Keston
BY IDEAL HEATING

INSTALLATION & SERVICING

HEAT 2
45 55 45P 55P

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.

December 2020
UIN 220446 A03

ERP DATA

			MODEL			
	SYMBOL	**UNITS**	**45**	**55**	**45P**	**55P**
Condensing Boiler	n/a	n/a	yes	yes	yes	yes
Low Temperature Boiler	n/a	n/a	no	no	no	no
B1 Boiler	n/a	n/a	no	no	no	no
Cogeneration Space Heater	n/a	n/a	no	no	no	no
Equipped with a Supplementary Heater	n/a	n/a	no	no	no	no
Combination Heater	n/a	n/a	no	no	no	no
Nominal Heat Output for Space Heating						
Full Load	P_4	kW	45	55	45	55
Part Load	P_1	kW	14.6	18	14.6	18
Auxiliary Electricity Consumption						
Full Load	el_{max}	kW	0.135	0.128	0.113	0.130
Part Load	el_{min}	kW	0.03	0.026	0.026	0.024
Standby	P_{SB}	kW	0.009	0.009	0.002	0.002
Seasonal Space Heating Energy Efficiency						
Full Load	η_4	%	88.7	89.5	88.7	89.5
Part Load	η_1	%	97.7	98.5	97.7	98.5
Standby Loss	P_{stby}	kW	0.08	0.11	0.073	0.082
Ignition	P_{ign}	kW	0	0	0	0
Emissions	NO_x	mg/kWh	28.5	35.4	43.1	48.4
Annual Energy Consumption	Q_{HE}	GJ	139	170	137	167
Sound Power Level, Indoors	L_{WA}	dB	60.6	60.6	64.2	64.2

PRODUCT FICHE

KESTON HEAT2 BOILER
Keston Heating
ERP DATA

	SYMBOL	UNITS	MODEL			
			45	45P	55	55P
Condensing boiler			Yes			
Seasonal Space heating efficiency class			A			
Rated heat output		kW	45	45	55	55
Seasonal space heating energy efficiency	η_{son}	%	93*	93*	93*	93*
Annual energy consumption	Q_{HE}	GJ	139	137	170	167
Sound power level, indoors	L_{WA}	dB	60.6	60.6	64.2	64.2

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

Solar Contribution (from fiche of solar device)

Collector Size (in m^2)	Tank Volume (in m^3)	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

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

CONTENTS

Table 1 Performance Data (Natural Gas & Propane)

Keston Heat2 Model			45	45P	55	55P
Boiler Output (non-condensing) Mean 70°C	Max	kW	42.6	42.6	52.1	52.1
	Min	kW	12	12	12	12
Boiler Output (condensing) Mean 40°C	Max	kW	45	45	55	55
	Min	kW	12.7	12.7	12.7	12.7
Boiler Input Max Rate	Nett	kW	43.2	43.2	52.7	52.7
	Gross	kW	47.9	47.9	58.5	58.5
Boiler Input Min Rate	Nett	kW	12.2	12.2	12.2	12.2
	Gross	kW	13.5	13.5	13.5	13.5
Gas Rate	Max Rate	m^3/hr	4.56	1.78	5.57	2.18
Flue Gas Flow Rate	Max Rate	m^3/hr	65.8	68.03	80.6	83.71
CO_2 (±0.5%)	Max Rate	%	9.5	10.8	9.7	10.7
	Min Rate	%	8.7	9.9	8.7	9.9
DB			60.6	60.6	64.2	64.2
NO_x	Weighted	mg/kWh	28.5	43.1	35.4	48.4
Efficiency	Seasonal	%	96	96	96.7	96.7
	*SEDBUK 2009	%	89.2	89.2	89.6	89.6

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

Table 2 General Data

Keston Heat2 Model		45P	45	55	55P
Gas Supply		3P-G31-37mbar	2H – G20 – 20mbar		3P - G31 - 37mbar
Gas Supply Connection		G 3/4			
Flow Connection		G1 1/4			
Return Connection		G1 1/4			
Max Pressure (sealed sys)	Bar (psi)	6.0 (87.0)			
Maximum Static Head	m	61.0			
Electricity Supply		230V - 50Hz			
Fuse Rating	A	4.0			
Power Consumption	W	180	180	241	241
IP Rating		IP20			
Nominal flue dia - Concent.		Twin 50mm			
Condensate Drain		25			
Water Content	L	5.0			
Packaged Weight	Kg	66.75			
Unpackaged Weight	Kg	60.10			

Note.

Gas consumption is calculated using the following calorific values at 15°C and 1013.25 mbar.

G31 Gross CV - 95.7 MJ/m^3

G20 Gross CV - 37.8 MJ/m^3

G31 Gross CV - 2567 Btu/ft^3

G20 Gross CV - 1014 Btu/ft^3

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

For ft/h^3 divide the gross heat input (Btu/h) by the gross C.V. of the gas (Btu/ft^3).

For m^3/h multiply l/s by 3.6.

HEALTH & SAFETY DOCUMENT NO. 635

The electricity at work regulations, 1989. The manufacturer's notes must NOT be taken, in any way, as overriding statutory obligations.

IMPORTANT. These appliances are CE certified for safety and performance. It is, therefore, important that no external control devices, e.g. flue dampers, economisers etc., are directly connected to these appliances unless covered by these Installation and Servicing Instructions or as otherwise recommended by **Keston** in writing. If in doubt please enquire.

Any direct connection of a control device not approved by **Keston** could invalidate the certification and the normal appliance warranty. It could also infringe the Gas Safety Regulations and the above regulations.

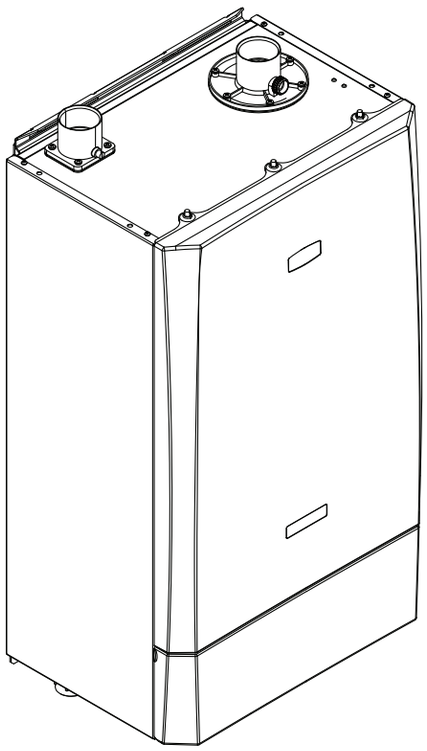
KESTON HEAT2

45, 55

45P, 55P

Natural Gas & Propane

Destination Countries: GB, IE, RO



CE No. 701341

Boiler size	G.C. Appliance No. (Benchmark No.)
45	41-930-50
55	41-930-51
45P	41-930-52
55P	41-930-53

Key to symbols

IE = Ireland

GB = United Kingdom

RO = Romania

PMS = Maximum operating pressure of water

B23 = An appliance intended to be connected to a flue which evacuates the products of combustion to the outside of the room containing the boiler. The combustion air is drawn directly from the room. The fan is up stream of the combustion chamber. ***Note: Air Inlet Kit must be used.***

C13 = A room sealed boiler which is connected via its ducts to a horizontally installed terminal that terminates within a common pressure zone***.***

C53 = A room sealed boiler which is connected via its separate ducts to two terminals that may terminate in zones of different pressure.

I2H = An appliance designed for use on 2nd Family gases.

I3P = An appliance designed for use on 3rd family gases.

II2H3P = An appliance designed for use on 2nd and 3rd Family gases.

NOTE TO THE INSTALLER: LEAVE THESE INSTRUCTIONS ADJACENT TO THE GAS METER.

1. GENERAL

1.1 INTRODUCTION

The boilers are fully automatically controlled, wall mounted, fanned, super efficient condensing appliances.

The condensing boilers can be installed either on the wall or into a prefabricated floor mounted frame.

The boilers are suitable for use with a room sealed flue or open flue application.

Through a sophisticated control system combined with premix burner arrangement the boilers are capable of high seasonal efficiencies of >96% and low emissions.

These boilers are fitted with an integral flue non-return valve.

These boilers are certified to meet the requirements of the EC Gas Appliance Directive, Boiler Efficiency Directive, EMC and Low Voltage Directive.

Note. *These boilers cannot be used on systems that include gravity circulation.*

The boiler are suitable for connection to fully pumped, open vented or sealed water systems. Adequate arrangements for completely draining the system by provision of drain cocks MUST be provided in the installation pipework.

1.2 OPTIONAL EXTRA KITS

SYSTEM

- Frame and Header Kits & accessories

CONTROLS

- Outside temperature sensor
- DHW tank sensor/Flow sensor/Header sensor. Pocket version
- DHW tank sensor/Flow sensor/Header sensor. Strap-on version
- Room temperature sensor
- OpenTherm room control
- Safety interlock kit
- Cascade, first boiler
- Cascade, subsequent boiler
- Extension module
- Modulating sequencer kit
- Sequencer, OpenTherm room control
- 6 relay zone expansion kit
- Sequencer and zone expansion pocket sensor, DHW or flow temperature
- RDG, remote diagnostic gateway
- OpenTherm to Modbus gateway
- OpenTherm to BACnet gateway
- OpenTherm to LONworks gateway
- OpenTherm to KNX gateway

1.3 SAFETY

Current Gas Safety (Installation and Use) Regulations or rules in force

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

In GB, the installation must be carried out by a suitably qualified Gas Safe registered engineer or in IE by a competent person. It must be carried out in accordance with the relevant requirements of the:

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

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

In IE, the installation must be carried out by a Competent Person and installed in accordance with the current edition of I.S.813 “Domestic Gas Installations” or I.S. 820 “Non-Domestic Gas Installations” as appropriate, the current Building Regulations and reference should be made to the current ETCI rules for electrical installation.

The boilers have been tested and certified to;

BSEN 15502-1, BSEN 15502-2, BSEN 15502-2-1, BSEN 60335-1, 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 Codes of Practice:

BSEN 60529	IPX4D using test method: Figure 4 - *Test device to verify protection against spraying and splashing water; second characteristic numerals 3 and 4 (oscillating tube)*.
BS. 6891	Installation of low pressure gas pipework of up to 28mm (R1) in domestic premises (2nd family gas).
BS. 5440	Inst. and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70kW net (1st, 2nd and 3rd family gases).
Part 1	Specification for installation of flues.
Part 2	Specification for installation and maintenance of ventilation for gas appliances.
BS. 6798	Installation and maintenance of gas fired hot water boilers of rated input not exceeding 70kW net.
BS. 6880	Low temperature hot water heating systems of output greater than 45kW.
Part 1	Fundamental and design considerations.
Part 2	Selection of equipment.
Part 3	Installation, commissioning and maintenance.
BSEN.12828:2012	Heating Systems in buildings: Design for water based systems.
BSEN.12831:2017	Heating Systems in buildings: Method for calculation of the design heat load.
BSEN.13831	Specification for: Expansion vessels using an internal diaphragm, for sealed hot water heating systems.
BSEN.14336:2004	Heating Systems in buildings: Installation and commissioning of water based heating systems.
IGEM/UP/1	Soundness testing and purging of industrial and commercial gas installation.
IGEM/UP/2	Gas installation pipework, boosters and compressors on industrial and commercial premises.
IGEM/UP/10	Installation of gas appliances in industrial and commercial premises.

ICOM Water treatment and conditioning of commercial heating systems guide.

Where reference is made throughout these instructions I.S.813:2002 “Domestic Gas Installations” reference should also be made to I.S.820:2000 “Non-Domestic Gas Installations” as applicable.

1.4 SAFE HANDLING

This boiler will 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.

1.5 SAFE HANDLING OF SUBSTANCES

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

1.6 LOCATION OF BOILER

The boiler must be installed on a flat and vertical wall capable of adequately supporting the weight of the boiler and any ancillary equipment or on a boiler frame supplied in kit form.

The wall must be 90º (±5º) from the perpendicular. This is to allow safe operation of the integral flue non-return valve.

The boiler must not be fitted outside.

1.7 GAS SUPPLY

IMPORTANT

Ensure all gas valve connections are gas tight with a gas soundness check up to the gas multi-functional control valve.

The local gas supplier should be consulted, at the installation planning stage, in order to establish the availability of an adequate supply of gas. An existing service pipe must NOT be used without prior consultation with the local gas supplier.

A gas meter can only be connected by the local gas supplier or by a suitably qualified Gas Safe registered engineer or in IE by a competent person.

An existing meter should be checked, preferably by the gas supplier, to ensure that the meter is adequate to deal with the rate of gas supply required. A minimum working gas pressure of 17.5mbar MUST be available at the boiler inlet for Natural gas and 32mbar for Propane.

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

The complete installation MUST be tested for gas soundness and purged in accordance with the appropriate standards listed on page 8.

1.8 FLUE INSTALLATION

Individual air supply and flue outlet pipes are used. The material used for the flue outlet and the air intake systems, must be muPVC (PVC-C) to BS 5255. In addition the flue outlet and air intake pipework must be marked BSEN 1566-1 and the fittings must be marked BSEN 1329. Marley muPVC Solvent Weld System (50mm), Polypipe System 2000 muPVC Solvent Weld System (50mm), Wavin Osma Solvent Weld System and Polypipe Terrain 200 muPVC Solvent Weld System are recommended.

DO NOT USE ABS PIPE OR FITTINGS.

IMPORTANT

It is the responsibility of the installer to ensure, in practice, that products of combustion discharging from the terminal cannot

re-enter the building or any other adjacent building through ventilators, windows, doors, other sources of natural air infiltration, or forced ventilation / air conditioning.

If this should occur the appliance MUST be turned OFF, labelled as ‘unsafe’ and corrective action taken.

Where the lowest part of the terminal is fitted less than 2m above a balcony, above ground or above a flat roof to which people have access then the terminal MUST be protected by a purpose designed guard. The minimum spacing between the balcony and the terminal should be 75mm, in order to allow a terminal guard to be fitted.

Terminal guards are available from boiler suppliers

Ensure that the guard is fitted centrally.

The air inlet/products outlet duct and the terminal of the boiler MUST NOT be closer than 25mm to combustible material. Detailed recommendations on the protection of combustible material are given in BS. 5440-1. In IE refer to I.S.813.

The flue must be installed in accordance with Building Regulations and the recommendations of BS. 5440-1 for inputs up to 70kW nett.

1.9 WATER CIRCULATION SYSTEM

The boiler must NOT be used for direct hot water supply. The hot water storage cylinder MUST be of the indirect type.

Single feed, indirect cylinders are not recommended and MUST NOT be used on sealed systems.

The appliances are NOT suitable for gravity central heating nor are they suitable for the provision of gravity domestic hot water.

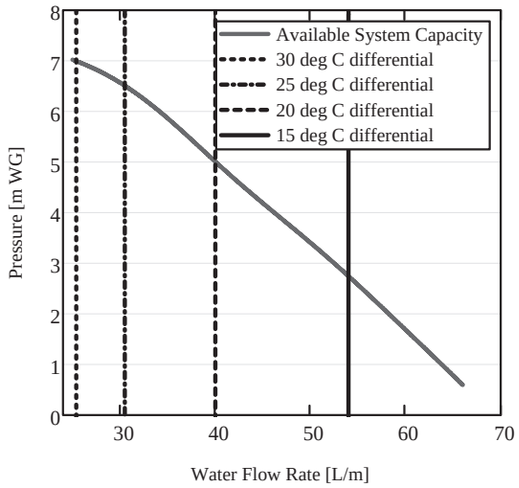
The hot water cylinder and ancillary pipework, not forming part of the useful heating surface, should be lagged to prevent heat loss and any possible freezing - particularly where pipes run through roof spaces and ventilated underfloor spaces.

The boiler must be vented.

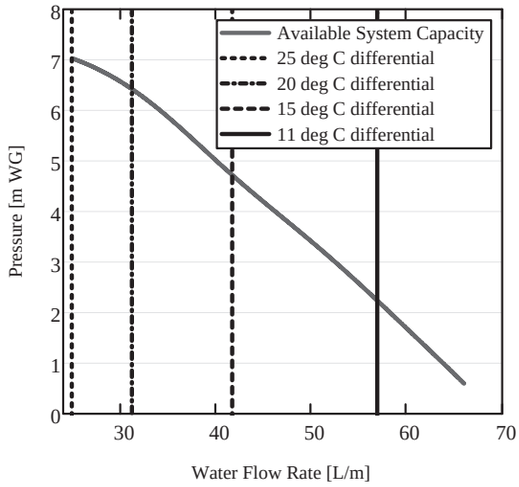
Draining taps MUST be located in accessible positions, which permit the draining of the whole system - including the boiler and hot water storage vessel. They should be at least 1/2” BSP nominal size and be in accordance with BS. 2879.

The central heating system should be in accordance with the relevant standards listed on page 8.

The Keston boilers feature an integral circulating pump which has sufficient excess head to drive most domestic systems. The available head is indicated in the chart below. If the system resistance, at the desired flow rate, is in excess of the available head from the integral pump an additional system pump will be required.



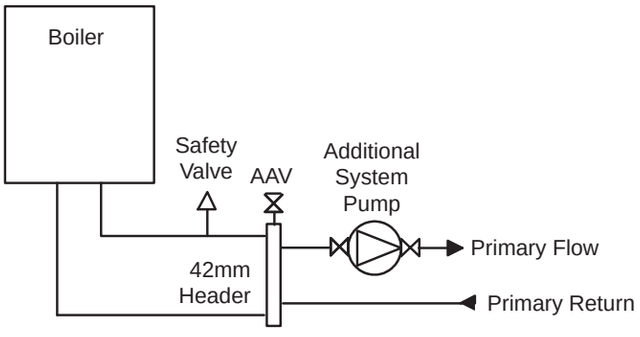
Keston Heat 2 55 - Hydraulic System Capacity



Keston Heat 2 45 - Hydraulic System Capacity

The schematic below illustrates a recommended approach to using an additional system pump. The additional system pump should be sized to overcome the index circuit resistance only as the boilers integral pump will overcome boiler resistance.

If an additional pump is required the selected pump must comply with BS 1394.



Installation of air bleed valves at the high spot(s) in the system will allow for air elimination when filling the system and will allow re-venting in a day or so after all air has been driven out of solution.

Note.

- *With the boiler firing at minimum rate, the temperature differential should not be greater than 35°C. Lower flow rates generating higher temperature differentials will lead to lock out of the boiler.*

In installations where all radiators have been provided with thermostatic radiator valves, it is essential that water circulation through the boiler is guaranteed. This can be best achieved by means of a differential pressure valve, which is installed in a bypass between the flow and return pipes. The bypass should be fitted at least 6m from the boiler, and should use a minimum size of 28mm pipe. The bypass should be capable of allowing a minimum flow rate to achieve a temperature differential of no greater than 35°C at minimum rate.

1.10 WATER TREATMENT

These boilers incorporate an ALUMINIUM heat exchanger.

IMPORTANT. The application of any other treatment to this product may render the warrnaty of Keston Heating INVALID.

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

If water treatment is used Keston 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.

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.calmagltd.com
Tel: +44 (0) 1535 210320

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

Notes.

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.
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.

1.11 ELECTRICAL SUPPLY

Wiring external to the appliance MUST be in accordance with the current I.E.T. (BS7671) Wiring Regulations and any local regulations which apply. For Ireland reference should be made to the current ETCI rules for electrical installations

The point of connection to the mains should be readily accessible and adjacent to the boiler.

1.12 CONDENSATE DRAIN

Refer to Sections 2.15 & 3.7

A condensate drain is provided on the boiler. This drain must be connected to a drainage point on site. All pipework and fittings in the condensate drainage system MUST be made of plastic - *no other materials may be used.*

IMPORTANT.

Installation must be in accordance with BS 6798.

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

1.13 BOILER CLEARANCES AND CONNECTIONS

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

Front of boiler - 450mm

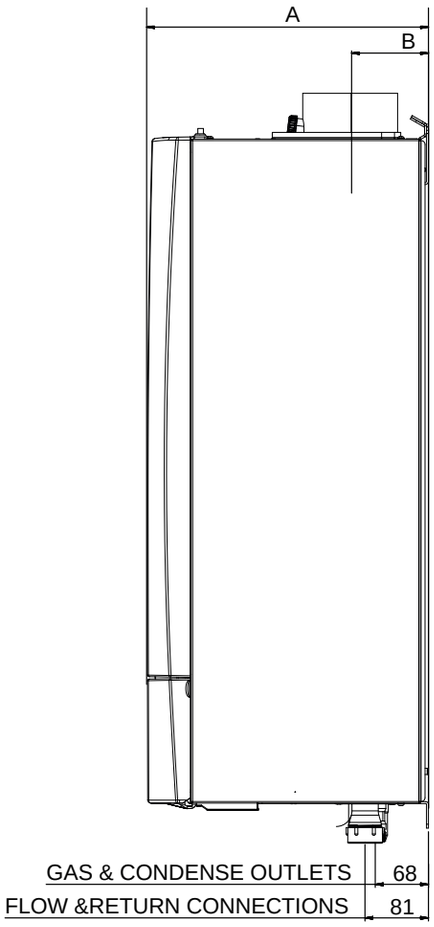
Sides of boiler - 25mm

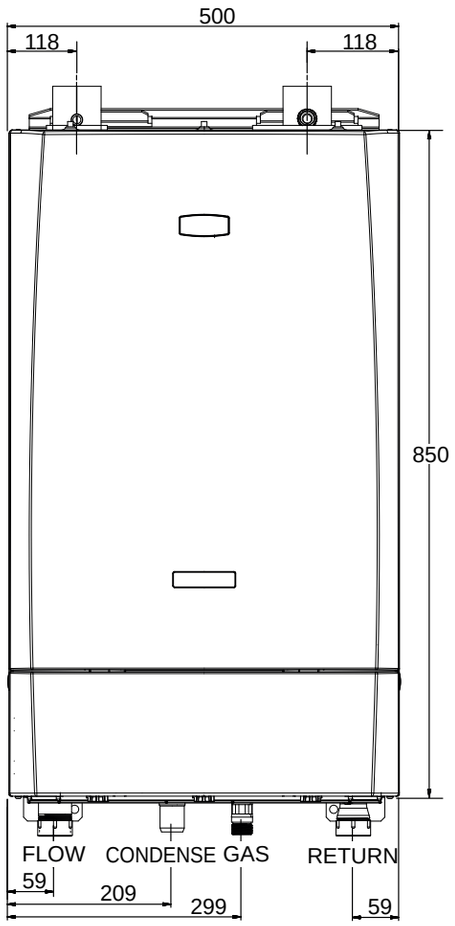
Above boiler - dependent upon the flue system see drawings

Below boiler - 300mm

Clearance between multiple boiler installations - 25mm

Boiler	Dim. A	Dim. B
45, 55	360	130





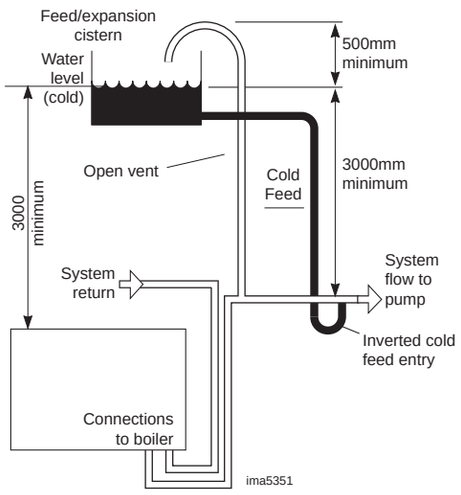
1.14 OPEN VENTED SYSTEM REQUIREMENTS

Detail reference should be made to the appropriate standards listed on page 8.

The information and guidance given below is not intended to override any requirements of the above publications or the requirements of the local authority, gas or water undertakings.

The vertical distance between the pump and feed/expansion cistern MUST comply with the pump manufacturer's minimum requirements, to avoid cavitation. Should these conditions not apply either lower the pump position or raise the cistern above the minimum requirement specified by Keston Heating. The isolation valves should be fitted as close to the pump as possible.

The boiler is fitted with an automatic air vent, located in the left top side of the interior. This air vent must never be shut off, as this could result in dry firing of the boiler and subsequent damage to the heat exchanger.



1.15 SEALED SYSTEM REQUIREMENTS

Note. *The method of filling, refilling, topping up or flushing sealed primary hot water circuit from the mains for a non-domestic property is shown below.*

1. General

a. Detail reference should be made to the appropriate standards listed on page 8. The information and guidance given below is not intended to override any requirements of these publications or the requirements of the local authority, gas or water undertakings.

b. The installation should be capable of working with flow temperatures of up to 90°C and a temperature differential of up to 35°C at minimum rate only.

c. All components of the system, including the heat exchanger of the indirect cylinder, must be suitable for a working pressure of 6 bar (87lbf/in^2) and temperature of 110°C. Care should be taken in making all connections so that the risk of leakage is minimised.

d. The boiler is fitted with an automatic air vent, located in the left top side of the interior. This air vent must never be shut off, as this could result in dry firing of the boiler and subsequent damage to the heat exchanger.

e. Suitable isolation valves and drain points must be provided by the installer.

2. Safety Valve

A spring loaded safety valve complying with the relevant requirements of BS. 6759 Pt. 1 must be fitted in the flow pipe as close to the boiler as possible and with no intervening valve or restriction. The valve should have the following features:

a. A non-adjustable preset lift pressure not exceeding 6 bar (87lbf/in^2).

b. A manual testing device.

c. Provision for connection of a discharge pipe. The valve or discharge pipe should be positioned so that the discharge of water or steam is visible, but will not cause hazard to user or plant.

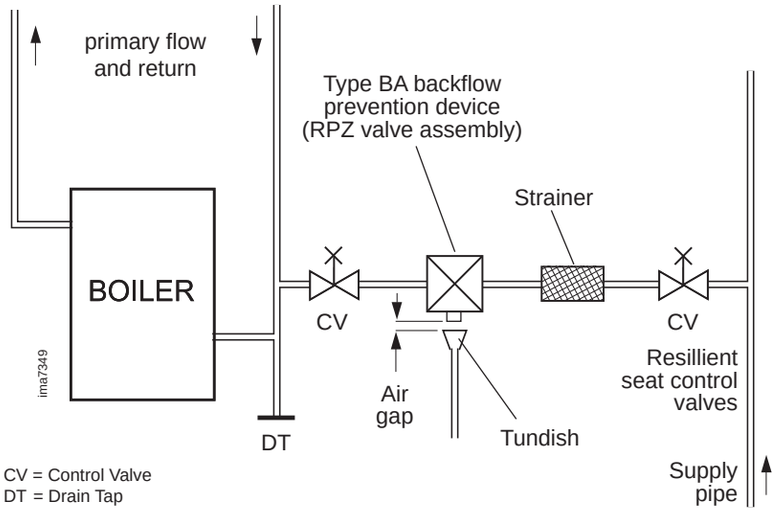
3. Pressure Gauge

A pressure gauge covering at least the range 0-6 bar must be fitted to the system. The gauge should be easily seen from the filling point and should preferably be connected at the same point as the expansion vessel.

IMPORTANT NOTE: If the boilers are installed on to an Ideal frame & header kit and operated in excess of 3 bar then all safety relief valves will require upgrading. The boiler has a maximum operating pressure of 6 bar.

4. Expansion Vessel

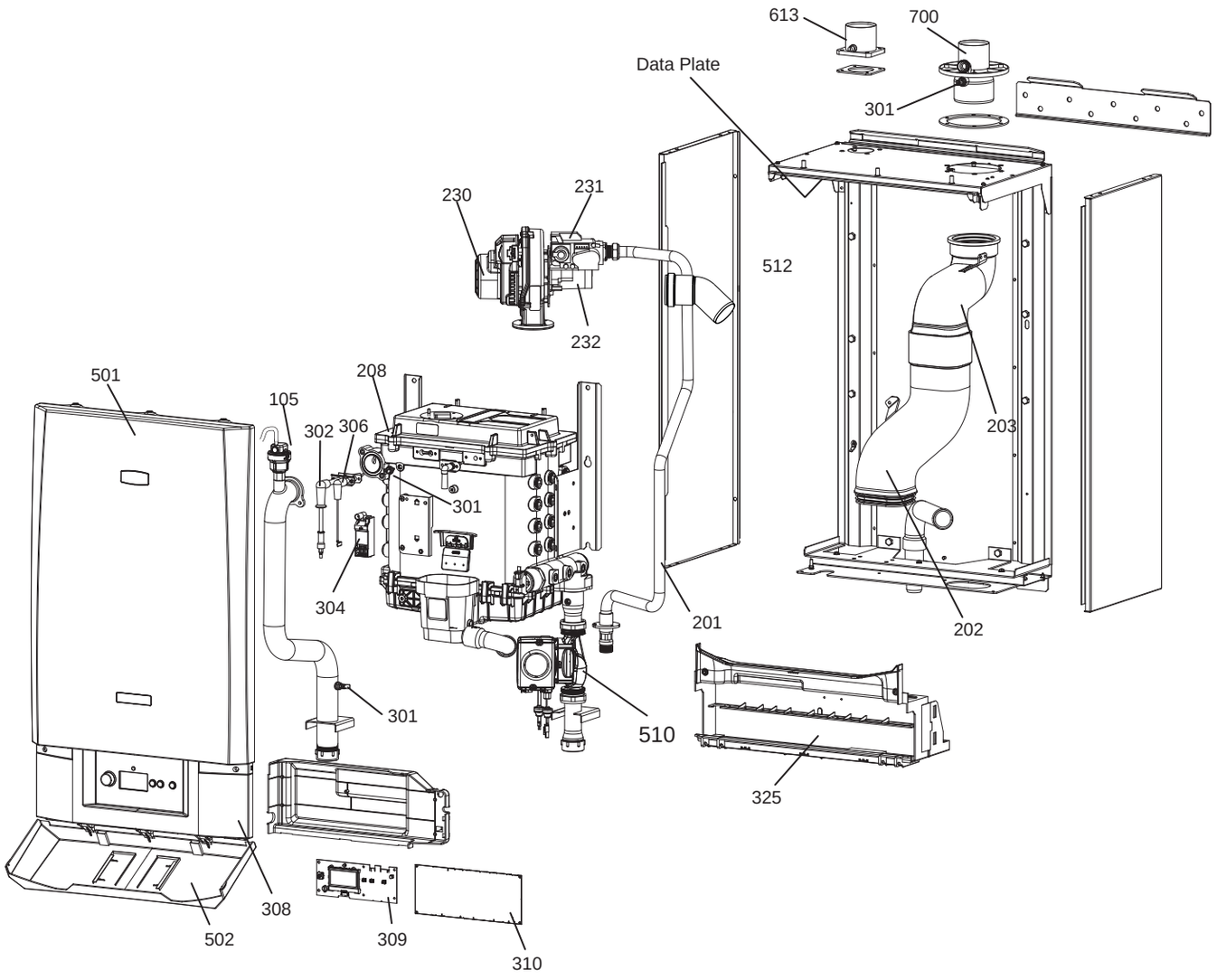
Expansion vessels used must comply with BS. EN 13831. Connection to the system must not incorporate an isolating valve.



CV = Control Valve
DT = Drain Tap

2. INSTALLATION

2.1 BOILER ASSEMBLY - Exploded View

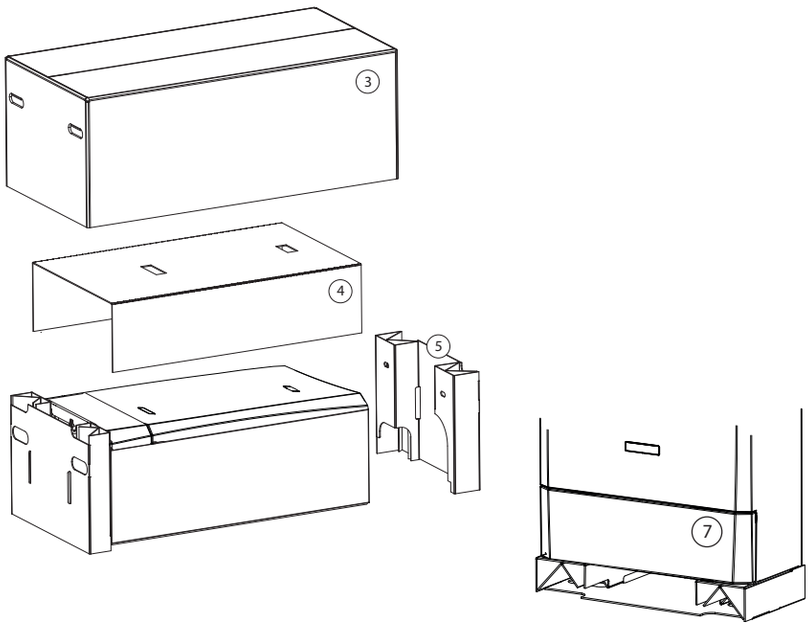


KEY

105	Auto Air Vent	302	Lead Ignition Kit	502	Door Assembly Kit
201	Gas pipe	304	Ignitor Unit	510	Pump
202	Flue manifold (lower)	305	Electrode Detection Kit	511	Non-return Valve Assembly
203	Flue manifold (upper)	306	Ignition Electrode Kit	512	Air Inlet Damper
208	Burner Fixings Kit	308	Fascia Plastic	613	Air Inlet
230	Fan	309	System Manager Board	700	Flue Adapter
231	Gas Valve Kit	310	Primary PCB		
232	Venturi Kit	325	Bulkhead		
301	Thermistor Kit	501	Jacket Assembly Kit		

2.2 PACKAGING REMOVAL

1. The boiler should be laying on its back with the straps removed.
2. Carefully read the installation instructions before proceeding.
3. Remove the outer packing sleeve.
4. Remove the protective cardboard wall mounting template from the front of the boiler.
5. Remove the packing piece from the top of the boiler.
6. Check the contents against the list in Section 2.3 ‘Unpacking’. Note: some items are contained within the top packing piece.
7. The boiler may now be stood on its base, with the cardboard bottom packing piece still in place to protect the connections. Due care should be taken when standing up the boilers, with respect to their weights, see Table 2 on page 6.

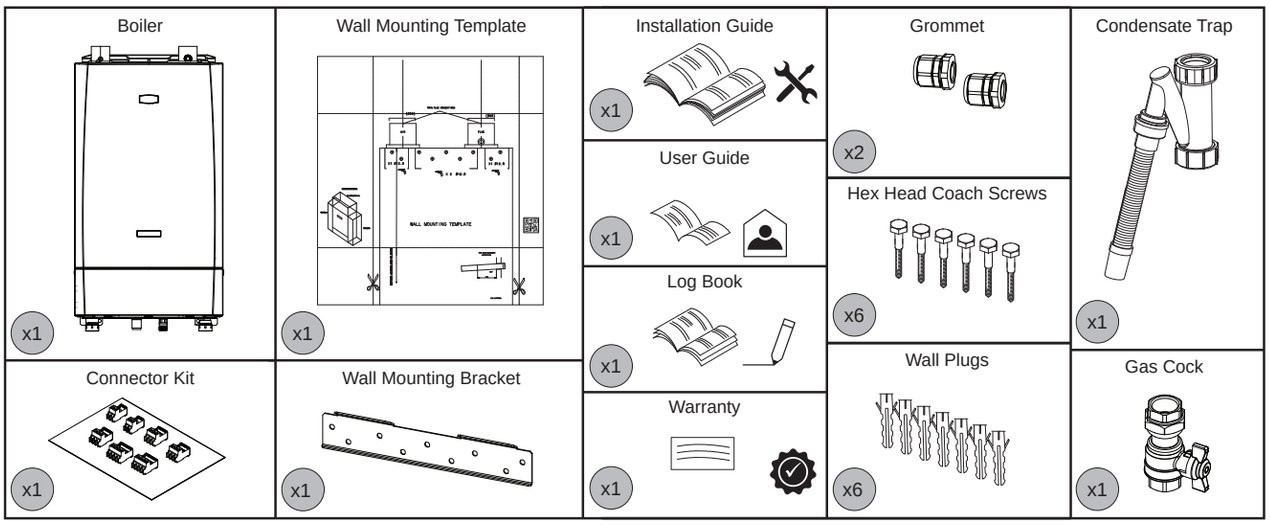


2.3 UNPACKING

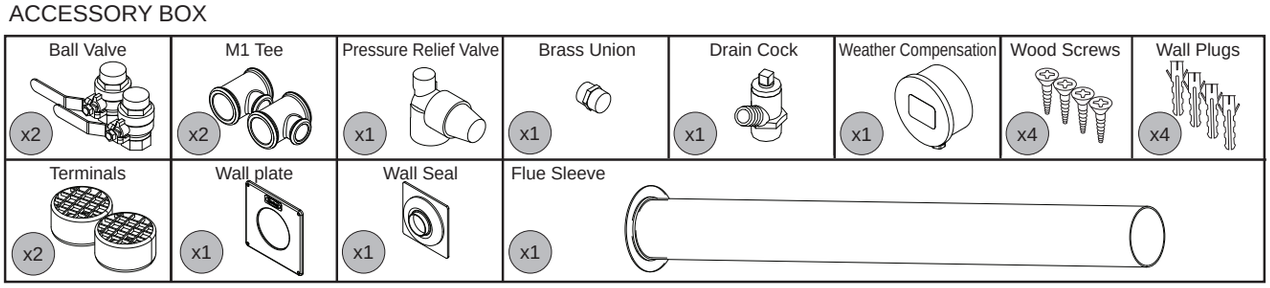
The boiler is supplied fully assembled in one pack.

