any component on the boiler, remove the hose, close the drain valve and open all system isolating valves.
4. Repressurise by reconnecting the filling loop, check for leaks before proceeding to check operation of the boiler.
5. Disconnect filling loop.

Refer to Section
2.18



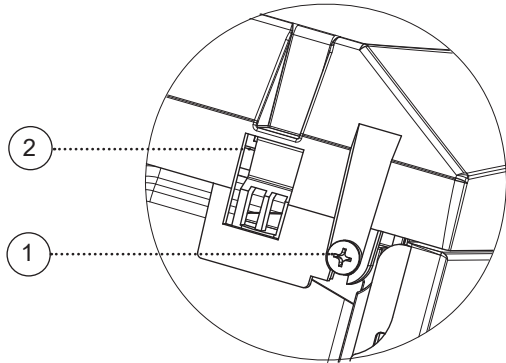
DOMESTIC HOT WATER CIRCUIT

1. Close all the DHW water isolating valves on the boiler inlet.
2. To drain the domestic hot water circuit: As there is no direct drain for the domestic hot water circuit, depending on the location of the boiler, opening the lowest hot water tap may drain this circuit. However it must be noted that some residual water will be released during replacement of components.
3. After replacing any component on the boiler, open isolating valves.
4. Check that the boiler operates in both DHW & CH modes.

3.4 BOILER FRONT PANEL REMOVAL / REPLACEMENT

REMOVAL

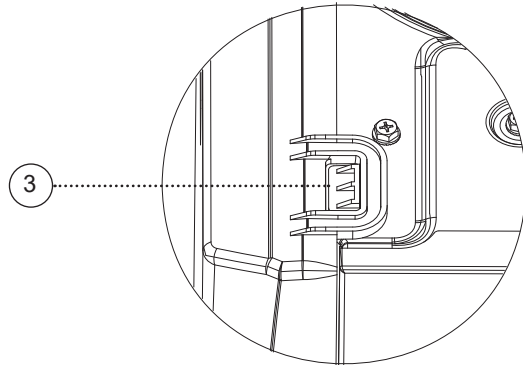
1. Loosen the two screws retaining the front panel.
2. Pull the two clips down to disengage and pull panel forward and upward and remove.



View from bottom of boiler

REPLACEMENT

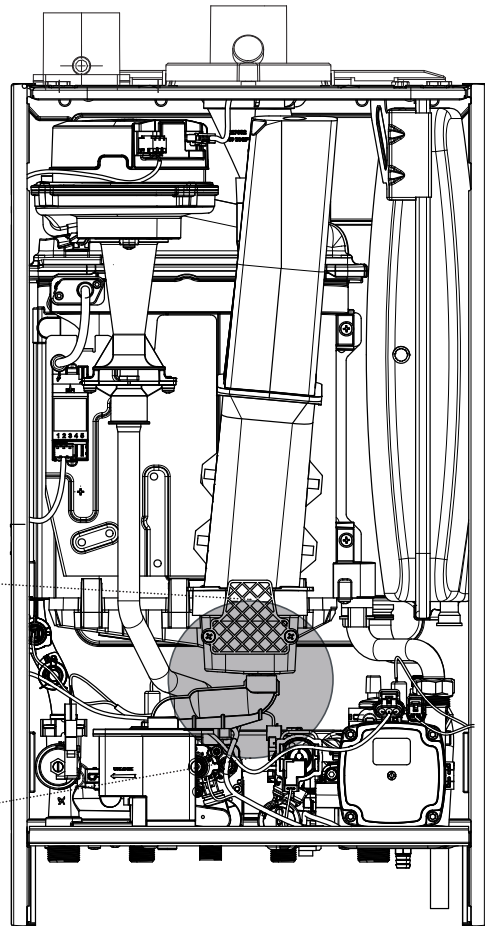
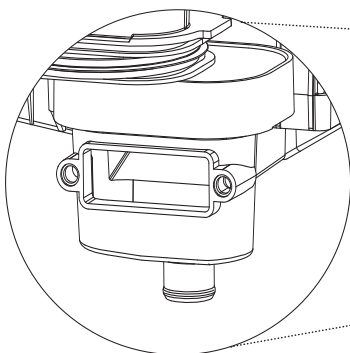
3. Hook the panel onto the top retaining clips.
4. Push the panel until the 2 bottom spring clips engage ensuring the 2 knobs and 4 buttons line up with the holes in the front panel.
5. Re-tighten the two retaining screws.



View from top of boiler

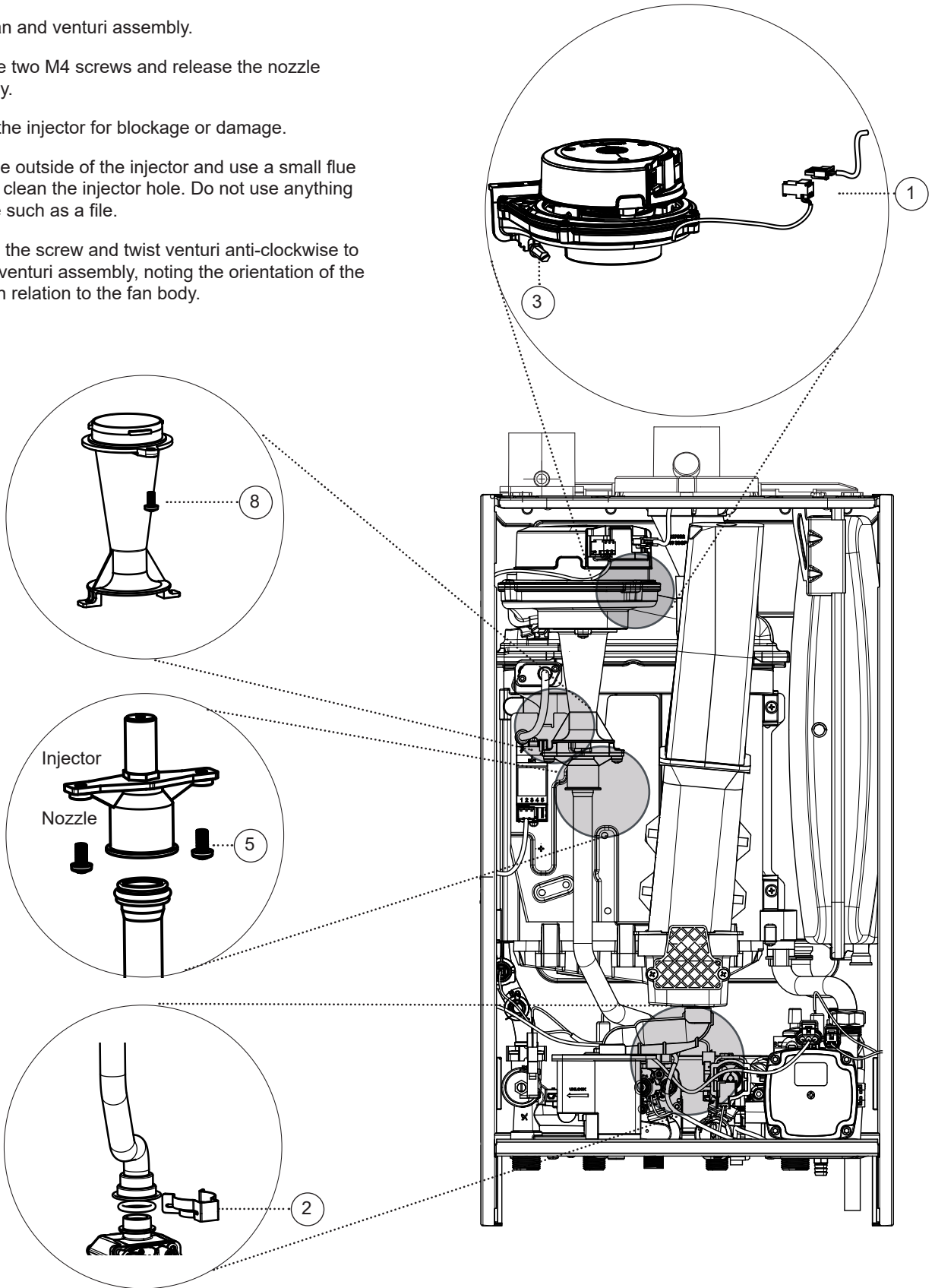
3.5 FLUE MANIFOLD REMOVAL / REPLACEMENT

1. Remove the two sump cover retaining screws.
2. Remove the sump cover.
3. Lift the manifold upwards to clear the sump.
4. Move the manifold to the left and pull down to remove.



3.6 FAN AND VENTURI ASSEMBLY REMOVAL AND CLEANING

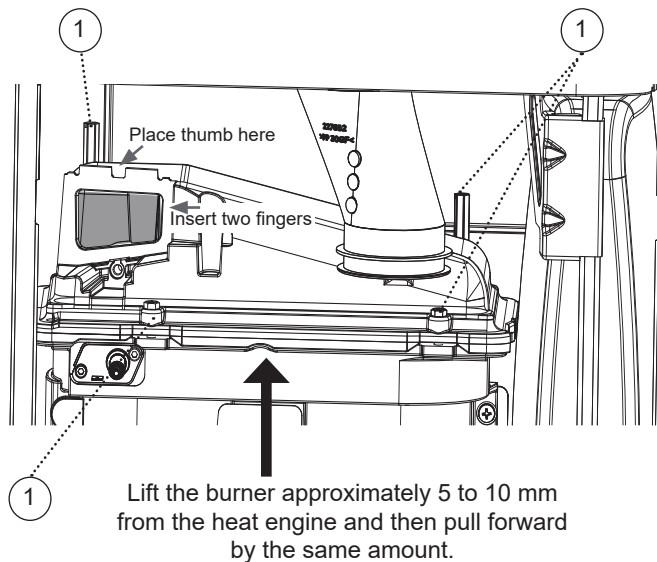
1. Disconnect the electrical leads from the fan.
2. Remove the clip from the gas control valve outlet and ease the pipe upwards. Rotate and then ease down to remove.
3. Remove the extended nut on the fan mounting bracket.
4. Lift off fan and venturi assembly.
5. Undo the two M4 screws and release the nozzle assembly.
6. Inspect the injector for blockage or damage.
7. Clean the outside of the injector and use a small flue brush to clean the injector hole. Do not use anything abrasive such as a file.
8. Remove the screw and twist venturi anti-clockwise to remove venturi assembly, noting the orientation of the venturi in relation to the fan body.
9. Inspect fan outlet sealing gasket and replace if necessary.
10. Ensure the venturi is free from dust/debris.
11. Check the 'O' rings are fitted correctly to the gas outlet pipe replacing if any damage is witnessed.



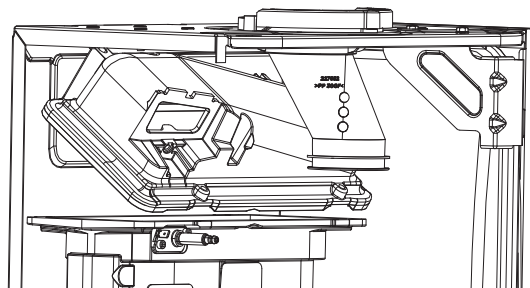
3.7 BURNER REMOVAL AND CLEANING

Refer to Section
3.5 & 3.6

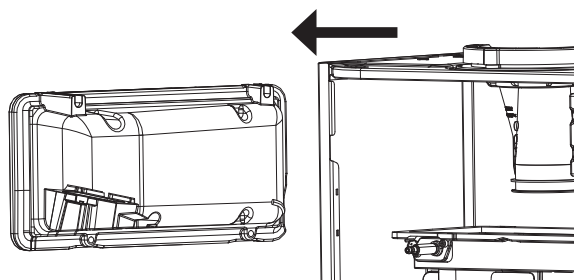
1. Remove the 2 burner front fixing screws and the 2 rear extended nuts.
2. Lift and pull forward the burner from the combustion chamber by holding the burner with two finger in the air inlet duct and your thumb on the top of the burner.
3. Tilt the burner towards yourself so that it raises to the vertical position.



4. Pull the burner out from the left hand side of the boiler once it is in the vertical position.



5. Carefully brush the ceramic burner with a soft non metallic bristle brush.

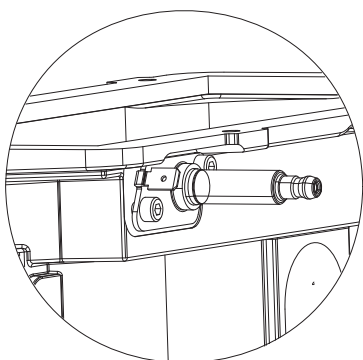


3.8 CLEANING THE HEAT EXCHANGER

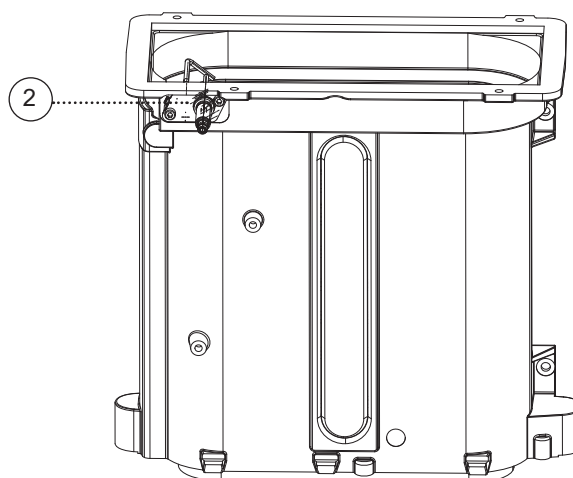
1. Replace the sump cover prior to the water flush process.
2. Thoroughly flush the heat exchanger by pouring water into the top of the combustion chamber ensuring the full surface of the heat exchanger is cleaned. Avoid pouring water over the electrode.
3. Remove the sump cover and clean loose deposits from the sump.

4. Inspect the ignition/detection electrode. Ensure that it is clean and in good condition - replace if necessary.
5. Check that the ignition gap is correct.

Refer to Section
3.9



Combined Ignition Detection Electrode



3.9 IGNITION / DETECTION ELECTRODE REPLACEMENT / INSPECTION

Refer to Section
3.2

1. Remove the fan.

Refer to Section
3.6

2. Remove the flue manifold.

3. Remove the burner.

Refer to Section
3.13

4. When servicing the boiler inspect the condition of the electrode and check the dimensions shown. If there is damage to the electrode continue to follow steps below for replacement.

5. Unplug the ignition lead from the electrode.

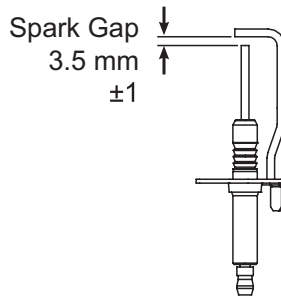
6. Remove the earth lead from the electrode.

7. Remove the 2 screws holding the electrode to the combustion chamber.

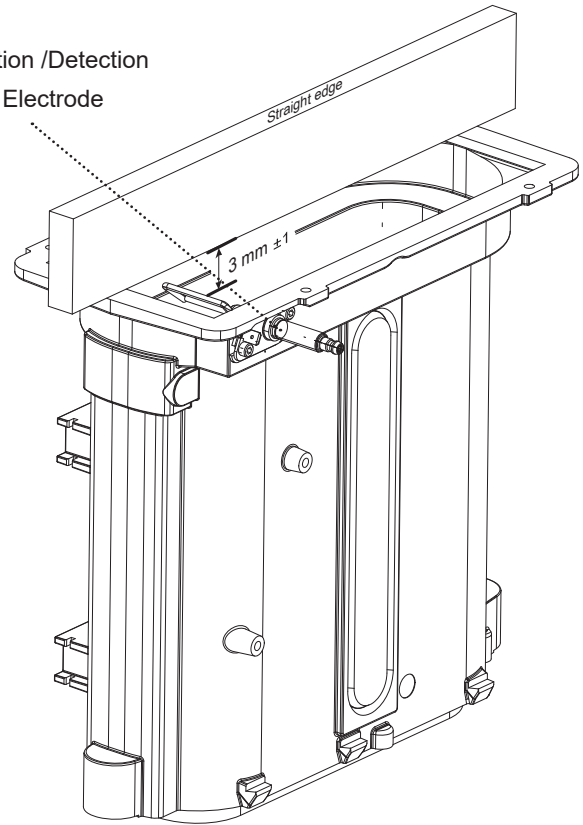
8. Remove the electrode.

