

WARMCAIR C16DW

Condensing Air & Water Heater

High Efficiency Downflow
Condensing Air & Water Heater



INSTALLATION,
COMMISSIONING
& SERVICING
INSTRUCTIONS

WarmCair C16DW - G.C. No. 43-417-60

These instructions are to be left with the User
For Installation in Mainland UK only.



**UK
CA**



Johnson
& Starley

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**PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE STARTING INSTALLATION.
LEAVE THESE INSTRUCTION WITH THE USER OR AT THE GAS METER AFTER INSTALLATION**



The Benchmark Scheme

Benchmark places responsibilities on both manufacturers and installers. The purpose is to ensure that customers are provided with the correct equipment for their needs, that it is installed, commissioned and serviced in accordance with the manufacturer's instructions by competent persons and that it meets the requirements of the appropriate Building Regulations. The Benchmark Checklist can be used to demonstrate compliance with Building Regulations and should be provided to the customer for future reference.

Visit www.centralheating.co.uk for more information.

Installers are required to carry out installation, commissioning and servicing work in accordance with the Benchmark Code of Practice which is available from the Heating and Hot water Industry Council who manage and promote the Scheme.

In the interest of continuous development Johnson and Starley reserve the right to change specification without prior notice. Johnson and Starley prides itself on it's ability to supply spare parts quickly and efficiently.

1. FEATURES

Appliance Classification:

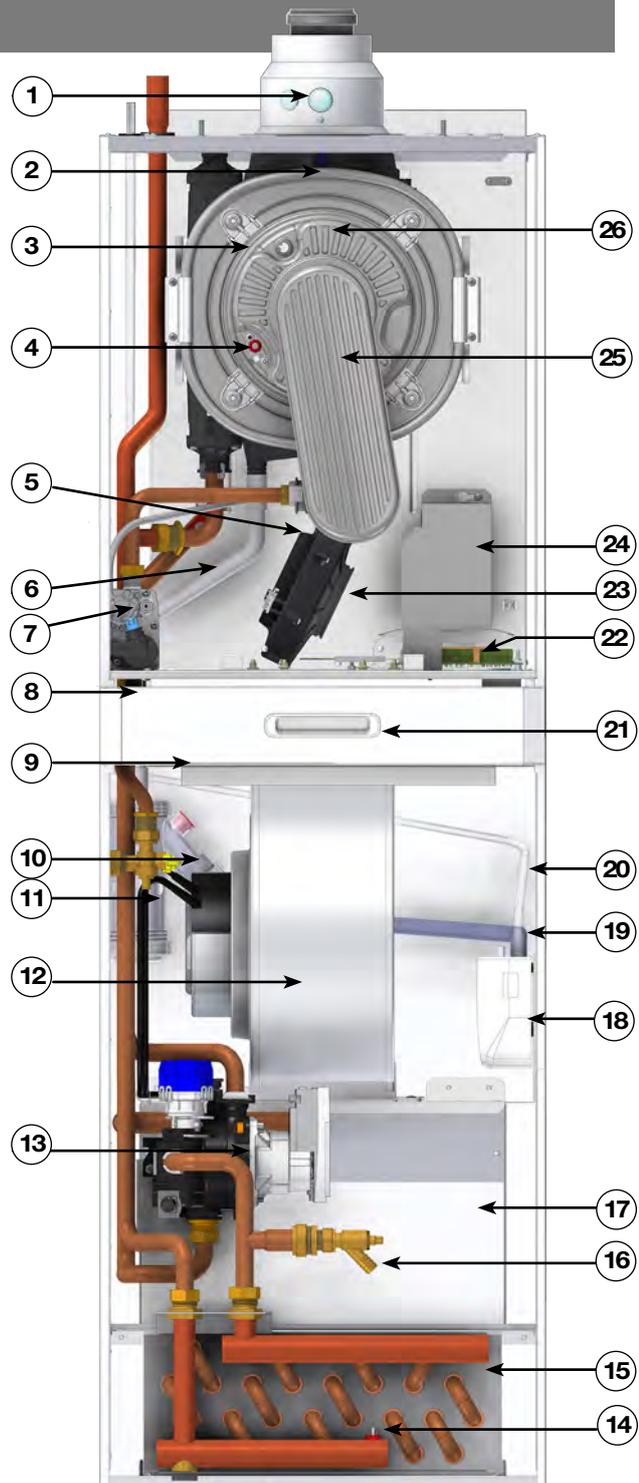
The WarmCaire C16DW has been tested and CE certified by B.S.I Ltd for use with NATURAL gas G20.