When unpacking the boiler check the contents against the items below.

Do not dispose of the packaging until all contents are accounted for, as some parts are held within the cardboard packing pieces.



ACCESSORY BOX

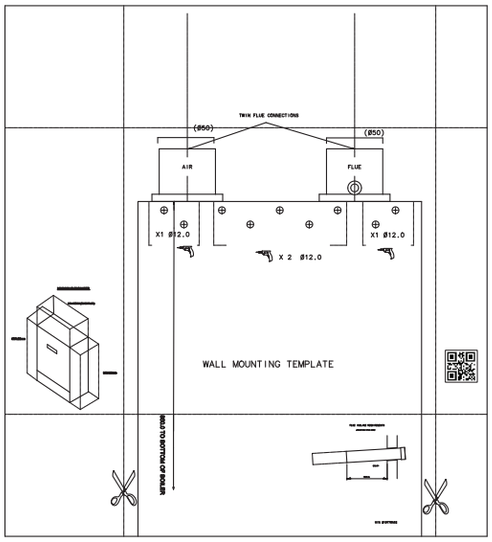


2.4 WALL MOUNTING TEMPLATE

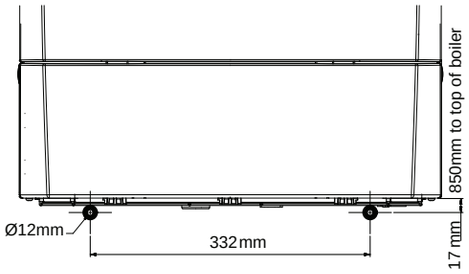
Note. *The template shows the positions for the top fixing holes. Care must be taken to ensure the correct holes are drilled.*

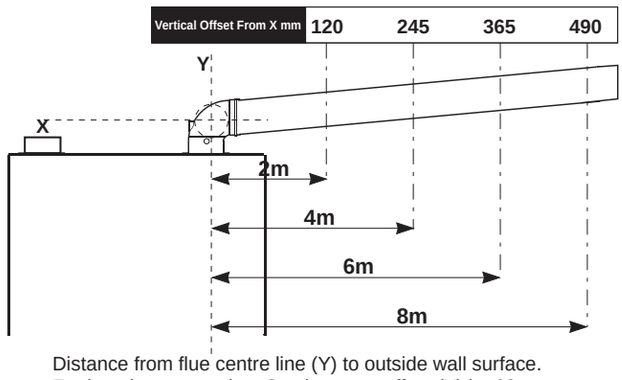
1. Tape template into the selected position.
2. Ensure squareness by hanging a plumbline.
3. Mark on to the wall:
   a. The top 4 wall mounting plate screw positions.
   b. The 2 boiler lower fixing positions using diagram below
   c. The position of the flue duct. Mark the centre of the hole as well as the circumference.
4. Remove the template from the wall.

Note: Horizontal flue runs must be inclined at 1.5-3º to the horizontal to allow condensate to drain back to the boiler.



BOILER LOWER FIXING POSITIONS





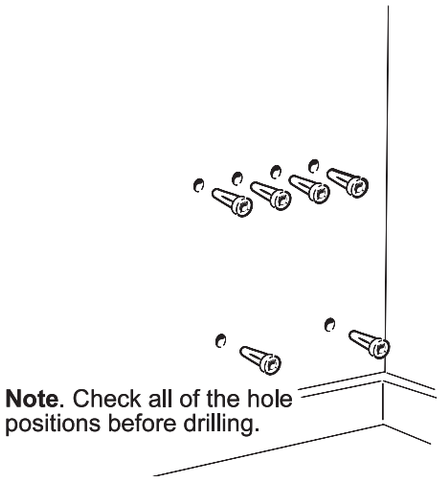
Distance from flue centre line (Y) to outside wall surface. For lengths greater than 8m, increase offset (X) by 60mm for every additional 1m.
Does not apply to air intake.

2.5 PREPARING THE WALL

IMPORTANT. The wall must be vertical 90º (±5º) from the perpendicular to allow safe operation of the integral flue non-return valve.

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

1. Drill 4 boiler top fixing holes with a 12mm masonry drill and insert the plastic plugs provided, for the wall mounting plate.
2. Drill the 2 boiler lower fixing holes with a 12mm masonry drill, insert the plastic plugs provided .
3. Fix the wall bracket into place with 4 M10x70 hex head coach screws provided.



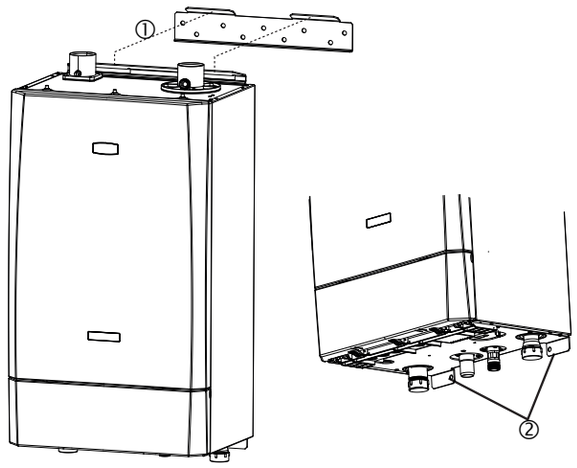
Note. Check all of the hole positions before drilling.

2.6 MOUNTING THE BOILER

- Due care should be taken when lifting the boilers, with respect to their weights, see Table 2 on Page 6. Also refer to Section 1.4 Safe Handling.

1. Lift the boiler onto the wall mounting plate as shown. Note: It is not necessary to hold the boiler at an angle to engage the wall mounting plate.
2. Using the remaining coach screws, secure the bottom of the boiler to the wall through the attached brackets.

IMPORTANT NOTE It is essential that these bolts be fitted prior to making up the flow and return connections to the boiler to prevent the boiler becoming detached .



2.7 VENTILATION

If installing in a room or internal space then no purpose provided ventilation is required. When installing in a compartment, the table below details the ventilation requirements in line with BS5440.

Keston ventilation requirements when installed in a compartment up to 70kW (BS5440)				
	To a room or internal space		**To outside Air**	
Model	**45 & 45P**	**55 & 55P**	**45 & 45P**	**55 & 55P**
Min Free Area (cm^2)	432	527	216	263

Keston Heat 45/55 (multiple boiler applications)

Detail reference should be made to BS. 6644 for inputs between 70kW and 1.8MW (net). In IE refer to the current edition of I.S.820. The following notes are for general guidance only:

If ventilation is to be provided by means of permanent high and low vents communicating direct with outside air, then reference can be made to the sizes below. For other ventilation options refer to BS. 6644. In IE refer to the current edition of I.S.820.

2.8 FLUE SYSTEMS

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

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.

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*

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*

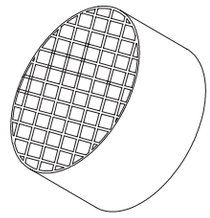
Marley muPVC Solvent Weld System (50mm)	
Marley Code	
KP 304	*50mm x 4m double spigot pipe*
KP32	*50mm x 45 deg bend*
KSC3	*50mm straight coupling*
KB3	*50mm x 88.5 deg bend*
KT3	*50mm swept tee*

Wavin OSMA PVC-C Solvent Weld System (50mm)	
Wavin Code	
2M073	*3M lenght 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 2.10) in this installation and Servicing Instructions for further guidance.

Both the 50mm flue outlet terminal and the 50mm air inlet terminal are supplied with the flue pack and are illustrated in Fig. 1 and must be used in ALL installations. (Both terminals are identical).

Fig.1



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 Fig 3 & 4. (Alternatively a vertical flue pipe termination is acceptable.)

The air pipe must have an elbow and 150mm length of pipe directed downwards with a termination grill fitted.

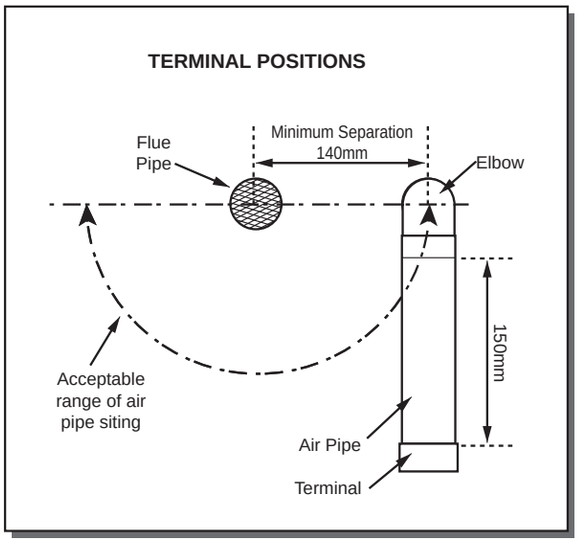
The air pipe can be situated at the side or beneath the flue pipe to a minimum dimension of 140mm (see diagram below). It must not be sited above the flue pipe.

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

Condensing boiler 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 2m from ground level a terminal guard must be fitted.

Fig.2



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 16.0m (50mm muPVC) are used. In such cases the boiler output will be reduced by 0.8% per additional metre.

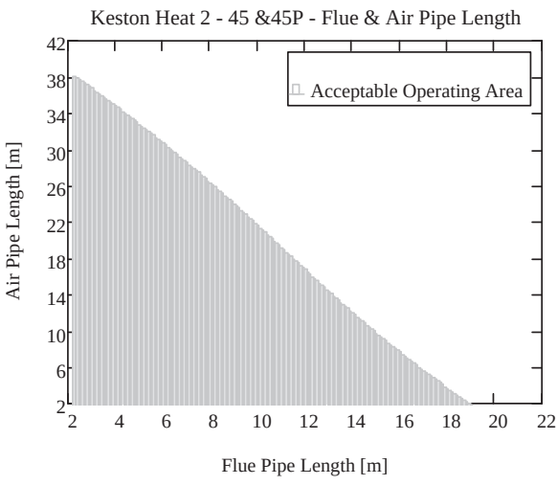
The maximum lengths of both air inlet pipe and flue outlet pipe, when no bends are used, are as detailed in figs 3 & 4.

However, each bend used has an equivalent length that must be deducted from the maximum straight length stated in figs 3 & 4. Knuckle bends must not be fitted.

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

It is possible to have variable flue and air lengths as described within the shaded area of Figs 3 & 4.

Fig.3

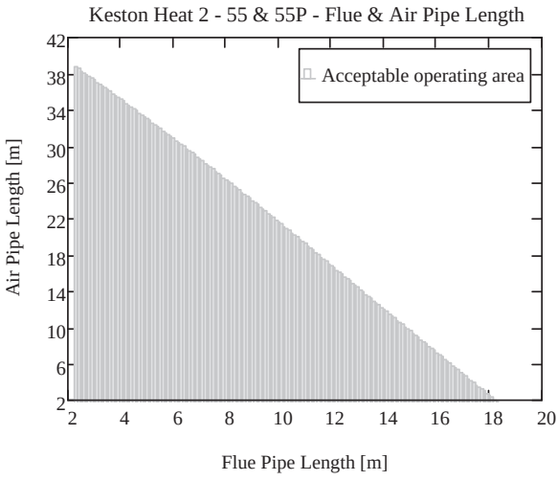


SLOPE

'Horizontal' flue outlet pipework MUST slope at least 3.5 degrees (60mm per metre run) downwards towards the boiler. Pipework can be vertical. Only swept elbows can be used.

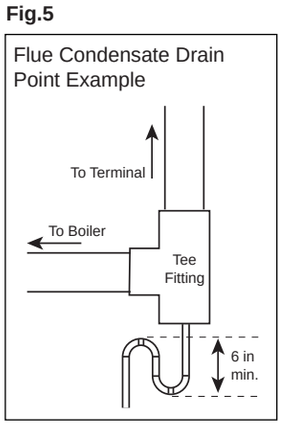
Air inlet pipework can be truly horizontal or vertical, or sloping in a downward direction towards the boiler but in each case rain, etc., **must** be prevented from entering the pipe. **There must be no troughs in any of the pipework, whether it be air inlet or flue outlet.**

Fig.4



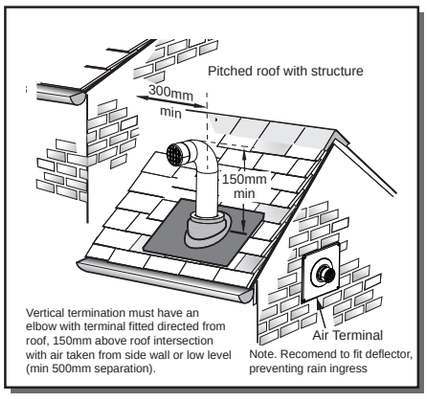
Due to the low temperature of the gases, further condensate will form within the flue system. Drain points, with suitable traps, must therefore be incorporated within the flue system at the base of the vertical flue sections in excess of 3m, for 50mm muPVC pipe flue systems. These additional condensate drains must be run to discharge as detailed in Section 2.15. Such drain points can be formed using standard plastic fittings. Refer to the example in Fig. 5.

Fig.5



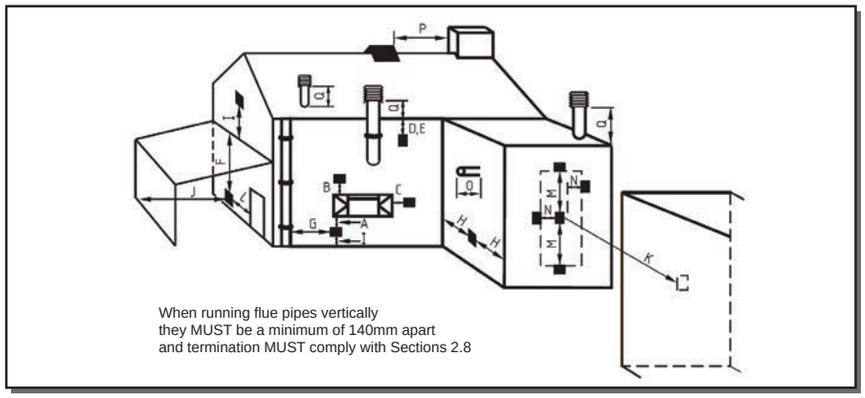
2.9 FLUE TERMINATION POSITION

Twin Flue Positions		When Flue & Air Terminals are less than 500mm apart		When Flue & Air Terminals are more than 500mm apart	
		Flue min. spacing	Air min. spacing	Flue min. spacing	Air min. spacing
A	Below an opening (1)	300mm	50mm	300mm	50mm
B	Above an opening (1)	300mm	50mm	300mm	50mm
C	Horizontally to an opening	300mm	50mm	300mm	50mm
D	Below gutters,soil pipes or drain pipes	75mm	75mm	75mm	75mm
E	Below eaves	200mm	50mm	200mm	50mm
F	Below balcony or car port roof	200mm	50mm	200mm	50mm
G	From a vertical drain pipe or soil pipe	150mm	50mm	150mm	50mm
H	From an internal or external corner or to a boundary alongside the terminal (2)	200mm	50mm	200mm	50mm
I	Above ground,roof or balcony level	300mm	100mm	300mm	100mm
J	From a surface or boundary facing the terminal	600mm	100mm	600mm	100mm
K	From a terminal facing a terminal	1200mm	1200mm	1200mm	1200mm
L	From an opening in the car port into the building	1200mm	100mm	1200mm	100mm
M	Vertically from a terminal on the same wall	1500mm	1500mm	1500mm	1500mm
N	Horizontally from a terminal on the same wall	300mm	300mm	300mm	300mm
O	From the wall on which the terminal is mounted	40mm	40mm	40mm	40mm
P	From a vertical structure on the roof	NA	NA	300mm	NA
Q	Above intersection with roof	NA	NA	150mm	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				

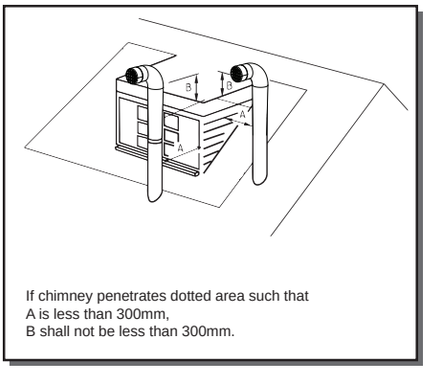


Vertical termination must have an elbow with terminal fitted directed from roof, 150mm above roof intersection with air taken from side wall or low level (min 500mm separation).

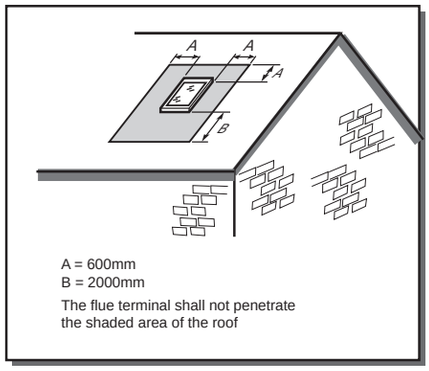
Note. Recomend to fit deflector, preventing rain ingress



When running flue pipes vertically they MUST be a minimum of 140mm apart and termination MUST comply with Sections 2.8

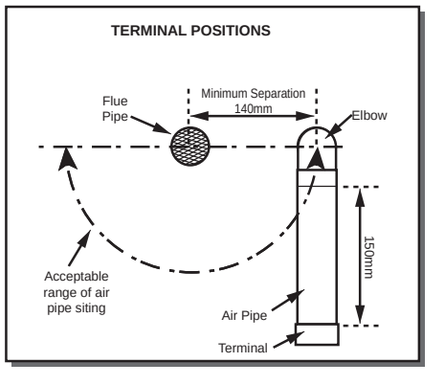


If chimney penetrates dotted area such that A is less than 300mm, B shall not be less than 300mm.



A = 600mm
B = 2000mm

The flue terminal shall not penetrate the shaded area of the roof



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 and conforming to BS 6209.

Consideration must be given to 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 Heat 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.

2.10 ASSEMBLY PRACTICE

Remove all plastic debris and burrs when installing air intake piping. Plastic filings 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.

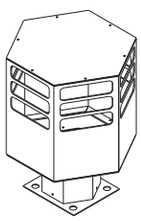
However re-using the existing boiler flue installation is acceptable if the installer adheres to Section 2.7 Flue System - Important, and also checks and confirms the following:

- Remove the flue adaptor and air spigot from the flue pack supplied with the boiler.
- Remove boiler front panel - Refer to 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.
- Insert the flue adaptor into the flue manifold on the top of the boiler and secure using the 6 M5 screws provided
- 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). Care must be taken when applying solvent weld to ensure it does not come into contact with the sample plug. 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 - Se Section 2.7 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 1m or vertical runs of any length must always be supported. Brackets should be placed at intervals of approximately 1m. 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.**
- Check all connections for security and re-seal any joints using solvent cement where soundness may be in doubt.
- Check Sample plug for free movement and seating.

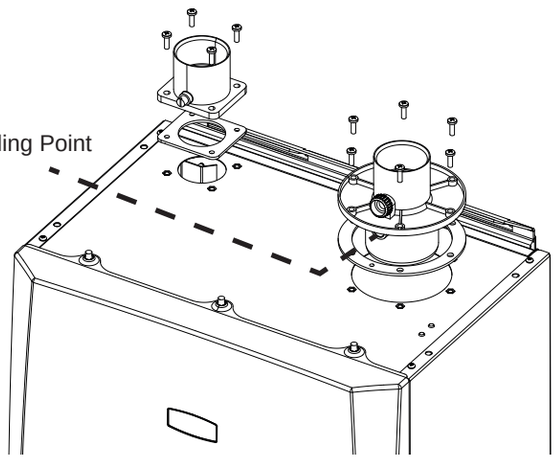
Note. It is equally important to seal the air inlet with solvent cement as the flue outlet pipe joints.

Optional Extra / Alternative Flue Connector available.



Kit number UIN 355139 / 221509

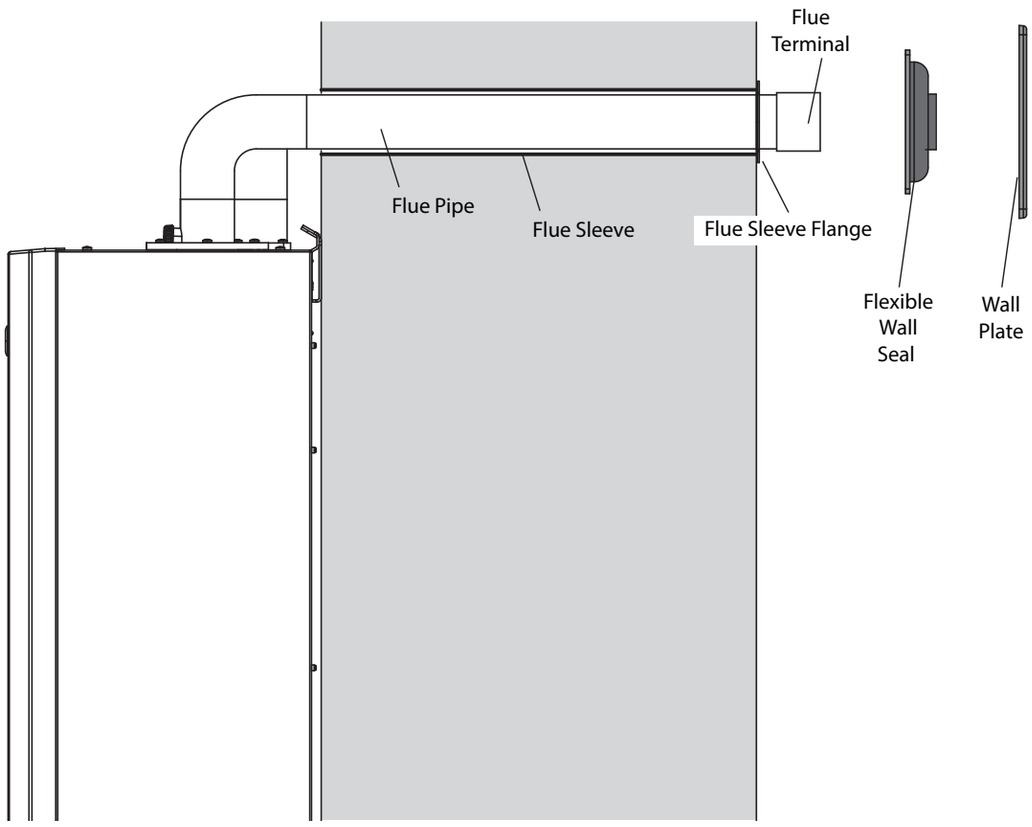
Flue Sampling Point



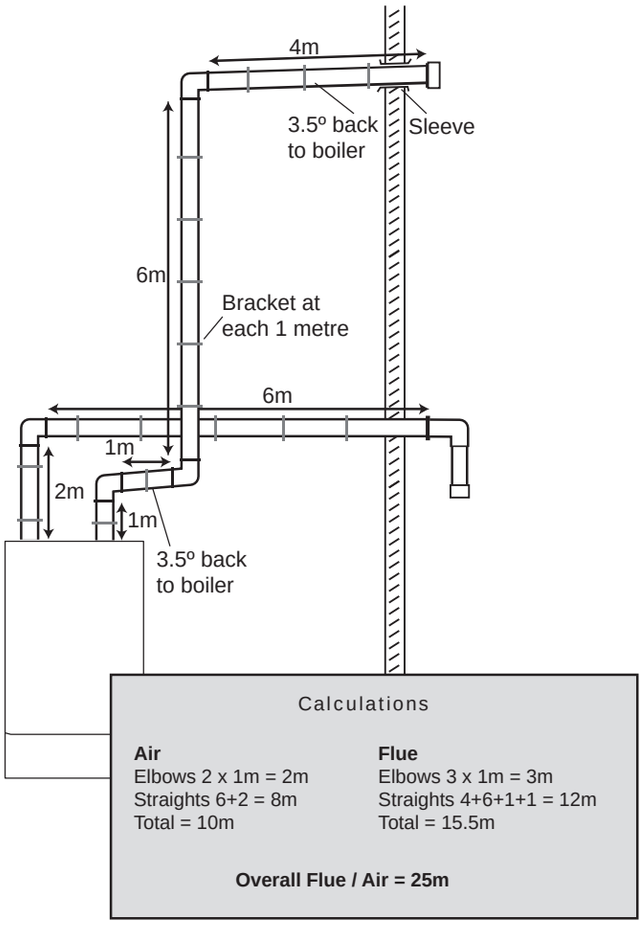
FLUE OUTLET

2.11 FITTING THE FLUE SLEEVING

1. Cut hole in wall (preferably with 60mm core bore tool).
2. Measure wall Thickness
3. Cut sleeve length to match wall thickness & remove burrs.
4. Grout sleeve into wall with flange on external face.
5. Slide flue pipe into sleeve, checking it is free to slide.
6. Slide Flexible wall seal over flue pipe and push centre ring up to sleeve flange when cold.
7. Locate wall plate over flexible wall seal and clamp in place using the raw plug pack.
8. Affix flue terminal
9. During boiler test check that the flue end is free to expand and contract with flexible wall seal.



2.12 FLUE INSTALLATION EXAMPLE KESTON HEAT 55

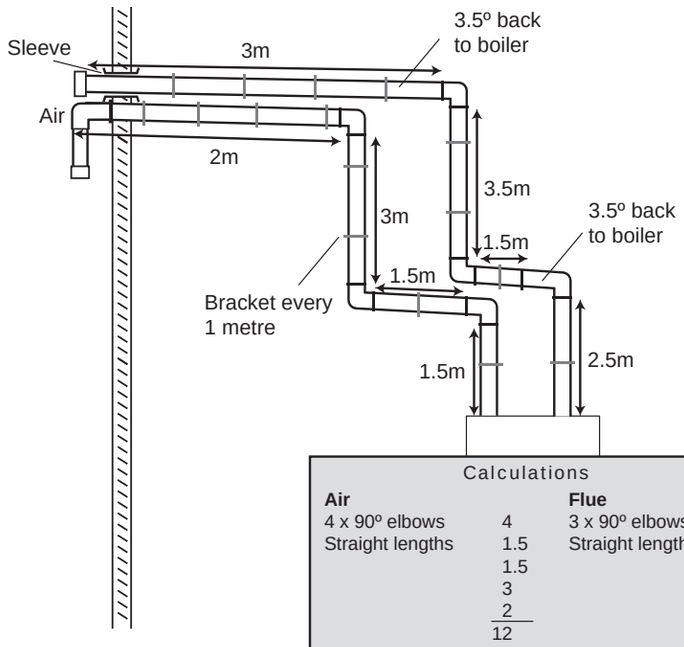


Calculations

Air	**Flue**
Elbows 2 x 1m = 2m	Elbows 3 x 1m = 3m
Straights 6+2 = 8m	Straights 4+6+1+1 = 12m
Total = 10m	Total = 15.5m

Overall Flue / Air = 25m

2.13 FLUE INSTALLATION EXAMPLE KESTON HEAT 45



Calculations

Air		**Flue**	
4 x 90º elbows	4	3 x 90º elbows	3
Straight lengths	1.5	Straight lengths	2.5
	1.5		1.5
	3		3.5
	2		3
	12		13.5

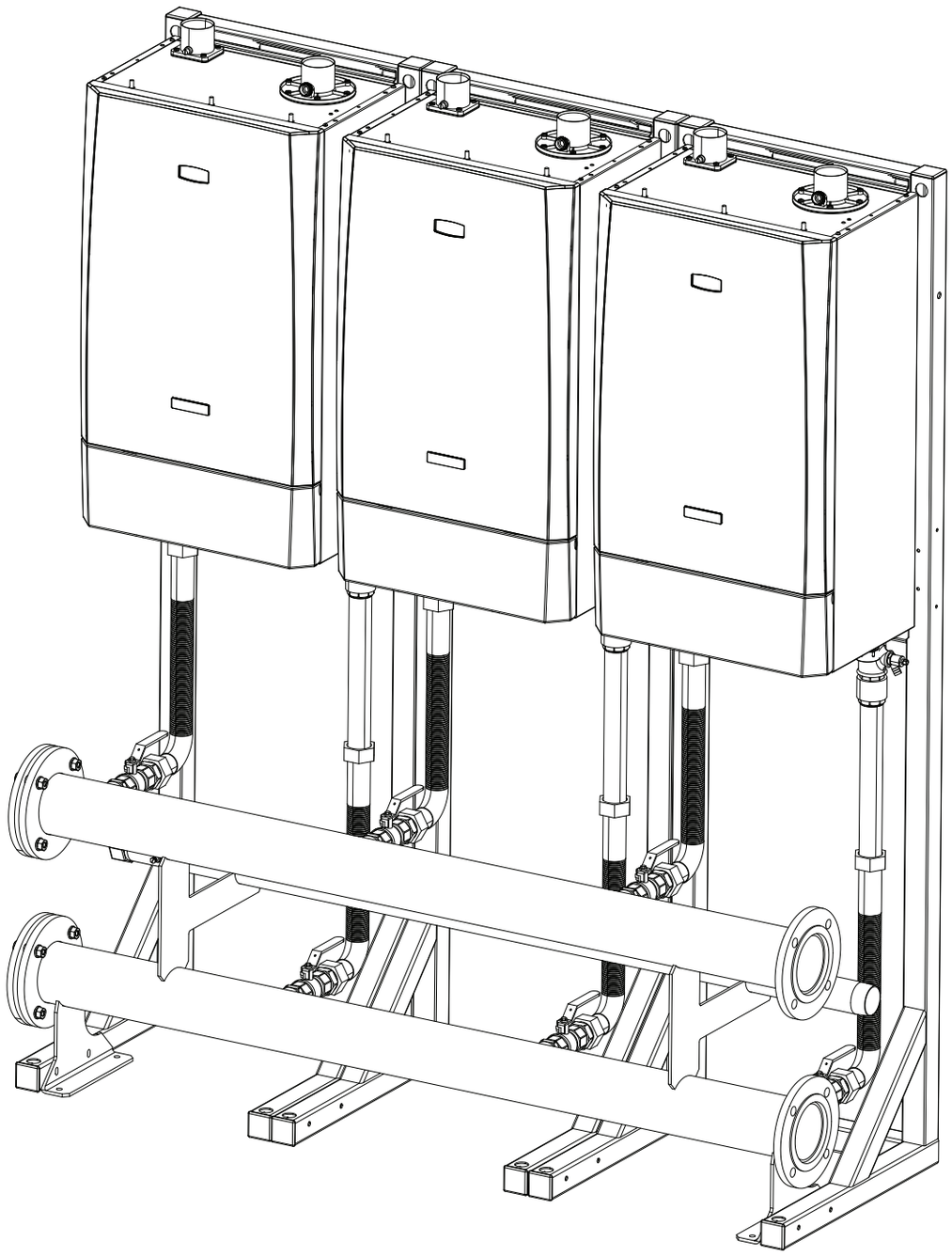
Overall Flue / Air = 25.5m

FLUE OUTLET

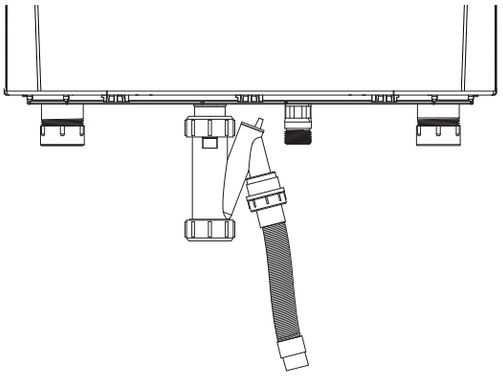
2.14 BOILER FRAME AND HEADER KITS

Heat output to a maximum of 330kW can be achieved by cascading up to six Keston Heat 2 boilers.

This can be achieved by the use of the Keston Heat 2 boilers fitted side by side on the wall or frames in conjunction with the required header kits.



2.15 CONDENSATE DRAIN



This appliance is fitted with a 75mm 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:

a. 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.

b. Plastic with push fit or solvent connections.

c. Internal plastic pipe work a minimum of 19mm ID (typically 22mm OD)

d. External plastic pipe must be a minimum of 30mm ID (typically 32 OD) before it passes through the sleeved wall.

e. All horizontal pipe runs, must fall a minimum of 45mm per metre away from the boiler at a minimum gradient of 1:19.

f. External & unheated pipe work should be kept to a minimum and insulated with Class "O" waterproof pipe insulation.

g. All installations must be carried out in accordance to the relevant connection methods as shown in the "Condensate installation diagrams" & BS6798:2009

h. Pipe work must be installed so that it does not allow spillage into the dwelling in the event of a blockage (through freezing)

i. All internal burrs should be removed from the pipe work and any fittings.

In order to minimise the risk of freezing during prolonged very cold spells, one of the following methods of terminating condensate drainage pipe should be adopted.

Internal Drain Connections

Wherever possible, the condensate drainage pipe should be routed to drain by gravity to a suitable internal foul water discharge point such as an internal soil and vent stack or kitchen or bathroom waste pipe etc. See Figs 1 and 2.

Condensate Pump

Where gravity discharge to an internal termination is not physically possible or where very long internal pipe runs would be required to reach a suitable discharge point, a condensate pump of a specification recommended by the boiler or pump manufacturer should be used terminating into a suitable internal foul water discharge point such as an internal soil and vent stack or internal kitchen or bathroom waste pipe etc. (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 soak away. 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 see Fig 4. Insulation measures as described should be used.
- 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, see Fig 5.
- 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.
- Where the condensate drain pipe terminates in a purpose designed soak away (see BS 6798) any above ground condensate drain pipe Sections should be run and insulated as described above. See Fig 6.

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.

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

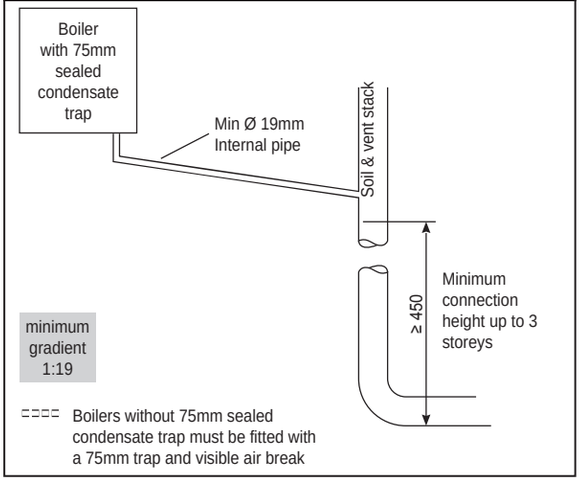
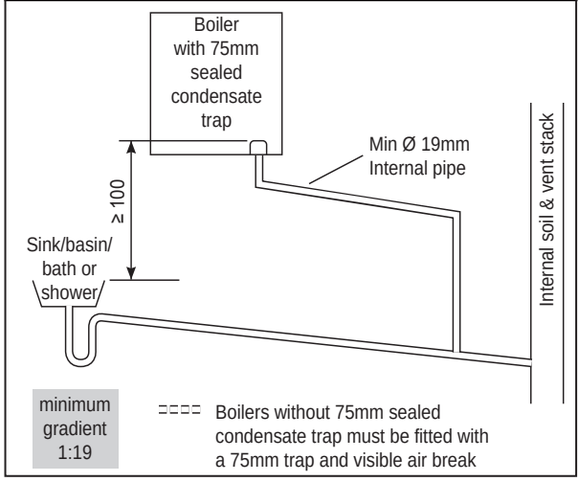


Figure 2 - Connection of a Condensate Drainage Pipe Downstream of a Sink, Basin, Bath or Shower Water Trap to Internal Soil Vent Stack



continued . . . . .