9. Fit the new electrode, using the new gasket supplied. Check dimensions as shown.

Refer to Section
2.35 & 2.36



Ignition /Detection
Electrode

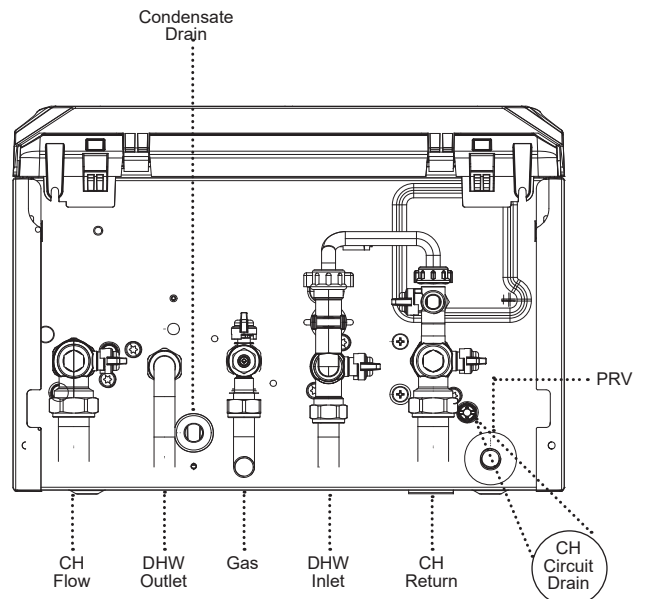
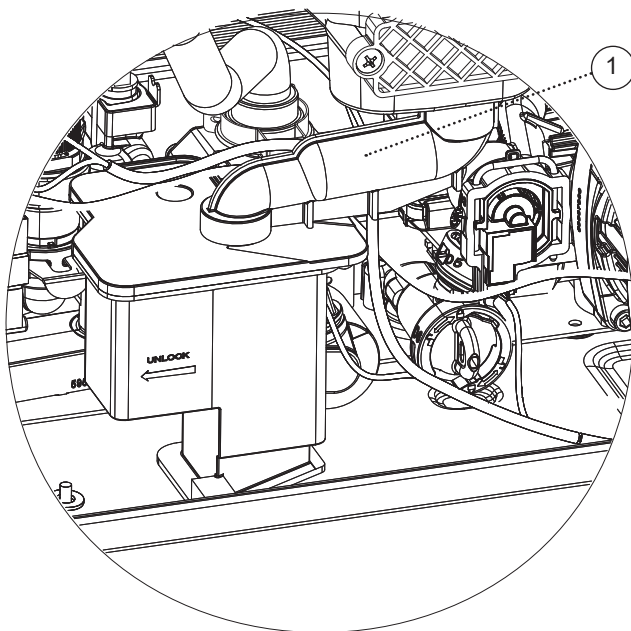


3.10 CLEANING THE CONDENSATE TRAP

CAUTION: Keep trap upright when removing

1. Pull off the rubber pipe at the sump drain.
2. Turn the trap clockwise to disengage and lift to remove.
3. Clean and fill trap with water.

SCAN
for video



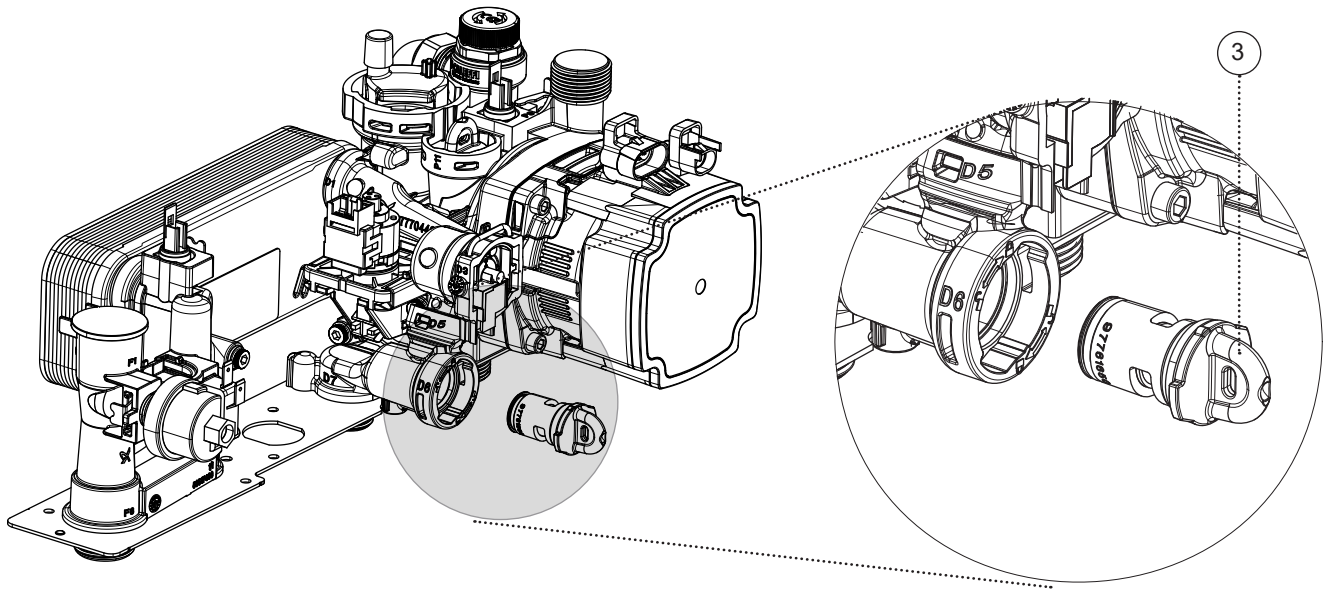
3.11 DHW FILTER & DHW FLOW REGULATOR CLEANING / REPLACEMENT

Refer to Section
3.2

1. Isolate the DHW system.

Refer to Section
3.3

2. Turn the housing anti clockwise and pull forward to remove the cartridge. Be prepared for some water release.
3. Using a pair of pliers, pull out the plastic filter/flow regulator.
4. Clean or replace filter as necessary.



3.12 BURNER INJECTOR REPLACEMENT

Refer to Section
3.6

3.13 BURNER REPLACEMENT

Refer to Section
3.5 & 3.6 & 3.7

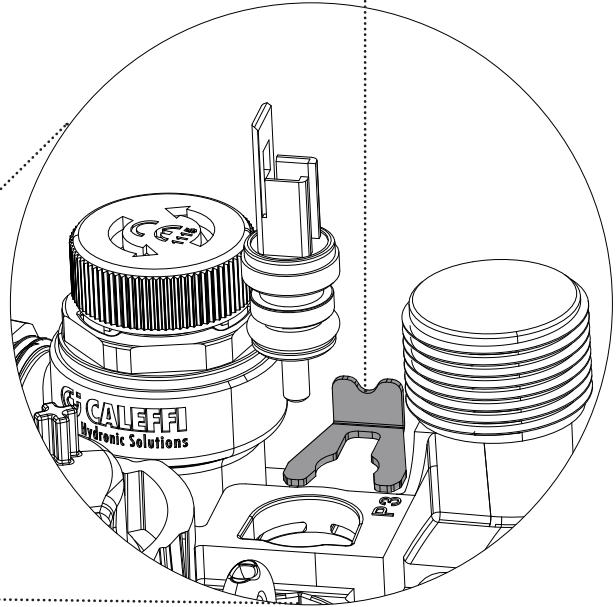
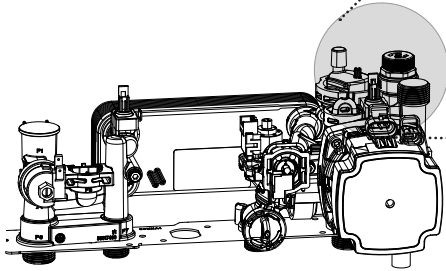
SCAN
for video



3.14 RETURN THERMISTOR REPLACEMENT

Refer to Section
3.2

1. Isolate and drain down the boiler.
2. Remove the clip from the pump housing and remove the thermistor.
3. Disconnect the electrical lead from the thermistor.
4. Reconnect the electrical lead to the new thermistor and reassemble, Check the 'O' ring is fitted, thermistor is fully engaged and the clip correctly located .

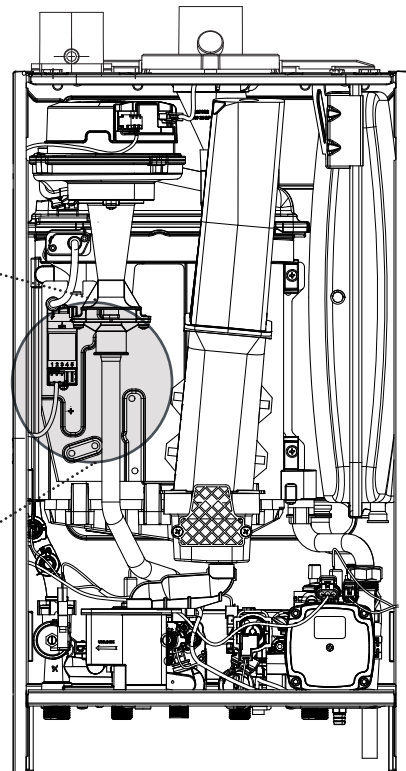
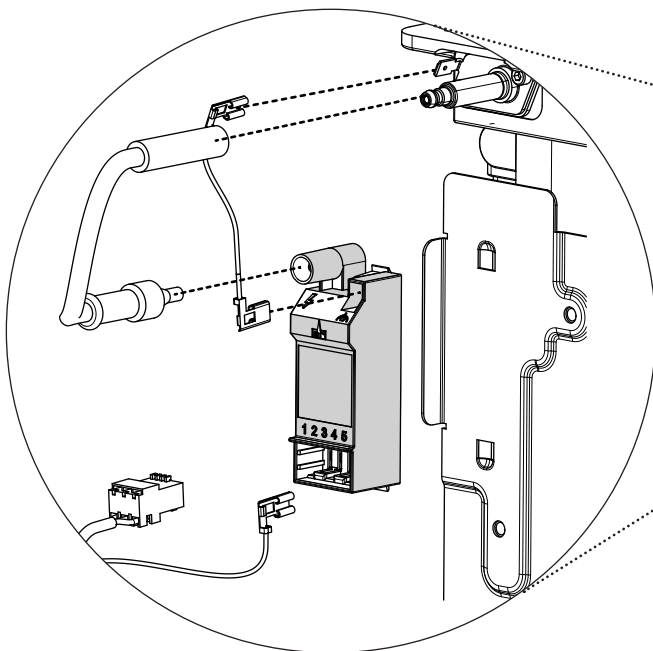


SERVICING

3.15 SPARK GENERATOR REPLACEMENT

Refer to Section
3.2

1. Disconnect the leads from the spark generator.
2. Gently push up the generator to release the lower clip from the spark generator bracket.
3. Lift the spark generator up and out of the bottom retaining location point.
4. Fit the new spark generator and reassemble, ensuring that the the earth lead is replaced.



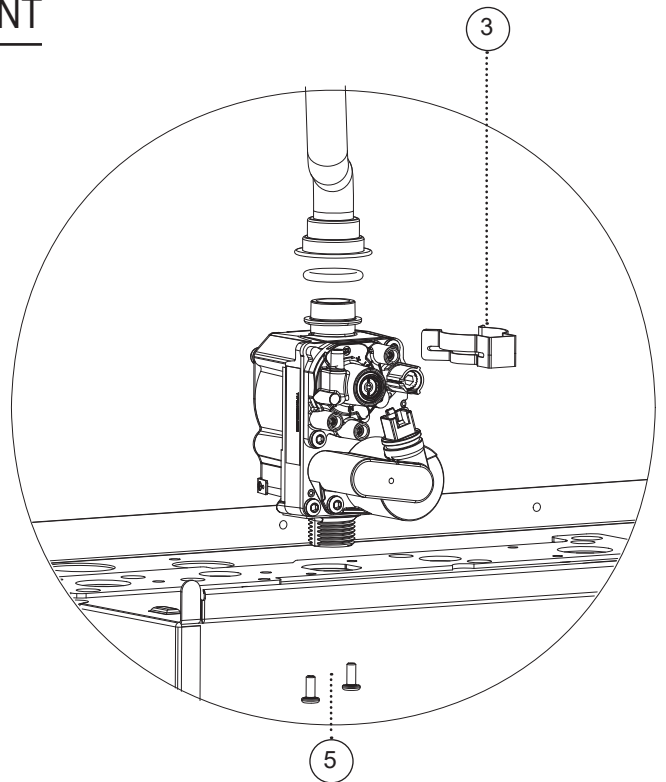
3.16 GAS CONTROL VALVE REPLACEMENT

Refer to Section
3.2

1. Disconnect and remove the trap and rubber connector.

Refer to Section
3.18

2. Unplug the electrical lead connection from the gas control valve.
3. Remove the outlet gas valve clip and slide the pipe upwards.
4. Undo the gas inlet pipe union at the inlet to the gas valve.
5. Undo the two screws fixing the gas valve to the chassis base and lift the gas valve upwards.
6. Fit the new gas control valve ensuring that the 'O' ring and sealing washer are in place and reconnect gas and electrical connections.
7. Refit the trap.
8. Ensure all gas valve connections are gas tight with a gas soundness check up to the gas control valve.



3.17 DIVERTER VALVE ACTUATOR REPLACEMENT

Refer to Section
3.2

To remove the motor:

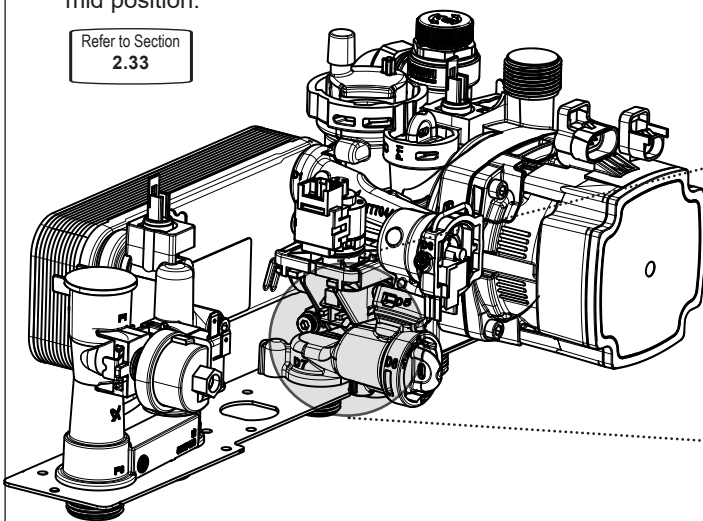
1. Remove the condensate trap.

Refer to Section
3.18

2. Press Down on the hot keys until the diverter valve mid position is highlighted. Ensure that the diverter valve is in mid position.

Refer to Section
2.33

3. Place a flat bladed screwdriver in the actuator slot provided and ease out the actuator.
4. Disconnect the electrical plug from the motor.
5. Fit the new motor ensuring the arm is correctly engaged in the metal fork and reassemble ensuring the condensate trap is refilled with water. Reconnect the electrical plug to the motor.
5. Check the operation of the boiler.



Note. All spares will be delivered in mid-position.

3.18 CONDENSATE TRAP REPLACEMENT / CLEANING

Refer to Section
3.10

3.19 PRIMARY PCB REPLACEMENT

WARNING: It is critical that the correct boiler size and fuel type is entered in to the boiler.

CAUTION: Fit the earth strap provided with the PCB to your wrist and secure to a suitable earth on the boiler chassis.

Refer to Section 3.2

1. Remove and keep the screw.
2. Carefully release the four retaining clips and remove control box cover.
3. Unplug all lead connections to the PCB.
4. Spring out the four side retaining clips and pull the PCB upwards to clear the corner retaining posts.
5. Fit the new PCB.
6. Re-connect all plug connections.
7. Reassemble.
8. Turn power on, display shows:

Installer
Initialise spare PCB?
Yes

Press Yes and the following screen is shown:

Select boiler type
Option 1 of 2
Keston

Press Next until [Keston] is shown. Press Select.