Figure 3 - Connection of a Condensate Pump Typical Method (see manufacturers detailed instructions)

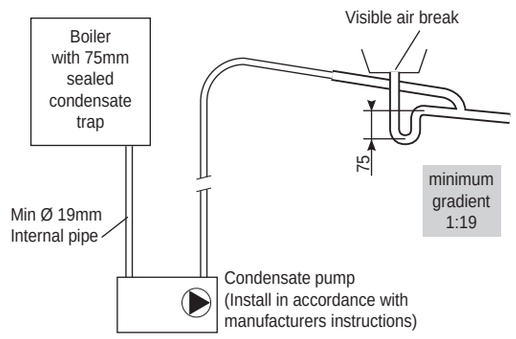


Figure 4 - Connection of condensate Drainage Pipe to External Soil & Vent Stack

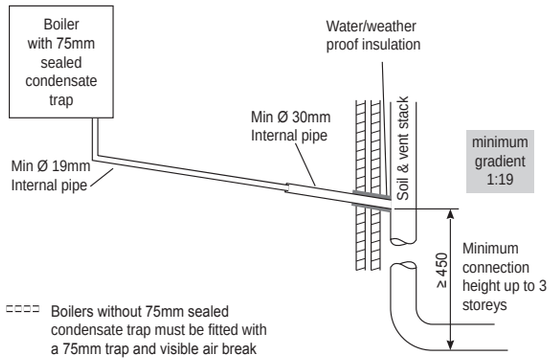


Figure 5 - Connection of a Condensate Drainage Pipe to an External Rainwater Downpipe (only combined foul/rainwater drain)

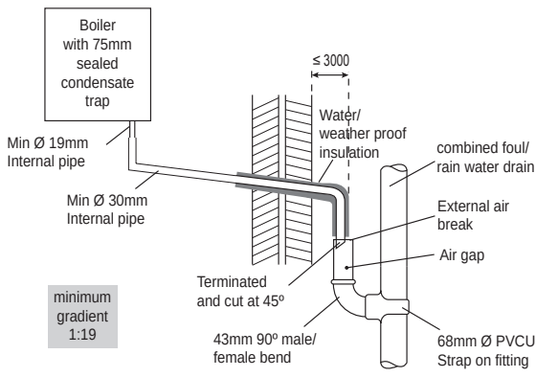
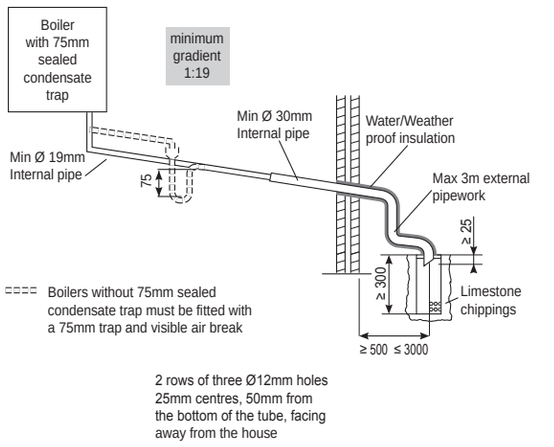


Figure 6 - Connection of a Condensate Drainage Pipe to an External Purpose Made Soak Away.



2.16 BOILER WATER CONNECTIONS

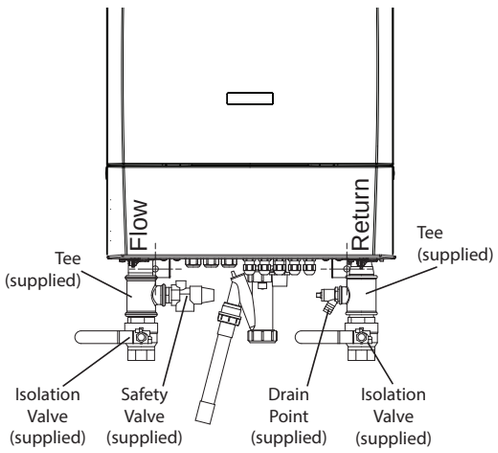
The boiler flow and return pipes are terminated with a 1 $^{1}/_{4}$" BSP male taper connection located at the bottom of the appliance.

Note. *This appliance is NOT suitable for use with a direct hot water cylinder.*

Plastic plugs if fitted into the open ends of the flow and return pipes must be removed before connecting the system pipework.

Upon installation a tee connection, isolation valve and safety relief valve/drain point must be fitted to the boiler flow/return connection respectively. (See image opposite). This hardware is provided within the boiler carton. This allows isolation for the water connections in the event of servicing the water circulation pump fitted within the boiler casing.

IMPORTANT: Correct fitment of the safety pressure relief valve **must** be made to protect the boiler in the event of inadvertent operation when isolated.



2.17 FROST CONNECTION

The boiler has built into its control system the facility to protect the boiler, only against freezing.

If the boiler flow temperature T_1, falls below 5°C the boiler pump and burner run until the temperature exceeds 19°C.

Central heating systems fitted wholly inside the building do not normally require frost protections as the building acts as a 'storage heater' and can normally be left at least 24 hours without frost damage. However, if parts of the pipework run outside the building 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.

2.18 GAS CONNECTION

Refer to Section 1.13 for details of the position of the gas connection.

A MINIMUM working gas pressure of 17.5 mbar (7" w.g.) must be available at the boiler inlet for natural gas and minimum of 32mbar for propane with the boiler firing. Refer to Section 3.3 for details of the pressure test point position.

Extend a gas supply pipe NOT LESS THAN 22mm O.D. to the boiler and connect using the gas cock provided.

IMPORTANT. The gas service cock contains a non-metallic seal so must not be overheated when making capillary connections.

In order to determine the actual working gas pressure at the boiler inlet the figure from the table below must be added to the measured pressure (refer to Section 3.3).

Keston Heat Gas Line Pressure Drop (Natural Gas & Propane)	
Boiler Model	**mbar**
45	1
45P	0.5
55	1.4
55P	0.6

Note. *It should be noted that this pressure drop is present within the internal boiler pipe work and is irrespective of the fact that manifold headers are used. This pressure drop will be experienced on each individual boiler regardless of single or multiple installation.*

2.19 FITTING THE WEATHER COMPENSATION KIT

SUPPLIED IN ACCESSORY BOX

This kit provides the facility to apply outside air temperature correction to the Boiler or System water flow temperature which therefore provides energy savings.

The outside sensor provided allows the actual outside air temperature to be measured at the point of location. The system then adjusts the boiler or system flow temperature in proportion based upon the heating curve. This will reduce the flow temperature set point to reduce running costs.

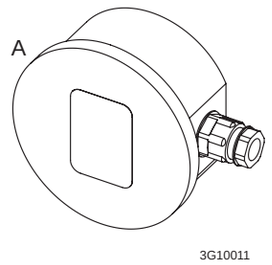
If the outside air temperature is above the required Heating Circuit room temperature setting then the Boiler and/or HC will be switched off.

The Boiler or System will also operate the boiler in condensing mode more frequently increasing savings.

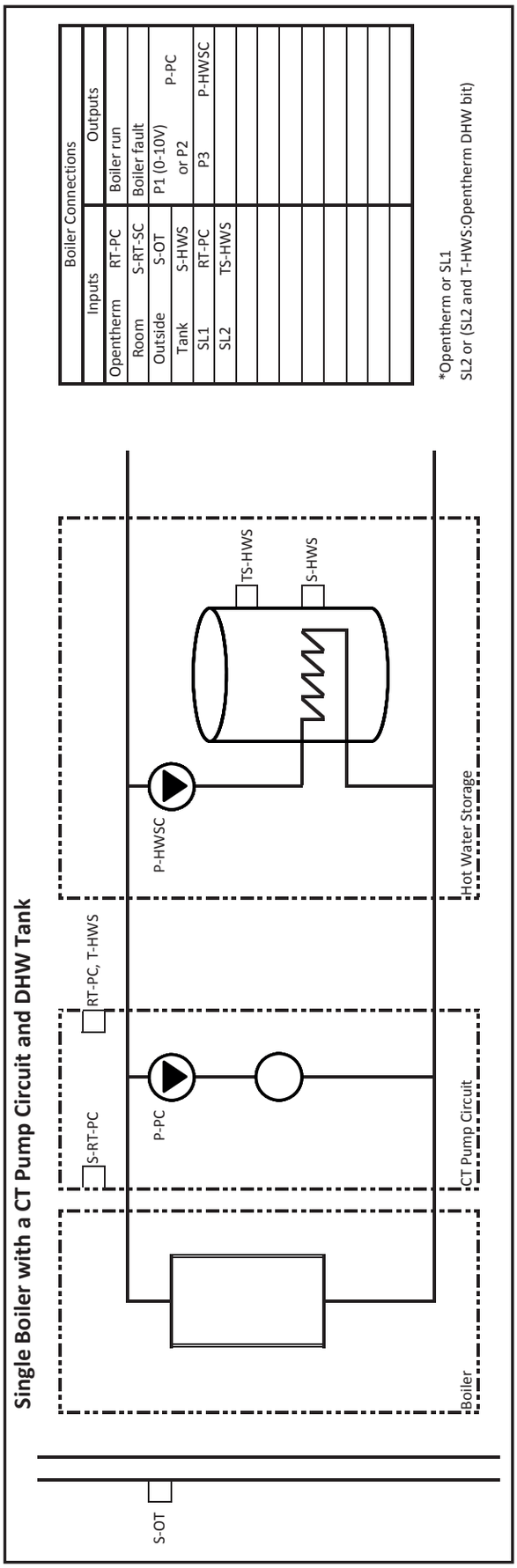
Once the sensor is fitted it must be configured during the Boiler configuration process.

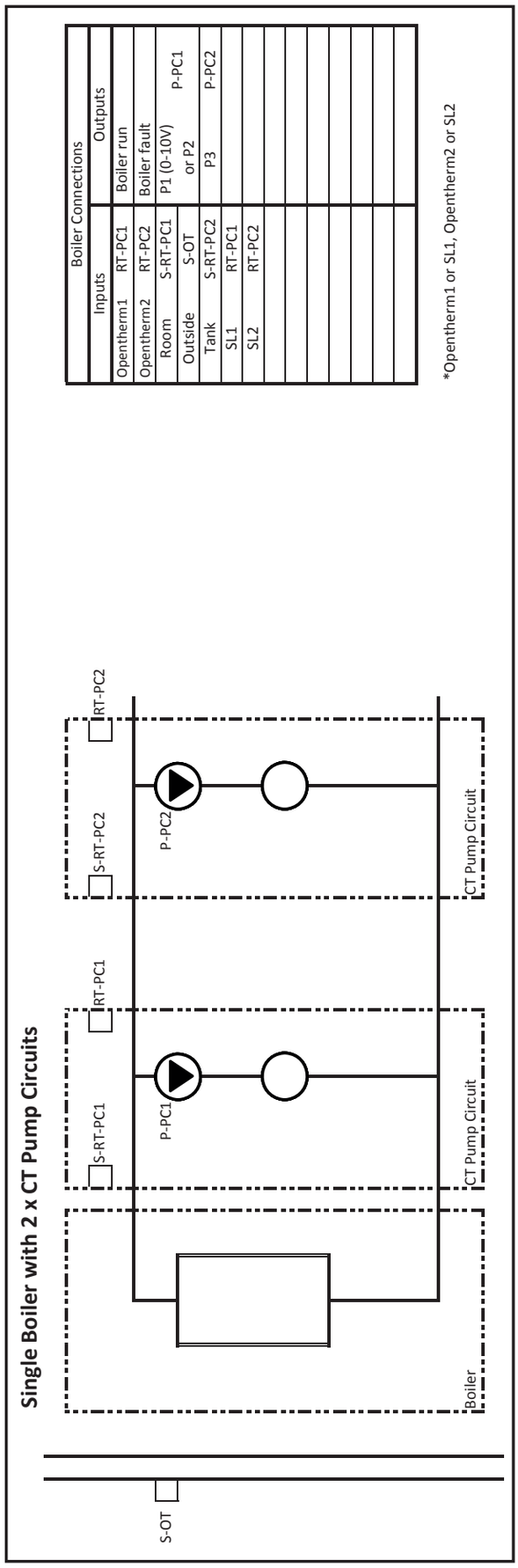
Kit Contents

A. Outside Air Sensor



2.20 STAND ALONE BOILER - PARTIAL HYDRAULICS





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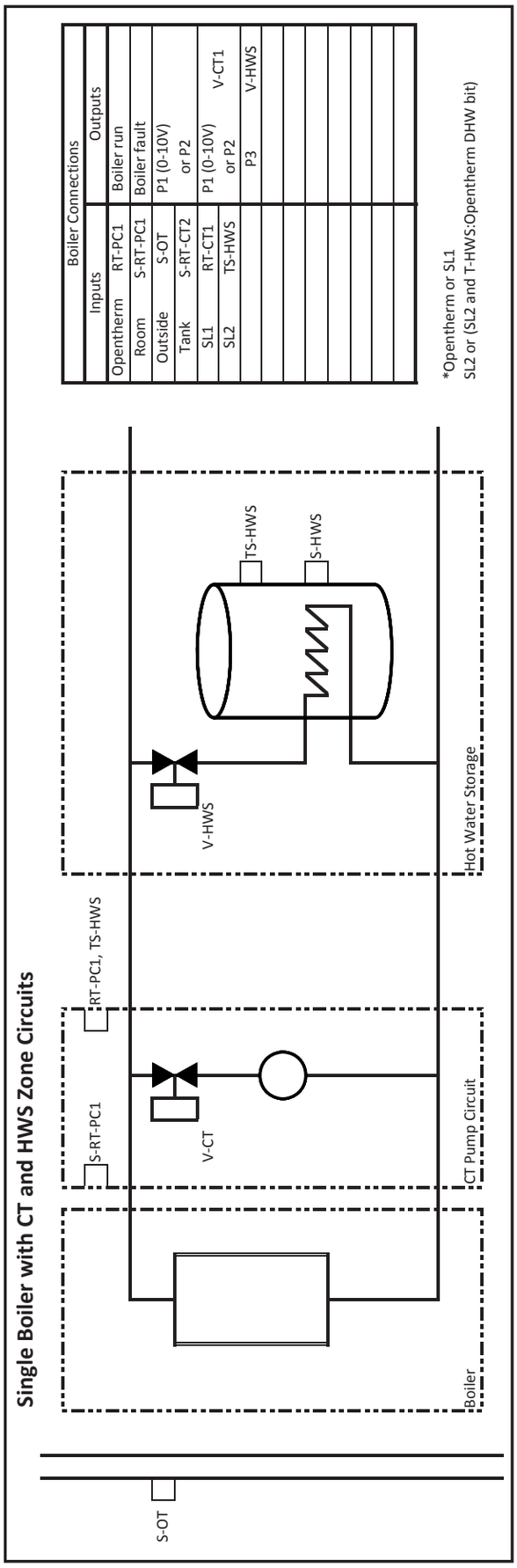
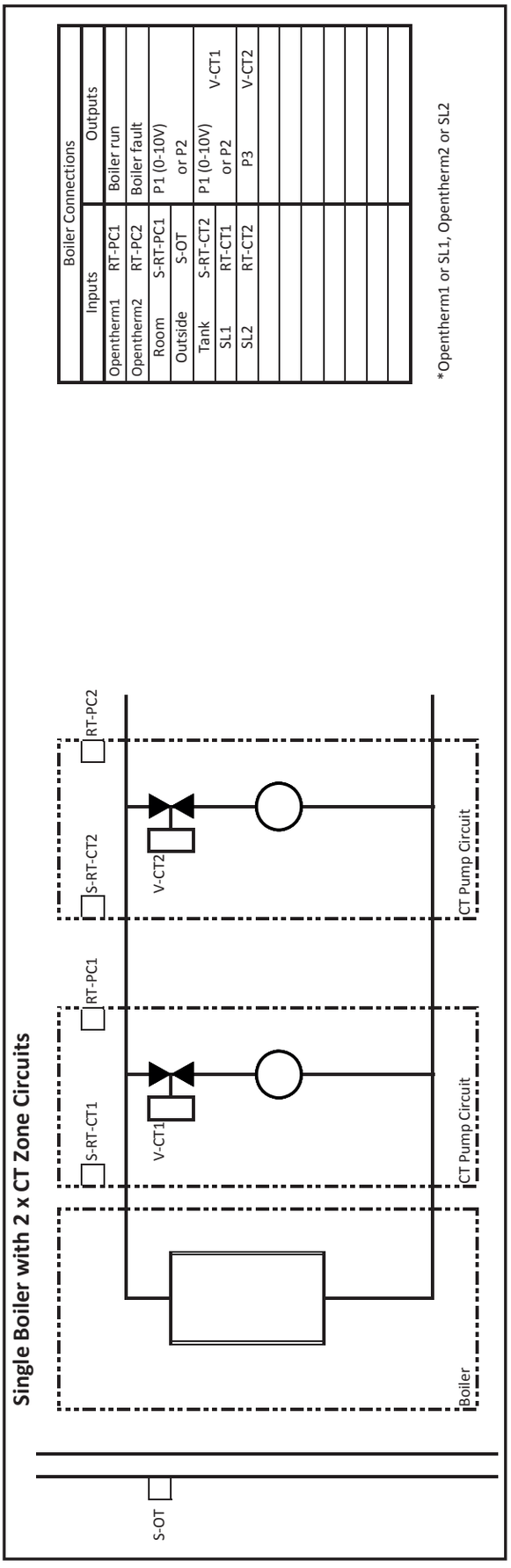


Boiler Connections	
Inputs	Outputs
Opentherm RT-PC1	Boiler run
Room S-RT-PC1	Boiler fault
Outside S-OT	P1 (0-10V) or P2
Tank S-RT-CT2	P1 (0-10V) or P2 V-CT1
SL1 RT-CT1	
SL2 TS-HWS	P3 V-HWS

*Opentherm or SL1
SL2 or (SL2 and T-HWS:Opentherm DHW bit)



Boiler Connections	
Inputs	Outputs
Opentherm1 RT-PC1	Boiler run
Opentherm2 RT-PC2	Boiler fault
Room S-RT-PC1	P1 (0-10V) or P2
Outside S-OT	
Tank S-RT-CT2	P1 (0-10V) or P2 V-CT1
SL1 RT-CT1	
SL2 RT-CT2	P3 V-CT2

*Opentherm1 or SL1, Opentherm2 or SL2

2.21 ABBREVIATIONS

Abbreviation	Description
AH-HC	Air heater of Heater Circuit
Bn	On/Off Boiler n
CP	Circulating pump (controlled by Sequence Control)
F-PP-HWSC	Fault contact of primary pump of Hot Water Storage Circuit
FM	Fault Messages Function
F-B	Fault contact of Boiler
F-CP	Fault contact of Circulating pump
F-P-HWSC	Fault contact of pump of Hot Water Storage Circuit
Gen	General Function
HC	Heater Circuit Function
HD-SC	Heat demand contact of Sequence Control
HWS	Hot Water Storage Circuit Function
MC	Mixing Circuit Function
NC	No Connection
PC	Pump Circuit Function
P-HWSC	Pump of Hot Water Storage Circuit
P-MC	Pump of Mixing Circuit
P-PC	Pump of Pump Circuit
PP-HWS	Primary pump of Hot Water Storage Circuit

Abbreviation	Description
S-FT	Flow temperature sensor
S-FT-HC	Flow temperature sensor of Heating Circuit
S-FT-MC	Flow temperature sensor Mixing Circuit
S-FT-SC-PT	Common Flow temperature sensor of Sequence Control and Pump Circuit
S-HWS	Water temperature sensor Hot Water Storage Circuit
S-OT	Outdoor temperature sensor
S-RT-HC	Room temperature sensor of Heating Circuit
S-RT-MC	Room temperature sensor Mixing Circuit
S-RT-PC	Room temperature Pump Circuit
S-RT-SC	Room temperature sensor Sequence Control
SC	Sequence Control Function (Plant Control)
T-HC	Overtime contact of Heater Circuit
T-HWS	Overtime contact of Hot Water Storage Circuit
T-MC	Overtime contact of Mixing Circuit
T-PC	Overtime contact of Pump Circuit
T-SC	Overtime contact of Sequence Control
T-SC-HWS	Overtime contact of both Sequence Control and Hot Water Storage Circuit
V-MC	3-Way valve of Mixing Circuit

2.22 ELECTRICAL CONNECTIONS

Warning. This appliance MUST be efficiently earthed.

A mains supply of 230V 50Hz is required. The supply wiring MUST be suitable for mains voltage. Wiring should be 3 core PVC insulated cable NOT LESS than 0.75mm^2 (24 x 0.2 mm) and to BS. 6500, Table 16. The fuse rating should be 4A.

Wiring external to the boiler MUST be in accordance with the current I.E.T. (BS7671) Wiring Regulations and any local regulations. For Ireland reference should be made to the current ETCI rules for electrical installations.

Connection should be made in a way that allows complete isolation of the electrical supply - such as a double pole switch, having a 3mm contact separation in both poles, or a plug and unswitched socket serving only the boiler and system controls. The means of isolation must be accessible to the user after installation.

2.23 EXTERNAL WIRING

External wiring MUST be in accordance with the current I.E.T. (BS7671) Wiring Regulations. For Ireland reference should be made to the current ETCI rules for electrical installations.

The wiring diagrams illustrated in Section 2.25 covers examples of the range of systems that may be used with this appliance.

For wiring external controls to the boiler, reference should be made to the systems wiring diagram supplied by the relevant manufacturer in conjunction with the connection diagram shown in Section 2.25.

Difficulty in wiring should not arise, providing the following directions are observed:

1. The appliance must be wired with a permanent live supply.
2. Four Multi Function Relay Volts free outputs are provided that may be configured to control Pumps, Valves and other devices over the voltage ranges specified: 24V DC to 230V 50Hz.
   An additional option kit may be added to control a Pump using a modulating 0-10V DC control signal.
3. Input terminals are available for connecting a variety of system controls for heating demand, and optionally for DHW demand.

Heating demand can be controlled by:

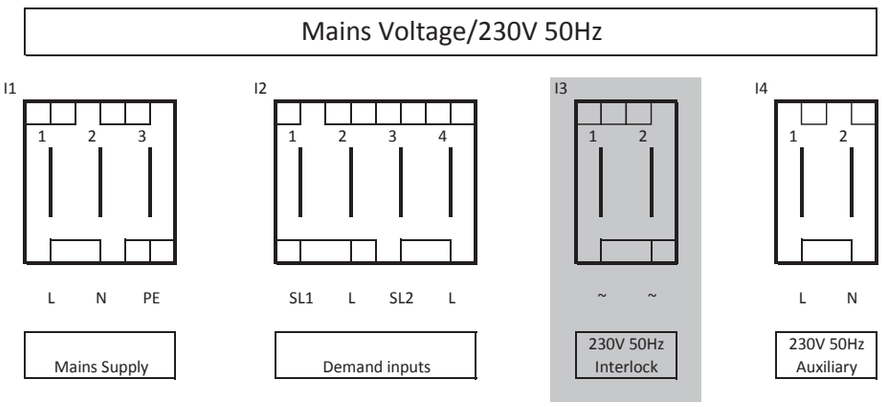
- 230V SL1 and SL2 inputs where configured for two heating circuits
- Two OpenTherm bus interfaces for the connection of OpenTherm compatible room control kits. One per heating circuit.
- Modulating sequencer kit
- an external BMS
- an outside temperature sensor.
- Optional Room Temperature sensor kit, one for each heating circuit configured.
- Optional Header Temperature sensor where hydraulic separation or a combined flow temperature control is required

DHW demand can be controlled by:

- 230V programmer and/or cylinder thermostat
- tank sensor kit.
- One 2 channel OpenTherm interface for a Heating and a DHW circuit.

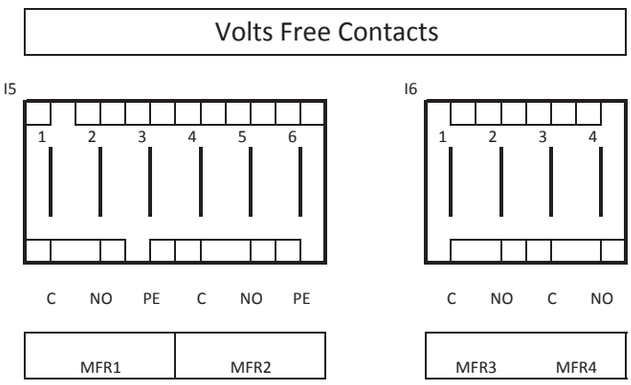
The electrical supply and other inputs for the boiler can be seen in Section 2.24.

2.24 INSTALLER CONNECTIONS



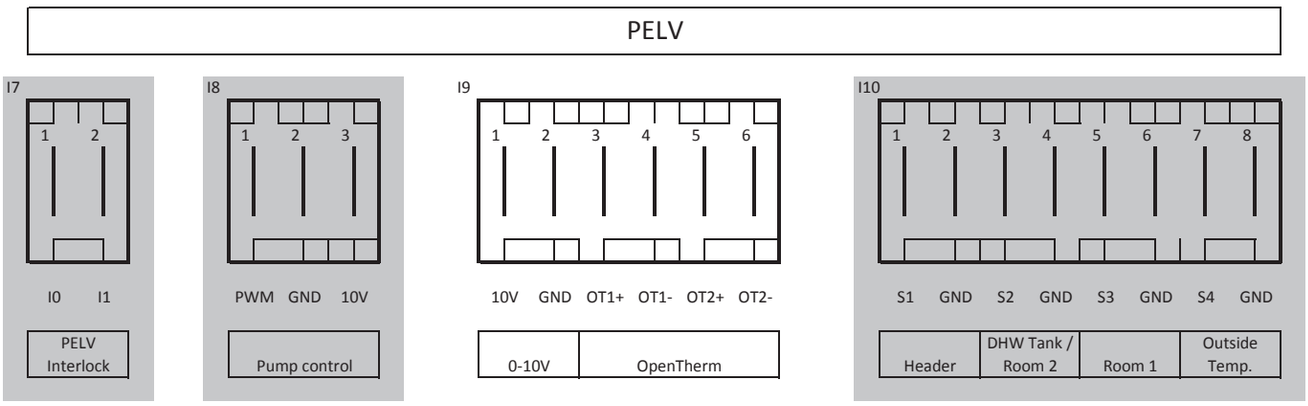
KEY

I1 Mains Supply Connector, 230V 50Hz. Live, Neutral, PE.
I2 Demand inputs, Multifunctional, 230V 50Hz. Typical setting:
SL1, Heating Circuit 1
SL2, Heating Circuit 2/DHW
I3 Optional Interlock input, 230V 50Hz
I4 Auxiliary Mains Supply Output, 230V 50Hz. Live, Neutral.
Internal Pump power connection



KEY

I5 Multifunction Volts Free Relay Outputs, 24V DC to 230V 50Hz. Typical setting:
MFR1 Heating Circuit 1 Pump
MFR2 DHW Circuit Pump
Internal Pump PE connection
I6 MFR3 Burner On Indication
MFR4 Boiler Fault Indication



KEY

PELV Only
I7 Optional Interlock input.
I8 N/A.
I9 Boiler Control:
0-10V Capacity or Temperature.
OpenTherm Interface 1. Boiler, Heating Circuit 1 and/or DHW Circuit Control.
OpenTherm Interface 2. Heating Circuit 2 Control.

I10 Optional Sensors:
Header Sensor for Cascade Control.
DHW Tank Temperature or Heating Circuit 2 Room Temperature.
Heating Circuit 1 Room Temperature.
Outside Temperature Sensor for Heating Curve.

**Note: The items grayed out are not standard and are connections provided by the relevant option kits.*

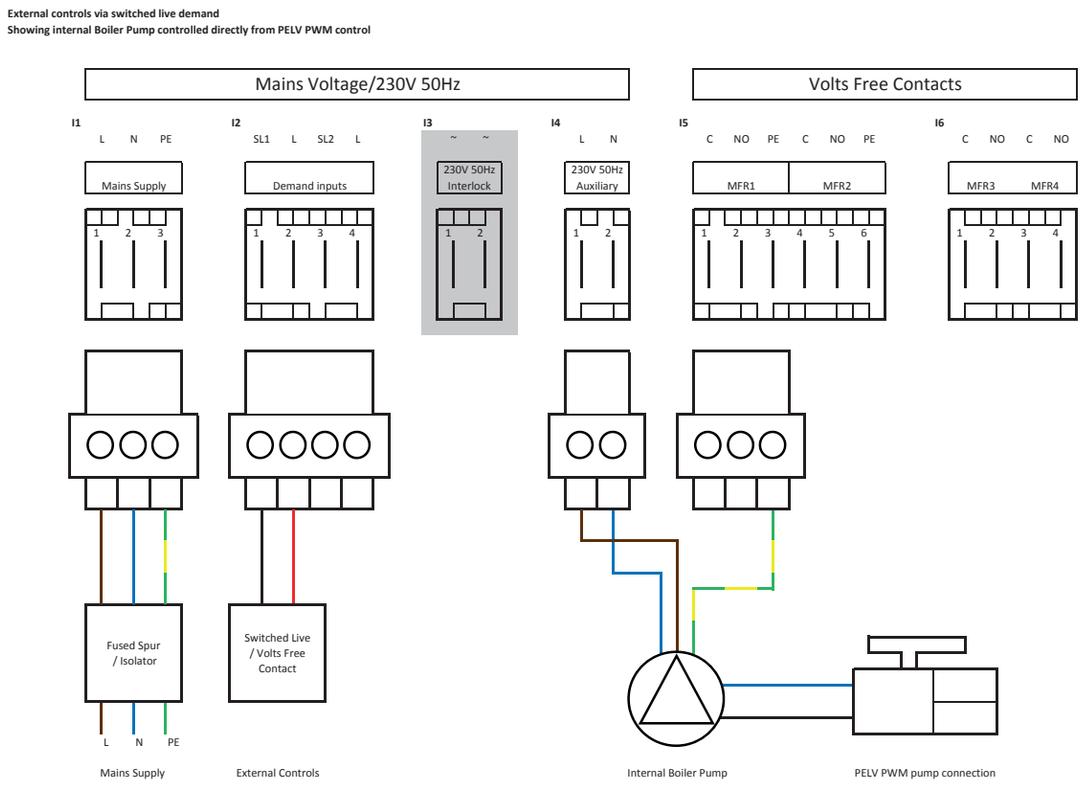
2.25 BOILER WITH EXTERNAL CONTROLS

1. If the boiler circulating pump is not controlled by the boiler then the overrun time of this pump MUST be set to a minimum of 30 seconds. Failure to do so may invalidate the warranty.
2. It is preferable that any pump used to circulate water through an individual boiler is controlled by the local boiler. Either as a 230V 50Hz supply as shown, enabled by the Volts Free Contacts e.g. MFR1 or controlled by the option kit for 0-10V pump control. If not then a pump overrun function MUST be provided by the controlling system.
3. The pump load and switch on surge current must be within the limits of the output if it is powered directly from the Volts Free Contact. The limits are as specified in the Electrical Specification Table below.

   A slave contactor may be used to power the pump where needed.
4. If the switched live is provided without a Volts Free Contact then this MUST be taken from the same phase as the boiler mains supply, preferable through the same isolator.

Electrical Specifications for External Connections		
	Voltage	**Load**
Input - SL1, SL2	230V 50Hz	3kΩ min
Input - 0-10V	0 to 10V DC	5mA max
Sensor - Outside Sensor - Header Sensor - Room Sensor - DHW Tank	5V DC	10kΩ @ 25ºC β(25/85)=3977
Output - MFR1..4 output	24 V DC to 230V 50Hz	1.0 A max at CosØ = 0.6
	230V 50Hz	Peak Surge 20A < 20ms
	230V 50Hz	Peak Transient 100A < 10uS
Bus - OT1, OT2	OpenTherm V 4.0	
Bus - VariCAN	CAN Open, proprietary protocol	

External Controls via Switched Live Demand



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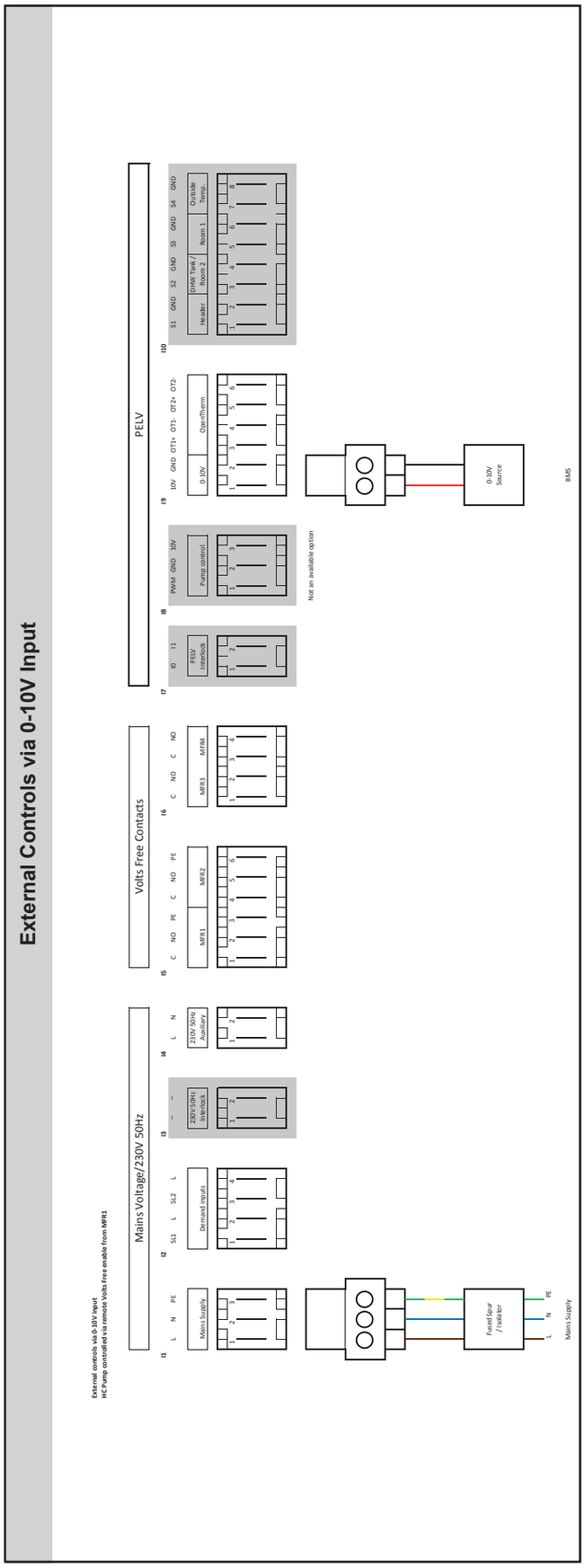
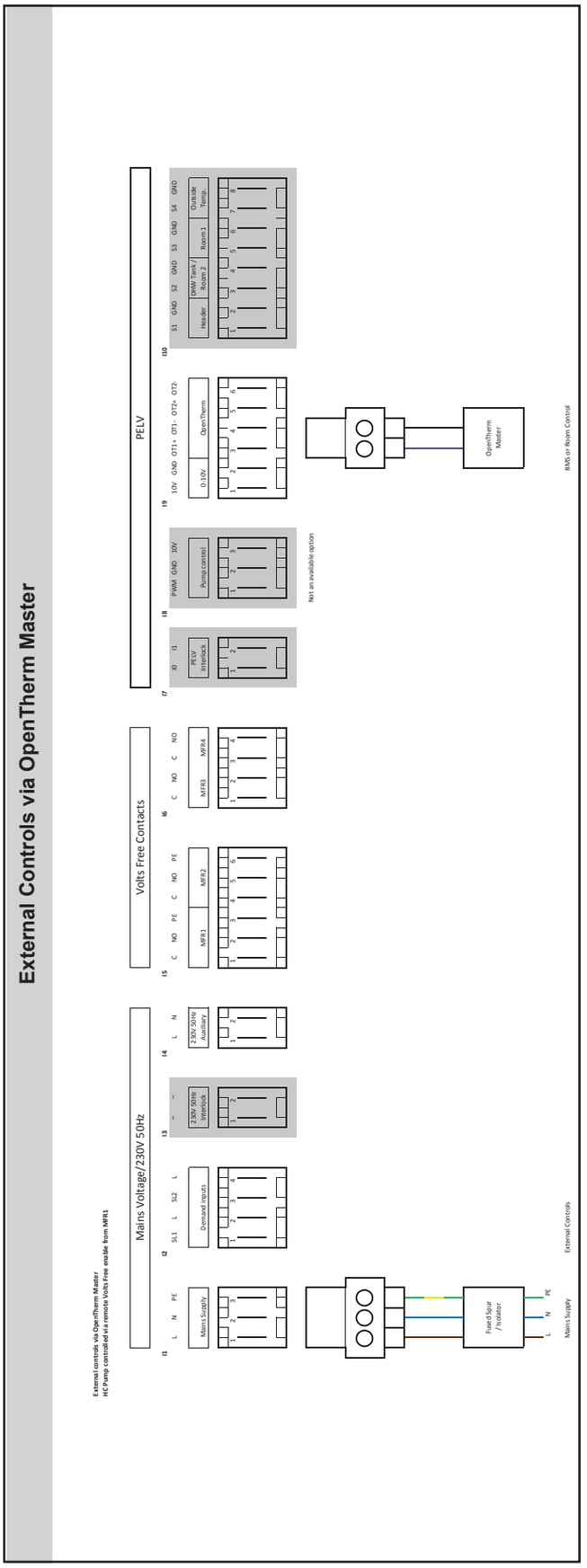
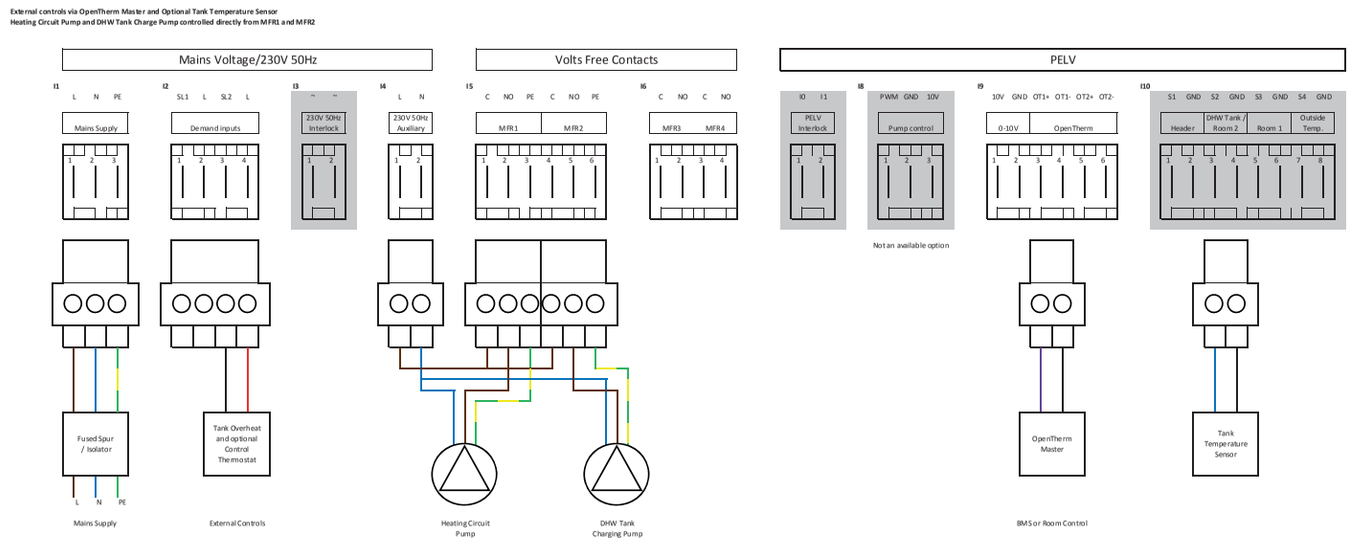

External Controls via 0-10V Input
External controls via 0-10V Input
HC Pump controlled via remote Volts Free enable from MFR1
Mains Voltage/230V 50Hz
Volts Free Contacts
PELV
Mains Supply
Demand Inputs
230V 50Hz Interlock
230V 50Hz Auxiliary
MFR1
MFR2
MFR3
MFR4
PELV Interlock
Pump control
0-10V
OpenTherm
Header
DHW Tank / Room 2
Room 1
Outside Temp.
Not an available option
0-10V Source
Fused Spur / Isolator
Mains Supply
BMS


External Controls via OpenTherm Master
External controls via OpenTherm Master
HC Pump controlled via remote Volts Free enable from MFR1
Mains Voltage/230V 50Hz
Volts Free Contacts
PELV
Mains Supply
Demand Inputs
230V 50Hz Interlock
230V 50Hz Auxiliary
MFR1
MFR2
MFR3
MFR4
PELV Interlock
Pump control
0-10V
OpenTherm
Header
DHW Tank / Room 2
Room 1
Outside Temp.
Not an available option
OpenTherm Master
Fused Spur / Isolator
Mains Supply
External Controls
BMS or Room Control

continued.....

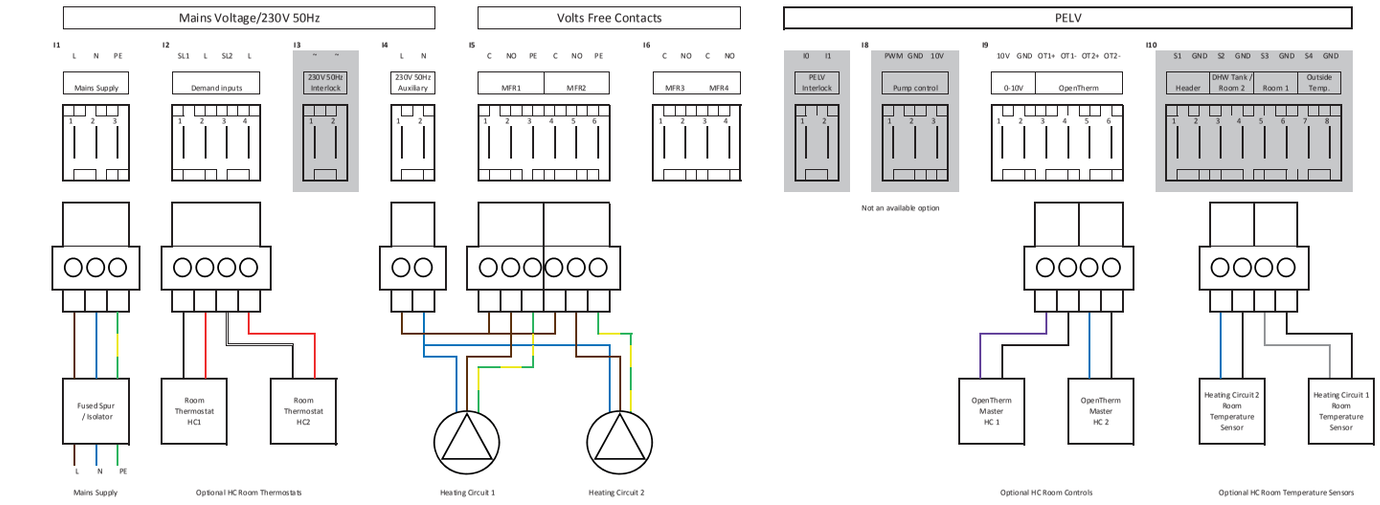
External Controls via OpenTherm Master and Optional Tank Temperature Sensor

Heating Circuit Pump/Valve and DHW Tank Charge Pump/Valve controlled directly from MFR1



External Controls via Switched Live or OpenTherm or Room Temperature Sensors for Two Heating Circuits

Heating Circuit Pumps/Valves controlled directly from MFR1 and MFR2



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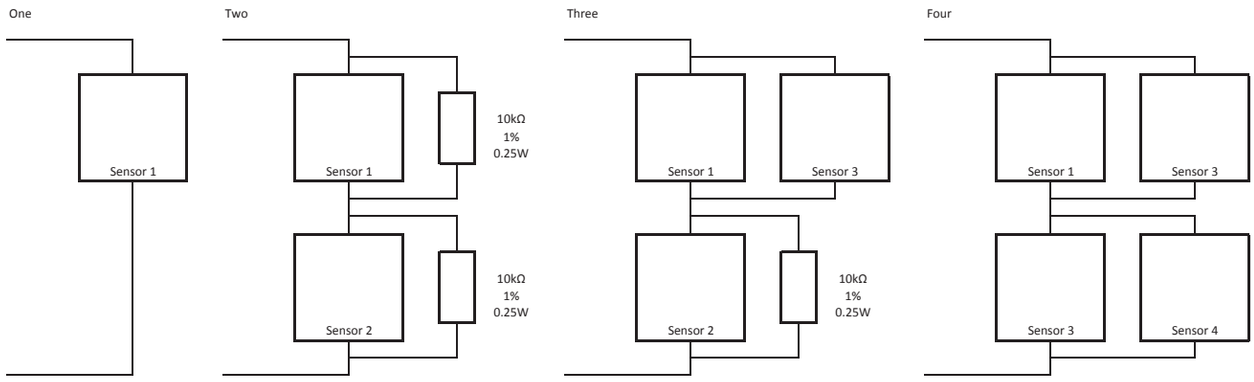
Connecting Multiple Room Sensors



Note.
Where multiple sensors are used the overall accuracy of temperature measurement is reduced, this can be compensated for by trimming the parallel resistors
Siting of multiple room sensors for large spaces should be carefully considered to avoid significant temperature differences between sensors

2.26 CONTROLS CONFIGURATION, COMMISSIONING AND TESTING

A. ELECTRICAL INSTALLATION

1. Checks to ensure electrical safety should be carried out by a competent person.
2. ALWAYS carry out the preliminary electrical system checks, i.e. earth continuity, polarity, resistance to earth and short circuit, using a suitable meter.

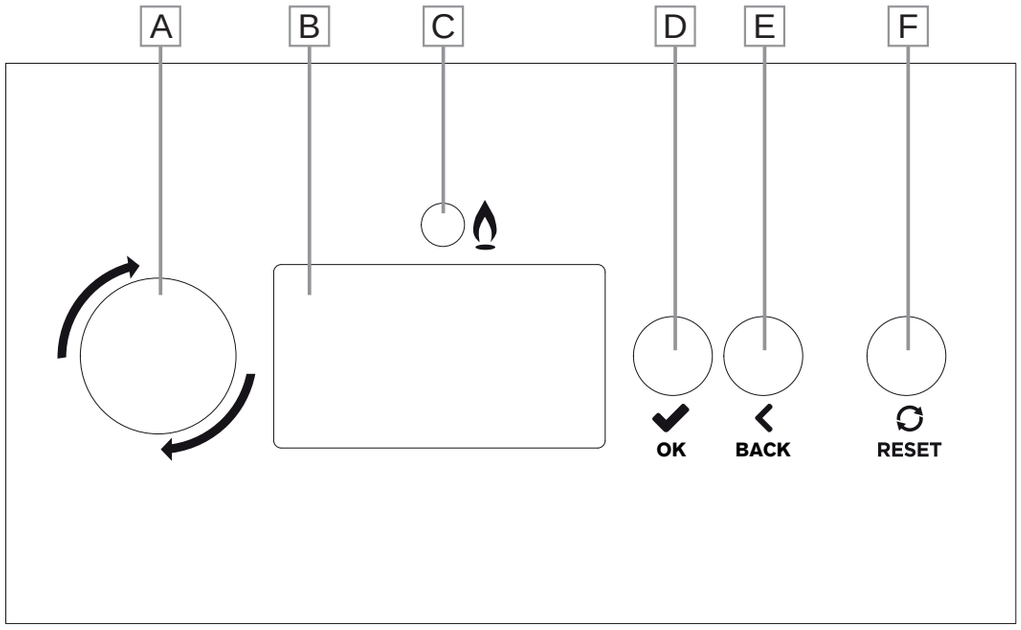
B. GAS INSTALLATION

1. The whole of the gas installation, including the meter, should be inspected and tested for soundness and then purged in accordance with the recommendations of the relevant standards listed on page 8, by the installer.

   In IE refer to I.S.813:2002.

WARNING. *Whilst effecting the required gas soundness test and purging air from the gas installation, open all windows and doors, extinguish naked lights and DO NOT SMOKE.*

2.27 USER INTERFACE



A. **ROTARY KNOB**
- Enter a menu, if in the normal operation screen, and highlight the first menu item.
- Scroll up (anti-clockwise) or down (clockwise) in a menu
- Change the value in parameter setting.
- If an error is showing in the title bar, scroll to the associated error screen(s), and return.

B. **LCD DISPLAY SCREEN**
- Menu and status display.

C. **BURNER LED**
- Will be on if the burner is lit.

D. **SELECT BUTTON**
- Enter a menu, if in the normal operation screen, and highlight the first menu item.
- Enter the highlighted menu (sub menu or parameter), if in a menu or sub menu.
- If in a parameter setting, select a parameter which will then flash for adjustment, once adjusted using the rotary knob press again to store and move on.

E. **BACK BUTTON**
- In a menu, return to the previous menu layer.
- In parameter setting, exit the parameter without storing the value.
- In a guided assistant, go back to the previous screen.

F. **RESET BUTTON**
- Reset the associated boiler module error, if a resettable (lockout) error is active.
- Return to the normal operation screen.

2.28 GLOSSARY OF TERMS

2.28.1 Menu function resource definitions

- Plant – related to the master or standalone boiler for plant control (common) functions
- Boiler – only related to an individual boiler and only used by that boiler
- Heating Circuit – only related to an individual heating circuit
- DHW circuit – only related to an individual DHW circuit

2.28.2 Pump definitions

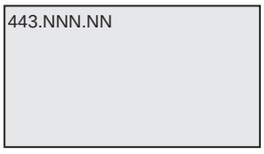
- System pump – used to circulate water through the Heating and/or DHW circuits as well as either the boiler or the secondary side of a LLH or Plate H/X
- Shared boiler pump – used to only circulate water through more than one boiler
- Shunt pump – used to circulate an amount of water between flow and return to limit the temperature differential
- Boiler pump – used to only circulate water through a single boiler
- HC pump – a pump or valve that allows flow through a HC
- DHW pump – a pump or valve that allow flow through a DHW circuit

2.29 BOILER GUIDED CONFIGURATION STAND ALONE BOILER

Power up the boiler

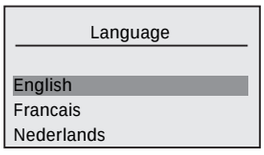
Initailly the software revision of the System Manager with be displayed in the top LHS of the screen.

The following screens will then be sequentially displayed:



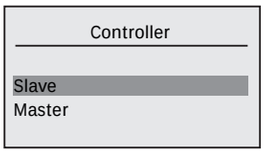
2.29.1 Initial Settings

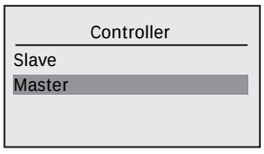
At start up the default language is selected and shown on the display, this can be changed if required or just confirmed:

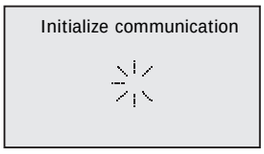


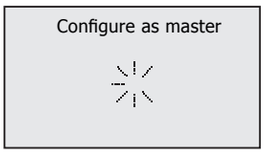
Once the language is either confirmed or selected then this is stored and set as the default.

For a standalone boiler the controller must be selected as a Master:

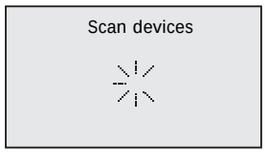


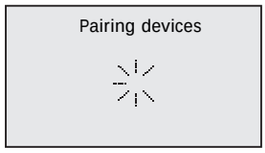




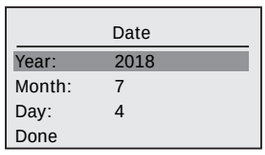


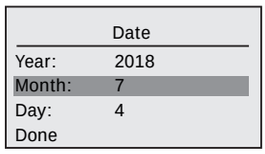
The system will then scan the bus to determine if any other devices are present:

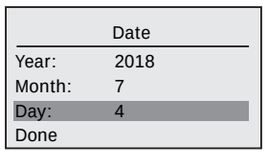


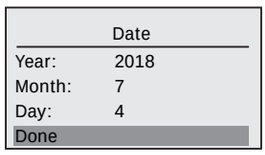


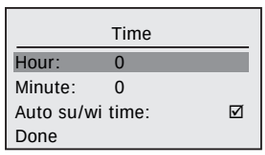
The current date followed by the time can now be set:

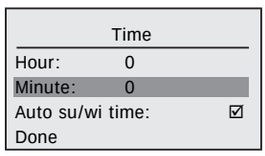


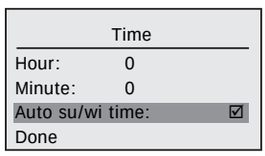


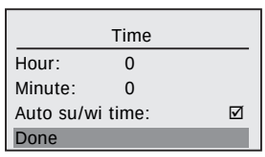






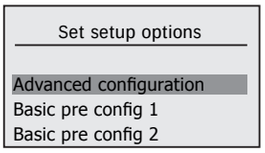


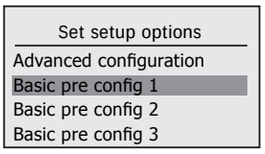


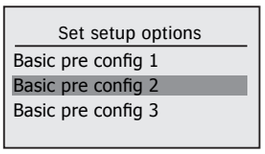


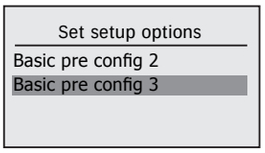
2.29.2 Boiler setup options - Pre configuration selection

A standalone or non-VariCAN cascade boiler can be set up quickly to a selected configuration at this step. One of the following options can be selected:



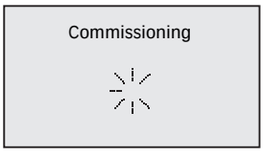




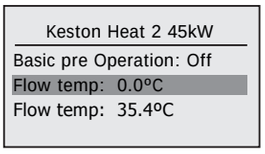


By selecting Advanced Configuration the system will continue to follow the guided configuration as detailed in Section 2.29.3.

If one of the basic pre config options is selected then the configuration will be set to a specific set up, then the system will reboot:



Followed by the boiler status screen.



For each of the selected basic pre config options the setting for the boiler are detailed below.

These pre configurations can also be used as a starting point and then adapted to match the requirement.

Basic pre config 1 (Not for Keston Heat 2)

Standalone boiler with the following configuration:

Plant options for Boiler run and Boiler fault on MFR3 and MFR4 respectively.

One Heating circuit with HC enable on SL1 with an ON/OFF Pump/Valve on MFR1. Maximum and minimum flow temperature settings of 80 and 30 degrees respectively. With DHW priority and set to run immediately in Day operating mode.

One DHW circuit with DHW enable (Overheat and control) on SL1 with an ON/OFF Pump/Valve on MFR2. Set to run in Time clock single day operating mode.

Basic pre config 2

Standalone/non-VariCAN cascade boiler with the following configuration:

Plant control enable on SL1 with a modulating boiler pump, and with options for Boiler run and Boiler fault on MFR3 and MFR4 respectively.

Basic pre config 3

Standalone boiler with the following configuration:

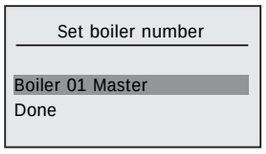
Plant options for a modulating System pump with Boiler run and Boiler fault on MFR3 and MFR4 respectively.

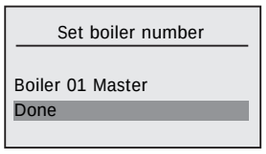
One Heating circuit with HC enable on SL1 with an ON/OFF Valve on MFR1. Maximum and minimum flow temperature settings of 80 and 30 degrees respectively. With DHW priority and set to run immediately in Day operating mode.

One DHW circuit with DHW enable (Overheat and control) on SL1 with an ON/OFF Valve on MFR2. Set to run in Time clock single day operating mode.

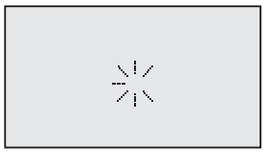
2.29.3 Advanced Configuration

The display will now prompt for selection of the boiler number, this is necessary to identify the boiler should it become part of a *i*CCS (Commercial Control System), by default a Master boiler will have a setting of 01:

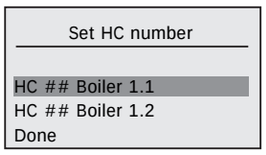




The system will now scan the known devices on the bus to determine what Heating Circuits are available in the boiler for configuration:

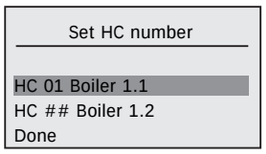


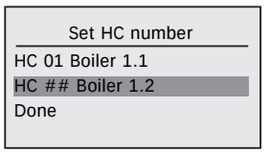
Once this is completed, the display will prompt with the available heating circuits so that they may have HC numbers allocated, and then later configured.

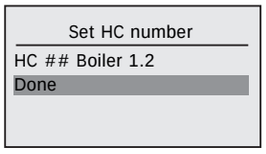


If any heating circuits are required for the boiler, then number them sequentially from 1. If there are no heating circuits to be configured to this boiler just move on past by selecting "Done". Examples:

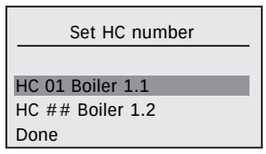
Single Heating Circuit:

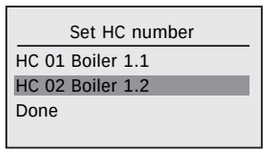


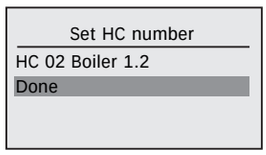




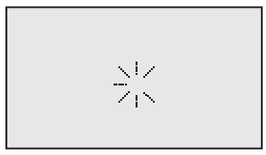
Two Heating Circuits:



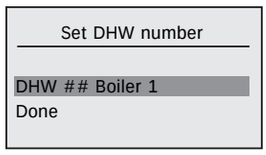




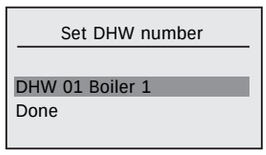
The system will now scan the known devices on the bus to determine what DHW circuits are available in the boiler for configuration:

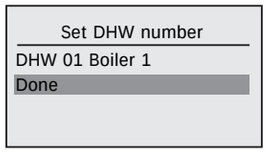


Once this is completed, the display will prompt with the available DHW circuits so that they may have DHW circuit numbers allocated, and then later configured.



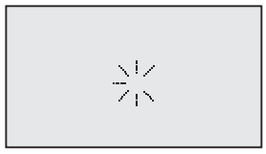
If any DHW circuits are required for the boiler then number them sequentially from 1. If there are no DHW circuits to be configured to this boiler just move on past by selecting 'Done'. Example:





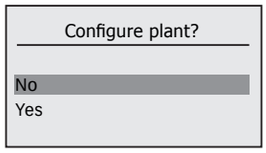
The system will now configure the System Manager for these circuits.

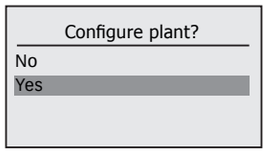
The system will now scan the known devices on the bus to determine what Plant functions are available in the boiler for configuration:



2.29.4 Plant Settings

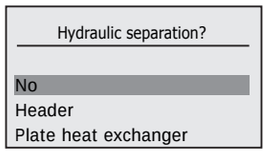
If you wish to configure any of the following plant functions, then select 'Yes', if not continue by selecting 'No' and move to Section 2.29.5. ONLY configure these functions here if you are not going to use them in any HC's or DHW circuits.

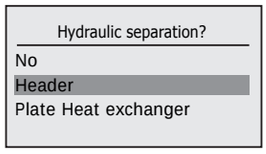


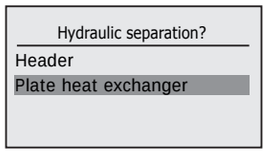


Hydraulic Separation:

If the boiler has Hydraulic Separation from the intermediate or final circuits in the heating system, or if the boilers have a combined flue system then set this option to either ‘Header’ or ‘Plate heat exchanger’.





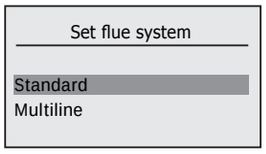


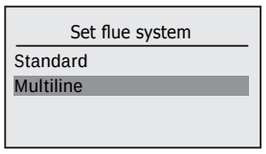
Header Thermistor:

If the system has a header sensor fitted, combined flow, then select ‘Yes’, otherwise the system will use the average flow temperature of all running boilers.

Set Flue System:

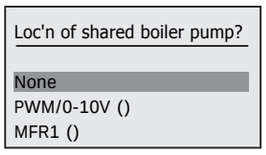
If the boilers are connected into a common or cascade flue system then you can choose multiline flue system where the minimum capacity of the boiler in a cascade can be increased in order to ensure no backflow in the flue system.

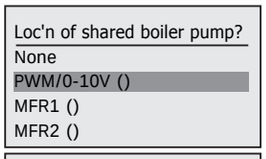


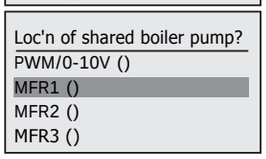


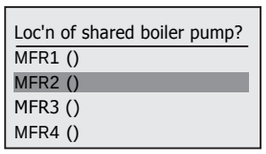
Shared Boiler Pump:

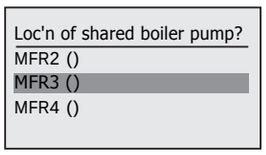
If the Master boiler has a pump that is shared across the plant then select the output that is used to control it from the list. Otherwise select ‘None’.

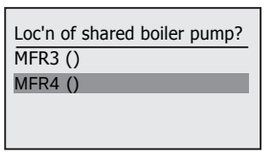








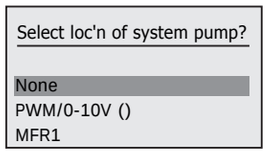


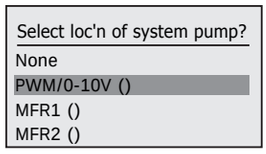


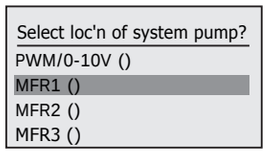
System Pump:

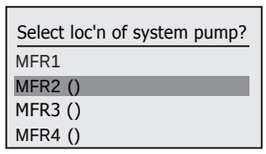
If the boiler has a Plant System Pump connected then select the output that is used to control it from the list. Otherwise select ‘None’.

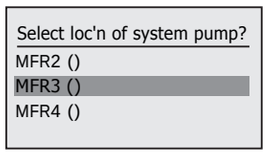
Once an output has been configured the selected function is shown in brackets behind the output name.

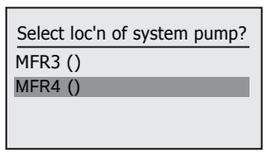








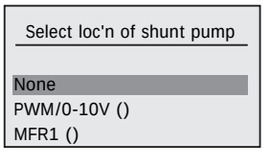


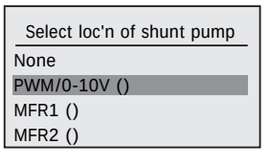


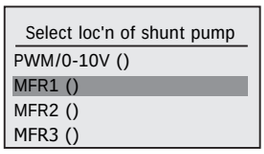
Shunt Pump:

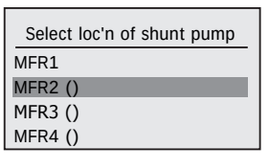
Shunt Pump. If the boiler has a Plant Shunt Pump connected between the Flow and Return headers then select the output that is used to control it from the list. Otherwise select 'None'.

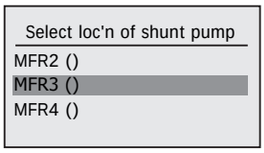
Once an output has been configured the selected function is shown in brackets behind the output name.

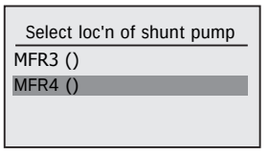






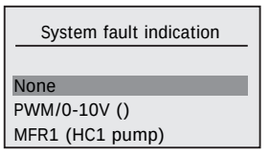


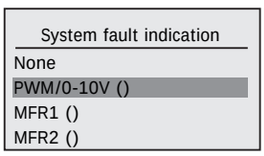


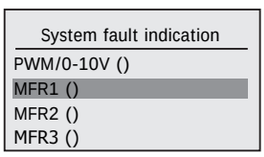


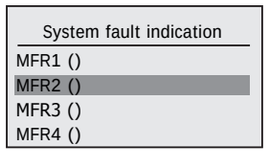
System Fault Indication:

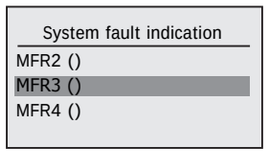
If the Master boiler has Slave boilers or Extension Modules connected and the requirement to signal errors for the plant then select the output that is used to control it from the list. Otherwise select 'None'.

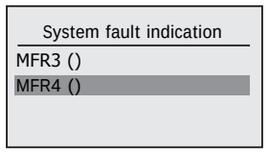








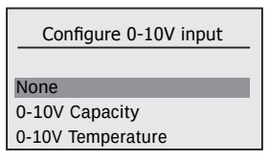


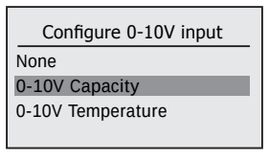


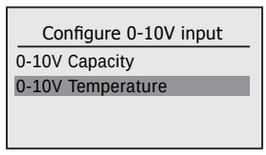
0-10V Input:

If the Plant is to be controlled by a single 0-10V signal, this can be configured. Otherwise set to 'None'.

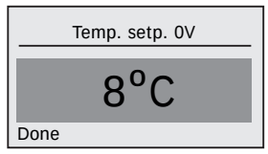
The options are Capacity or Temperature control, with additional parameters for Temperature control:

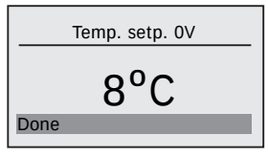




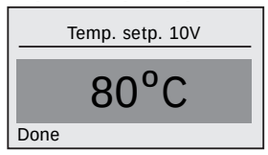


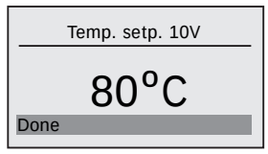
0-10V input Temp. Setp. 0V:



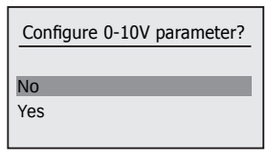


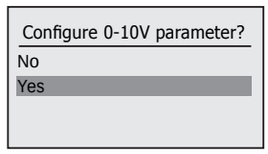
0-10V input Temp. Setp. 10V:



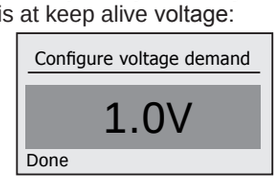


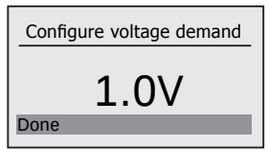
Configure 0-10V Parameters:



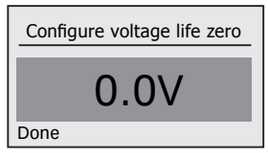


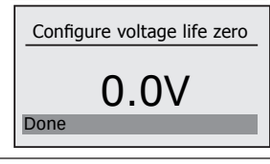
Voltage demand. This setting determines the switching point at which demand is expected by the system, anything below this is at keep alive voltage:





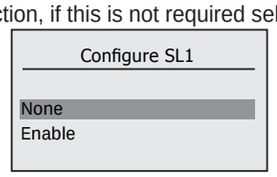
Voltage life zero. This setting determines the minimum keep alive voltage where the system expects a voltage to be present on an operational interface, anything below this indicates a wiring fault:

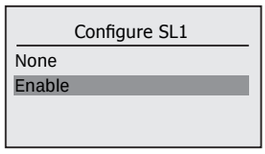


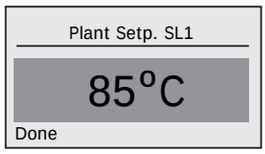


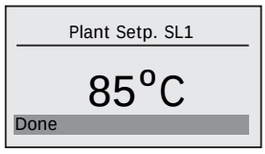
Switched Live 1 Input Function:

The SL1 input can be configured as a Plant function, if this is not required select 'None'.



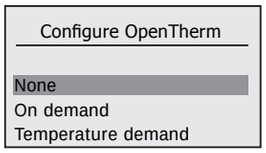


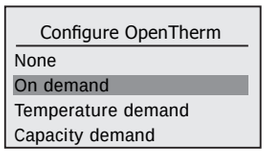




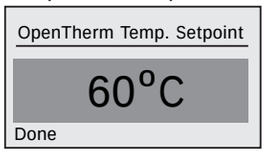
Plant OpenTherm interface:

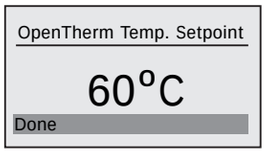
Plant OpenTherm control. If the boiler has the requirement to use the OpenTherm interface then select the connection type used from the list. Otherwise set to 'None'.

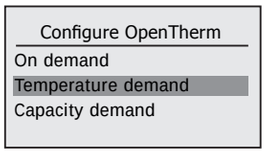


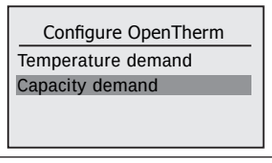


For On demand there is an associated flow temperature setpoint:



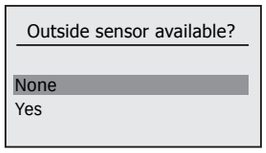


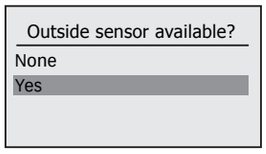




Outside Sensor:

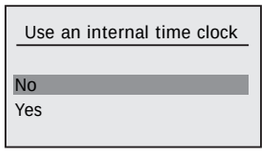
This sensor can be selected and used for all demands to the boiler, if this is not required select 'None':

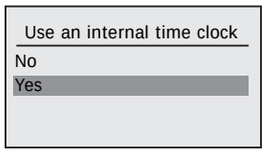




Internal Time Clock:

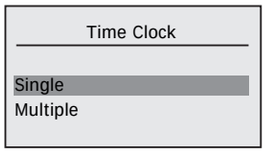
Internal timeclock. A timeclock can be set for the Plant, this will control all functions. It can be set as a single or multiple day timer.

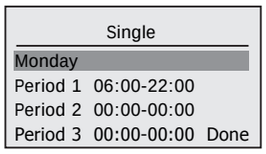


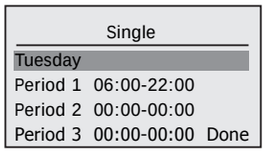


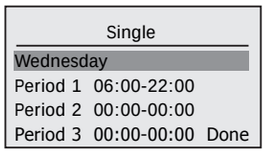
Internal Time Clock Single:

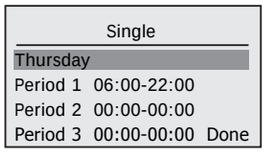
Single day timer is programmable for each of the 7 days with 3 periods per day, Monday through Sunday:

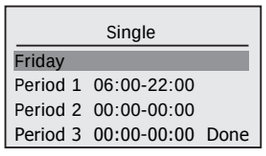


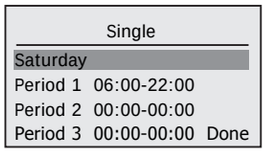


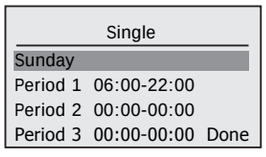


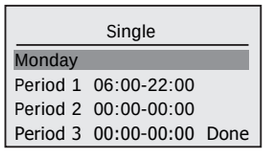


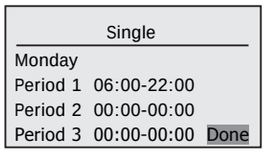








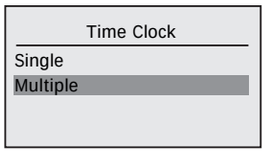


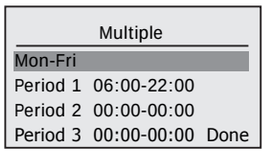


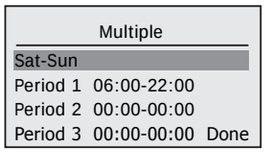
Once all days and times are set, select 'Done' to continue.