Select Boiler Brand
Option 1 of 4
Combi
Back Next Select

Press Next until correct Boiler type is shown:

Combi

Press Select to confirm & the following screen is shown:

Select Boiler Model
Option 1 of 4
Combi
30kW
Natural Gas
Back Next Select

Press Next until correct Boiler model shown.

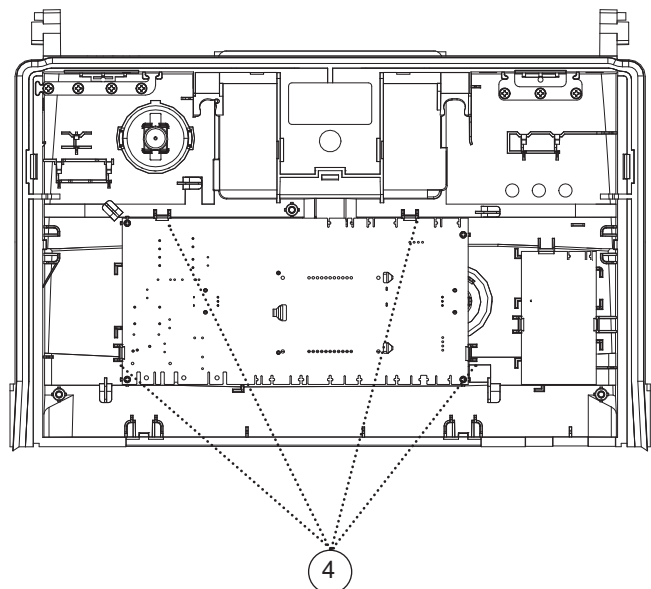
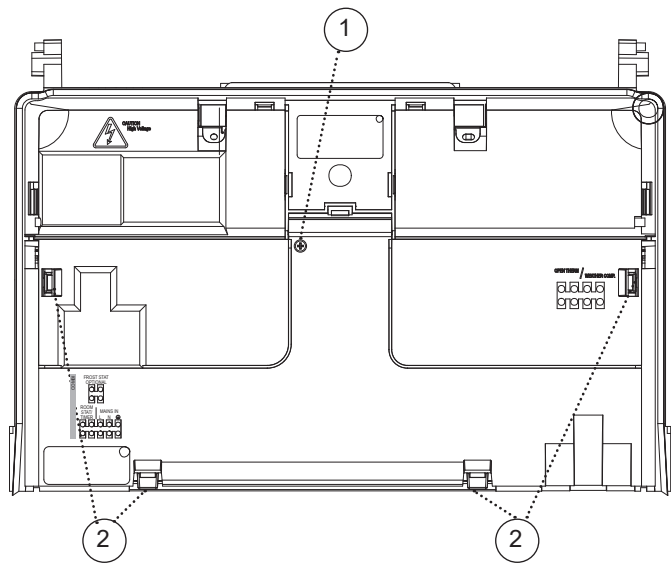
- 1/4, Combi 30kW, Natural Gas
- 2/4, Combi, 30kW, Propane
- 3/4, Combi, 35kW, Natural Gas
- 4/4, Combi, 35kW, Propane

Press Select to confirm & the following screen is shown:

Program this model?
1/4
Combi 30kW
Natural Gas
Back Yes

Press Yes to finish.

9. Check that the boiler operates in both DHW and CH modes.



3.20 DHW FLOW TURBINE SENSOR REPLACEMENT

Refer to Section
3.8

1. Drain the DHW system.

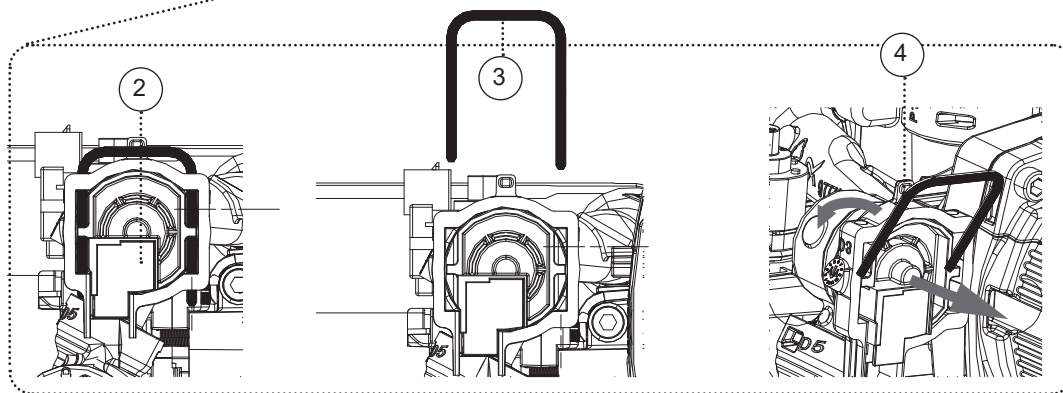
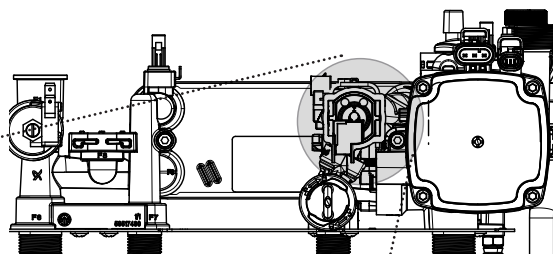
Refer to Section
3.5

2. Pull off the electrical connection.

Refer to Section
3.21

3. Using a suitable tool, lift and remove the retaining clip.

4. Use the clip to ease the turbine sensor from its housing.
5. Reassemble with new sensor.
6. Check that the boiler operates in both DHW & CH modes. Check for leaks.



3.21 PRESSURE GAUGE REPLACEMENT

Refer to Section
3.2

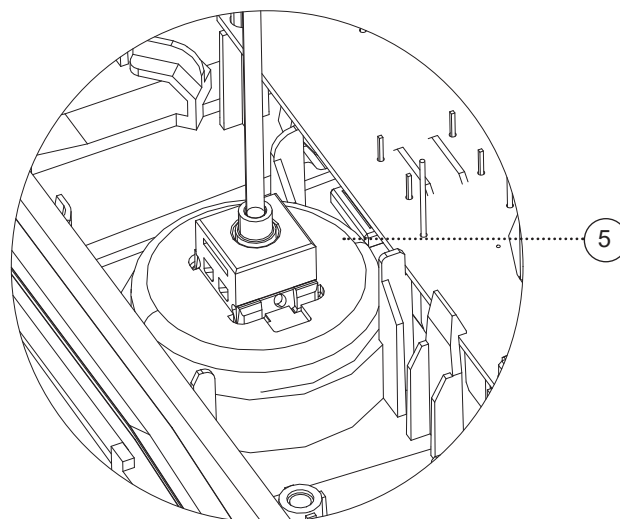
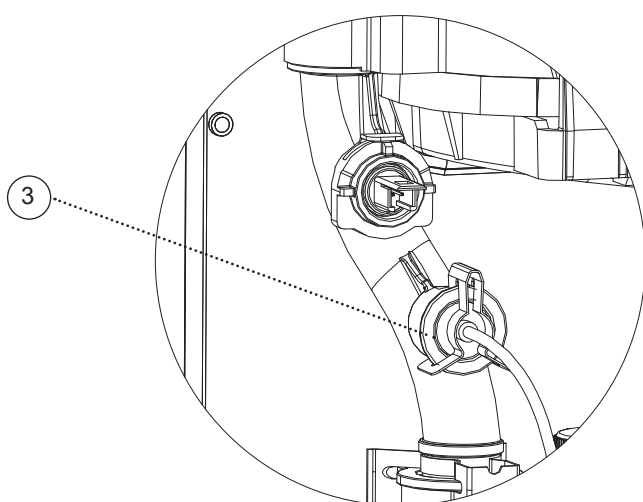
1. Drain the boiler.

Refer to Section
3.3

2. Remove the boiler front (see section 3.2), lower the control panel and remove the control box cover.
3. Ensuring there is no pressure in the system unclip the 'C' clip from the flow pipe port and remove the capillary connection together with 'O' ring.

4. Releasing the two retaining clips on the pressure gauge ease the pressure gauge through the front of the control panel.
5. Fit the new pressure gauge from the front of the lower control panel ensuring correct orientation. Locate push fit connection into flow pipe ensuring 'O' ring in place and secure with the 'C' clip.
6. Refill the boiler.

Refer to Section
2.18



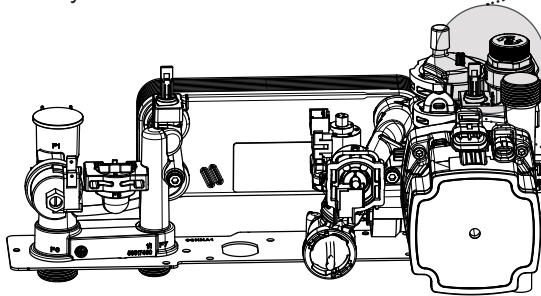
3.22 PRV REPLACEMENT

Refer to Section
3.2

1. Drain the boiler.

Refer to Section
3.3

2. Remove the trap and rubber pipe.
3. Pull out and remove the clip retaining the PRV.
4. Undo the discharge pipe compression coupling.
5. Lift out the PRV/pipe assembly.
6. Remove the pipe and transfer to the new PRV.
7. Reassemble ensuring the retaining clip is correctly fitted.

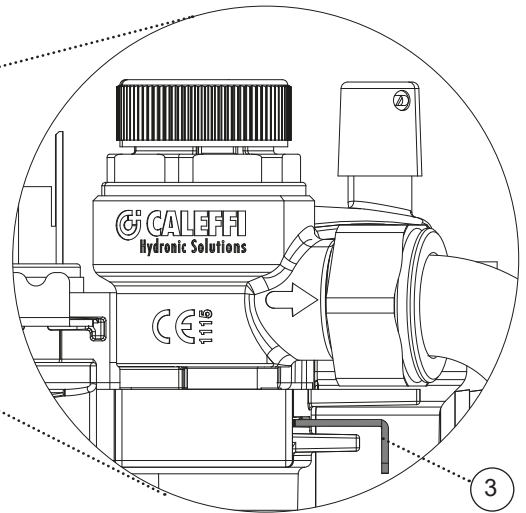


8. Check the operation of the PRV by raising the water pressure until the valve lifts. This should occur within 0.3 bar of the preset lift pressure.
9. Check no escape of water occurs except at the discharge point
10. Release water from the system until the minimum system design pressure is reached; 1.0 bar if the system is to be pre-pressurised.

SCAN
for video



Refer to Section
2.18



3.23 PUMP AUTOMATIC AIR VENT REPLACEMENT

Refer to Section
3.2

1. Drain the boiler.

Refer to Section
3.3

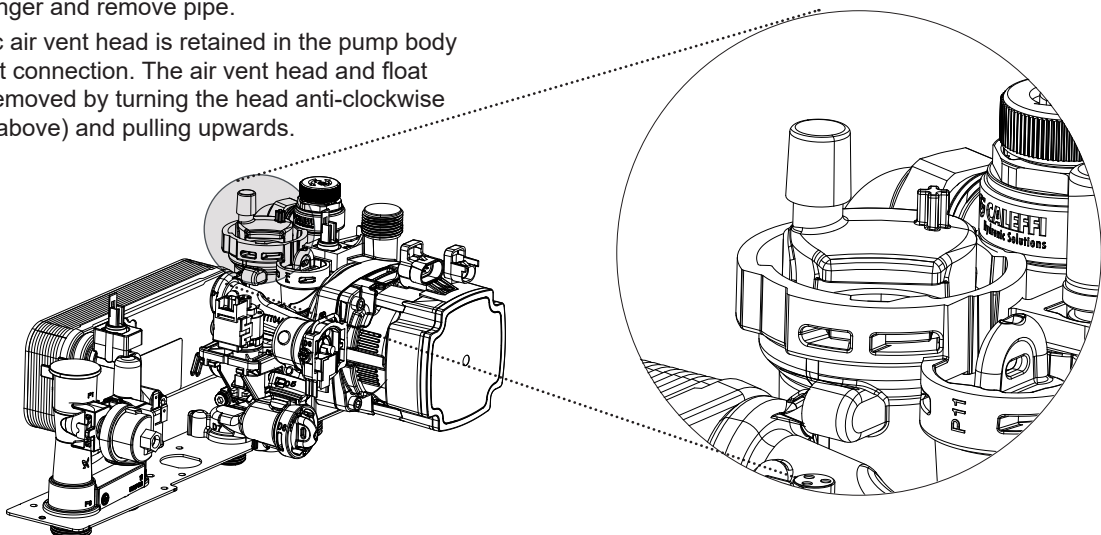
2. Remove the expansion vessel.

Refer to Section
3.31

3. Firstly, increase access area by disconnecting the 22 mm pipe connection at top of pump manifold and bottom of heat exchanger and remove pipe.
4. The automatic air vent head is retained in the pump body with a bayonet connection. The air vent head and float assembly is removed by turning the head anti-clockwise (viewed from above) and pulling upwards.

5. Reassemble. Check the air vent head 'O' ring seal is fitted.
6. Check that the air vent cap is loose.
7. Refill the boiler. Check for leaks around the new air vent joint.

Refer to Section
2.16

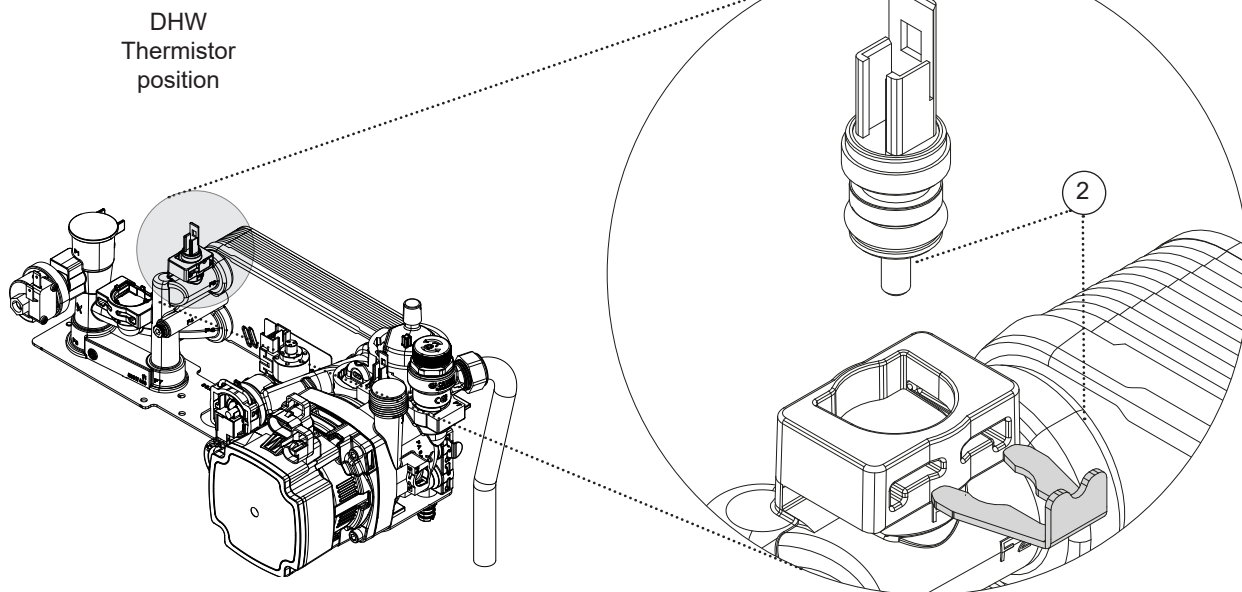


3.24 REPLACEMENT OF DHW THERMISTOR

Refer to Section
3.2

1. Isolate the DHW system.
2. Remove the retaining clip and extract the thermistor.
Be prepared for some water release.
3. Disconnect the wiring harness.

4. Fit the replacement thermistor and reassemble.
5. Re-establish the DHW supply, turn on a hotwater tap checking for leaks.



3.25 DHW PLATE HEAT EXCHANGER REPLACEMENT

Refer to Section
3.2

1. Drain the boiler.

Refer to Section
3.3

2. Remove condensate trap.

Refer to Section
3.18

3. Remove the 2 hex screws securing the plate heat exchanger to the composite housings.
4. Manoeuvre the plate heat exchanger out of the top LH or centre of the controls area. Be aware of any water spillage.