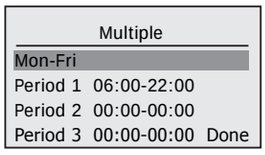
Internal Timeclock Multiple:

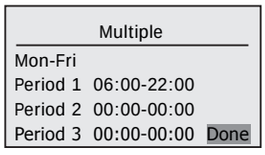
Multiple day timer is programmable for Mon-Fri and Sat-Sun with 3 periods per group of days:







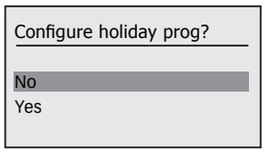


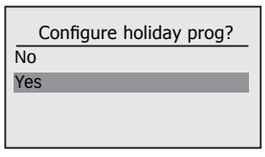


Once all days and times are set, select 'Done' to continue.

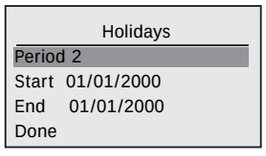
Holiday Programme:

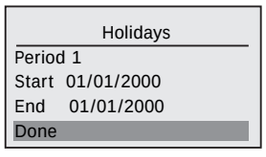
Holiday programme. Up to 8 holiday periods can be set, each has a start and end date.





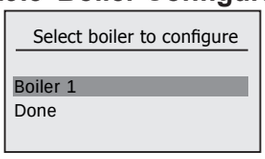
Holiday Programme Holidays:

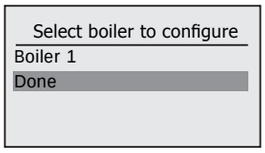




Once all are set select 'Done' to continue.

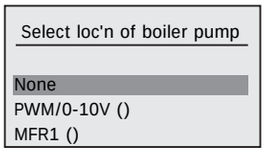
2.29.5 Boiler Configuration:

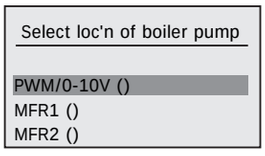


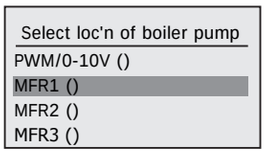


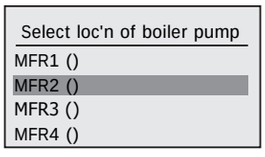
Boiler Pump Location:

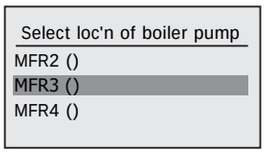
If the boiler has an individual Boiler Pump connected then select the output that is used to control it from the list. Otherwise select 'None'.

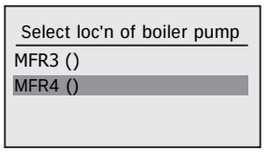






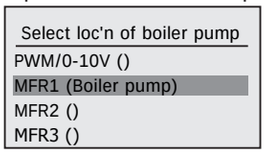






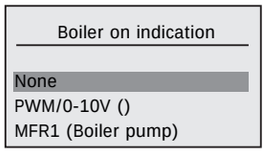
Once an output has been configured the selected function is shown in brackets behind the output name:

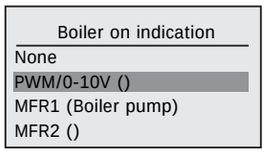
Example MFR1 as a boiler pump.

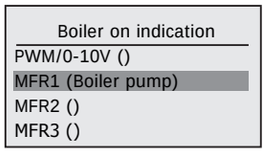


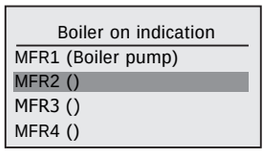
Boiler On Indication:

If the boiler has the requirement to signal when the burner is lit then select the output that is used to control it from the list. Otherwise select 'None'.



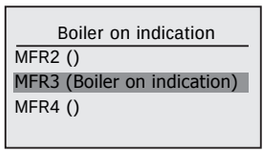






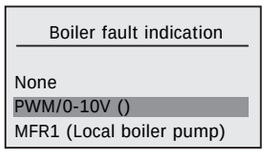
Once an output has been configured the selected function is shown in brackets behind the output name:

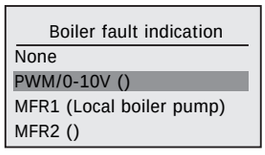
Example MFR3 as a boiler on indication:

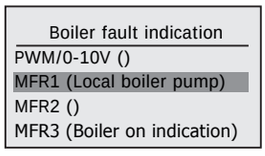


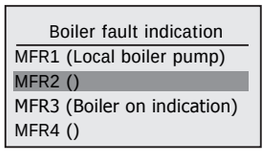
Boiler Fault Indication:

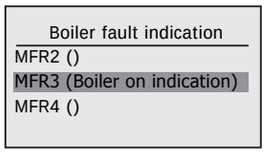
Boiler fault indication. If the boiler has the requirement to signal when the Boiler is at fault then select the output that is used to control it from the list. Otherwise select 'None'.





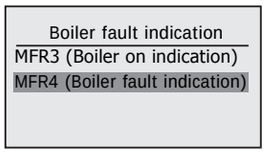






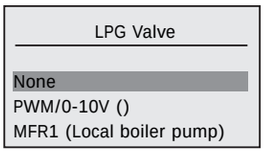
Once an output has been configured the selected function is shown in brackets behind the output name:

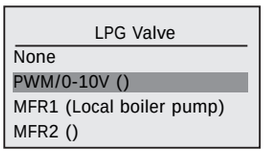
Example MFR4 as a boiler fault indication.

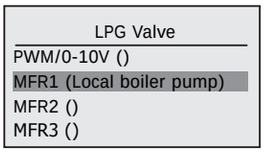


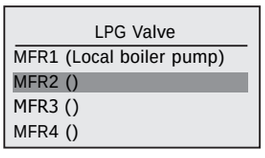
LPG Valve:

If the boiler has the requirement to control an external LPG valve then select the output that is used to control it from the list. Otherwise select 'None'.



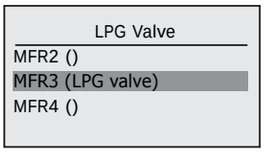






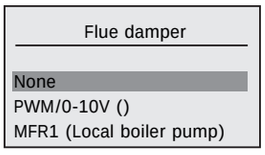
Once an output has been configured the selected function is shown in brackets behind the output name:

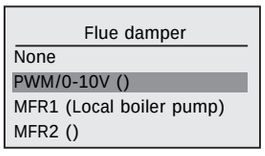
Example MFR3 as an LPG valve control.

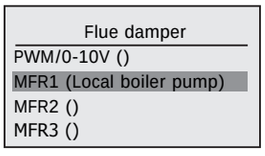


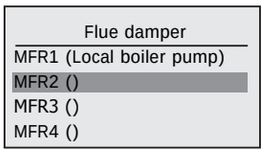
Flue Damper:

If the boiler has the requirement to control an external flue damper then select the output that is used to control it from the list. Otherwise select 'None'.



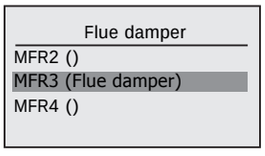




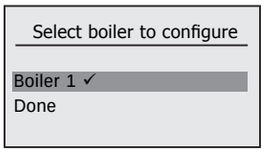


Once an output has been configured the selected function is shown in brackets behind the output name:

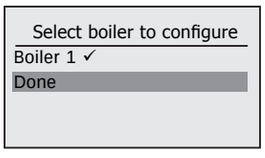
Example MFR3 as a flue damper control:



The boiler has now been configured and the display will return to:

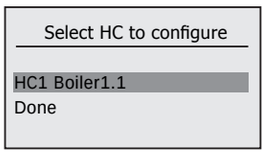


Note. The boiler number now has a tick next to it showing that it has been configured. If you completed the boiler configuration, select 'Done'.

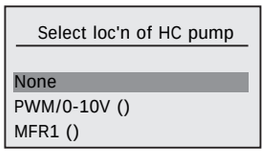


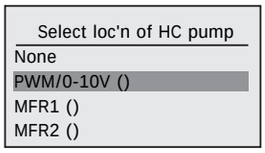
2.29.6 Heating Circuit Configuration:

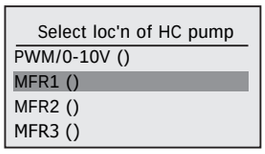
Heating circuit selection for configuration. Select the HC from the available heating circuits in the list:

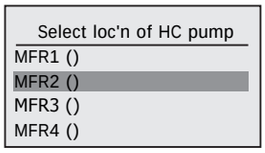


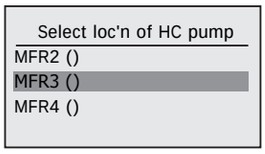
HC pump location. If the HC has an individual HC Pump connected then select the output that is used to control it from the list. Otherwise select 'None'.

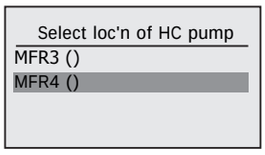






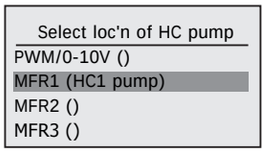




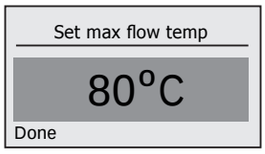


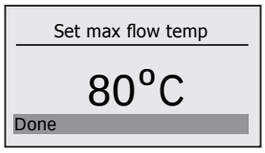
Once an output has been configured the selected function is shown in brackets behind the output name:

Example, MFR1 as a HC pump:

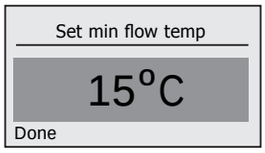


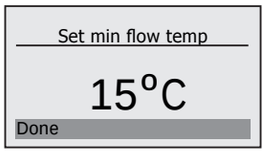
The HC maximum temperature set-point can be set, it defaults to the maximum output of the boiler model, but this can be decreased:



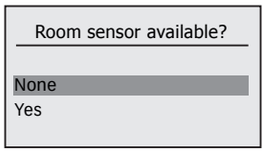


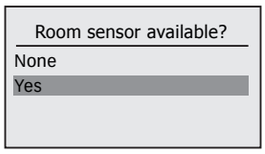
The HC minimum set-point can be set, it defaults to the minimum output of the boiler model, but this can be increased:



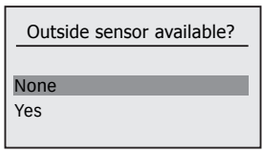


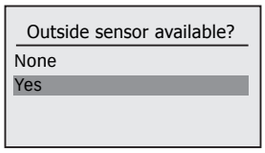
Room Sensor. If the HC has a Room Sensor connected then select 'Yes' from the list. Otherwise set to 'None'.



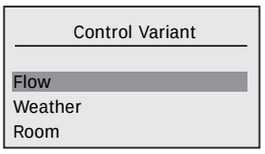


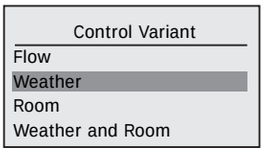
Outside Sensor. If the HC has a specific Outside Sensor connected then select 'Yes' from the list. Otherwise set to 'None'.

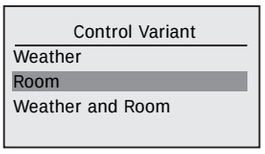


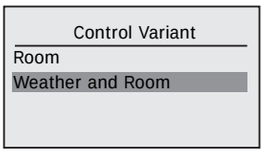


Control variant. The HC must have a control variant that is used to determine the demand. This is usually set to Flow Temperature unless specific configuration options are chosen.

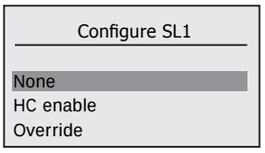


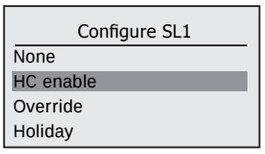


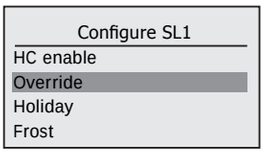


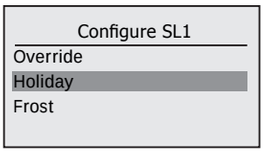


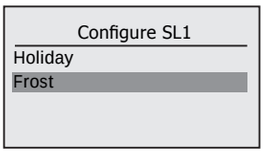
Switched Live 1 input function. The SL1 input can be configured as a HC function, if this is not required select 'None'.



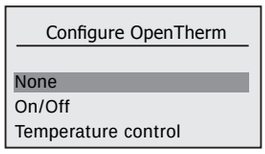


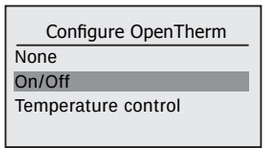


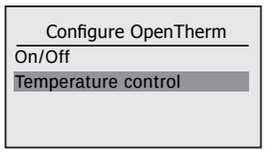




OpenTherm input function. The OpenTherm interface can be configured as a HC function, if this is not required select 'None'.

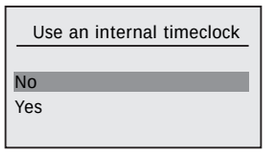


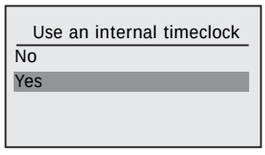




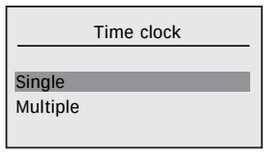
If the external OpenTherm device has its own timeclock then confirm this on the next screen

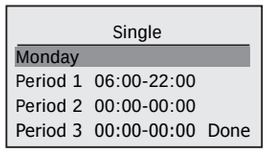
Internal timeclock. A timeclock can be set for the HC, this will control all functions. It can be set as a single or multiple day timer.

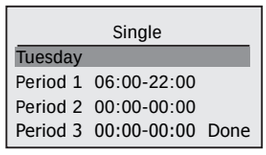


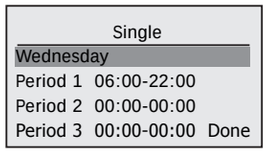


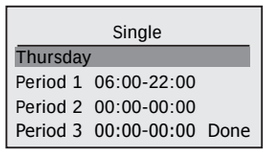
Single day timer is programmable for each of the 7 days with 3 periods per day, Monday through Sunday:

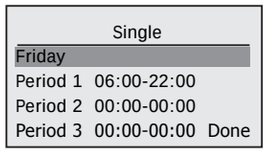


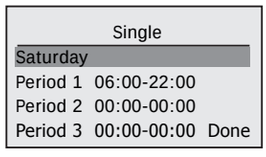


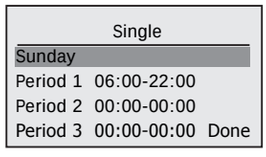


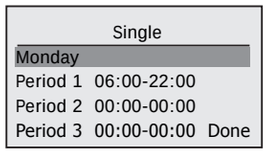


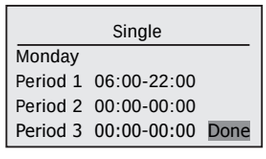




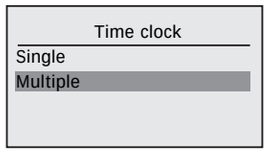


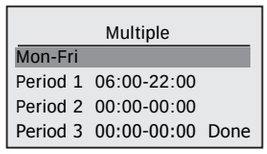


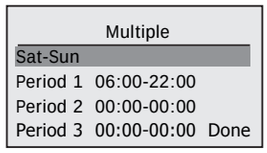


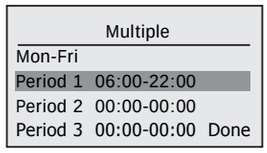


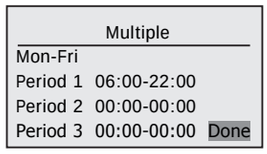
Multiple day timer is programmable for Mon-Fri and Sat-Sun with 3 periods per group of days:





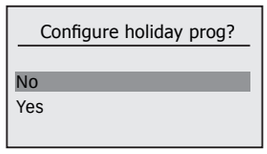


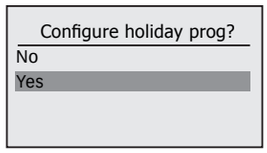


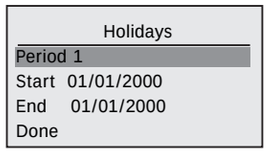


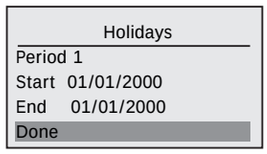
Once all days and times are set, select 'Done' to continue.

Holidy programme. Up to 8 holiday periods can be set, each has a start and end date. Once all are set select 'Done' to continue:

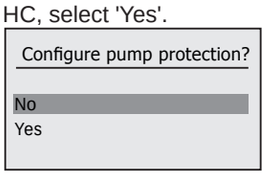


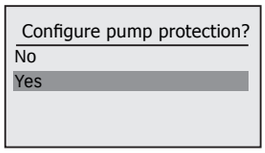




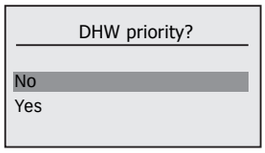


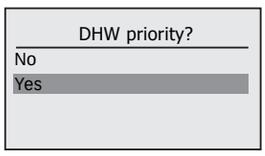
Pump protection. To enable seizure protection on pumps/valves connected to the HC, select 'Yes'.



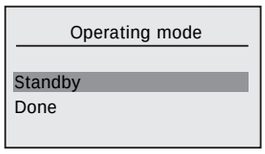


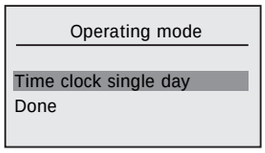
DHW priority. If the HC is requried to give priority to any DHW demands in the system then select 'Yes'.

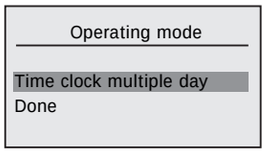


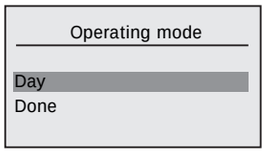


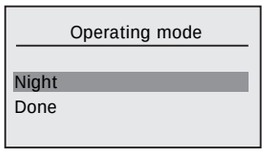
Operating mode. The operating mode of the HC can be set from a scrolling field, once this is set then the HC configuration is completed by selecting 'Done'.



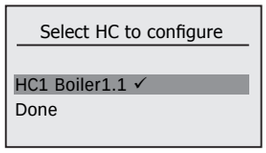




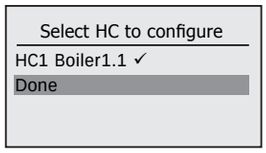




The HC has now been configured and the display will return to:

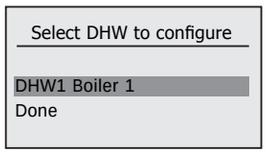


Note, that the HC number now has a tick next to it showing that it has been configured. If you have completed the HC configuration, select 'Done'.



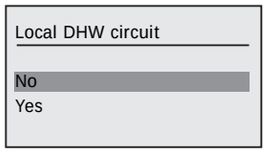
2.29.7 DHW Configuration

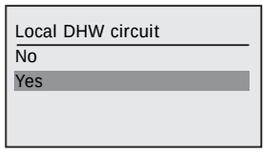
DHW circuit selection for configuration. Select the DHW circuit from the available DHW circuits in the list:



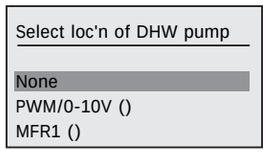
Local DHW Circuit

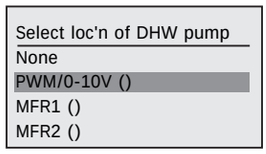
If the Master boiler has its own independent DHW circuit then select ‘Yes’, if not select ‘No’.

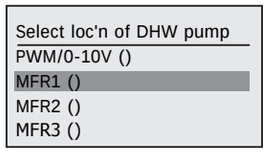


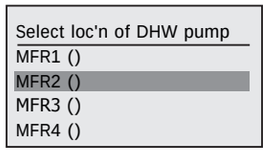


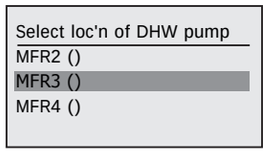
DHW pump location. If the DHW circuit has an individual DHW Pump connected then select the output that is used to control it from the list. Otherwise select 'None'.

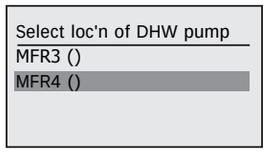




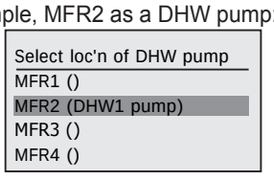




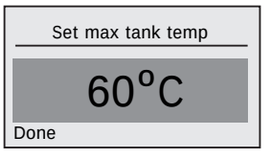


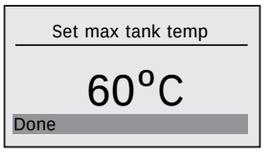


Example, MFR2 as a DHW pump:

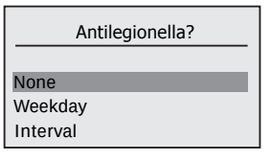


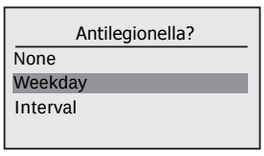
The DHW maximum tank temperature set-point can be set, it defaults to the maximum DHW output of the boiler model, but this can be decreased:



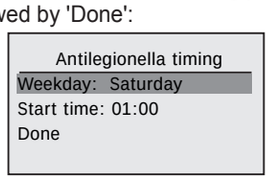


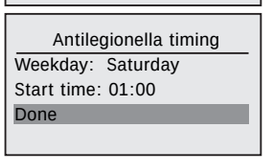
Antilegionella. If the DHW tank requires the Antilegionella function then select either 'Weekday' or 'Interval' from the list. Otherwise set to 'None'.



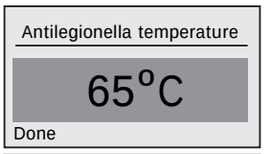


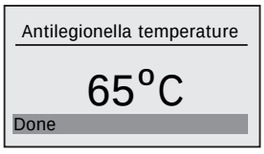
For weekday set the following parameters, followed by 'Done':



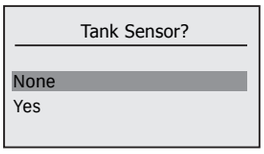


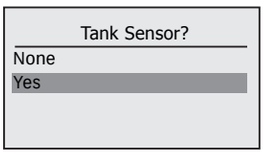
Then set the desired Antilegionalla temperature, followed by 'Done':



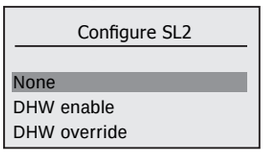


Tank Sensor. If the DHW has a Tank Sensor connected then select 'Yes' from the list. Otherwise set to 'None'.

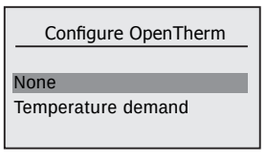


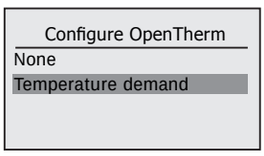


SL2 input function: The SL2 input can be configured to act as an enable, in the case of a tank thermostat with the internal timer, or as an override switch/tank thermostat with external timer. By default the SL2 input must be wired via a safety thermostat and isolating valve on a pressurised DHW tank, and must always be present for the DHW tank charge to operate.

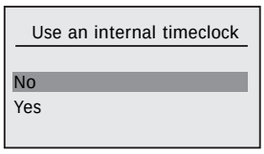


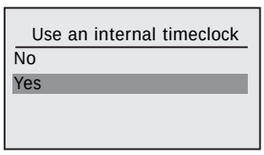
OpenTherm Input Function. The OpenTherm interface can be configured as a DHW circuit control function, if this is not required, select 'None'.



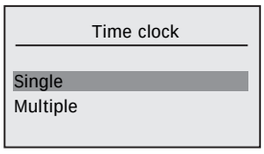


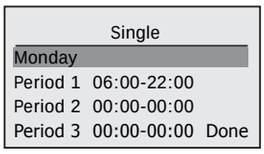
Internal timeclock. A timeclock can be set for the DHW circuit, this will control all functions. It can be set as a single or multiple day timer.

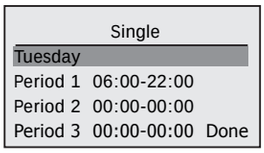


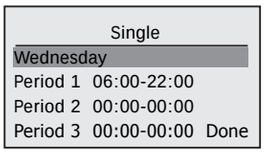


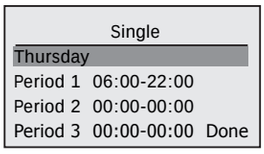
Single day timer is programmable for each of the 7 days with 3 periods per day, Monday through Sunday:

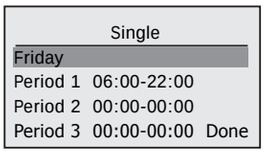


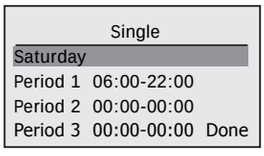


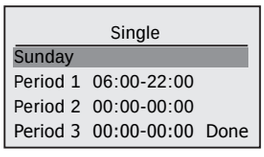


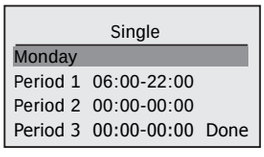


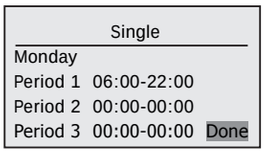




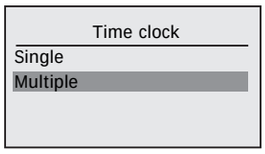


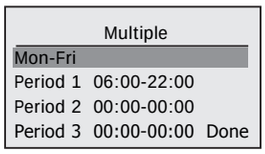


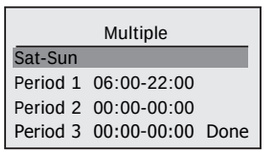


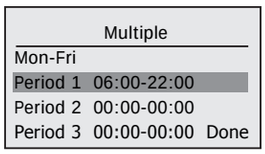


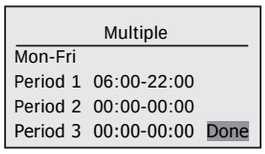
Multiple day timer is programmable for Mon-Fri and Sat-Sun with 3 periods per group of days:





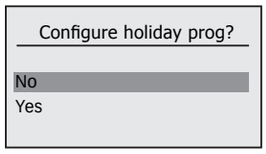


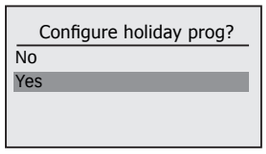


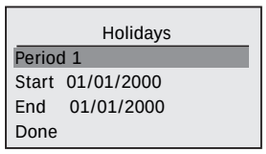


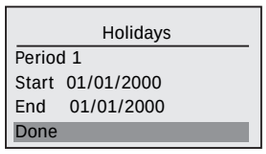
Once all days and times are set, select 'Done' to continue.

Holiday programme. Up to 8 holiday periods can be set, each has a start and end date. Once all are set select 'Done' to continue:

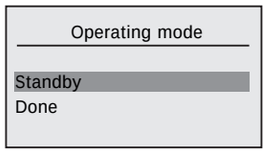


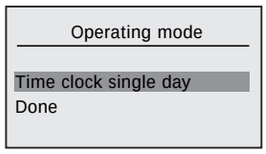


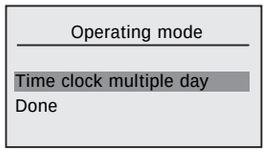




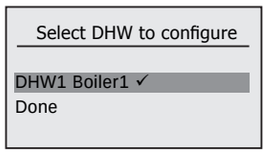
Operating mode. The operating mode of the DWH Circuit can be set from a scrolling field, once this is set then the DHW Circuit configuration is completed by selecting 'Done'.



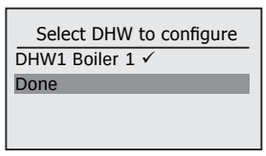




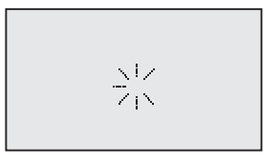
The DHW circuit has now been configured and the display will return to:

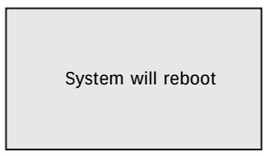


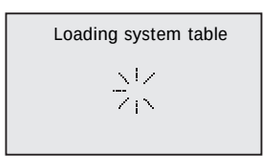
Note, that the DHW circuit number now has a tick next to it showing that it has been configured. If you have completed the DHW circuit configuration, select 'Done':



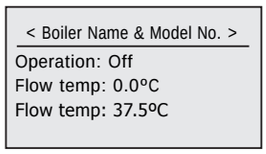
The system will now reboot:







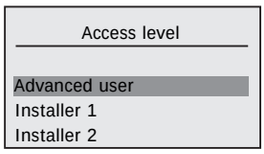
The boiler configuration is now complete and the display will show the boiler status screen:

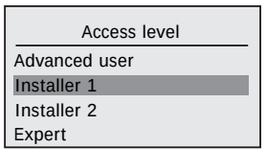


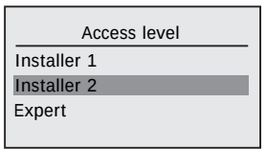
If you need to re-configure a function in the boiler then the appropriate access level needs to be enabled.

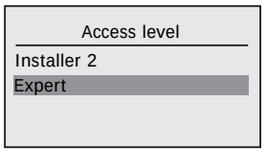
2.29.8 Menu – Configuration – General – Access level

The Access level screen is then displayed and each item can be selected and the default access level code can be changed:

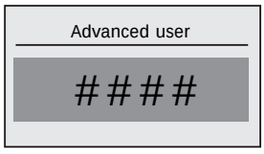




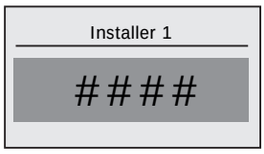




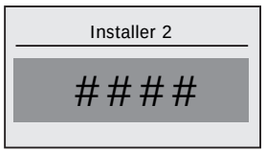
Once an access level is selected then the display will allow the current access level code to be entered. Each access level has its own initial code:



Default code 2222

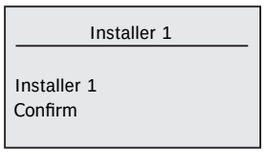


Default code 3333



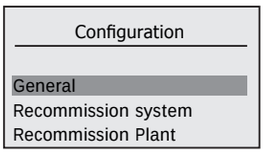
Default code 4444

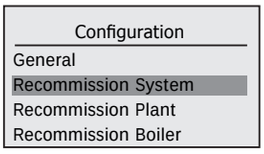
Once the correct code has been entered the following confirmation screen will be displayed for a short period, depending upon which access level was selected:

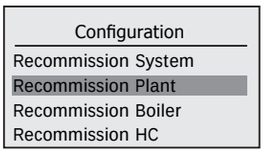


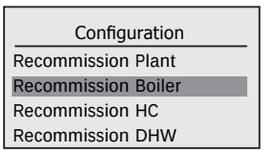
2.29.9 Menu - Configuration

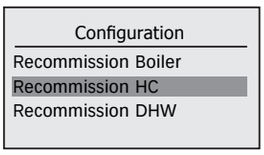
All menus and setting will now be available for that particular access level. There will now also be the chance to reconfigure different functions within the system:

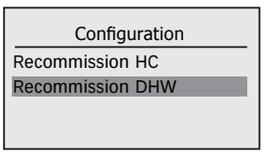












Depending upon the access level, not all configuration options will be available.

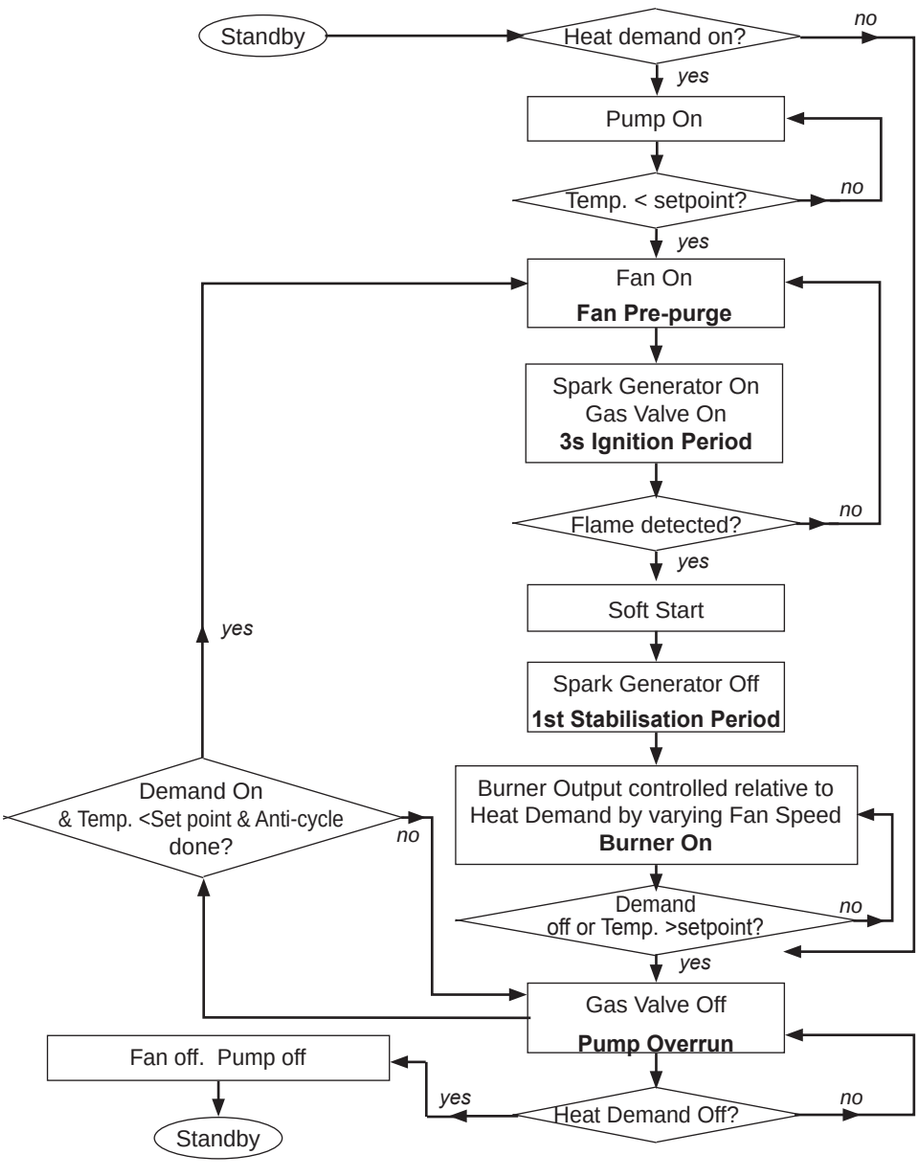
Once selected, refer to the Configuration section above for guidance.

2.30 INITIAL LIGHTING

1. Check that the system has been filled and the boiler is not air locked - air in the boiler could damage the heat exchanger. For this reason the air vent located in the left top side must never be shut off.
2. Check that all the drain cocks are closed and any valves in the flow and return are open.
3. Check that the GAS SERVICE COCK IS ON.
4. Fill the condensate trap with water before putting the unit into operation (see Section 3.7 for condensate trap removal).
5. Check the indication on the pressure gauge. If the pressure is less than 1 bar the installation should be filled up first (sealed system only).
6. Switch the electricity supply ON and check that all the external controls are calling for heat. Check boiler is set for winter operation - see boiler user interface basic operating instructions.
7. The boiler will commence the ignition sequence. If after 5 attempts the boiler has failed to light then it will lock out. Press the reset button to restart the ignition sequence.
8. Operate the boiler for 10 minutes and check the gas rate (Table 1). You should be able to read at least 90% of the nominal. If this is not possible contact the boiler manufacturer.

Keston Heat2 ~ Flue CO_2 % measurements (hot condition)				
	45	**55**	**45P**	**55P**
Max Rate ± 0.5%	9.5	9.7	10.8	10.7
Min Rate ± 0.5%	8.7	8.7	9.9	9.9

OPERATING SEQUENCE



2.31 GENERAL CHECKS

Make the following checks for correct operation.

1. The correct operation of ANY secondary system controls should be proved. Operate each control separately and check that the main burner or circulating pump, as the case may be, responds.
2. Water circulation system;
   a. With the system HOT examine all water connections for soundness.
   b. With the system still HOT, turn off the gas, water and electricity supplies to the boiler and drain down to complete the flushing process.
   c. Refill and vent the system, clear all air locks and again check for water soundness.
   d. Balance the system.
3. Check the condensate drain for leaks and check it is discharging correctly.
4. Finally set the controls to the User's requirements.

Note. *If an optional programmer kit is fitted then refer to the instructions supplied with the kit.*

2.32 HANDING OVER

ROUTINE OPERATION

Full instructions covering routine lighting and operation of the boiler are given in the User Guide located on the inside of the lower controls door.

Draw the attention of the boiler owner or his representative to the User Guide. Give a practical demonstration of the lighting and shutting down of the boiler.

Describe the function of the boiler and system controls and show how they are adjusted and used.

Hand these Installation and Servicing Instructions, and Log book to the customer and request him to keep them in a safe place for ready reference. Place the User Guide back into the lower controls door. For IE, it is necessary to complete a "Declaration of Conformity" to indicate compliance to the appropriate standard.

IMPORTANT. Point out to the owner that the boiler must have regular maintenance and cleaning, at least annually, in order to ensure reliable and efficient operation. Regular attention will also prolong the life of the boiler and should preferably be performed at the end of the heating season.

After servicing, complete the service Section of the log book and return to the owner or their representative.

Recommend that a contract for this work should be made with the regional gas authority or a suitably qualified Gas Safe Registered Engineer. In IE servicing work must be carried out by a competent person.

2.33 SAFETY

It is the law that any service work must be carried out by a Suitably qualified Gas Safe Registered Engineer. In IE service work must be carried out by a competent person.

***WARNING*. Always turn off the gas supply at the gas service cock, and switch off and disconnect the electricity supply to the appliance and any external controls before servicing or replacing components.**

IMPORTANT.

After completing the servicing or replacement of components always:

- Test for gas soundness.
- Check the water system is correctly filled and free of air. Air in the boiler could cause damage to the heat exchanger. For this reason the automatic air vent / vent tube in the left top side must never be blocked.
- Check the jacket front panel is correctly fitted, ensuring that a good seal is made. Secure the controls fascia in place.
- With the system hot examine all water connections for soundness.
- Check the gas rate and measure the combustion CO/CO_2 content. The CO/CO_2 ratio of the flue gas should not be greater than 0.004 ratio & the CO should not exceed 350ppm.
- Carry out functional checks as appropriate.

3. SERVICING

3.1 SERVICING SCHEDULE

Note. *Refer to "System Set up information" at rear of User Guide.*

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.

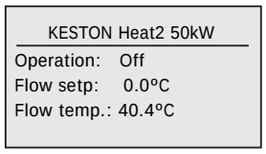
Keston Heating does not accept any liability resulting from the use of unauthorised parts or the repair and servicing of appliances not carried out in accordance with the Company's recommendations and specifications.

Note. *Some aluminium oxide build-up within the heat exchanger assembly is quite usual with this type of condensing boiler. Though removal and cleaning is recommended annually, the heat exchanger, sump and condensate trap must be inspected and cleaned after a maximum of 2 years operation.*

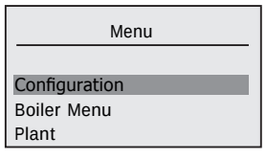
1. Light the boiler and carry out function checks, noting any operational faults.
2. Run the boiler for 5 minutes and then check the gas consumption rate. Refer to procedure opposite on how to force the burner to maximum rate.
3. Optional test - Connect a suitable gas analyser to the sampling point fitted in the flue adapter. For correct boiler operation the CO/CO_2 ratio of the flue gas should not be greater than 0.004 ratio and the CO_2 values should match those in table 1. If this is the case and the gas input is at least 90% of the nominal, unless the maximum length of flue/air inlet is used then gas input is at least 80% of the nominal, once compliance with the note above is ensured, then no further action need be taken. If not proceed to 4.
4. Remove and clean the burner. Refer to Sections 3.6. If after cleaning the burner the gas input is not at least 90% of the nominal then contact the boiler manufacturer.
5. Inspect the heat exchanger through the burner opening. If there are signs of aluminium oxide build up, spray water down the flueways. Refer to Section 3.5.
6. Remove the sump cover/Helmholtz where fitted and scrape out any deposits. Refer to Section 3.8.
7. Remove the condensate trap and flush through with water. Refer to Section 3.7.
8. Check that the flue terminal is unobstructed and that the flue system is sealed correctly.
9. After completion of servicing Refer to Section 2.32 for reference to final safety checks.

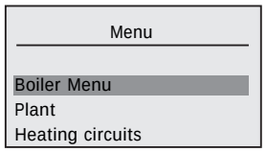
SETTING TO MAXIMUM OR MINIMUM OUTPUT

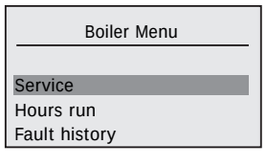
Ensure that there is a current CH demand to the boiler (e.g. the CH Switched Live is on)

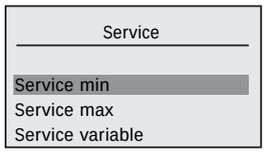


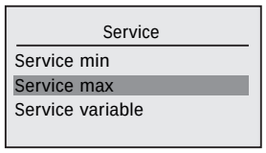
Press "OK" and the following screen witll be displayed.

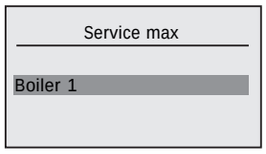


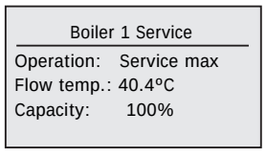












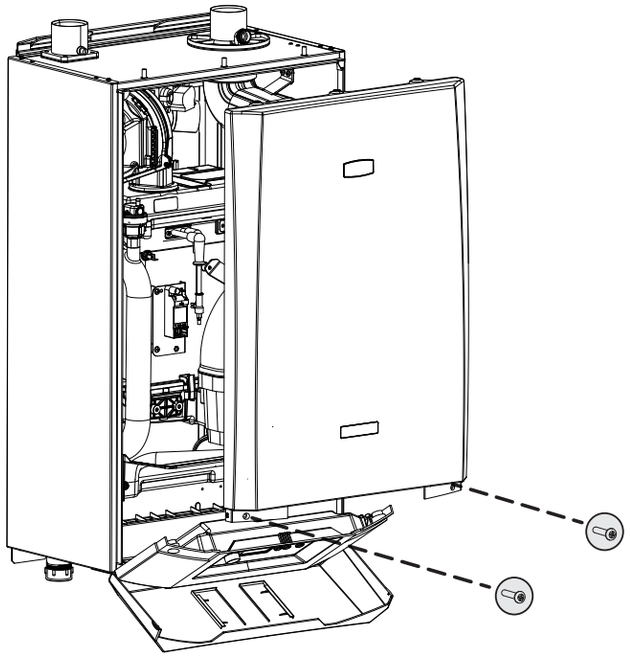
Press "OK" and the boiler will go to Maximum Rate for 10 minutes after which normal operation will resume.

3.2 REMOVAL OF CASING

Refer to Section 2.32.

Front Panels

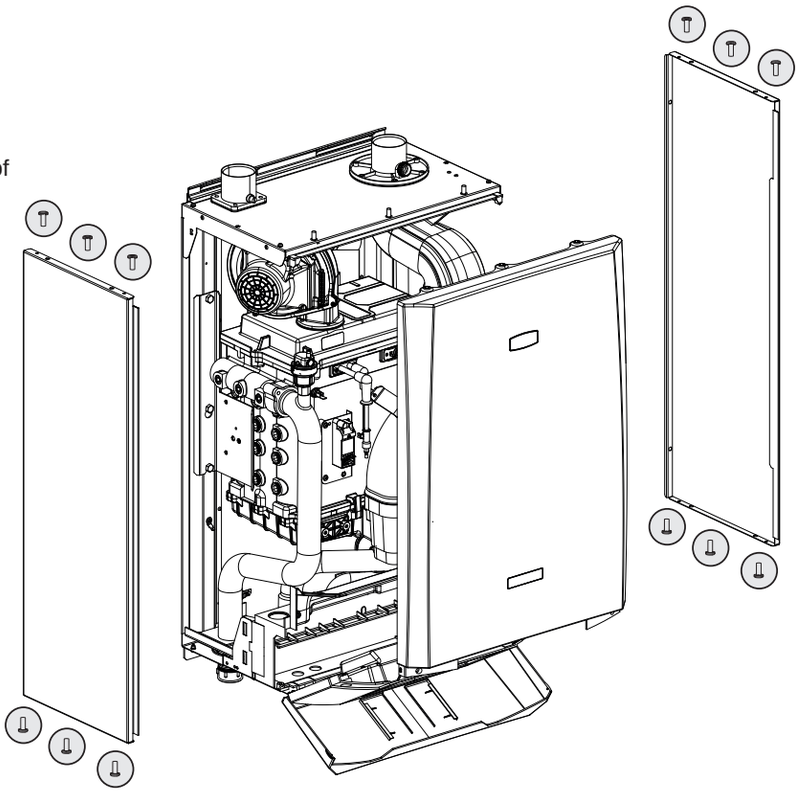
1. Open the control casing door.
2. Remove the two screws retaining the front panel, lift the panel to remove.
3. Lower the control panel to the service position.



Side Panels

Note. Removal of side panels is not required for normal service.

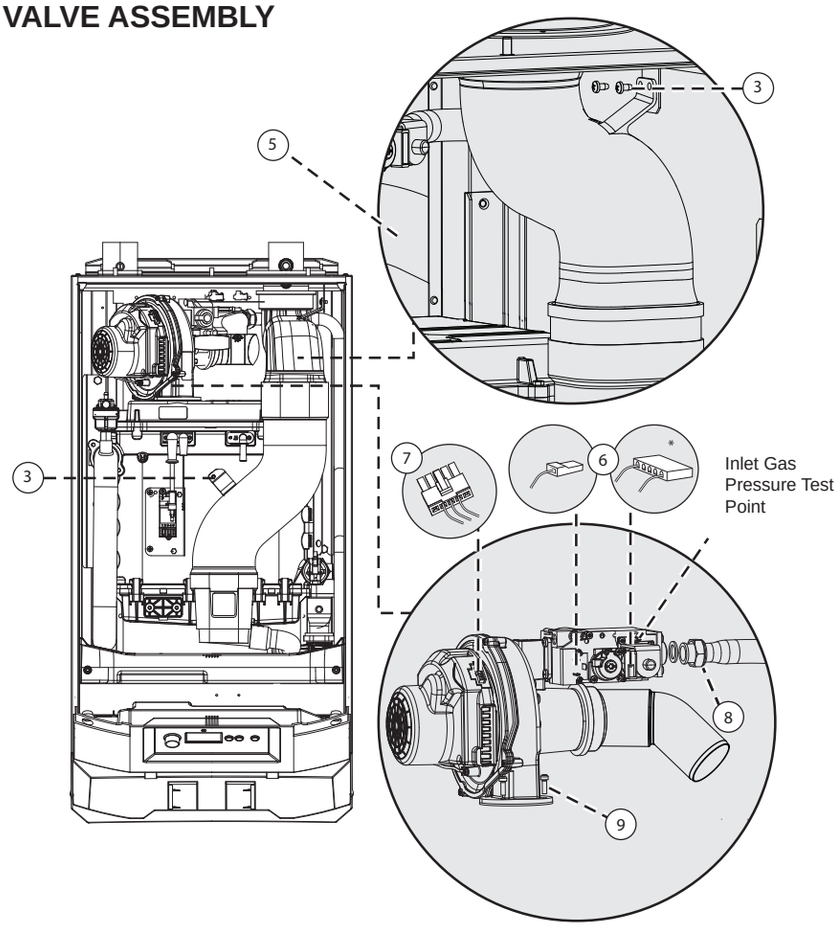
4. Remove the screws from the top and bottom of the side panels.
5. Re-assemble in reverse order.



3.3 REMOVAL OF FAN AND GAS VALVE ASSEMBLY

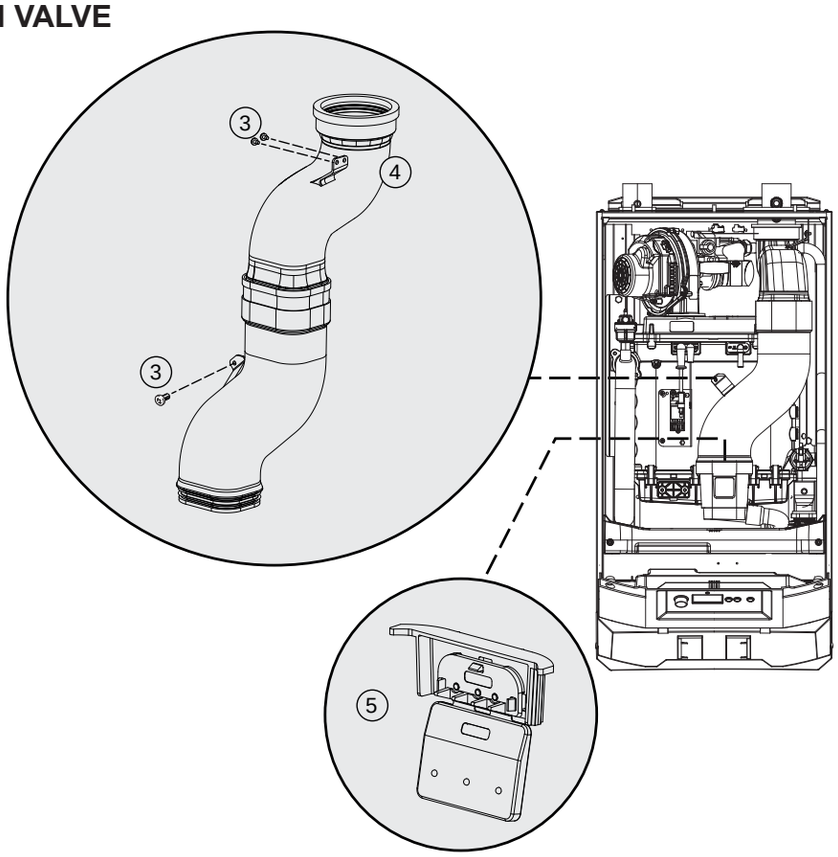
MODELS: 45 & 55

1. Refer to Section 2.32.
2. Remove the upper front panel, Refer to Section 3.2.
3. Remove the three screws retaining the upper and lower flue manifold.
4. To remove the flue manifold lift up the flue Sections and disengage from the sump then pull the flue Sections downwards and remove.
5. Remove the air inlet damper and seal.
6. Disconnect the electrical connections from the gas valve.
7. Disconnect the electrical connections from the fan.
8. Undo the gas valve union nut and replace the fibre washer.
9. Remove the three screws retaining the fan assembly and remove the fan assembly.
10. Inspect & clean as necessary.
11. Re-assemble in reverse order replacing all gaskets.



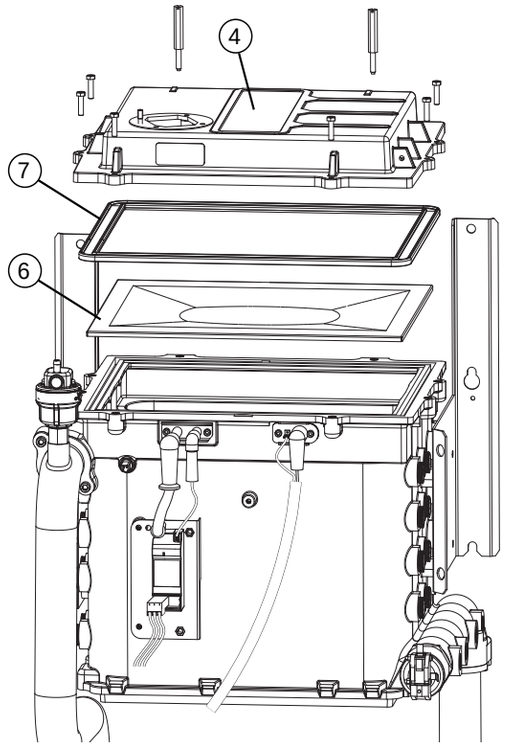
3.4 REMOVAL OF NON-RETURN VALVE

1. Refer to Section 2.32.
2. Remove the upper front panel. Refer to Section 3.2.
3. Remove the screw retaining the lower flue manifold to the heat exchanger.
4. Lift up the flue Sections and disengage from the sump then pull the flue Sections downwards and remove.
5. Remove the non-return Valve assembly and check for damage and that the non-return valve moves freely. If any damage is apparent the whole assembly must be replaced. Ensure correctly sized non-return valve is fitted.
6. Reassemble in reverse order, ensuring all flue manifold seals are located and undamaged. Replace if required.
7. Check the operation of the boiler. Refer to Section 2.32.



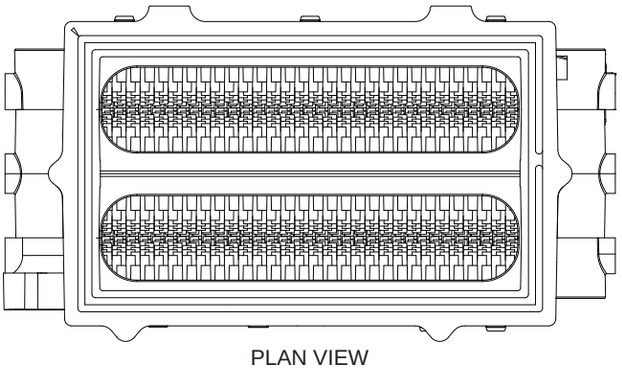
3.5 REMOVAL OF BURNER

1. Refer to Section 2.32.
2. Remove the front panel. Refer to Section 3.2.
3. Remove the fan and gas valve assembly. Refer to Section 3.3.
4. Remove the four or six screws and the two extended nuts securing the burner to release the burner body.
5. Lift the burner body by lifting out of its recess.
6. The burner can now be cleaned on the back face only, the metal fibre surface must not be touched. The burner must be replaced if it shows signs of damage.
7. After cleaning the burner replace it in the recess and check the burner body seal for signs of damage. If damage is apparent it must be replaced. The upstream (stainless steel) side may be cleaned of dust and debris.
8. Reassemble in reverse order. Ensure the notch in the burner aligns with the up-stand feature in the heat engine. The four or six screws and 2 extended nuts should be fitted following a diagonal tightening sequence twice. All fittings should be secured firmly.
9. Check the operation of the boiler (Refer to Section 2.32).



3.6 HEAT EXCHANGER INSPECTION / CLEANING

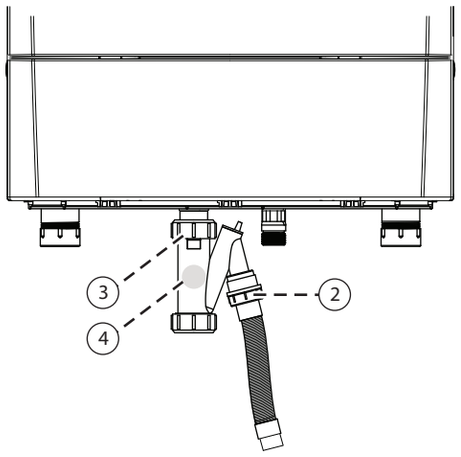
1. Refer to Section 2.32.
2. Remove the front panel. Refer to Section 3.2.
3. Remove the fan and gas assembly. Refer to Section 3.3.
4. Remove the burner.
5. Remove the ignition and detection electrodes. Refer to Sections 3.12 & 3.13.
6. Inspect the heat exchanger for signs of aluminium oxide deposits. If necessary clean the heat exchanger by spraying water down the flue ways.
7. Reassemble in reverse order replacing all gaskets.
8. Check the operation of the boiler. Refer to Section 2.32.



PLAN VIEW

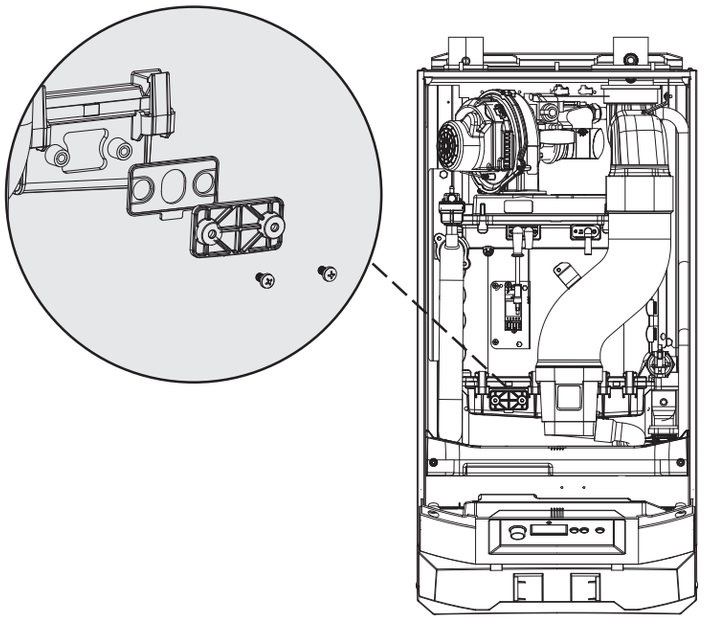
3.7 REMOVAL OF CONDENSATE TRAP

1. Refer to Section 2.32.
2. Unscrew the nut and disconnect the flexible pipe.
3. Unscrew the top nut and remove the condensate trap.
4. Remove the ball from the condensate trap and flush out with water to remove any debris.
5. Reassemble in reverse order.
6. Check the operation of the boiler. Refer to Section 2.32.



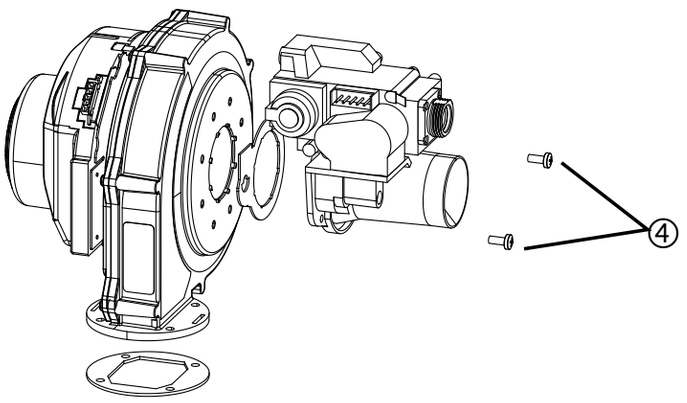
3.8 REMOVAL OF SUMP COVER

1. Refer to Section 2.32.
2. Remove the front panel. Refer to Section 3.2.
3. Prepare boiler for possible condensate spillage during the process.
4. Remove the two screws from the sump cover and pull away from the boiler.
5. Scrape out any deposits.
6. Reassemble in reverse order replacing all gaskets.
7. Check the operation of the boiler. Refer to Section 2.32.



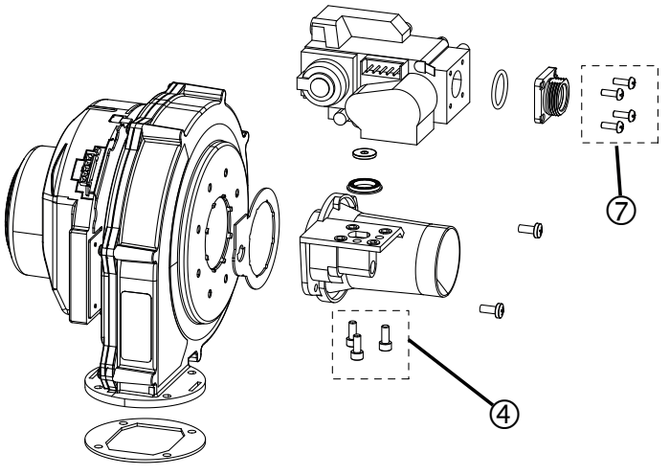
3.9 REMOVAL OF FAN

1. Refer to Section 2.32.
2. Remove the upper front panel (Refer to Section 3.2).
3. Remove the fan and gas assembly and air inlet damper (Refer to Section 3.3).
4. Remove the screws retaining the venturi to the fan.
5. Transfer venturi and gas valve assembly to the new fan.
6. Reassemble in reverse order replacing all gaskets.
7. Check the operation of the boiler.
8. Refer to Section 2.32



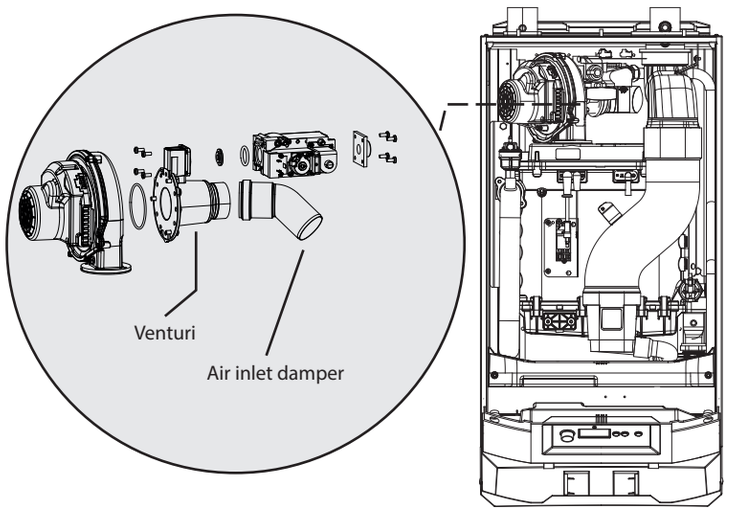
3.10 REMOVAL OF GAS VALVE

1. Refer to Section 2.32.
2. Remove the upper front panel (Refer to Section 3.2).
3. Remove the fan and gas assembly and air inlet damper (Refer to Section 3.3).
4. Remove the 3 screws holding the gas valve to the venturi.
7. Remove the 4 screws retaining the inlet flange to gas valve & transfer to new valve.
8. Fit new gas valve to venturi using the new seal provided, ensure gas nozzle is fitted correctly.
9. Reassemble in reverse order replacing all gaskets.
10. Check the operation of the boiler.
11. Refer to Section 2.32.



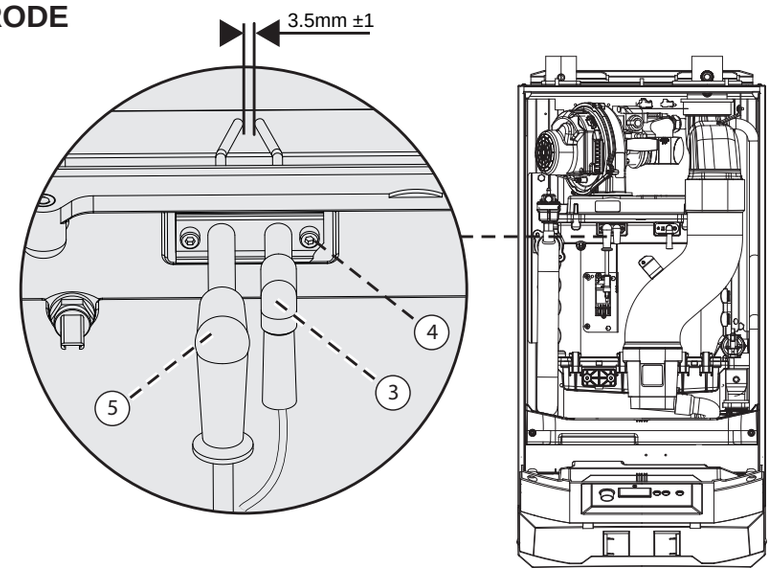
3.11 REMOVAL OF VENTURI / AIR INLET DAMPER

1. Refer to Section 2.32.
2. Remove the front panel. Refer to Section 3.2.
3. Remove the flue manifold complete with seal and remove the air damper Section refer to Section 3.3. If the air inlet damper is damaged go to points 6-8.
4. Remove the fan and gas assembly. Refer to Section 3.3.
5. Remove venturi from fan and gas valve. Refer to Sections 3.9 & 3.10.
6. Replace with new venturi/ air inlet damper if necessary ensuring the gas orifice is fitted and seal is replaced.
7. Reassemble in reverse order replacing all gaskets.
8. Check the operation of the boiler. Refer to Section 2.32



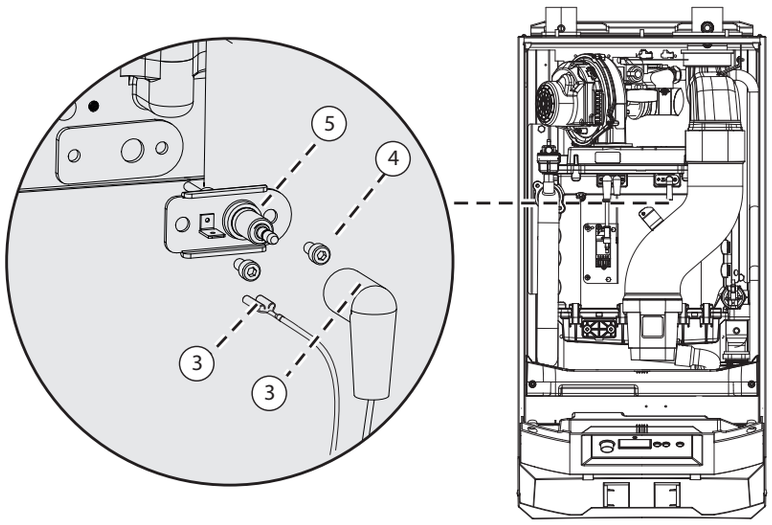
3.12 REMOVAL OF IGNITION ELECTRODE

1. Refer to Section 2.32.
2. Remove the front panel. Refer to Section 3.2.
3. Pull off the spark lead and earth connection.
4. Remove the two retaining cap head screws.
5. Pull out the electrode and pull off the old gasket.
6. Replace with new electrode and gasket supplied checking the spark gap is 3.5mm ±1.
7. Reassemble in reverse order.
8. Check the operation of the boiler (Refer to Section 2.32.



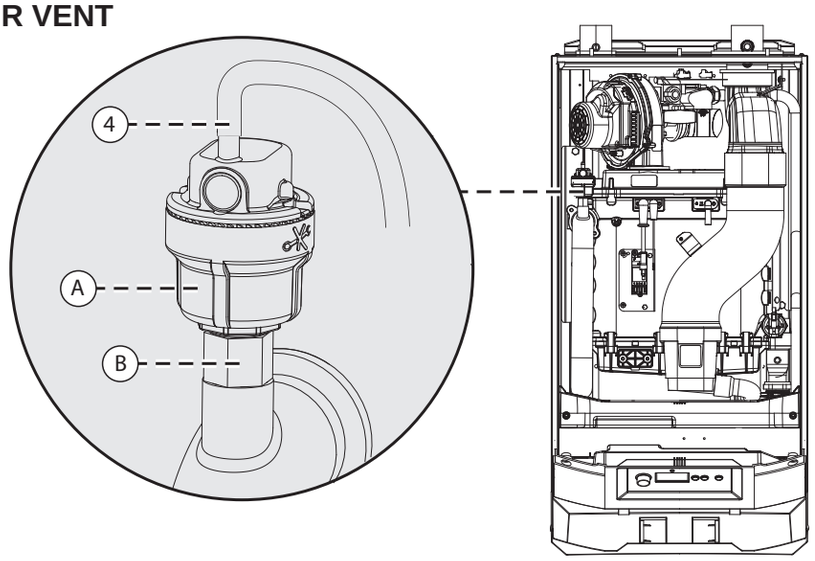
3.13 REMOVAL OF DETECTION ELECTRODE

1. Refer to Section 2.32.
2. Remove the front panel. Refer to Section 3.2.
3. Pull off the detection lead and earth connection.
4. Remove the two retaining cap head screws.
5. Pull out the electrode and pull off the old gasket.
6. Replace with new electrode and gasket.
7. Reassemble in reverse order.
7. Check the operation of the boiler. Refer to Section 2.32.



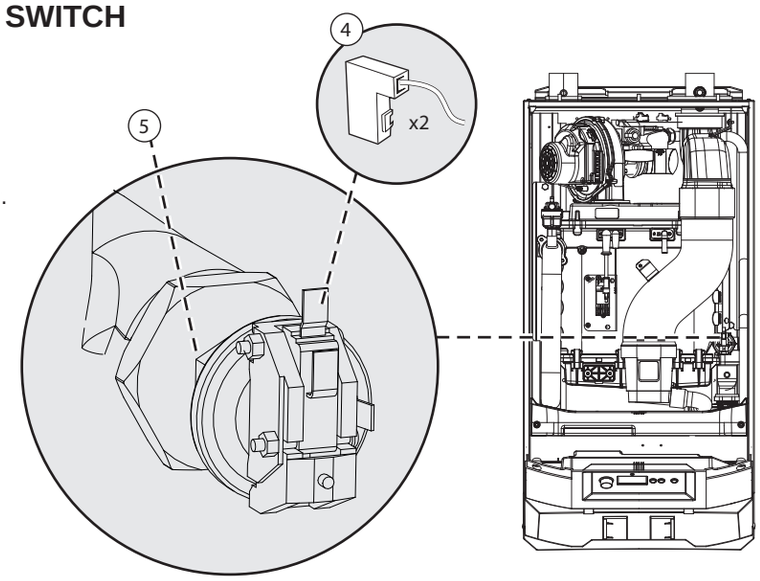
3.14 REMOVAL OF AUTOMATIC AIR VENT

1. Refer to Section 2.32.
2. Remove the front panel. Refer to Section 3.2.
3. Unscrew the air vent (A) from the self sealing fitting (B) on the top left of the flow pipe.
4. Remove the clear tubing from the air vent spigot.
5. Fit the new air vent.
6. Refit the clear plastic drain tubing ensuring there are no kinks as air in the boiler could cause damage to the heat exchanger.
7. Re-assemble in reverse order.
8. Check the operation of the boiler. Refer to Section 2.32.