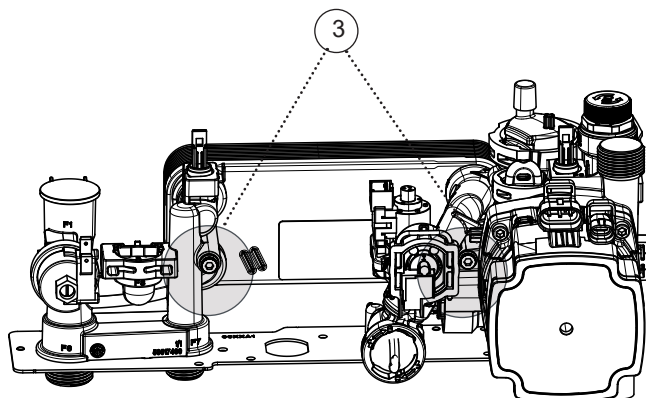
5. Fit the new plate heat exchanger, using the new 'O' rings supplied.

Check that the depressions are on the bottom prior to fitting.

6. Reassemble.

7. Refill the boiler.

Refer to Section
2.18



SCAN
for video



3.26 DIVERTER VALVE BODY ASSEMBLY REPLACEMENT

Refer to Section
3.2

To remove the valve body assembly:

1. Drain the boiler.

Refer to Section
3.3

2. Remove the condensate trap.

Refer to Section
3.18

3. Remove the electrical plug from the diverter valve.
4. Place a flat bladed screwdriver in the diverter valve motor body slot provided and ease out the motor.

Refer to Section
3.17

5. Remove the return thermistor electrical connection.

Refer to Section
3.14

6. Remove the pump electrical connections.

Refer to Section
3.28

7. Remove DHW Turbine electrical connection.

Refer to Section
3.26

8. Remove the DHW plate heat exchanger (note orientation).

Refer to Section
3.25

9. Loosen the nut above pump and rotate the pipe.

10. If required remove expansion vessel connection hose.

Refer to Section
3.31

11. If required remove the 15mm compression coupling to the PRV discharge pipework.

12. Remove the DHW inlet and CH return connection situated beneath the boiler.

13. Remove the four torx head screws fixing the return manifold to the boiler sheet steel base.

14. Lift the manifold assembly and remove from boiler.

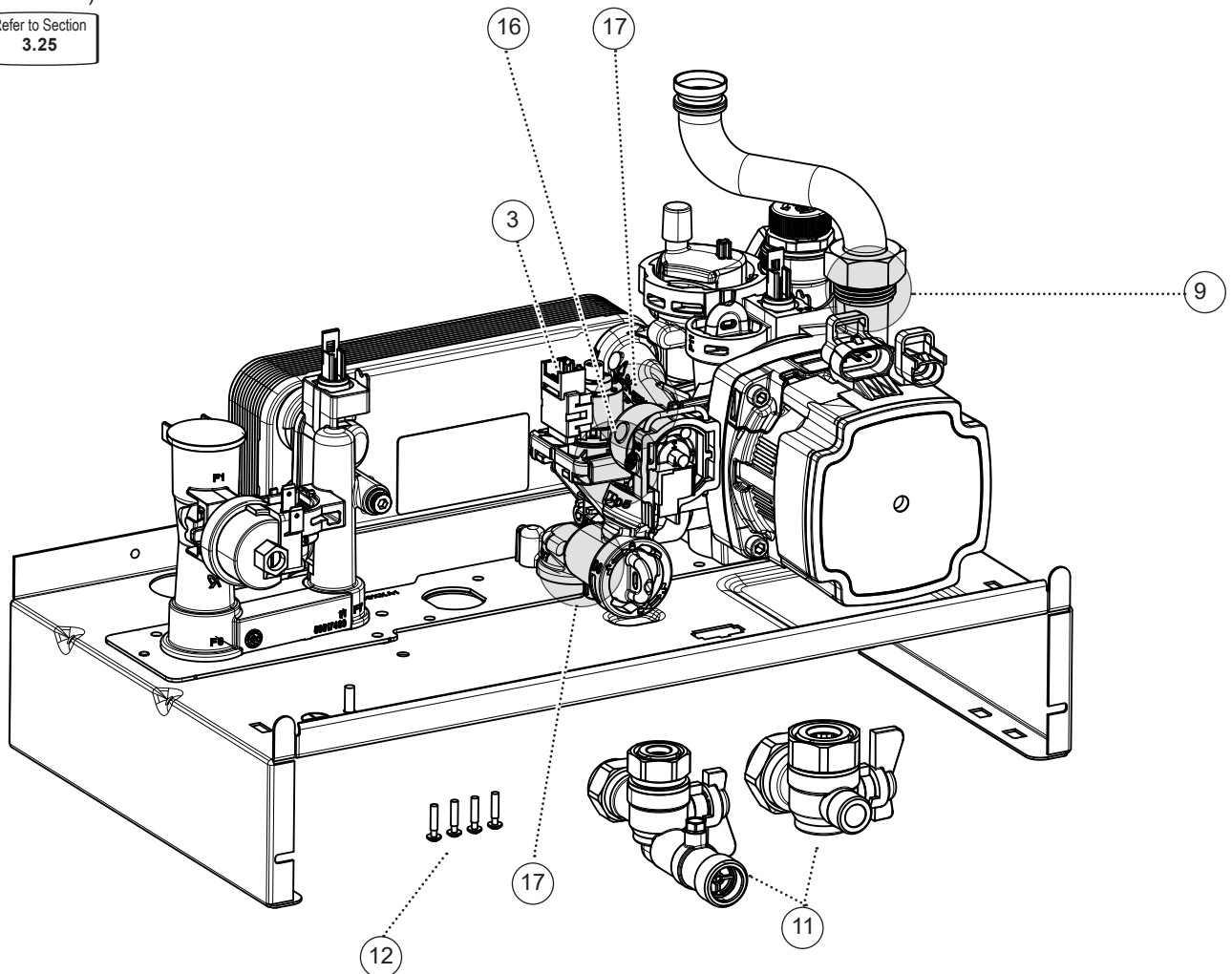
15. Twist and remove the DHW manifold.

16. Remove the two diverter valve body fixing screws and withdraw the diverter valve body assembly.

17. Fit the new diverter valve body assembly and replace the two fixing screws.

18. Refit the DHW manifold, fit the assembly back to the boiler and reassemble.

19. Refill the boiler and check for leaks. Check that the boiler operates in both DHW & CH modes.



3.27 CH WATER PRESSURE SWITCH REPLACEMENT

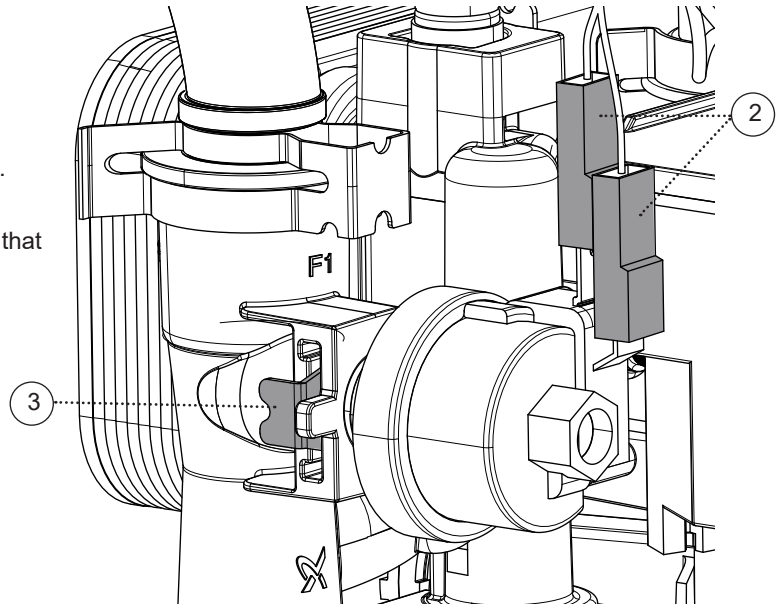
Refer to Section
3.2

1. Drain the boiler.

Refer to Section
3.3

2. Pull off the two electrical connections.
3. Using a suitable tool, pull out the metal retaining clip.
4. Carefully withdraw the pressure switch.
5. Fit the new pressure switch and reassemble. Check that the 'O' ring is fitted and replace clip.
6. Refill the boiler.

Refer to Section
2.18



SERVICING

3.28 PUMP HEAD REPLACEMENT

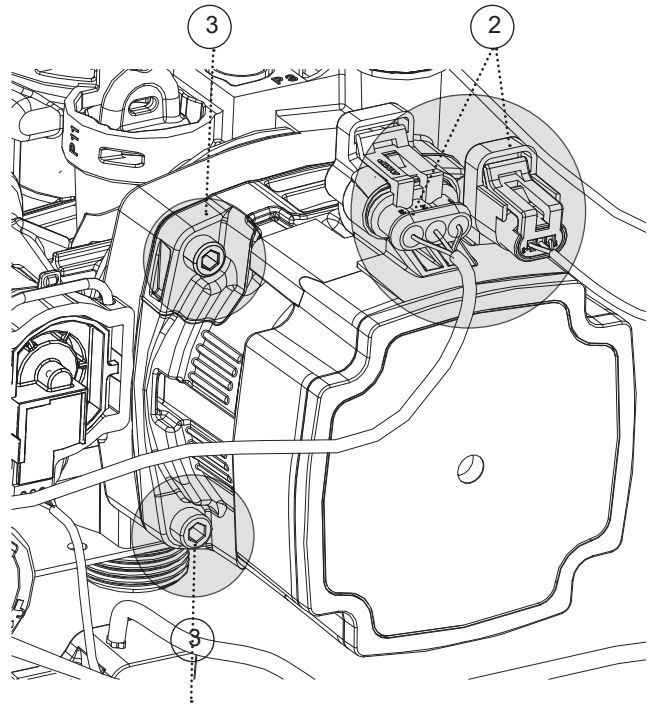
Refer to Section
3.2

1. Drain the boiler.

Refer to Section
3.3

2. Disconnect the two electrical leads from the pump.
3. Remove the 4 hex screws retaining the pump head.
4. Remove the pump head.
Be aware of water spillage.
5. Fit the new pump head.
6. Reassemble.
7. Refill the boiler.

Refer to Section
2.18



3.29 FLOW THERMISTOR REPLACEMENT

Refer to Section
3.2

1. Drain down the boiler.

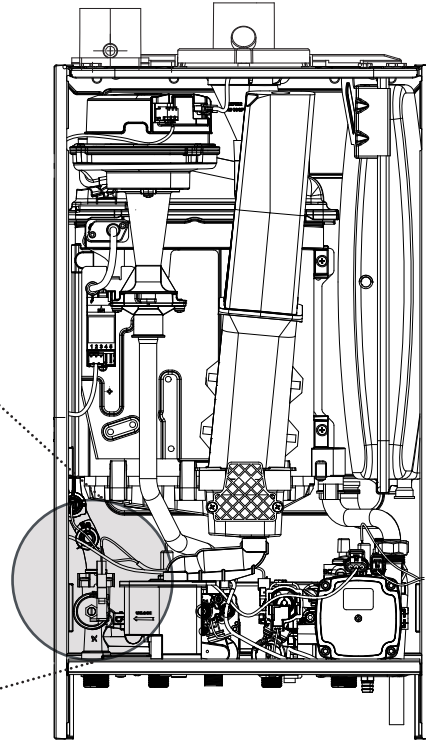
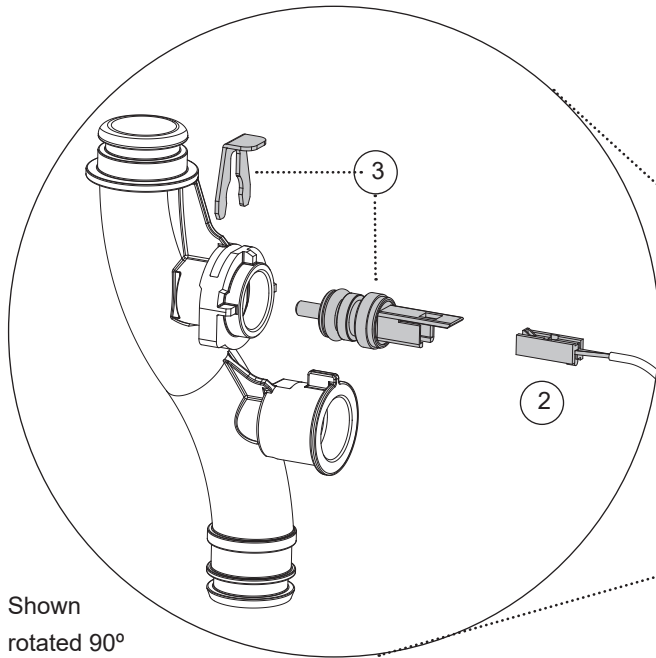
Refer to Section
3.3

2. Unplug the electrical lead.
3. Remove the clip from the flow pipe and remove the thermistor.
4. Fit the new thermistor, check that the 'O' ring is fitted and replace clip.

5. Reassemble.

6. Refill the boiler.

Refer to Section
2.18



3.30 HEAT ENGINE REPLACEMENT

Refer to Section
2.1

CAUTION: Protect the gas and electrical controls with a waterproof sheet.

Refer to Section
3.2

1. Drain the boiler (CH Circuit Drain).

Refer to Section
3.3

2. Undo the two screws and remove the sump cover retaining the lower flue manifold.
3. Lift the manifold to clear the bottom sealing gasket and remove manifold.
4. Remove the fan / venturi assembly and place on one side.

Refer to Section
3.6

5. Remove the burner and place on one side.

Refer to Section
3.4

6. Remove the ignition/detection electrode.

Refer to Section
3.18

7. Remove the spark generator.

Refer to Section
3.15

8. Remove the gas valve.

Refer to Section
3.16

9. Remove the expansion vessel.

Refer to Section
3.31

10. Remove the 2 M5 screws retaining the spark generator, mounting bracket and transfer bracket to the new heat exchanger.
11. Undo the pump union nut, remove clip and remove pipe from expansion vessel.
12. Remove the two retaining pipe clips and remove pipes.
13. Remove the condensate rubber pipe.

Refer to Section
3.18 No.2

14. Remove the two heat exchanger fixing screws.
15. Remove the heat exchanger, slide out of location bracket.
16. If replacement sump required: Rotate heat exchanger assembly 180°. Place new sump onto heat exchanger, ensuring correct orientation and seal is in place. Then gently apply pressure to the base of the sump at each tab fixing point and engage tabs onto the heat exchanger.

17. Reassemble, ensuring the heat exchanger is located correctly in the LHS retaining bracket. Replace any new 'O' rings supplied with new heat exchanger and replace gaskets or seals if any sign of damage is evident. When replacing the spring clips located on the return pipe connection, check that the clip is oriented to correctly match connecting pipe diameters.

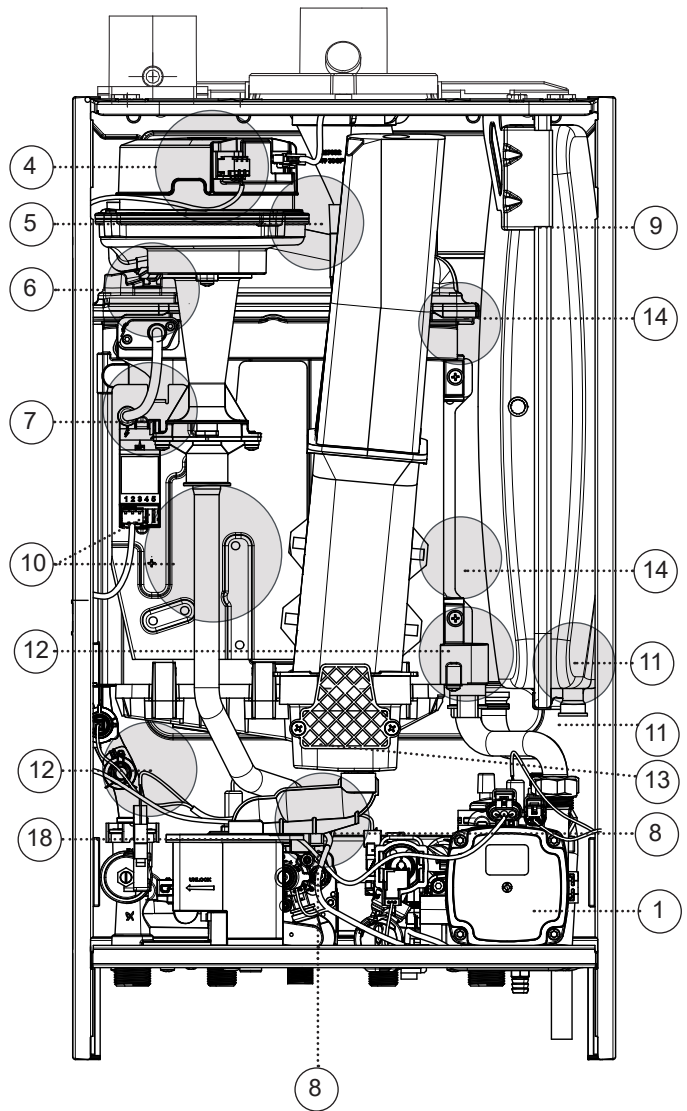
18. Ensure the trap is filled with water.

Refer to Section
3.18

19. Refill the boiler and check for leaks.

Refer to Section
2.16

20. Check that all gas valve connections are gas tight with a gas soundness check up to the gas control valve.



3.31 EXPANSION VESSEL RECHARGING & REPLACEMENT

Refer to Section
3.2

RECHARGING

1. Remove the charge point cap.
2. Recharge the tank pressure to 0.75 bar.
3. Reassemble.
4. Check that the boiler operates in both DHW & CH modes.

REPLACEMENT

5. Drain the boiler CH circuit.

Refer to Section
3.3

6. Remove the retaining clip on the vessel water connection pipe and remove the pipe.
7. Support the expansion vessel and unscrew the 2 screws from the securing bracket, located on the top of the boiler, and remove.

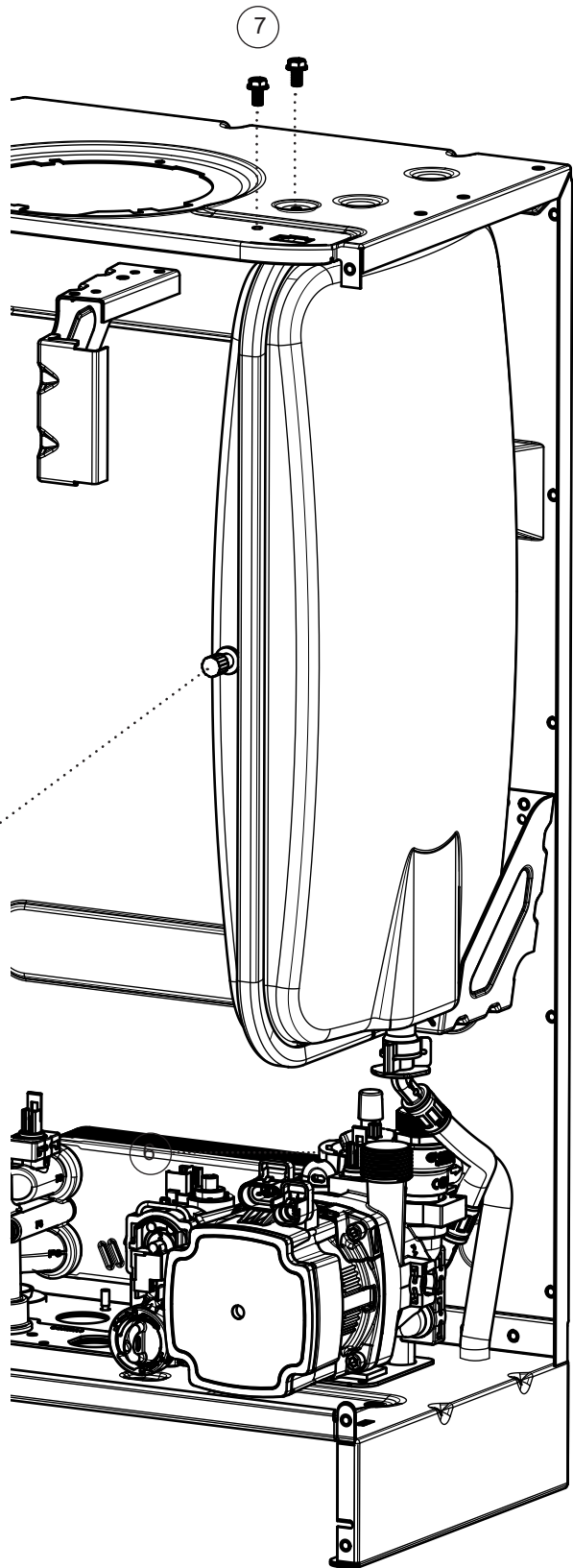
Note. the position of the bracket on the vessel.

8. Remove the expansion vessel.
9. Fit the new expansion vessel.
10. Reassemble ensuring the 'O' ring seal is in place.
11. Refill the boiler and check for leaks.

Refer to Section
2.16

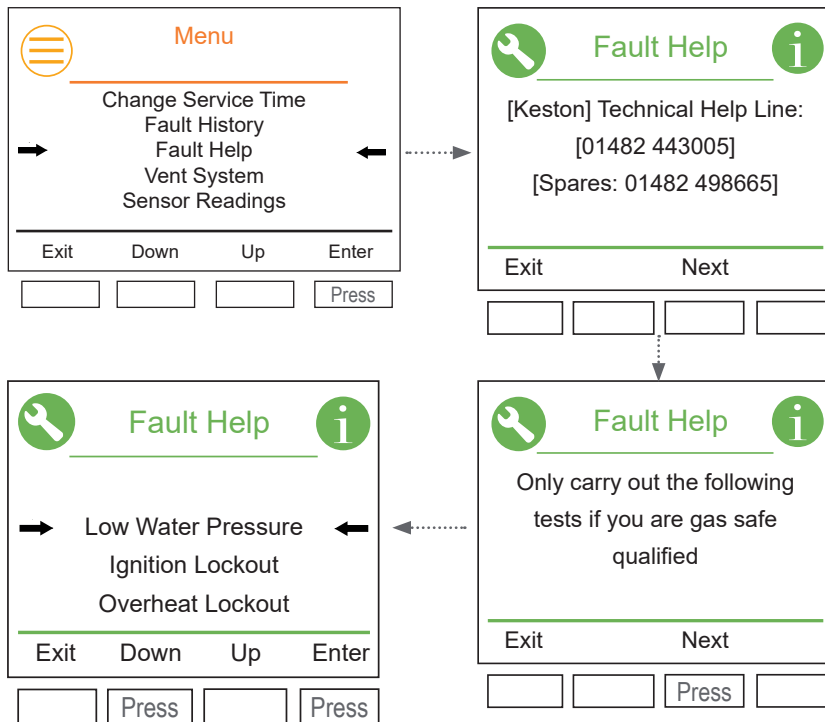
Recharge Point

1



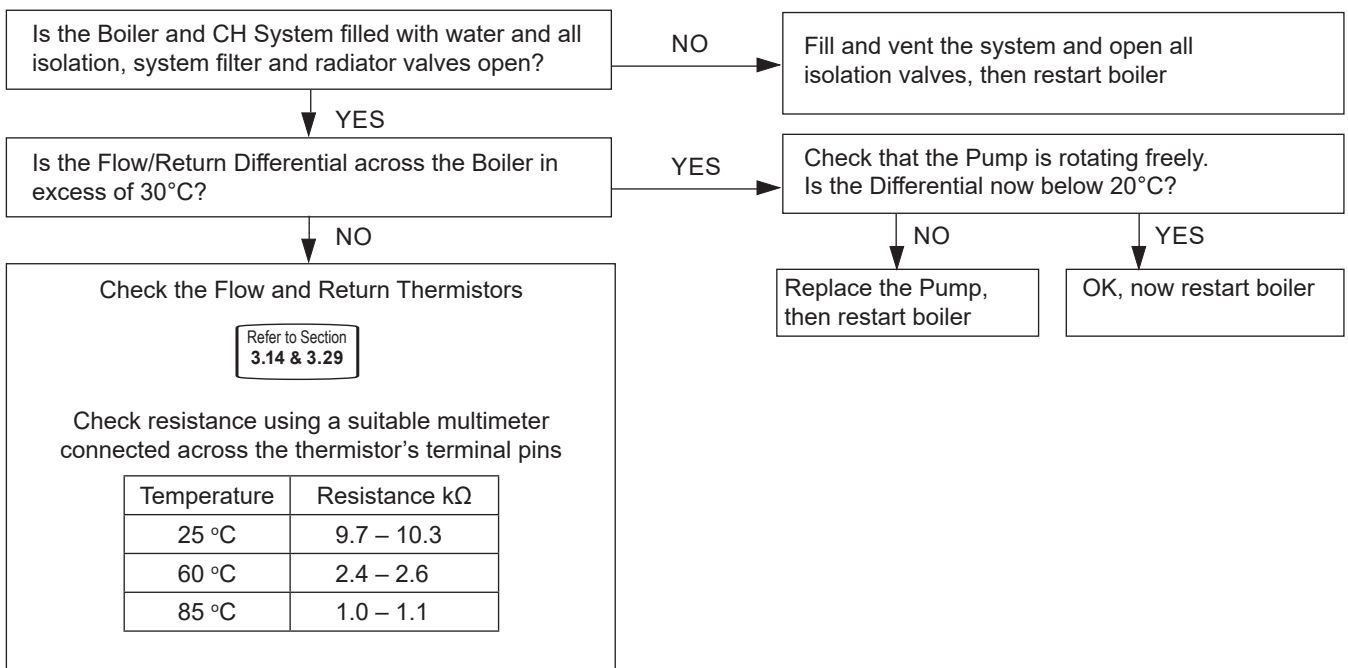
4.1 MAIN MENU, FAULT HELP

Fault finding help can be accessed through the menu. Fault finding help lists all the common faults with the necessary checks. More detailed fault checks and actions are described in the following pages.