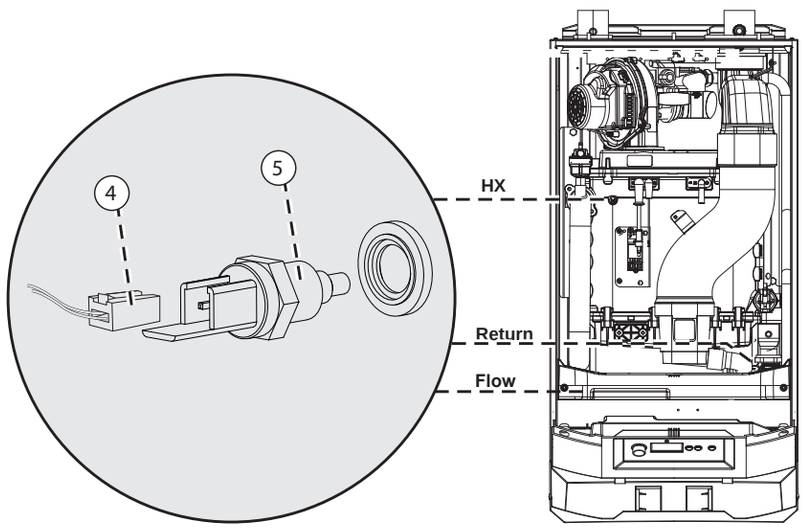
3.15 REMOVAL OF WATER PRESSURE SWITCH

1. Refer to Section 2.32.
2. Remove the front panel. Refer to Section 3.2.
3. Isolate the water circuit and drain the boiler.
4. Disconnect the electrical connections from the switch.
5. Unscrew the water pressure switch.
6. Refit new switch.
7. Connect electrical connections.
8. Refill the system ensuring all the air escapes via the air vent.
9. Reassemble in reverse order.
10. Check the operation of the boiler. Refer to Section 2.32.



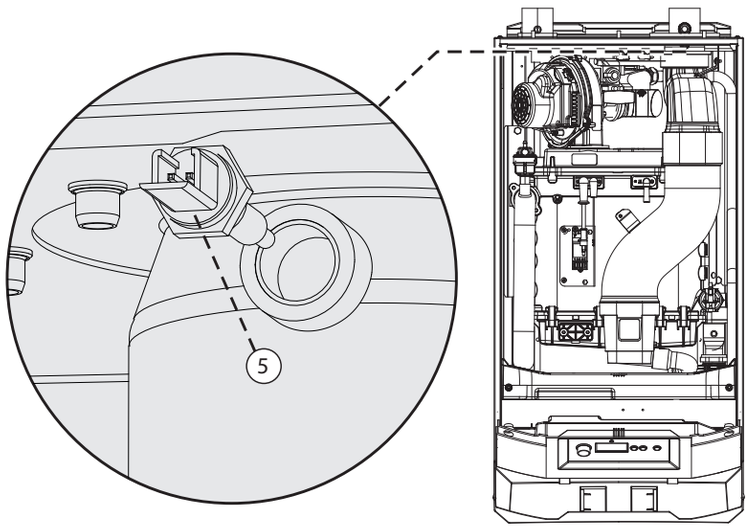
3.16 REMOVAL OF FLOW / RETURN / HEAT EXCHANGER THERMISTOR

1. Refer to Section 2.32.
2. Remove the front panel. Refer to Section 3.2.
3. Isolate the water circuit and drain the system.
4. Disconnect the electrical connections from the thermistor.
5. Unscrew the thermistor.
6. Fit the new thermistor and seal. Do not overtighten.
7. Refill the system ensuring all the air in the heat exchanger is vented through the air vent.
8. Re-assemble in reverse order.
9. Check the operation of the boiler. Refer to Section 2.32.



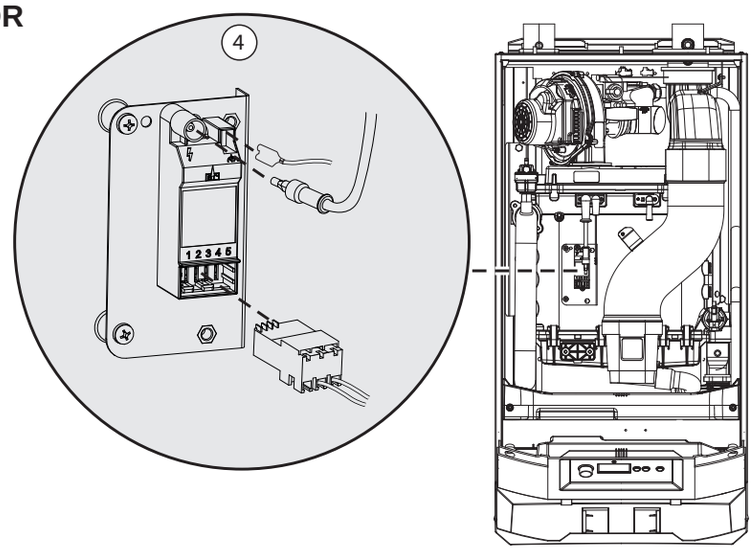
3.17 FLUE THERMISTOR REPLACEMENT

1. Refer to Section 2.32.
2. Remove the front panel. Refer to Section 3.2.
3. Disconnect the electrical connections from the thermistor.
4. Unscrew the thermistor.
5. Fit the new thermistor with gasket seal - DO NOT overtighten.
6. Re-assemble in reverse order.
7. Check the operation of the boiler. Refer to Section 2.32.



3.18 REMOVAL OF SPARK GENERATOR

1. Refer to Section 2.32.
2. Remove the front panel. Refer to Section 3.2.
3. Isolate the electrical supply to the boiler and fully isolate the boiler from any external supply.
4. Remove the three electrical connections from the spark generator.
5. Gently push down the ignitor to remove from the bracket.
6. Replace unit and reasseble in reverse order, ensuring all connections are fully inserted.
7. Check the operation of the boiler. Refer to Section 2.32.

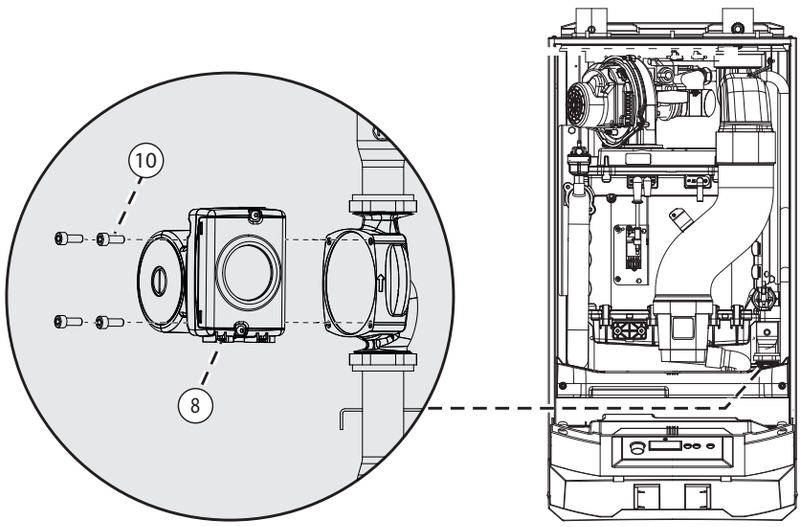


3.19 PUMP HEAD REPLACEMENT

1. Refer to Section 2.32.
2. Remove the front panel. Refer to Section 3.2.
3. Isolate water at the flow & return shut-off valves beneath boiler.
4. Drain the water from the boiler via the drain cock adjacent to the shut-off valve.
5. Remove the RHS casing panel to allow access. Refer to Section 3.2.
6. Remove condensate assembly (elbow, union, preformed hose).
7. Drop down the control panel door.
8. Disconnect the pump power supply at the left hand terminal plug.
9. Withdraw the power supply cable through the grommet.
10. Remove the four M5 Allen bolts securing the pump head to body. *(A high torque is required to release these bolts, a long 4mm 'T bar' Allen key is required).*
11. Withdraw the pump head from the body.
12. Remove the PWM cable plug from the pump head.
13. Remove the pump head through the bulkhead aperture. Removal of side panel will allow pump head to be rotated through the space between the bulkhead and the sump.

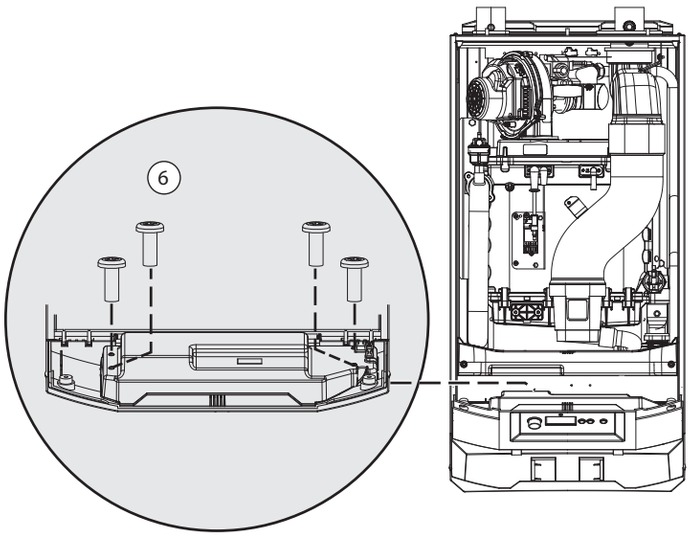
    Care should be taken to avoid water spillage onto the PCB connections when withdrawing the pump head through the aperture. There is a plug situated in the boiler casing floor directly beneath the pump to allow drainage of any spillage within the casing.

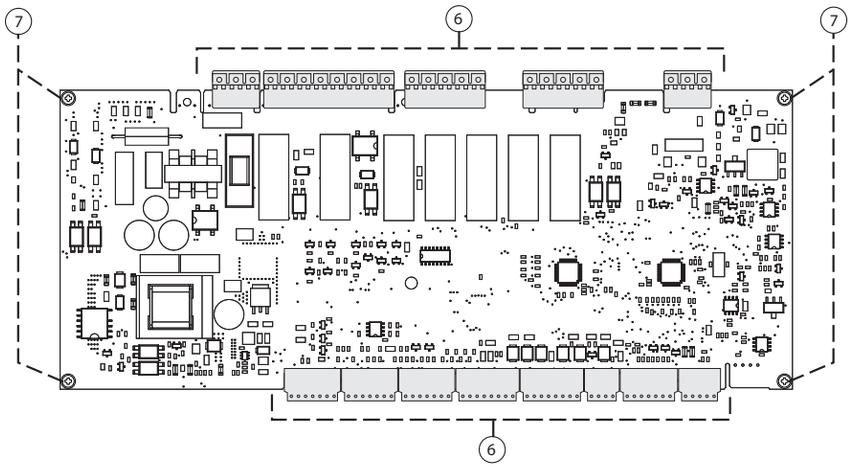
13. Fit replacement pump head.
14. Reconnect all connections in reverse order, ensuring all sealing grommets are correctly located. Refer to Section 2.32.
15. Re-fit side panel ensuring corner grommet is located correctly. Re-fit front panel.



3.20 REMOVAL OF MAIN PCB

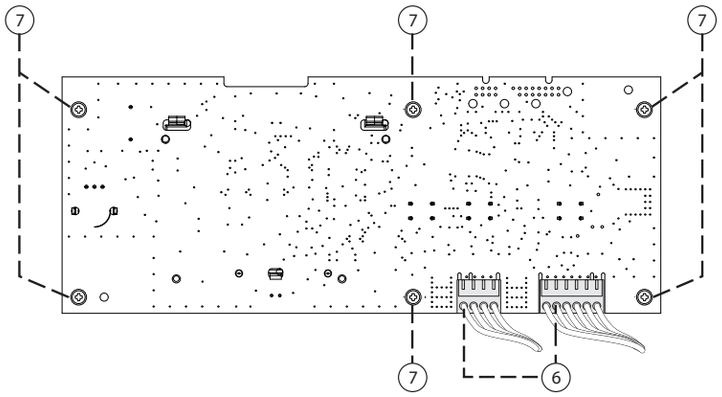
1. Refer to Section 2.32.
2. Isolate the electrical supply to the boiler and fully isolate the boiler from any external supply.
3. Remove the upper front panel and put the control panel into the service position. Refer to Section 3.2.
4. Fit the earth strap provided with the spare PCB to your wrist and to a suitable earthed metal.
5. Remove the PELV harness from the securing clips located on the rear of the control box cover
6. Pull off all of the main PCB connectors.
7. Remove the 4 PCB retaining screws.
8. Fit new PCB, refit in reverse order and refer to Replacement PCB Instructions.
9. Check the operation of the boiler. Refer to Section 2.32.





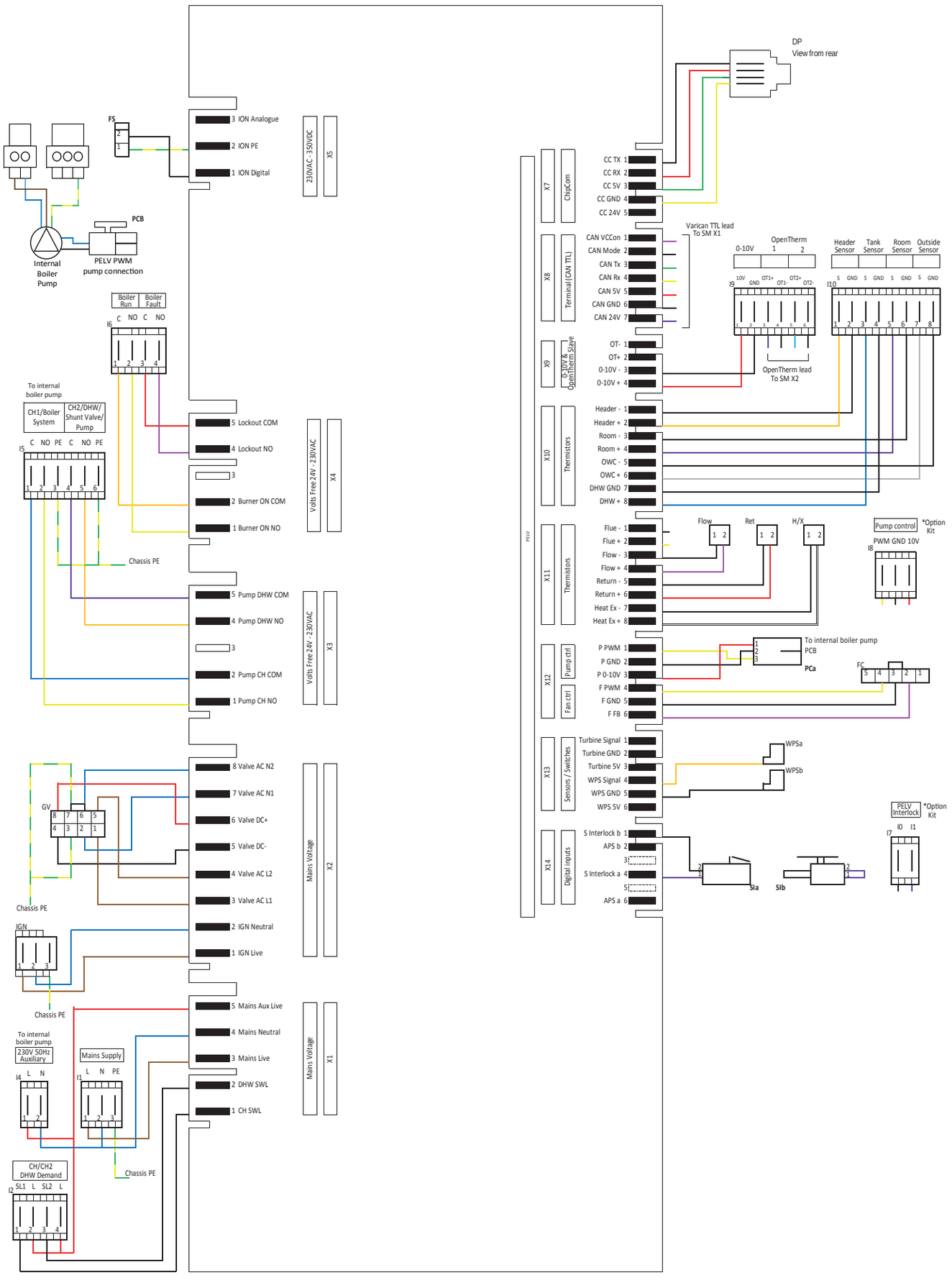
3.21 REMOVAL OF SYSTEM MANAGER

1. Refer to Section 2.32.
2. Isolate the electrical supply to the boiler and fully isolate the boiler from any external supply.
3. Remove the upper front panel and put the control panel into the service position. Refer to Section 3.2.
4. Fit the earth strap provided with the spare PCB to your wrist and to a suitable earthed metal.
5. The System Manager is fitted beneath the main PCB. To access follow points 5 - 7 in Section 3.21.
6. With access to the System Manager, remove the electrical connections
7. Remove the six retaining screws.
8. Replace with new system manager, refit in reverse order and refer to System Manager Replacement Instructions.
9. Check the operation of the boiler. Refer to Section 2.32.

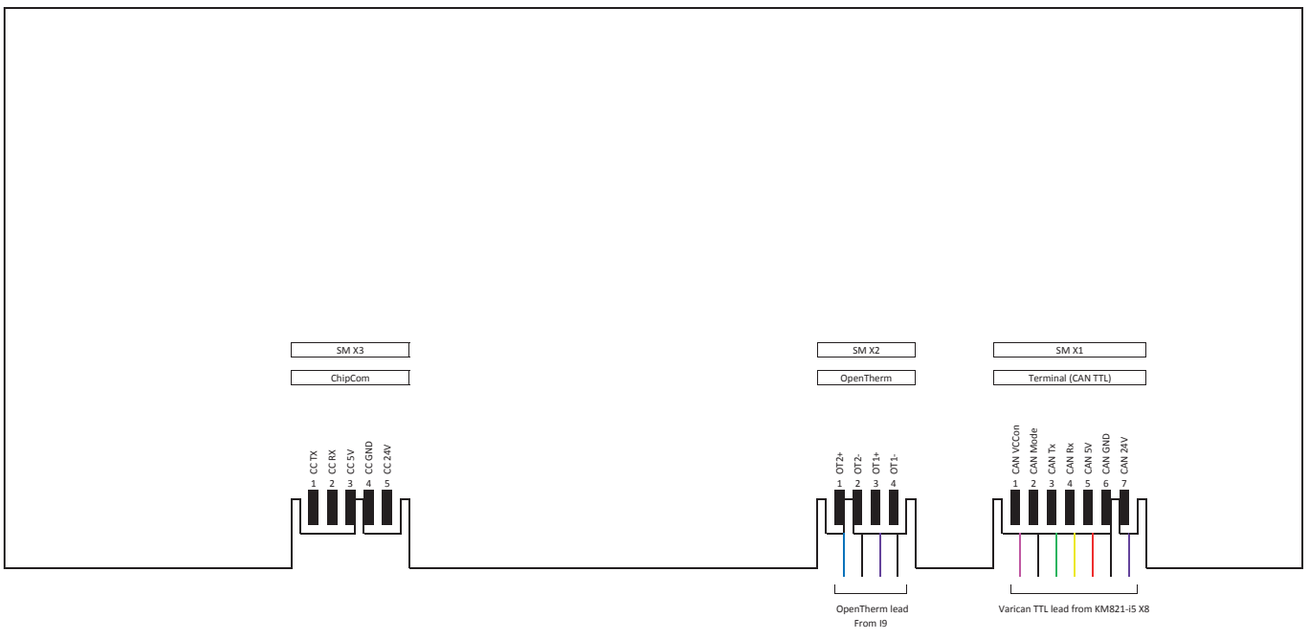


4. WIRING

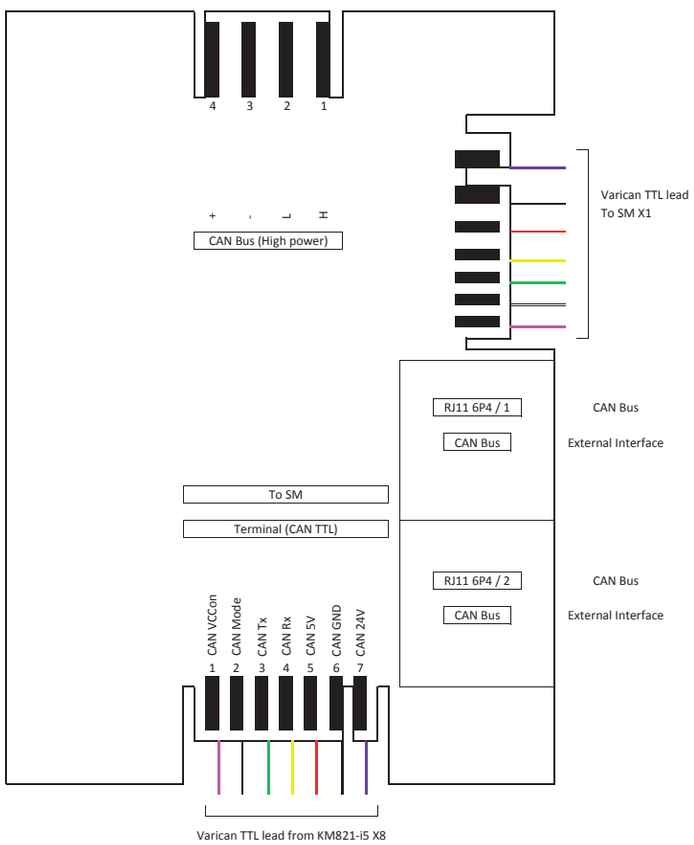
4.1 INTERNAL WIRING COMBUSTION MANAGER



4.2 SYSTEM MANAGER WIRING DIAGRAM



4.3 OPTIONAL VARICAN ADAPTER WIRING DIAGRAM

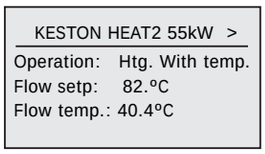


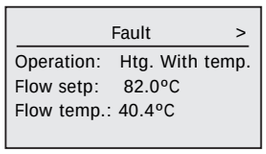
5. FAULT FINDING

5.1 FAULT FINDING SCREENS

Fault management

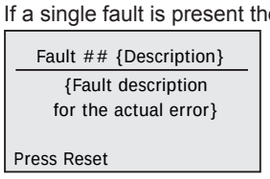
When a fault occurs on the boiler the status screen with alternate as shown below:



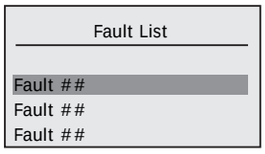


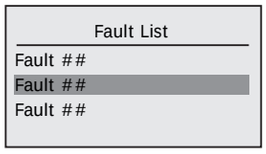
To show the fault description scroll right (Clockwise) to show the detail.

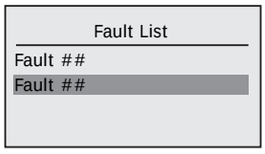
If a single fault is present then the screen will show:



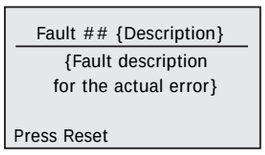
If multiple faults are present a list will appear in fault priority order:







The list can now be scrolled and any of the faults may be selected to retrieve the fault description:



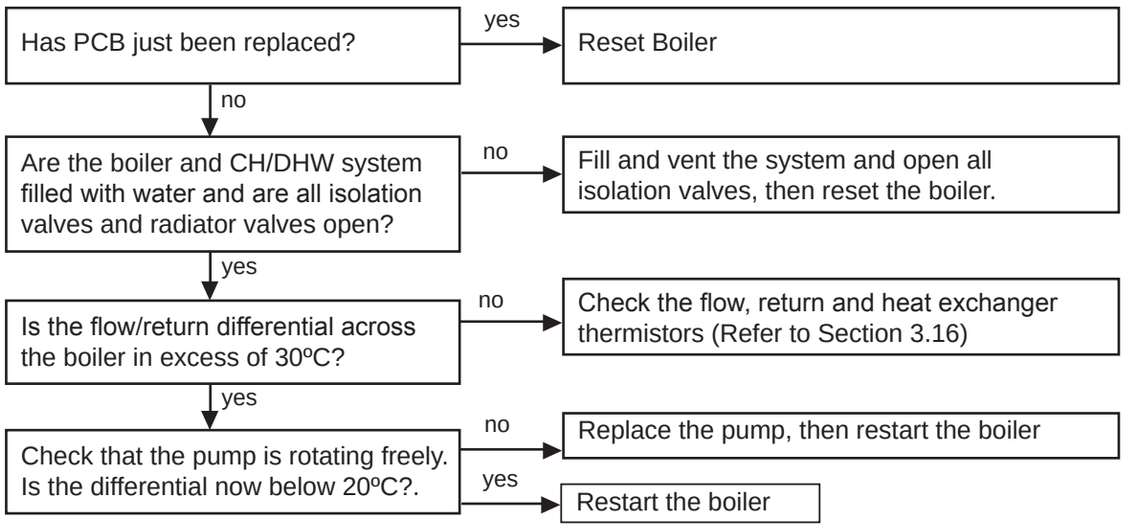
5.2 FAULT FINDING MENU

ERROR TYPE (Warning, Blocking, Lockout)	DESCRIPTION	ERROR CODE (OpenTherm)	REFER TO SECTION...
	HARDWARE (THERMISTORS, ACTUATORS)		
B	Flow thermistor open circuit (blocking)	1	5.9
B	Flow thermistor short circuit (blocking)	2	5.9
B	Return thermistor open circuit (blocking)	3	5.9
B / W	Return thermistor short circuit (blocking)	4	5.9
B / W	Flue thermistor open circuit (blocking)	5	n/a
B	Flue thermistor short circuit (blocking)	6	n/a
W	DHW thermistor open circuit	7	5.12
W	DHW thermistor short circuit	8	5.12
W	Outside thermistor defect (open / short)	9	5.10
B	Water pressure sensor defect	10	n/a
L	Flow thermistor open circuit (lockout after 24h)	11	5.9
L	Flow thermistor short circuit (lockout after 24h)	12	5.9
L	Return thermistor open circuit (lockout after 24h)	13	5.9
L	Return thermistor short circuit (lockout after 24h)	14	5.9
L	Flue thermistor open circuit (lockout after 24h)	15	n/a
L	Flue thermistor short circuit (lockout after 24h)	16	n/a
L	Heat thermistor open circuit (lockout after 24h)	17	5.9
L	Heat thermistor short circuit (lockout after 24h)	18	5.9
B	Heat thermistor open circuit (blocking)	19	5.9
B	Heat thermistor short circuit (blocking)	20	5.9
W	Header thermistor open circuit	21	5.10
W	Header thermistor short circuit	22	5.10
W	Room (hc1) thermistor open circuit	23	5.10
W	Room (hc1) thermistor short circuit	24	5.10
	TEMPERATURE SUPERVISIONS		
B	Blocking due to flow overheat	30	5.3
B	Blocking due to return overheat	31	5.3
B	Blocking due to flue overheat	32	n/a
B	Flow & return reversed	33	5.11
B	Flow gradient supervision	36	5.3
B	Flue gradient supervision (reserved)	37	n/a
B	Blocking delta temp flow/return	38	5.3
L	Lockout flow overheat	39	5.3
L	Lockout return overheat	40	5.3
L	Lockout flue overheat (flue thermistor) Lockout thermal fuse (thermal fuse)	41	1-6
B	Blocking due to heat exchanger overheat	42	5
	SYSTEM (FLAME, FAN, HYDRAULIC, ETC.)		
B	Blocking due to no CH water flow	50	1-4, 6
B	Low water pressure	51	5.6
W	No flame signal at start (restart)	52	5.7
W	Flameloss during operation => endless restarts (Parameter “endless restarts” activated)	53	5.7
L	Flameloss during operation, => Lockout after restarts attempts are used (Parameter “endless restarts” deactivated)	54	5.7
W	Flameloss during stabilisation => restart attempts	55	5.7
L	Flameloss during stabilisation => Lockout after restarts attempt are used	56	5.7
L	False flame (with heat demand)	57	5.7
L	No flame after restarts	58	5.4
B/L	Fan speed, stand still check	59	5.8
L	Fan speed not achieved, e.g. Pre-purge-test, post-purge-test etc.	60	5.8
B/L	Error fan speed during pre-purge (5* restarts => lockout)	61	5.8
W	Error min/max supervision fan speed during operation (restart)	62	5.8
W	Warning due to mains overvoltage	63	check mains supply
B	Blocking due to mains undervoltage	64	check mains supply
W	Opentherm plus error (communication faulty; no connection anymore , etc)	65	5.14, 5.15
L	Too many remote resets	66	power cycle the boiler
B	HX water flow fault (feedback < min flow rate)	70	n/a

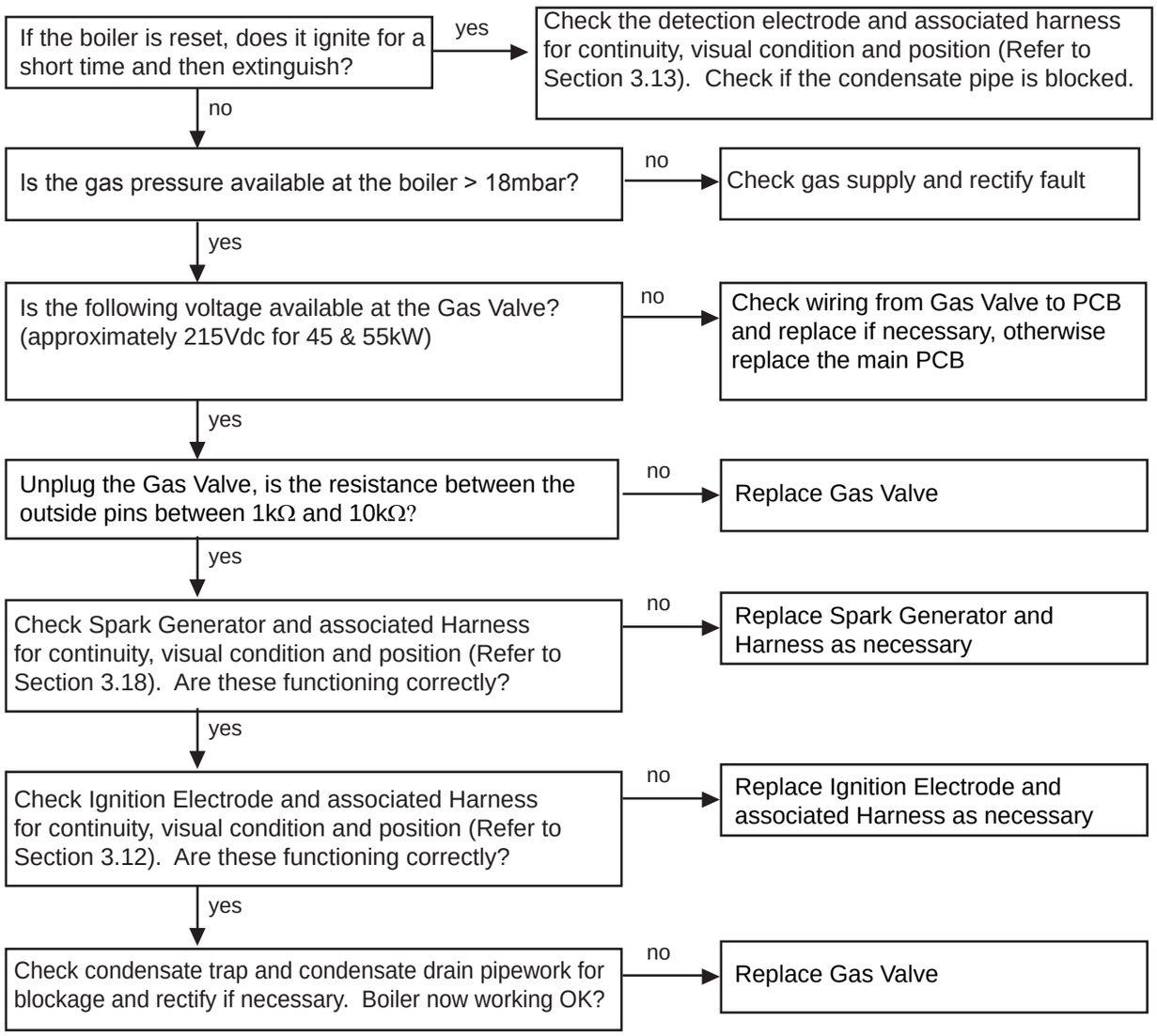
5.2 FAULT FINDING MENU - CONTINUED

ERROR TYPE (Warning, Blocking, Lockout)	DESCRIPTION	ERROR CODE (OpenTherm)	REFER TO SECTION...
	SYSTEM (FLAME, FAN, HYDRAULIC, ETC.) - CONTINUED		
B	PWM pump dry run error (feedback 80%)	71	4
B	Warning code from pump (feedback 75%)	72	4
W	VariCAN Error	73	Check Bus
B	Safety Interlock Function activated (controlled shutdown)	74	Info
L	Air Pressure Switch error	75	n/a
W	Air Pressure Switch warning (restart)	76	n/a
B	High water pressure	77	n/a
B/L	Min water flow rate	78	n/a
W	Maximum water flow rate exceeded	79	n/a
W	Quartz crystal error	80	contact service provider
B	0-10V Input out of range	81	Info
	INTERNAL SYSTEM		
L	Retails supervision error (COM-, Valve-Retails)	93	Reset, contact service if repeated
L	Request for re-update	94	contact service provider
B	Blocking due to programming mode	95	contact service provider
L	Lockout parameter mismatch	96	contact service provider
L	Lockout parameter set	97	contact service provider
B/L	Internal blocking error	98	contact service provider
L	System lockout (internal lockout error)	99	contact service provider

5.3 OVERHEAT LOCKOUT

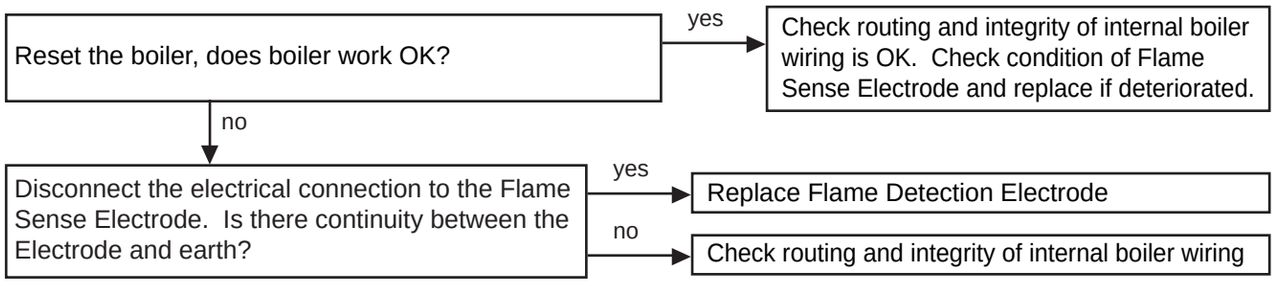


5.4 IGNITION LOCKOUT

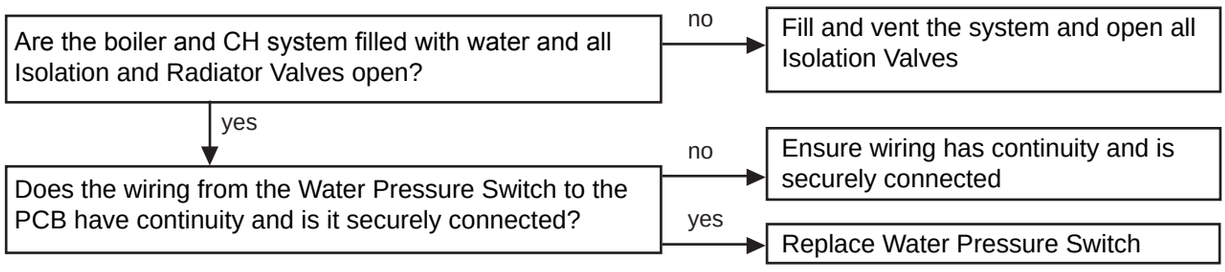


* Note: due to the wave form of the rectified voltage, the reading will vary depending on the type of meter used to measure the value. In general terms a reading of greater than 150V indicates that the correct voltage is supplied to the gas valve.