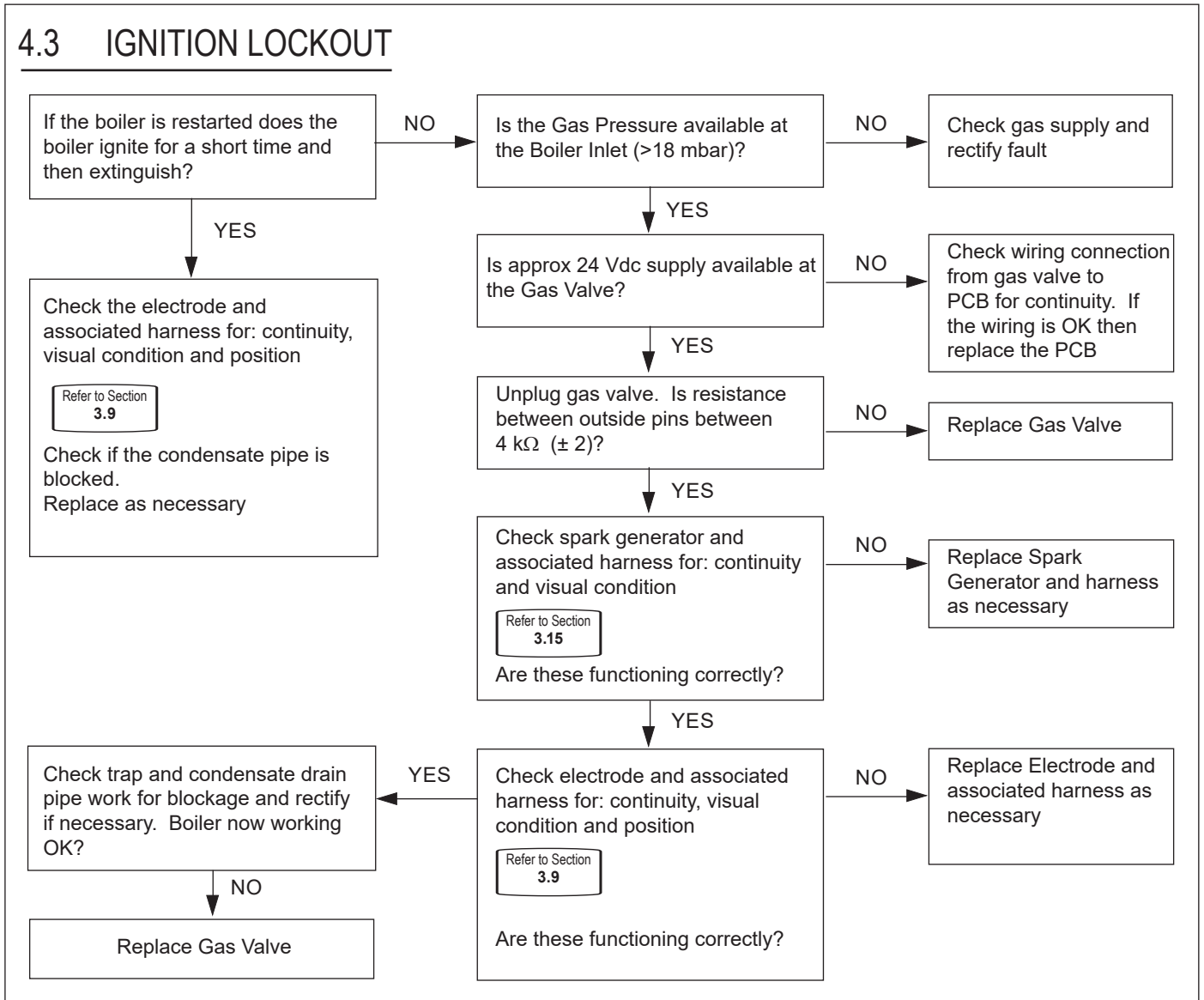


FAULT FINDING

4.2 OVERHEAT LOCKOUT

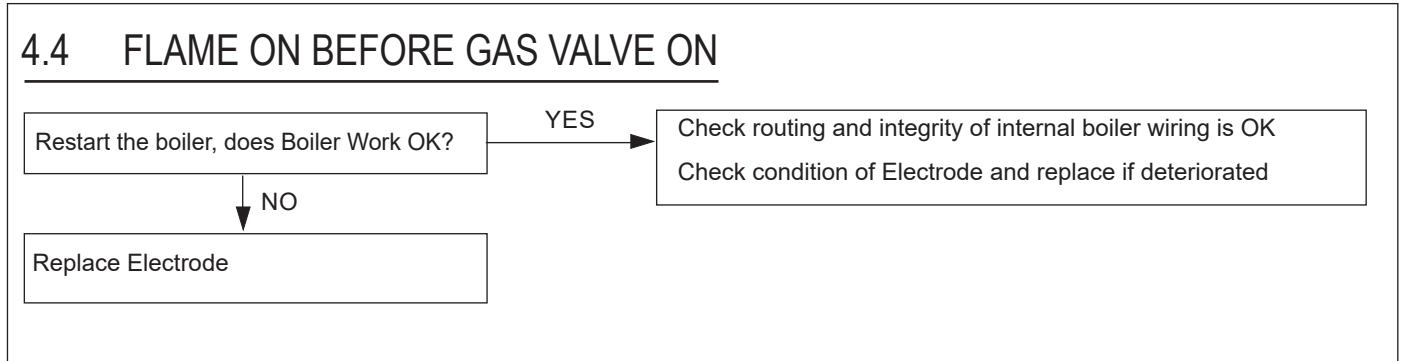


4.3 IGNITION LOCKOUT

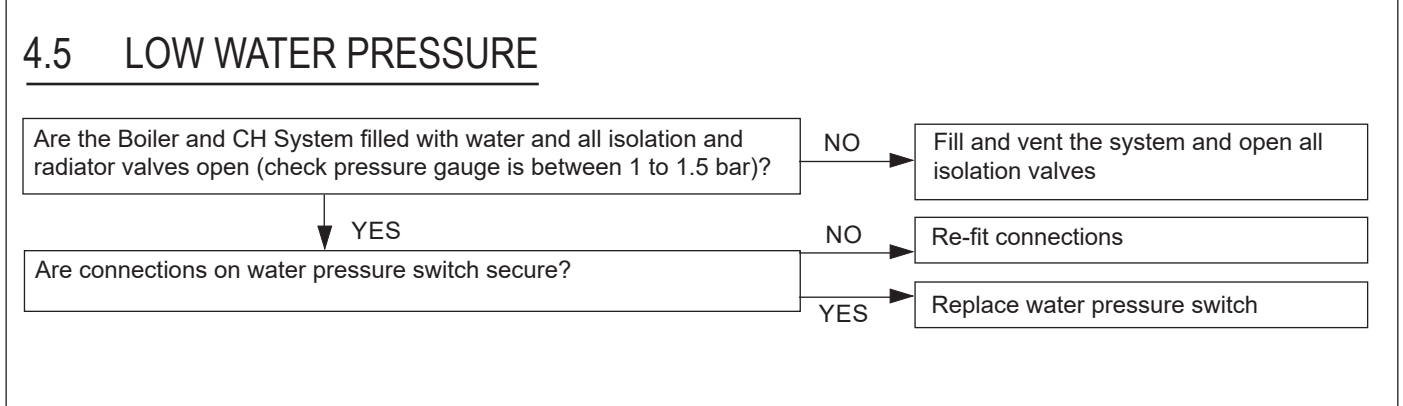


FAULT FINDING

4.4 FLAME ON BEFORE GAS VALVE ON

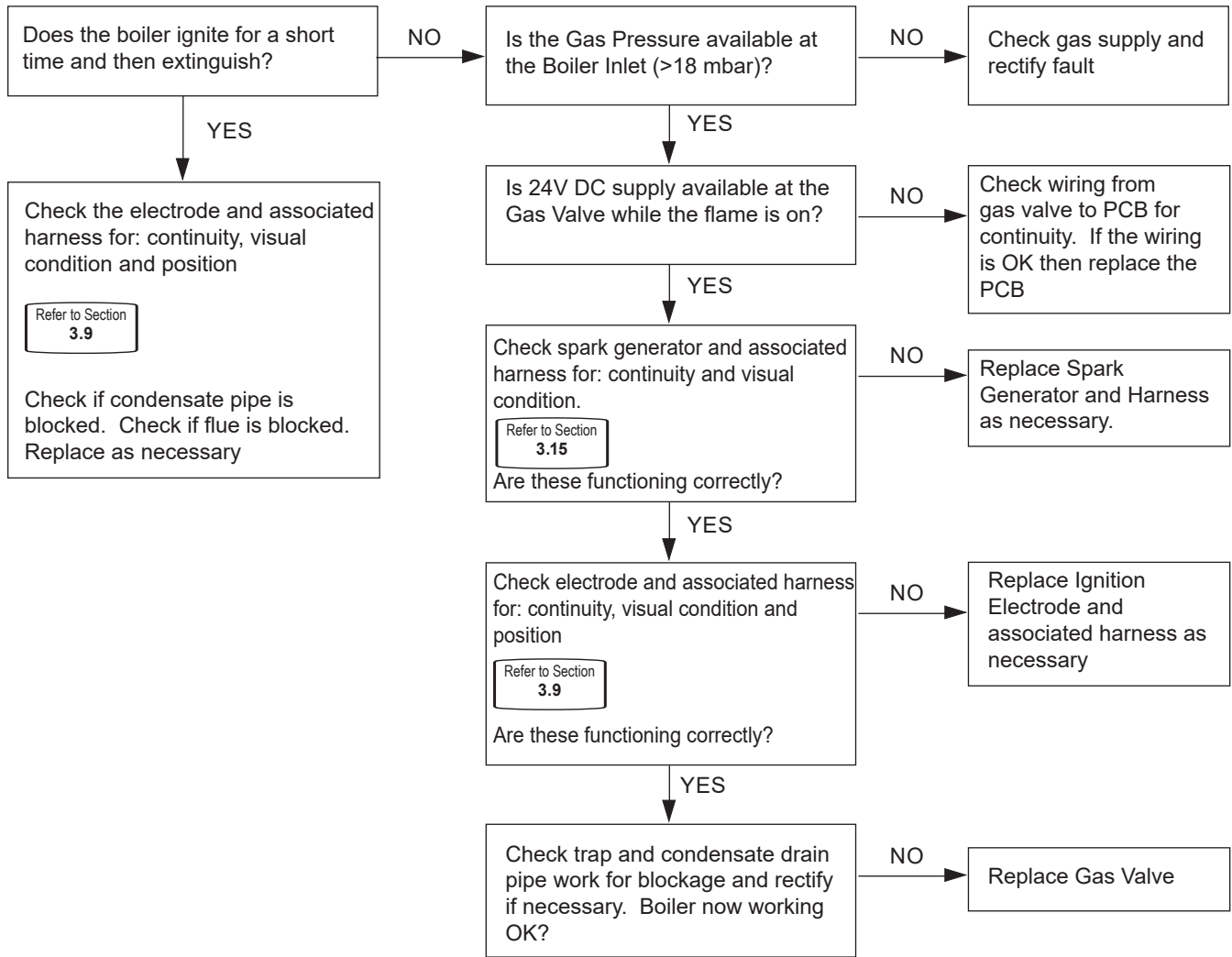


4.5 LOW WATER PRESSURE



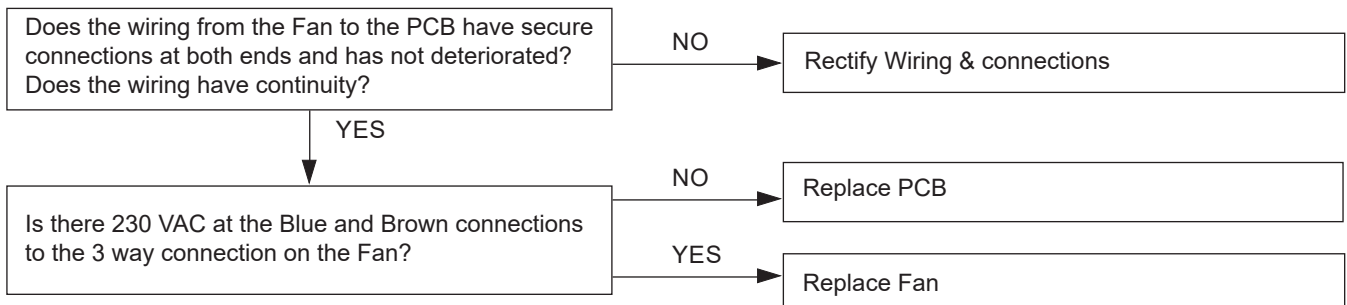
Section 4 - Fault Finding

4.6 FLAME LOSS

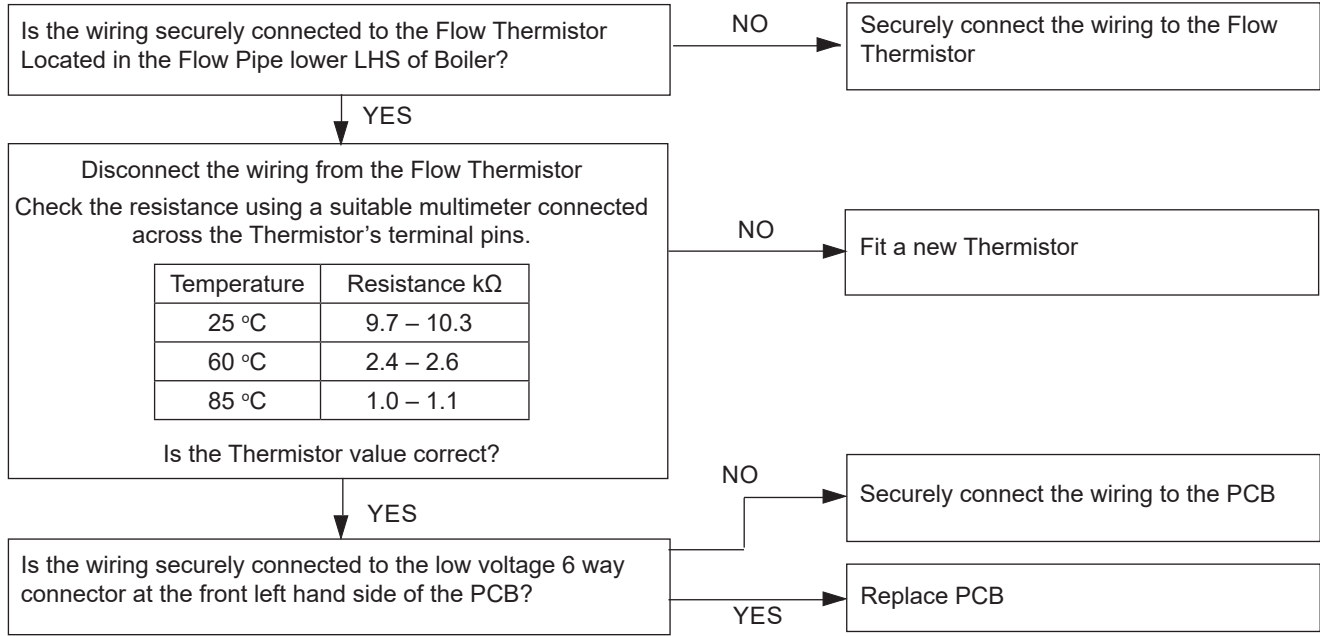


FAULT FINDING

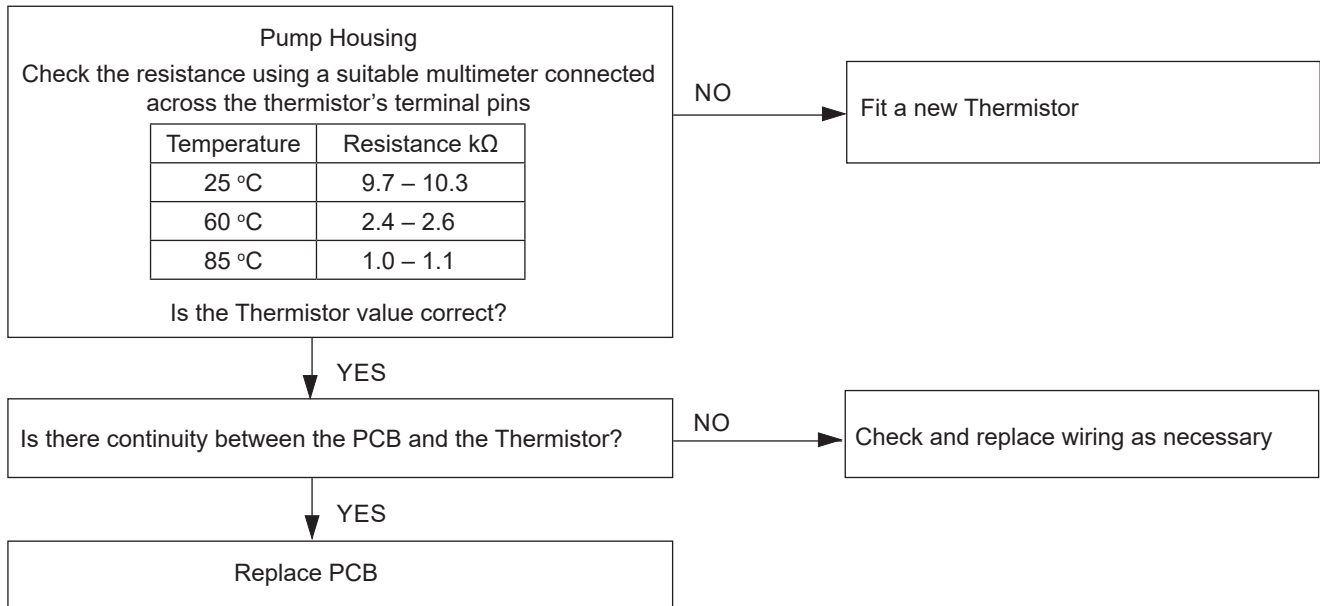
4.7 FAN FAULT



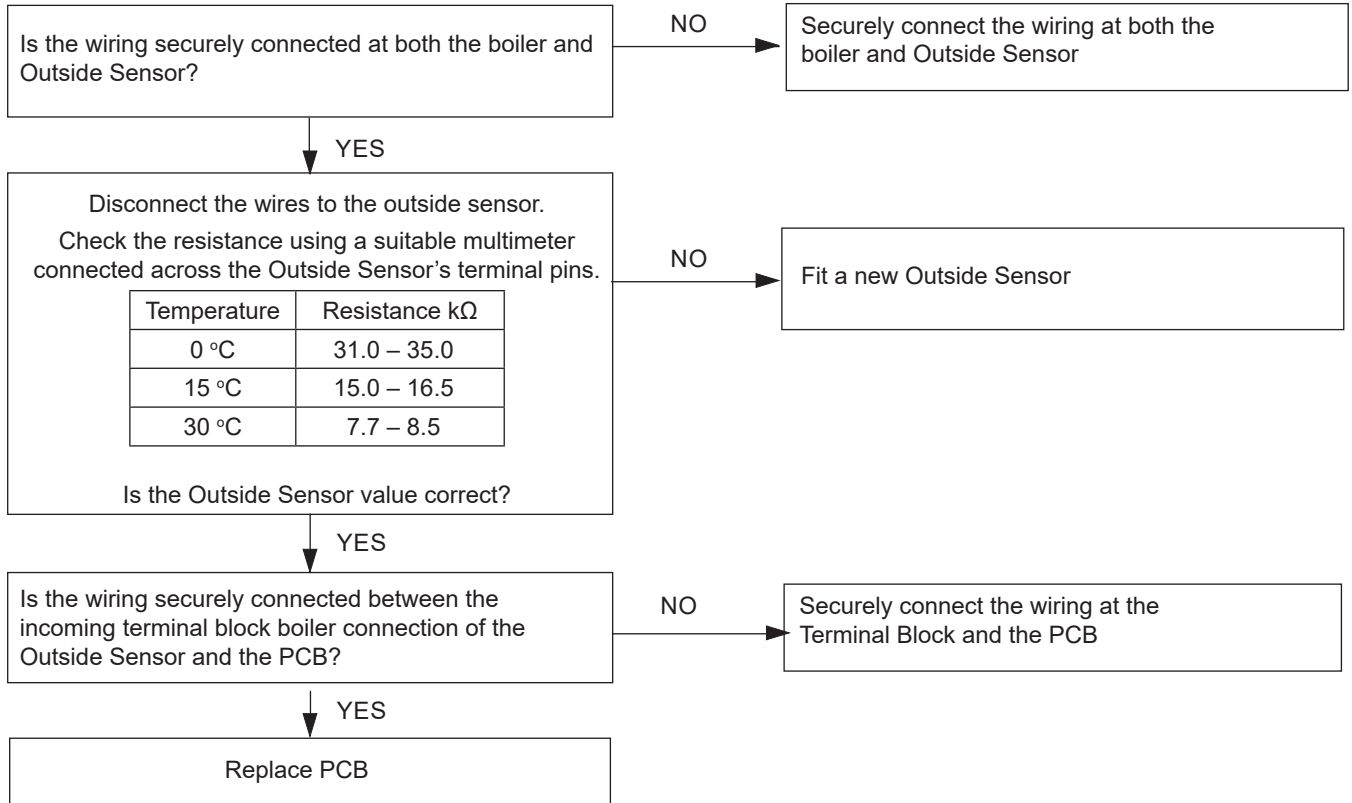
4.8 FLOW THERMISTOR FAULT



4.9 RETURN THERMISTOR FAULT

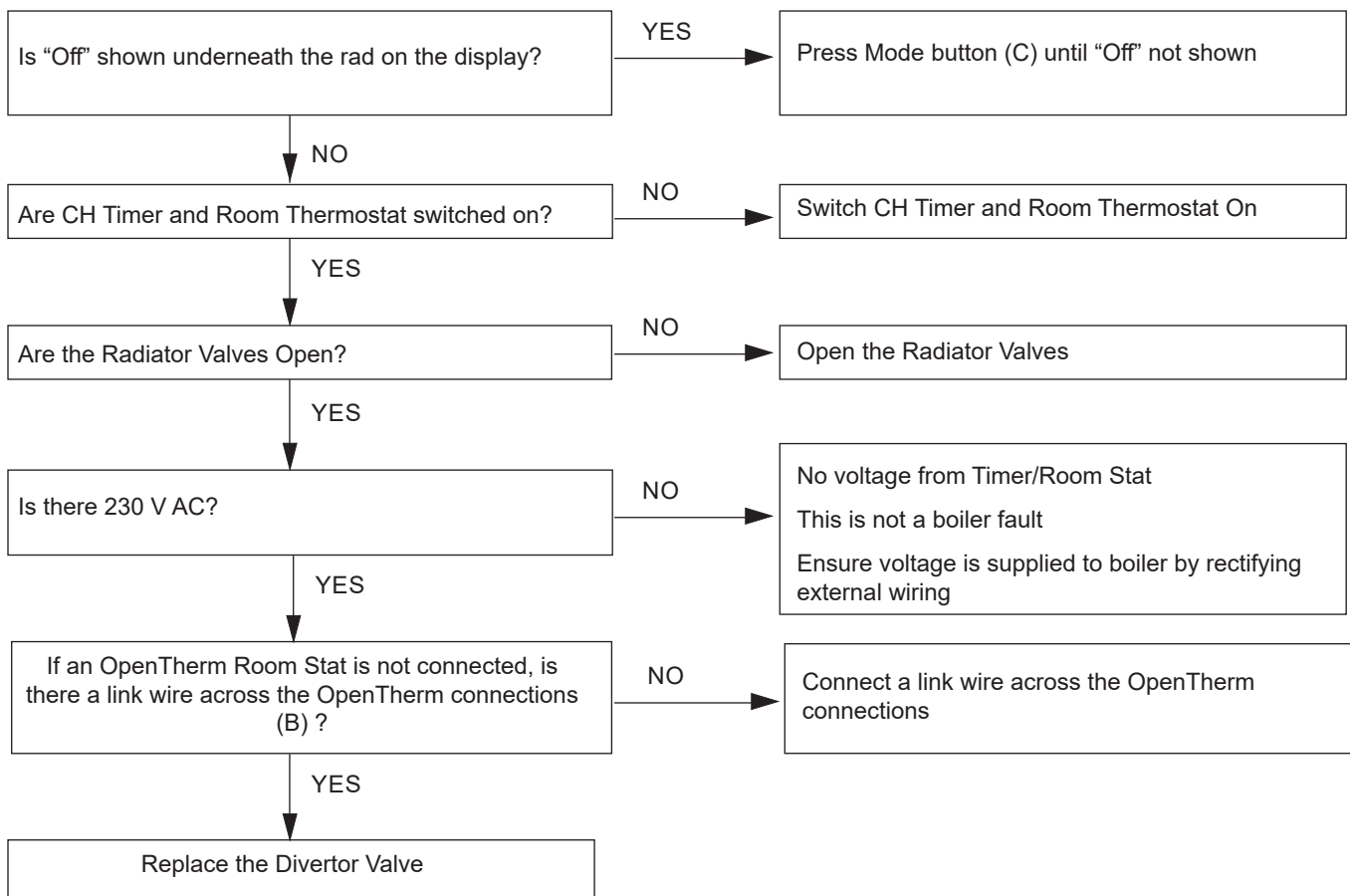


4.10 OUTSIDE SENSOR FAULT

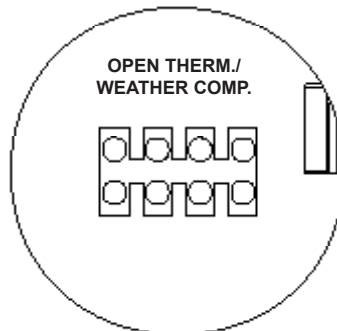
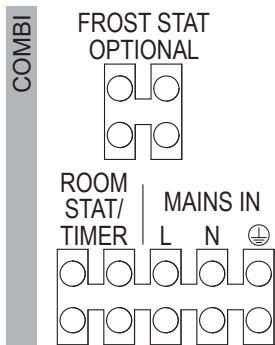
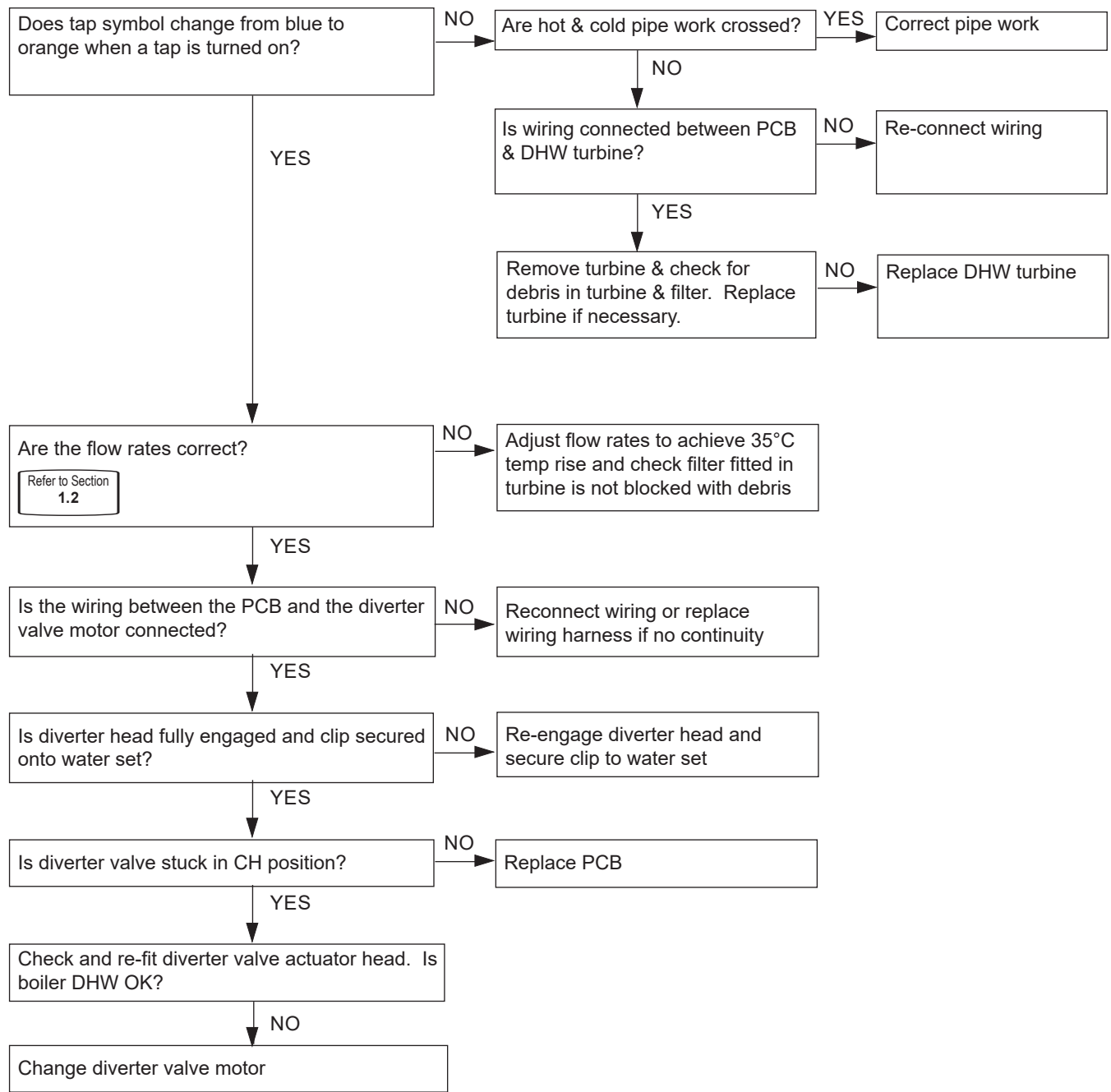


FAULT FINDING

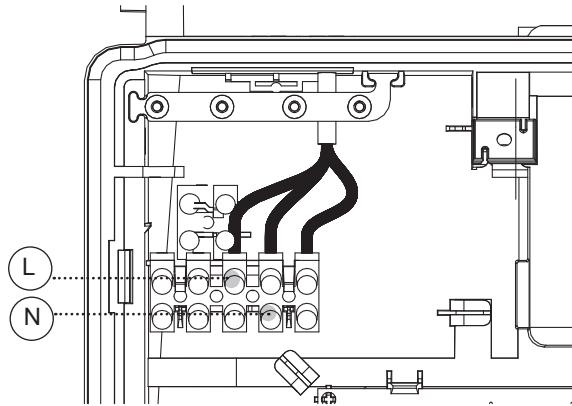
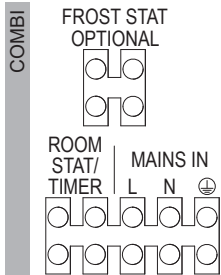
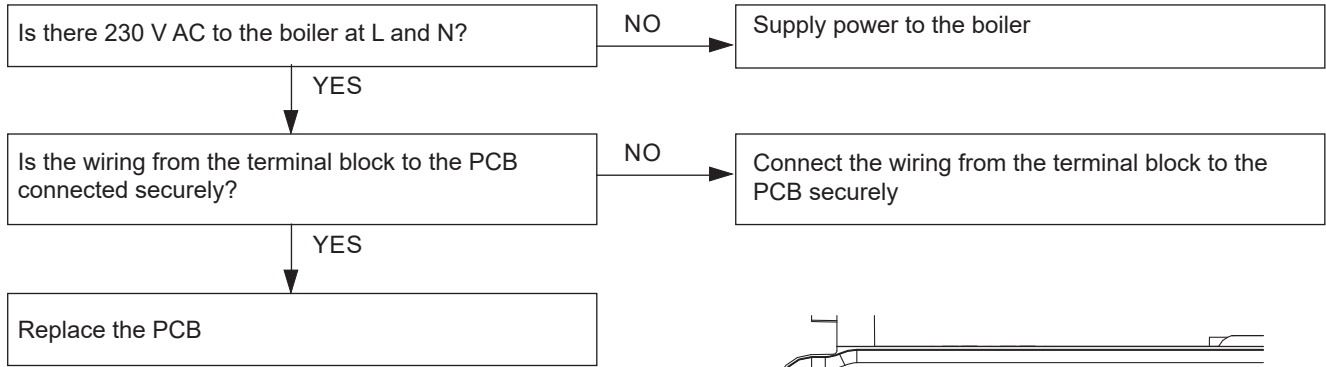
4.11 NO CH OPERATION BUT DHW WORKS OK



4.12 NO DHW BUT CH WORKS OK

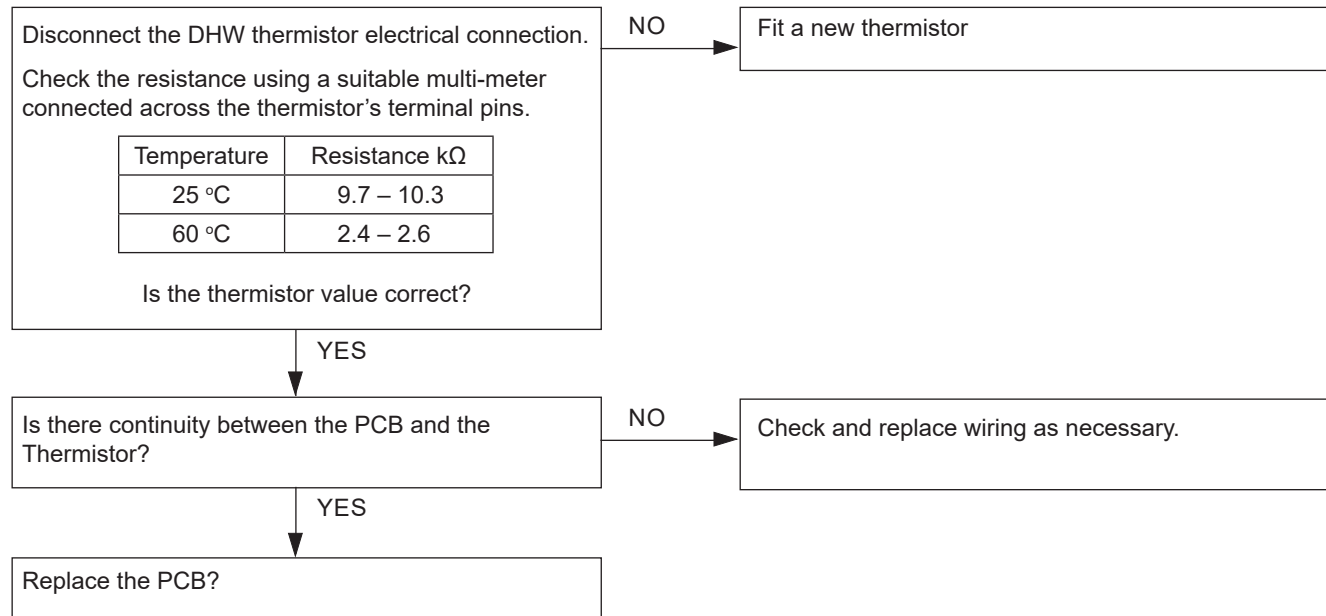


4.13 NO DISPLAY



FAULT FINDING

4.14 DHW THERMISTOR FAULT



Section 5 - Spare Parts

When replacing any part on this appliance use only spare parts that you can be assured conform to the safety and performance specification that we require. DO NOT use reconditioned or copy parts that have not been clearly authorised by Keston.

Failure to do so could affect safety or performance of this appliance.

Comprehensive spares parts information and details of approved Keston Parts Distributors are available on **idealparts.com**



Our Parts team are also available to help with your Keston Spare Parts enquiries on 01482 498665.

When calling, and to ensure we can provide you with the most accurate parts information, please ensure you have the following to hand;

- Boiler Model
- Appliance GC Number
- Boiler Serial Number

Code Of Practice

For the installation, commissioning and servicing of domestic heating and hot water products

Benchmark places responsibilities on both manufacturers and installers.* The purpose is to ensure that customers** are provided with the correct equipment for their needs, that it is installed, commissioned and serviced in accordance with the manufacturer's instructions by competent persons and that it meets the requirements of the appropriate Building Regulations. Installers are required to carry out work in accordance with the following:

Standards of Work

- Be competent and qualified to undertake the work required.
- Install, commission, service and use products in accordance with the manufacturer's instructions provided.
- Ensure that where there is responsibility for design work, the installation is correctly sized and fit for purpose.
- Meet the requirements of the appropriate Building Regulations. Where this involves notifiable work be a member of a Competent Persons Scheme or confirm that the customer has notified Local Authority Building Control (LABC), prior to work commencing.
- Complete all relevant sections of the Benchmark Checklist/Service Record when carrying out commissioning or servicing of a product or system.
- Ensure that the product or system is left in a safe condition and, whenever possible, in good working order.
- Highlight to the customer any remedial or improvement work identified during the course of commissioning or servicing work.
- Refer to the manufacturer's helpline where assistance is needed.
- Report product faults and concerns to the manufacturer in a timely manner.

Customer Service

- Show the customer any identity card that is relevant to the work being carried out prior to commencement or on request.
- Give a full and clear explanation/demonstration of the product or system and its operation to the customer.
- Hand over the manufacturer's instructions, including the Benchmark Checklist, to the customer on completion of an installation.
- Obtain the customer's signature, on the Benchmark Checklist, to confirm satisfactory demonstration and receipt of manufacturer's instructions.
- Advise the customer that regular product servicing is needed, in line with manufacturers' recommendations, to ensure that safety and efficiency is maintained.
- Respond promptly to calls from a customer following completion of work, providing advice and assistance by phone and, if necessary, visiting the customer.
- Rectify any installation problems at no cost to the customer during the installer's guarantee period.



*The use of the word "installer" is not limited to installation itself and covers those carrying out installation, commissioning and/or servicing of heating and hot water products, or the use of supporting products (such as water treatment or test equipment).

**Customer includes householders, landlords and tenants.

Benchmark Commissioning & Warranty Validation Service Record

It is a requirement that the boiler is installed and commissioned to the manufacturers' instructions and the data fields on the commissioning checklist completed in full.

To instigate the boiler warranty the boiler needs to be registered with the manufacturer within one month of the installation. The warranty rests with the end-user (consumer), and they should be made aware it is ultimately their responsibility to register with the manufacturer, within the allotted time period.