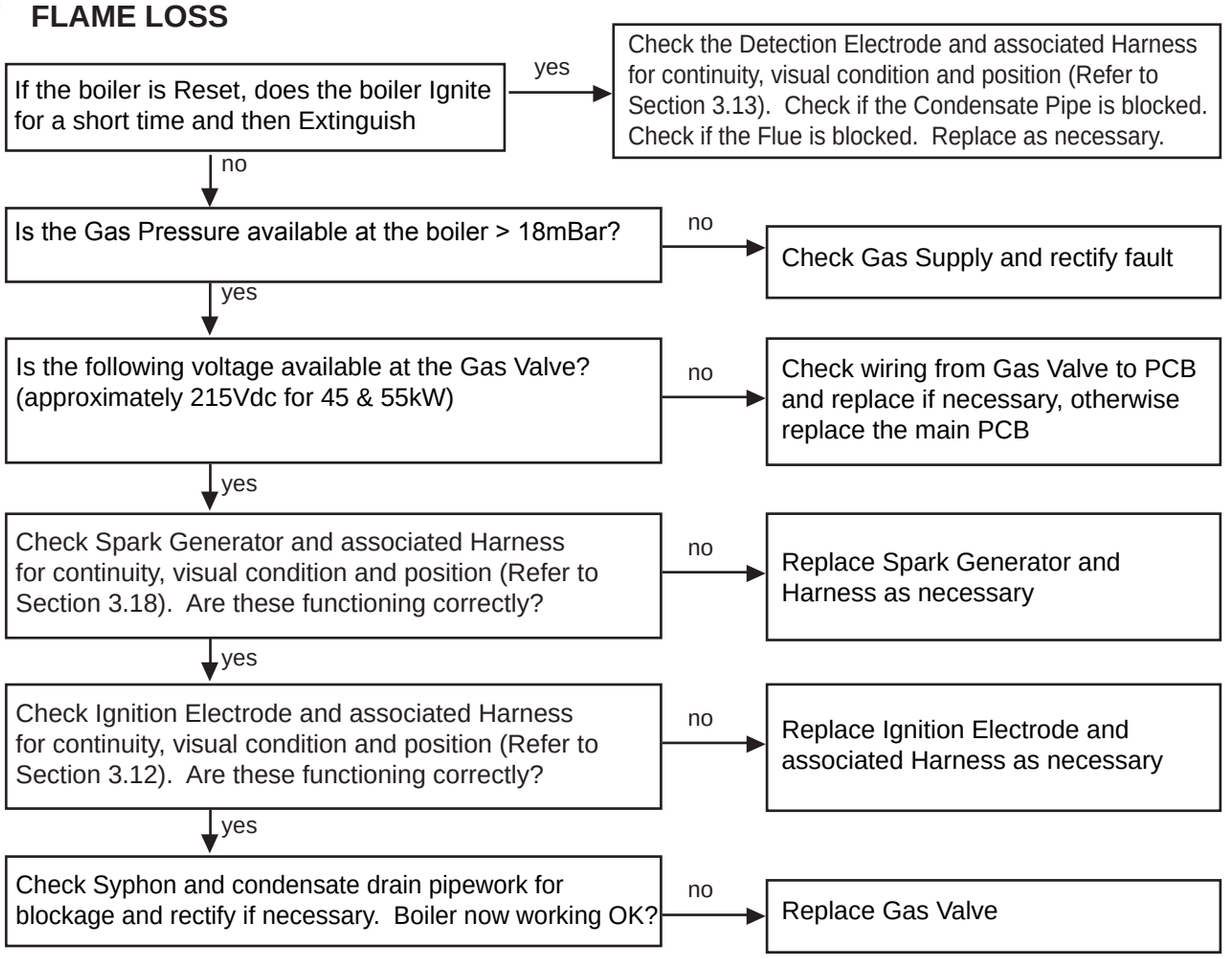
5.5 FALSE FLAME LOCKOUT / ERROR 20



5.6 LOW WATER PRESSURE

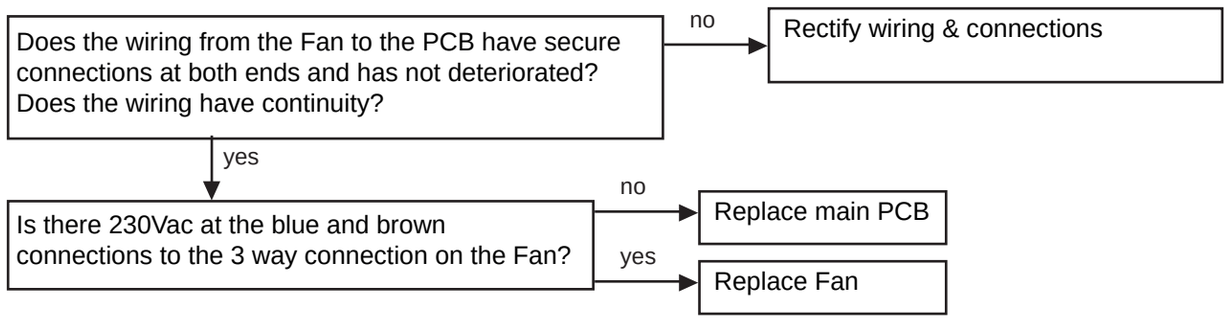


5.7 FLAME LOSS

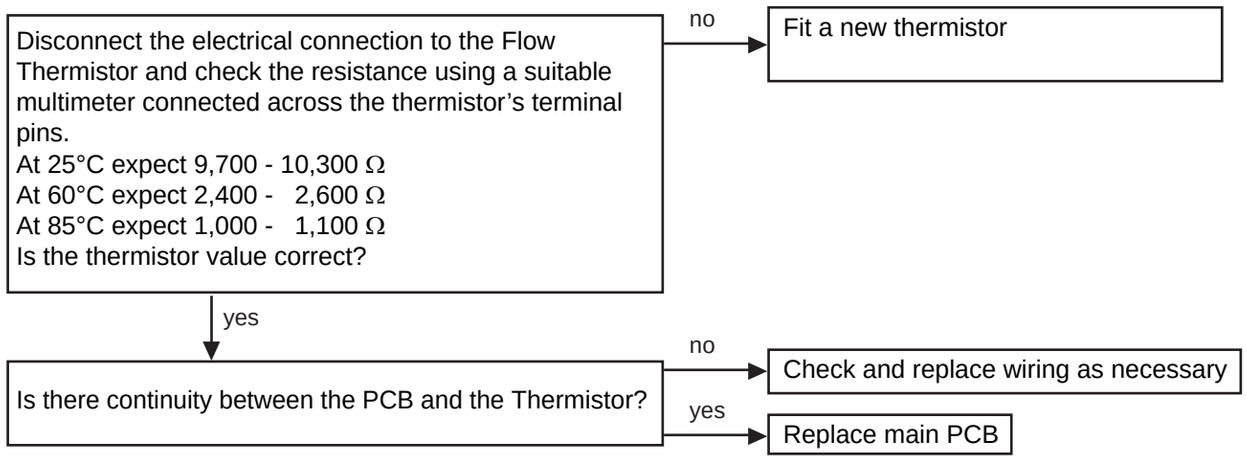


* Note: due to the wave form of the rectified voltage, the reading will vary depending on the type of meter used to measure the value. In general terms a reading of greater than 150V indicates that the correct voltage is supplied to the gas valve

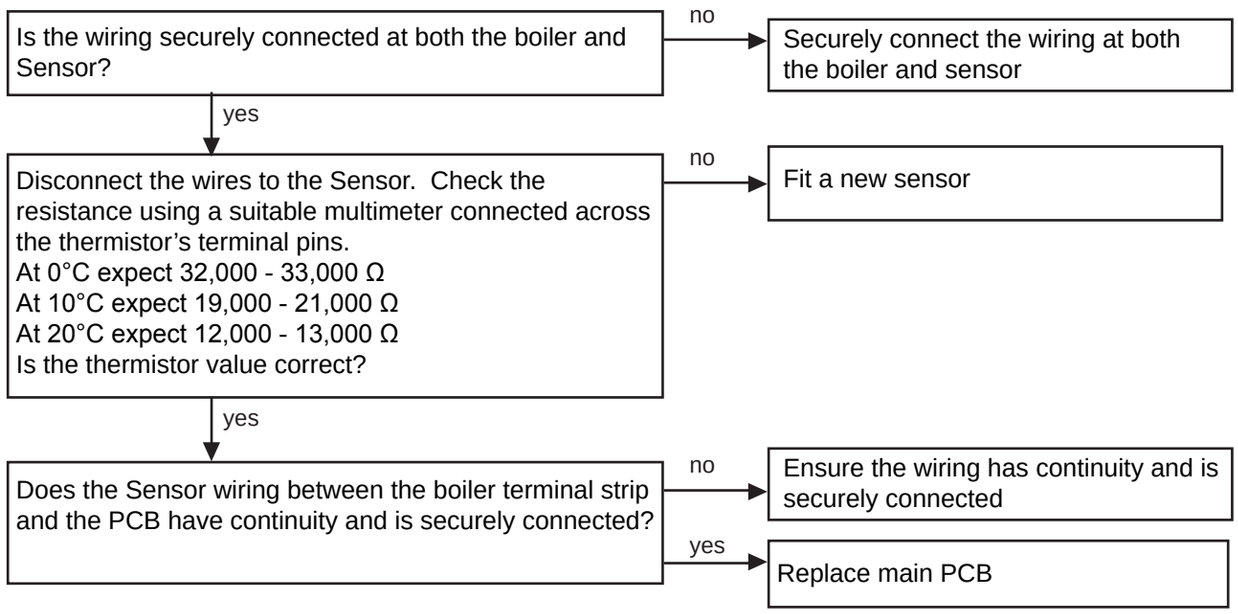
5.8 FAN FAULT



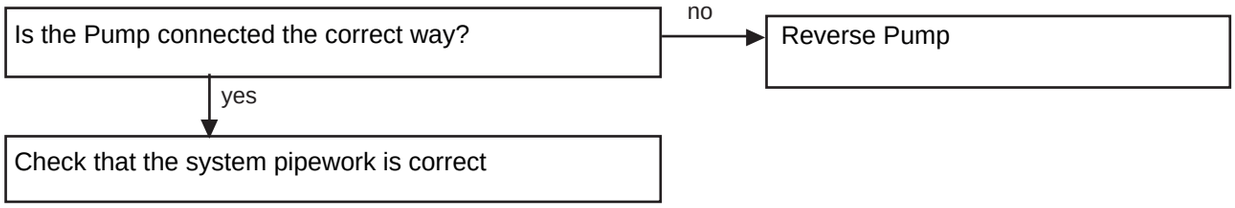
5.9 FLOW / RETURN THERMISTOR, HEAT EXCHANGER OR FLUE THERMISTOR FAULT



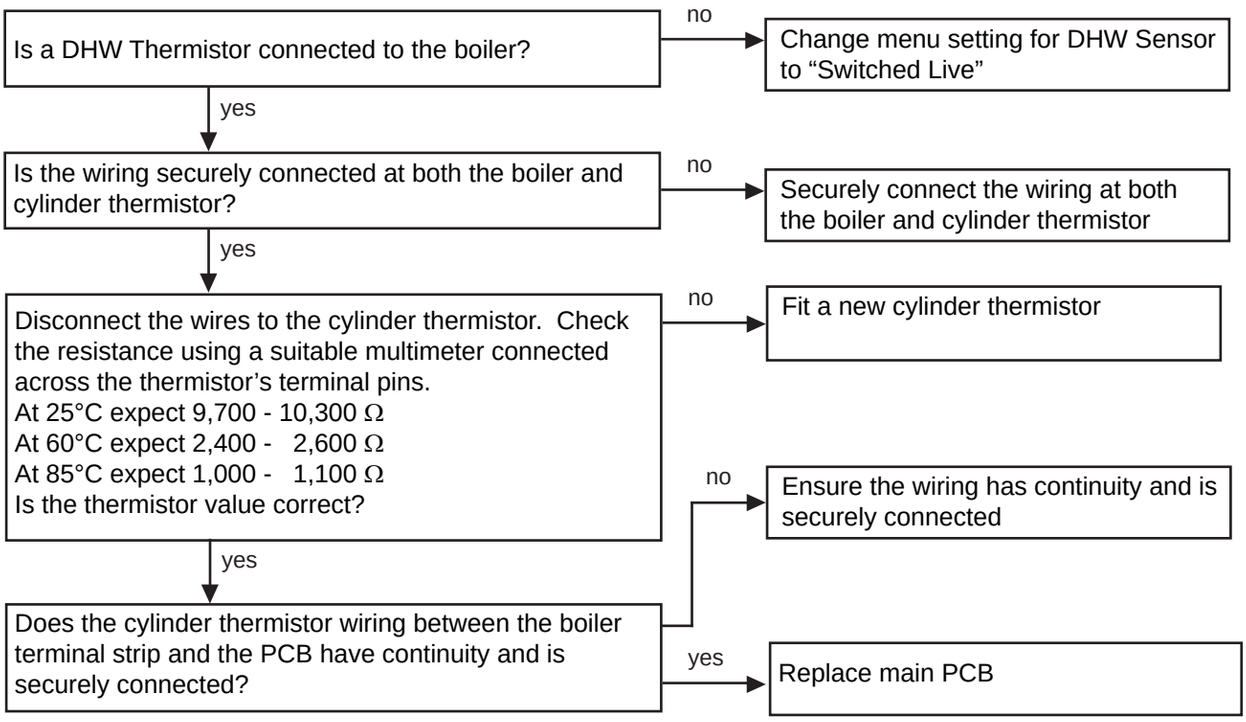
5.10 OUTSIDE / HEADER / ROOM SENSOR FAULT (IF FITTED)



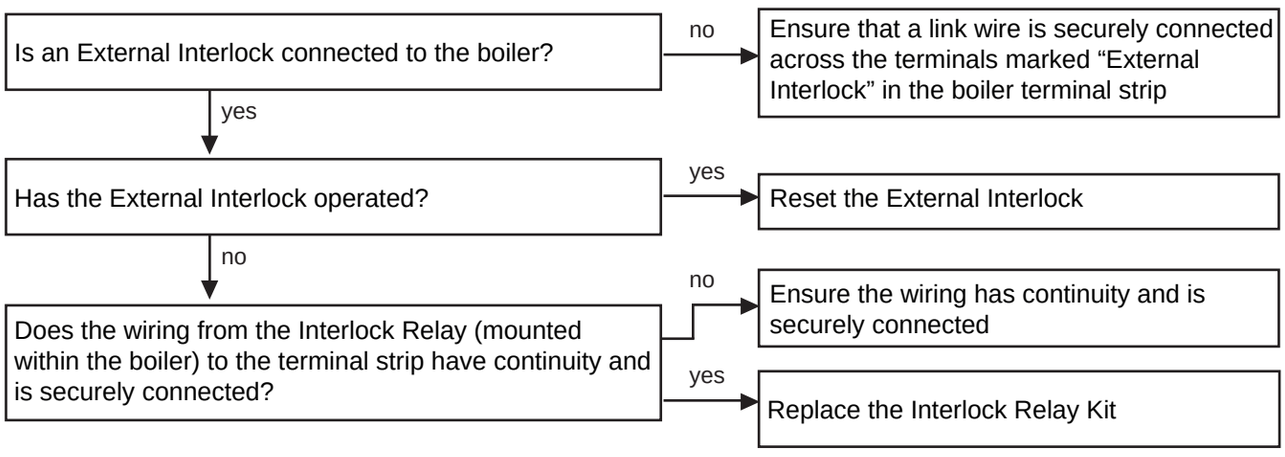
5.11 FLOW/RETURN REVERSED



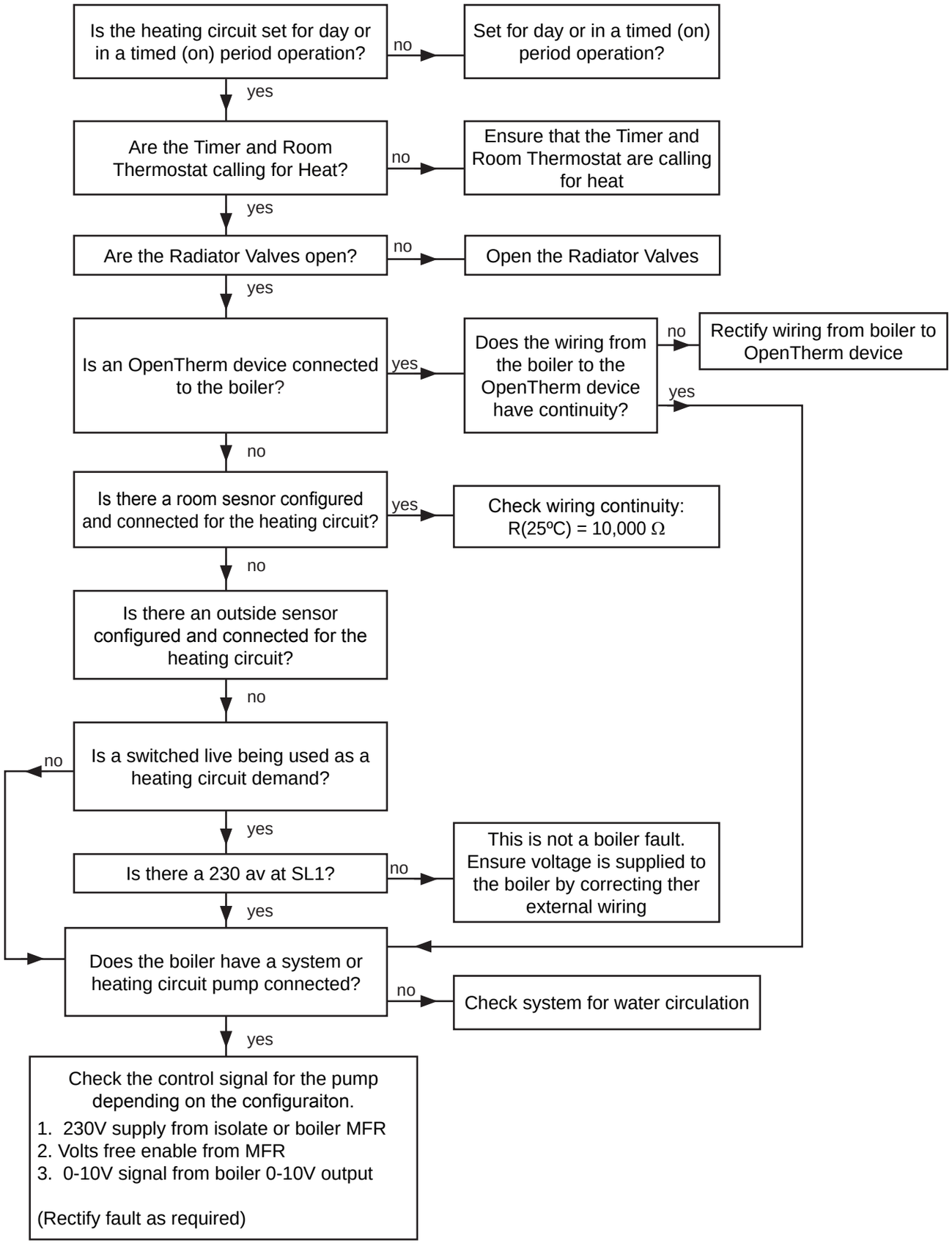
5.12 CYLINDER THERMISTOR FAULT (IF FITTED)



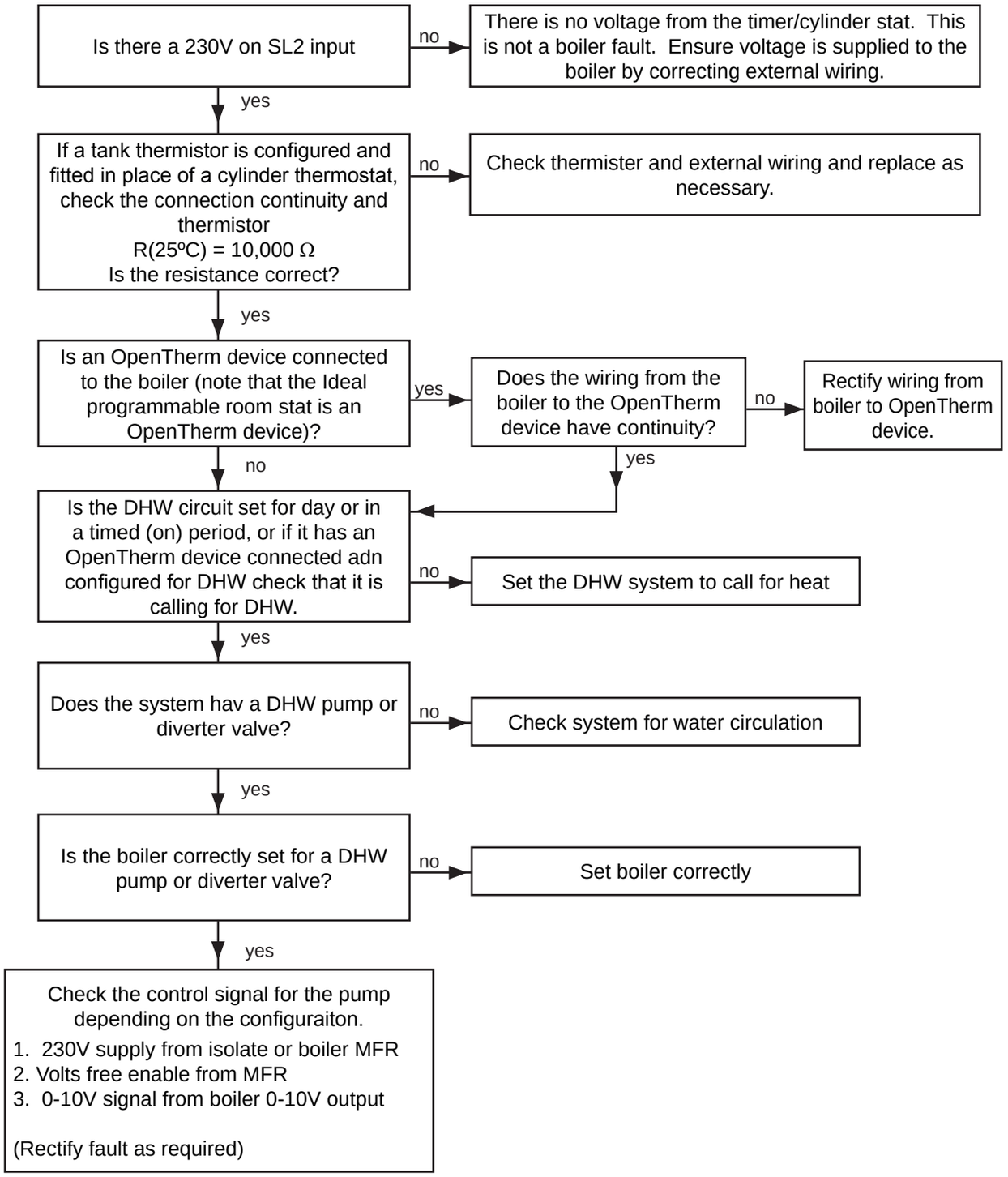
5.13 EXTERNAL INTERLOCK OPEN



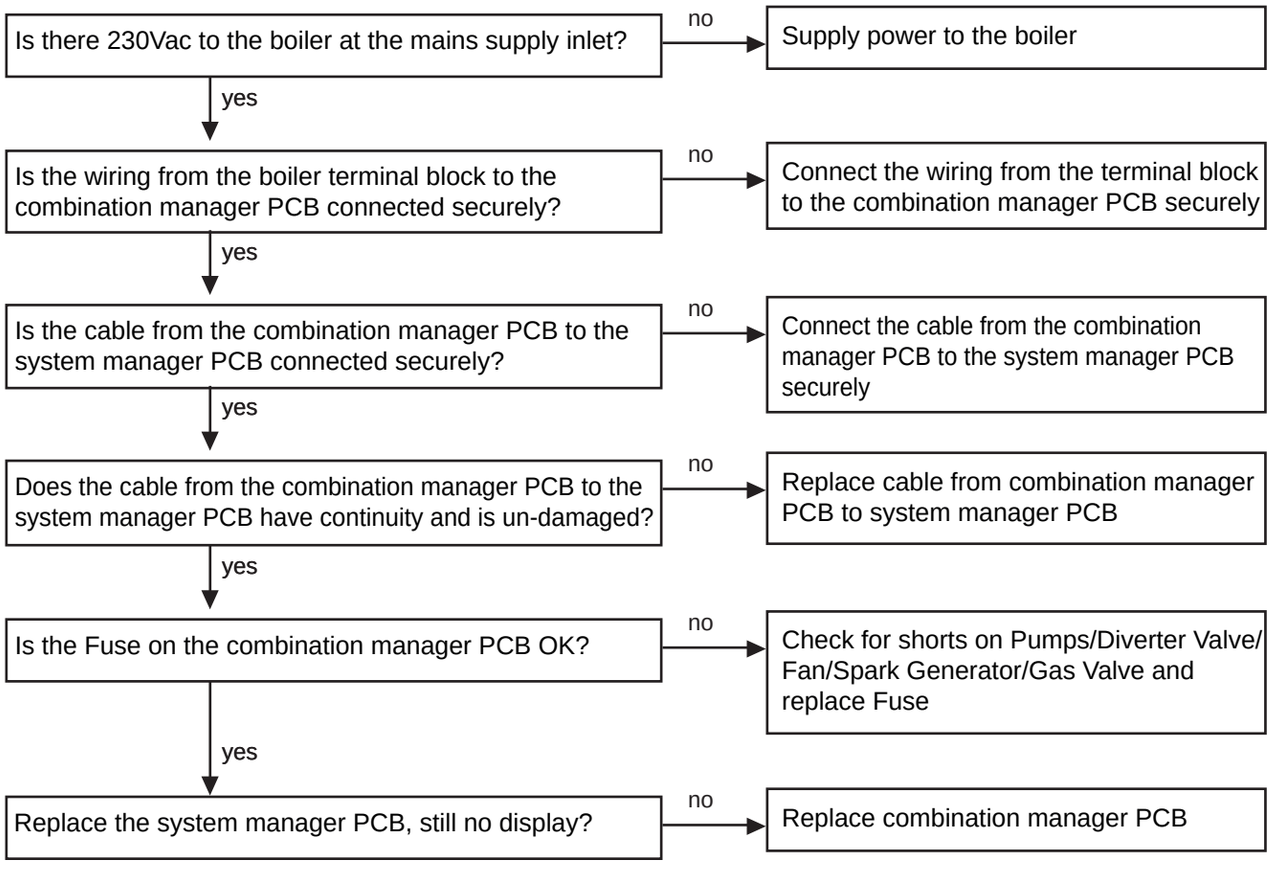
5.14 NO CH BUT DHW OK



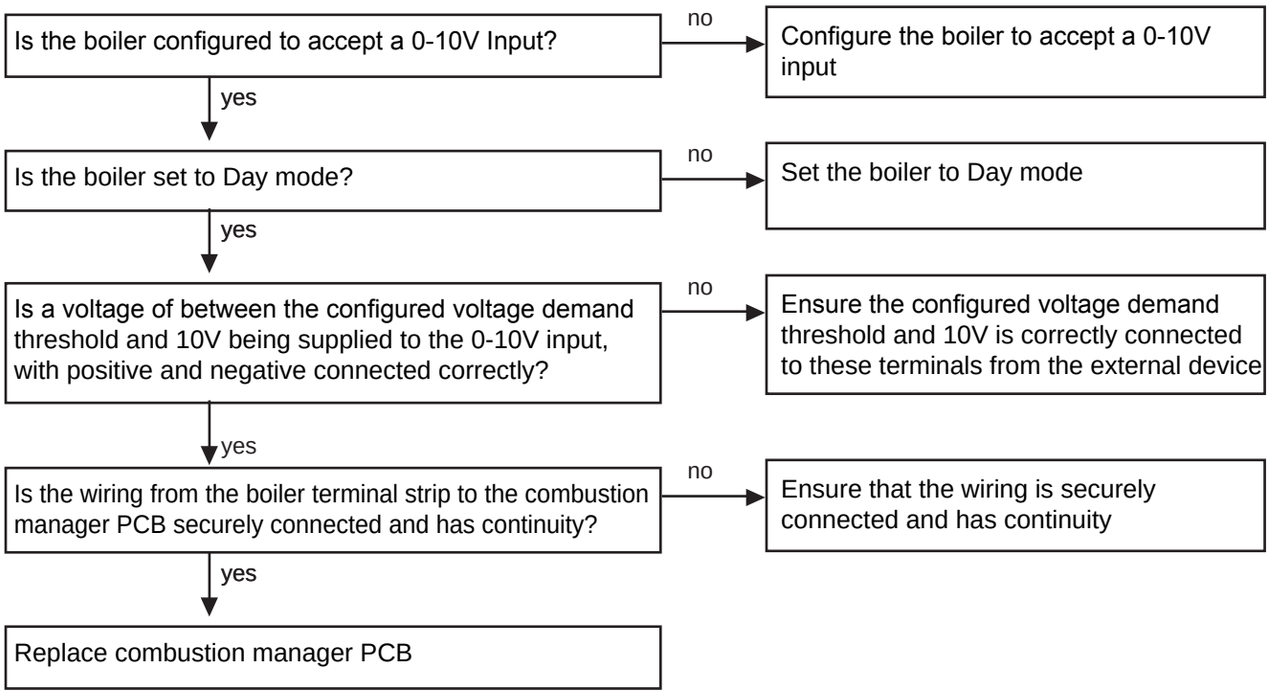
5.15 NO DHW BUT CH OK



5.16 NO DISPLAY



5.17 0-10V INTERFACE



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

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 e.g. 55
- Appliance GC Number (UK only) e.g. 41-930-51
- Boiler Serial Number e.g. ACK 205962000000480101

7. COMBUSTION AND FLUE INTEGRITY

7.1 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 7967.

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

CO_2 = carbon dioxide

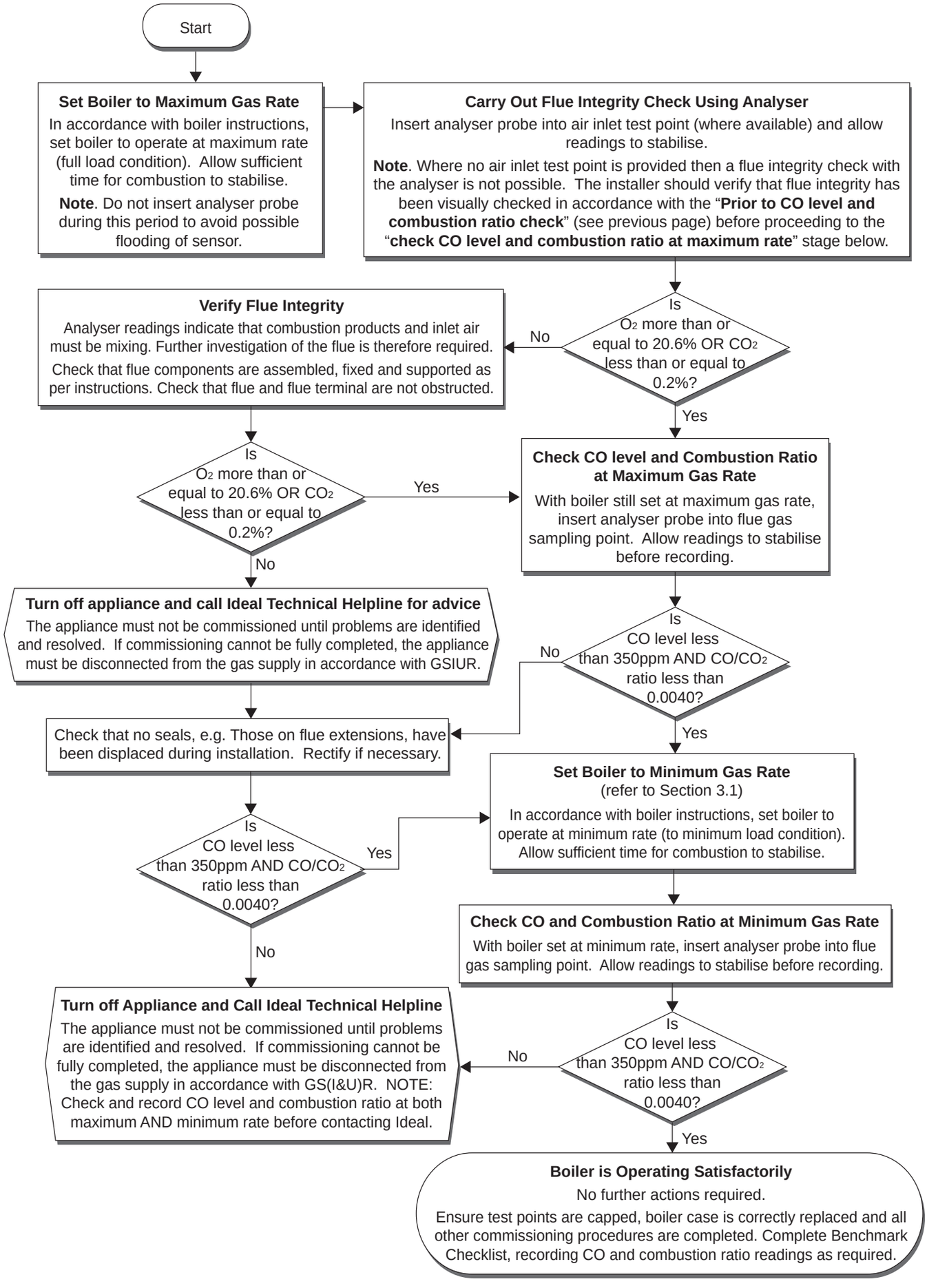
O_2 = oxygen

Combustion Ratio = The CO reading measured in ppm divided by the CO_2 reading first converted to ppm

ppm = parts per million

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

continued.....


Start
Set Boiler to Maximum Gas Rate
In accordance with boiler instructions, set boiler to operate at maximum rate (full load condition). Allow sufficient time for combustion to stabilise.
Note. Do not insert analyser probe during this period to avoid possible flooding of sensor.
Carry Out Flue Integrity Check Using Analyser
Insert analyser probe into air inlet test point (where available) and allow readings to stabilise.
Note. Where no air inlet test point is provided then a flue integrity check with the analyser is not possible. The installer should verify that flue integrity has been visually checked in accordance with the "Prior to CO level and combustion ratio check" (see previous page) before proceeding to the "check CO level and combustion ratio at maximum rate" stage below.
Is O2 more than or equal to 20.6% OR CO2 less than or equal to 0.2%?
No
Verify Flue Integrity
Analyser readings indicate that combustion products and inlet air must be mixing. Further investigation of the flue is therefore required.
Check that flue components are assembled, fixed and supported as per instructions. Check that flue and flue terminal are not obstructed.
Yes
Check CO level and Combustion Ratio at Maximum Gas Rate
With boiler still set at maximum gas rate, insert analyser probe into flue gas sampling point. Allow readings to stabilise before recording.
Is O2 more than or equal to 20.6% OR CO2 less than or equal to 0.2%?
Yes
No
Turn off appliance and call Ideal Technical Helpline for advice
The appliance must not be commissioned until problems are identified and resolved. If commissioning cannot be fully completed, the appliance must be disconnected from the gas supply in accordance with GSIUR.
Is CO level less than 350ppm AND CO/CO2 ratio less than 0.0040?
No
Yes
Check that no seals, e.g. Those on flue extensions, have been displaced during installation. Rectify if necessary.
Set Boiler to Minimum Gas Rate
(refer to Section 3.1)
In accordance with boiler instructions, set boiler to operate at minimum rate (to minimum load condition). Allow sufficient time for combustion to stabilise.
Is CO level less than 350ppm AND CO/CO2 ratio less than 0.0040?
Yes
No
Check CO and Combustion Ratio at Minimum Gas Rate
With boiler set at minimum rate, insert analyser probe into flue gas sampling point. Allow readings to stabilise before recording.
Turn off Appliance and Call Ideal Technical Helpline
The appliance must not be commissioned until problems are identified and resolved. If commissioning cannot be fully completed, the appliance must be disconnected from the gas supply in accordance with GS(I&U)R. NOTE: Check and record CO level and combustion ratio at both maximum AND minimum rate before contacting Ideal.
Is CO level less than 350ppm AND CO/CO2 ratio less than 0.0040?
No
Yes
Boiler is Operating Satisfactorily
No further actions required.
Ensure test points are capped, boiler case is correctly replaced and all other commissioning procedures are completed. Complete Benchmark Checklist, recording CO and combustion ratio readings as required.

NOTES

NOTES

FM 59915

Manufactured under
an ISO 9001
registered quality
management system

Technical Training

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

Registered Office

Ideal Boilers Ltd., National Avenue, Hull, East Yorkshire, HU5 4JN
Tel 01482 443005

Registration No. London 322 137

Keston by Ideal Heating Helpline: 01482 443005
Ideal Heating Parts: 01482 498665

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