It is essential that the boiler is serviced in line with the manufacturers' recommendations, at least annually. This must be carried out by a competent Gas Safe registered engineer. The service details should be recorded on the Benchmark Service and Interim Boiler Work Record and left with the householder. Failure to comply with the manufacturers' servicing instructions and requirements will invalidate the warranty.



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This Commissioning Checklist is to be completed in full by the competent person who commissioned the boiler as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference.

Failure to install and commission according to the manufacturers' instructions and complete this Benchmark Commissioning Checklist will invalidate the warranty. This does not affect the customer's statutory rights.

All installations in England and Wales must be notified to Local Authority Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer.

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Section 6 - Benchmark to Commissioning

GAS BOILER SYSTEM COMMISSIONING CHECKLIST & WARRANTY VALIDATION RECORD

Address:									
Boiler make and model:									
Boiler serial number:									
Commissioned by (PRINT NAME):					Gas Safe registration number:				
Company name:					Telephone number:				
Company email:					Company address:				
								Commissioning date:	
Heating and hot water system complies with the appropriate Building Regulations? Yes <input type="checkbox"/>									
Optional: Building Regulations Notification Number (if applicable):									
Time, temperature control and boiler interlock provided for central heating and hot water Yes <input type="checkbox"/>									
Boiler Plus requirements (tick the appropriate box(s))									
Boiler Plus option chosen for combination boiler in ENGLAND					Weather compensation		Smart thermostat with automisation and optimisation		
					Load compensation		Flue Gas Heat Recovery		
Time and temperature control to hot water		Cylinder thermostat and programmer/timer				Combination boiler			
Zone valves		pre-existing		Fitted		Not required			
Thermostatic radiator valves		pre-existing		Fitted		Not required			
Automatic bypass to system		pre-existing		Fitted		Not required			
Underfloor heating		pre-existing		Fitted		Not required			
Water quality									
The system has been flushed, cleaned and a suitable inhibitor applied upon final fill, in accordance with BS7593 and boiler manufacturers' instructions								Yes <input type="checkbox"/>	
What system cleaner was used?					Brand:		Product:		
What inhibitor was used?					Brand:		Product:		
Primary water system filter		pre-existing		Fitted		Not required			
CENTRAL HEATING MODE measure and record (as appropriate)									
Gas rate (for combination boilers complete DHW mode gas rate)				m ³ /hr		or		ft ³ /hr	
Central heating output left at factory settings?				Yes <input type="checkbox"/>				No <input type="checkbox"/>	
If no, what is the maximum central heating output selected?				kW					
Dynamic gas inlet pressure				mbar					
Central heating flow temperature				°C					
Central heating return temperature				°C					
System correctly balanced/rebalanced?				Yes <input type="checkbox"/>					
COMBINATION BOILERS ONLY									
Is the installation in a hard water area (above 200ppm)?				Yes <input type="checkbox"/>		No <input type="checkbox"/>			
Water scale reducer/softener		pre-existing		Fitted		Not required			
What type of scale reducer/softener has been fitted?				Brand:		Product:			
Water meter fitted?				Yes <input type="checkbox"/>		No <input type="checkbox"/>			
If yes- DHW expansion vessel		pre-existing		Fitted		Not required			
Pressure reducing valve		pre-existing		Fitted		Not required			
DOMESTIC HOT WATER MODE Measure and record									
Gas rate				m ³ /hr		or		ft ³ /hr	
Dynamic gas inlet pressure at maximum rate				mbar					
Cold water inlet temperature				°C					
Hot water has been checked at all outlets				Yes <input type="checkbox"/>		Temperature		°C	
CONDENSATE DISPOSAL									
The condensate drain has been installed in accordance with the manufacturers' instructions and/or BS5546/BS6798								Yes <input type="checkbox"/>	
Point of termination				Internal <input type="checkbox"/>		External (only where internal termination impractical) <input type="checkbox"/>			
Method of disposal				Gravity <input type="checkbox"/>		Pumped <input type="checkbox"/>			
ALL INSTALLATIONS									
Record the following		At max rate:		CO ppm		CO ₂ %		CO/CO ₂ Ratio	
		At min rate (where possible)		CO ppm		CO ₂ %		CO/CO ₂ Ratio	
Where possible, has a flue integrity check been undertaken in accordance with manufacturers' instructions, and readings are correct?								Yes <input type="checkbox"/>	
The operation of the boiler and system controls have been demonstrated to and understood by the customer								Yes <input type="checkbox"/>	
The manufacturers' literature, including Benchmark Checklist and Service Record, has been explained and left with the customer								Yes <input type="checkbox"/>	
Commissioning Engineer's signature									
Customer's signature (To confirm satisfactory demonstration and receipt of manufacturers' literature)									

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Section 6 - Benchmark to Commissioning

SERVICE & INTERIM BOILER WORK RECORD

It is recommended that your boiler and heating system are regularly serviced and maintained, in line with manufacturers' instructions, and that the appropriate service / interim work record is completed.

Service provider

When completing a service record (as below), please ensure you have carried out the service as described in the manufacturers' instructions. Always use the manufacturers' specified spare parts.

SERVICE/INTERIM WORK ON BOILER <small>delete as appropriate</small>					Date:	
Engineer name:		Company name:				
Telephone N°:		Gas Safe registration N°:				
Max rate	CO	ppm	CO ₂	%	CO/CO ₂	
Min rate	CO	ppm	CO ₂	%	CO/CO ₂	
Where possible, has a flue integrity check been undertaken in accordance with manufacturers' instructions, and readings are correct?*					yes	
Gas rate:	m ³ /h	OR	ft ³ /h			
Were parts fitted? <small>delete as appropriate</small>		Yes	No			
Parts fitted:						
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and boiler manufacturers' instructions. *					yes	n/a
Comments:						
Signature:						

*A System inhibitor efficacy test is required on every annual service in accordance with the manufacturers' instructions and BS 7593. It is only acceptable to not have undertaken this if the service engineers attendance visit was in between annual services to attend a non-water facing component.

SERVICE/INTERIM WORK ON BOILER <small>delete as appropriate</small>					Date:	
Engineer name:		Company name:				
Telephone N°:		Gas Safe registration N°:				
Max rate	CO	ppm	CO ₂	%	CO/CO ₂	
Min rate	CO	ppm	CO ₂	%	CO/CO ₂	
Where possible, has a flue integrity check been undertaken in accordance with manufacturers' instructions, and readings are correct?*					yes	
Gas rate:	m ³ /h	OR	ft ³ /h			
Were parts fitted? <small>delete as appropriate</small>		Yes	No			
Parts fitted:						
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and boiler manufacturers' instructions. *					yes	n/a
Comments:						
Signature:						

*A System inhibitor efficacy test is required on every annual service in accordance with the manufacturers' instructions and BS 7593. It is only acceptable to not have undertaken this if the service engineers attendance visit was in between annual services to attend a non-water facing component.

SERVICE/INTERIM WORK ON BOILER <small>delete as appropriate</small>					Date:	
Engineer name:		Company name:				
Telephone N°:		Gas Safe registration N°:				
Max rate	CO	ppm	CO ₂	%	CO/CO ₂	
Min rate	CO	ppm	CO ₂	%	CO/CO ₂	
Where possible, has a flue integrity check been undertaken in accordance with manufacturers' instructions, and readings are correct?*					yes	
Gas rate:	m ³ /h	OR	ft ³ /h			
Were parts fitted? <small>delete as appropriate</small>		Yes	No			
Parts fitted:						
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and boiler manufacturers' instructions. *					yes	n/a
Comments:						
Signature:						

*A System inhibitor efficacy test is required on every annual service in accordance with the manufacturers' instructions and BS 7593. It is only acceptable to not have undertaken this if the service engineers attendance visit was in between annual services to attend a non-water facing component.

SERVICE/INTERIM WORK ON BOILER <small>delete as appropriate</small>					Date:	
Engineer name:		Company name:				
Telephone N°:		Gas Safe registration N°:				
Max rate	CO	ppm	CO ₂	%	CO/CO ₂	
Min rate	CO	ppm	CO ₂	%	CO/CO ₂	
Where possible, has a flue integrity check been undertaken in accordance with manufacturers' instructions, and readings are correct?*					yes	
Gas rate:	m ³ /h	OR	ft ³ /h			
Were parts fitted? <small>delete as appropriate</small>		Yes	No			
Parts fitted:						
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and boiler manufacturers' instructions. *					yes	n/a
Comments:						
Signature:						

*A System inhibitor efficacy test is required on every annual service in accordance with the manufacturers' instructions and BS 7593. It is only acceptable to not have undertaken this if the service engineers attendance visit was in between annual services to attend a non-water facing component.

SERVICE/INTERIM WORK ON BOILER <small>delete as appropriate</small>					Date:	
Engineer name:		Company name:				
Telephone N°:		Gas Safe registration N°:				
Max rate	CO	ppm	CO ₂	%	CO/CO ₂	
Min rate	CO	ppm	CO ₂	%	CO/CO ₂	
Where possible, has a flue integrity check been undertaken in accordance with manufacturers' instructions, and readings are correct?*					yes	
Gas rate:	m ³ /h	OR	ft ³ /h			
Were parts fitted? <small>delete as appropriate</small>		Yes	No			
Parts fitted:						
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and boiler manufacturers' instructions. *					yes	n/a
Comments:						
Signature:						

*A System inhibitor efficacy test is required on every annual service in accordance with the manufacturers' instructions and BS 7593. It is only acceptable to not have undertaken this if the service engineers attendance visit was in between annual services to attend a non-water facing component.

SERVICE/INTERIM WORK ON BOILER <small>delete as appropriate</small>					Date:	
Engineer name:		Company name:				
Telephone N°:		Gas Safe registration N°:				
Max rate	CO	ppm	CO ₂	%	CO/CO ₂	
Min rate	CO	ppm	CO ₂	%	CO/CO ₂	
Where possible, has a flue integrity check been undertaken in accordance with manufacturers' instructions, and readings are correct?*					yes	
Gas rate:	m ³ /h	OR	ft ³ /h			
Were parts fitted? <small>delete as appropriate</small>		Yes	No			
Parts fitted:						
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and boiler manufacturers' instructions. *					yes	n/a
Comments:						
Signature:						

*A System inhibitor efficacy test is required on every annual service in accordance with the manufacturers' instructions and BS 7593. It is only acceptable to not have undertaken this if the service engineers attendance visit was in between annual services to attend a non-water facing component.

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FLOWCHART FOR CO LEVEL AND COMBUSTION RATIO CHECK ON COMMISSIONING A CONDENSING BOILER

Important Preliminary Information on Checks

The air gas ratio valve is factory-set and must not be adjusted DURING COMMISSIONING.

If the boiler requires conversion to operate with a different gas family (e.g. conversion from natural gas to LPG) separate guidance is provided with the conversion kit supplied and this must be followed.

PRIOR TO CO LEVEL AND COMBUSTION RATIO CHECK

The installation instructions must have been followed, gas type verified and gas supply pressure / gas rate checked as required prior to commissioning.

As part of the installation process, ESPECIALLY WHERE A FLUE HAS BEEN FITTED BY PERSONS OTHER THAN THE BOILER INSTALLER, visually check the integrity of the whole flue system to confirm that all components are correctly assembled, fixed and supported. Check that maximum flue lengths have not been exceeded and all guidance has been followed (e.g. Gas Safe Register Technical Bulletin (TB) 008 where chimney/flues are in voids).

The ECGA should be of the correct type, as specified by BS EN 50379-3:2012.

Prior to its use, the ECGA should have been maintained and calibrated as specified by the manufacturer. The installer must have the relevant competence for use of the analyser.

Check and zero the analyser IN FRESH AIR in accordance with the analyser manufacturer's instructions.

KEY:

CO = carbon monoxide

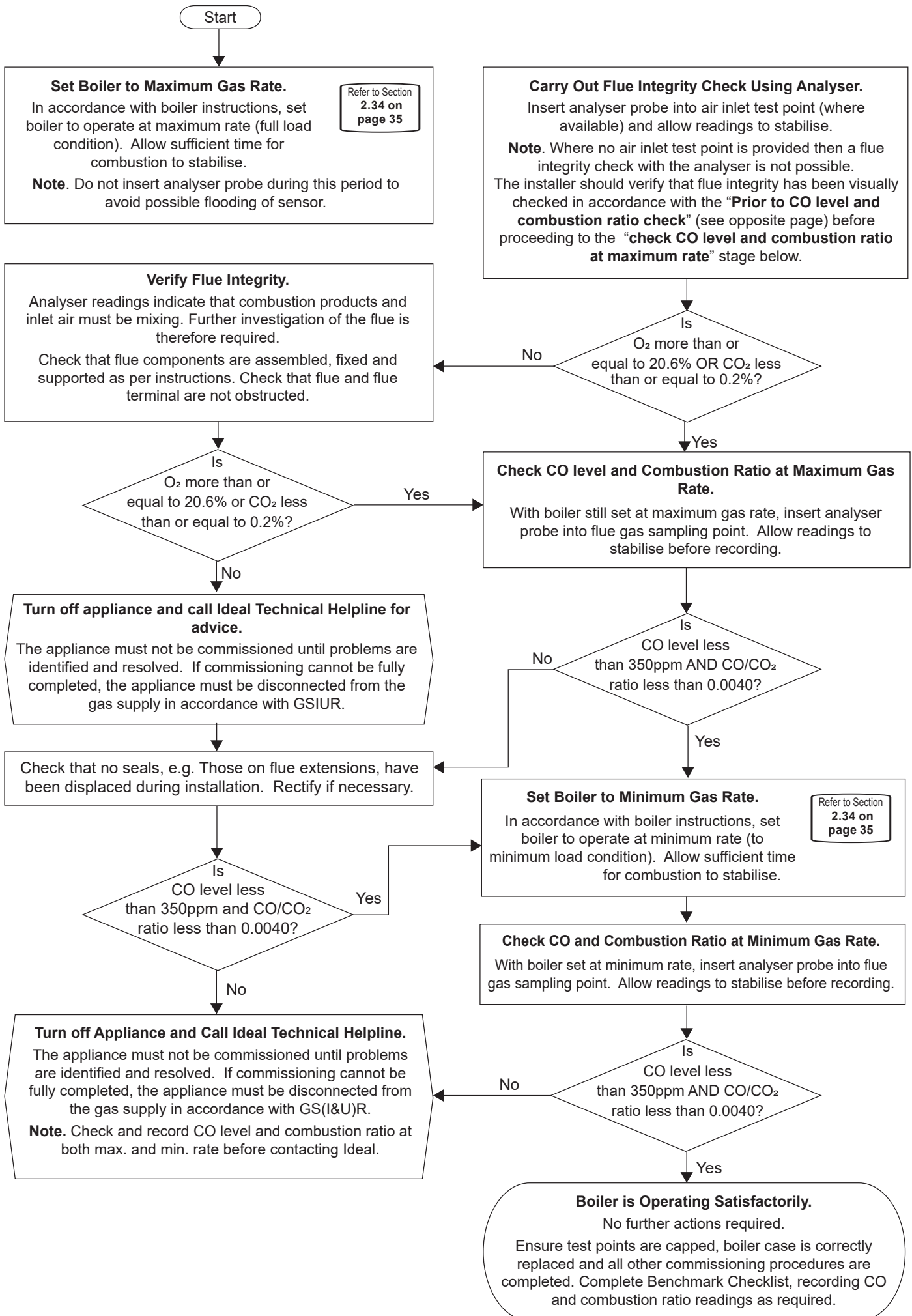
CO₂ = carbon dioxide

O₂ = oxygen

Combustion Ratio = The CO reading measured in ppm divided by the CO₂ reading first converted to ppm

ppm = parts per million

GS(I&U)R = Gas Safety (Installation and Use) Regulations





At Keston we take our environmental impact seriously, therefore when installing any Keston by Ideal Heating product please make sure to dispose of any previous appliance in an environmentally conscious manner. Households can contact their local authority to find out how. See <https://www.gov.uk/managing-your-waste-an-overview> for guidance on how to efficiently recycle your business waste.

Technical Training

Our Expert Academy offer a range of training options designed and delivered by our experts in heating. For details please visit: expert-academy.co.uk

Ideal Boilers Ltd., pursues a policy of continuing improvement in the design and performance of its products. The right is therefore reserved to vary specification without notice.

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