FEATURES

1. Flue Adaptor (*shown fitted but not supplied*)
2. Flue Test Point
3. Inspection Glass
4. Ignition Detection Electrode
5. Burner Injector
6. Flow & Return Sensors
7. Pressure Differential Tube
8. Gas Valve
9. Air Filter
10. Condensate Trap (*at the back*)
11. Gas Cock
12. Circulation Fan
13. HE Pump/Diverter Assembly
14. Return Water Temperature Sensor
15. Heat Exchanger (*warm Air*)
16. Drain Cock
17. Access Panel
18. Condensate Pump
19. Condensate Pipe
20. Condensate Drain Tube
21. Electronic Air Filter & LED
22. PCB Interface
23. Combustion Fan
24. Warm Air PCB
25. Heat Generator (*water*)
26. Flue Sensor



FIGURE 1. CONTROL PANEL



2. GENERAL DESCRIPTION

2.1 The WarmCair C16DW is a highly efficient combined condensing gas fired water to air downflow forced convection air heater and water heater. Significant reductions in Carbon and NOx emissions are achieved.

This appliance has been designed with two compartments, one to provide the user with Warm Air Central Heating and one to provide Domestic Hot Water. Using sophisticated controls, enabling it to provide a warm air heat output of 16.0kW and hot water output of 24.2kW fully modulating down to 4.8kW. It is room sealed, with a stainless steel heat exchanger, using a vertical or horizontal Concentric Flue System.

The WarmCair C16DW combines air heater is ideally suited for new built dwellings and the replacement of existing non-condensing air heaters. For Indirect system applications only.

2.2 "Summer Air Circulation" of unheated air is available by manual selection (see the user's instructions)

2.3 The air is drawn in through the air filter or air cleaner (if fitted) and the heat exchanger by a centrifugal fan, and is discharged through the base of the unit. A Summer Air Circulation switch (optional) provides the facility to supply unheated air to the air outlets during warm weather. Modairflow control is incorporated for modulating of the air circulation fan.

3. BUILDING STANDARDS & REGULATIONS



STATUTE LAW DEFINES THAT ALL GAS APPLIANCES MUST BE INSTALLED BY COMPETENT PERSONS, i.e. GAS SAFE REGISTERED INSTALLERS.

GAS SAFE MEMBERSHIP ENQUIRIES TEL: 0800 408 5500 IN ACCORDANCE WITH THE GAS SAFETY (INSTALLATION AND USE) REGULATIONS (CURRENT EDITION).

FAILURE TO COMPLY WITH THESE REGULATIONS MAY LEAD TO PROSECUTION.

3.1 INSTALLATION REGULATIONS

- **Building Standards (Scotland) (Consolidation) Regulations**
- **Building Regulations Part L**
- **Gas Safety (Installation and Use) Regulations (as amended)**
- **The Water Fittings Regulations or Water bylaws in Scotland**
- **Model and Local Authority Byelaws**
- **Health & Safety Document No. 635.**
- **The Electricity at Work Regulations, 1989.**
- **Institute of Electrical Engineers (I.E.E) Wiring Regulations**
- **EU Regulation No 811/2013 and No. 812/2013 supplement Directive 2013/20/EU**

This appliance has been Tested and Certified in order to meet the necessary European Directives and comply with the latest Building Regulations.

- **Efficiency of Hot Water Boilers Directive 92/42/EEC**
- **Gas Appliance Directive 2009/142/EC**
- **Low Voltage Directive 2006/95/EEC**
- **Electromagnetic Compatibility Directive 2004/108EC**

3.2 BUILDING STANDARDS AND REGULATIONS

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

BS 5440:1	Flues (for gas appliances of rated input not exceeding 70 kW).
BS 5440:2	Ventilation (for gas appliances of rated input not exceeding 70 kW).
BS EN 12828	Heating Systems in buildings: Design for water based heating systems.
BS EN 12831	Heating Systems in buildings: Method for calculation of the design heat load.
BS EN 14336	Heating Systems in buildings: Installation and commissioning of water based heating systems.
BS 5546	Installation of gas hot water supplies for domestic purposes (2nd Family Gases)
BS 6798	Installation of gas fired hot water boilers of rated input not exceeding 70 kW.
BS 6891	Installation of Low Pressure Gas Pipework of up to 28mm (R1) in domestic premises (2nd family gases).
BS 7671	Institute of Electrical Engineers (I.E.E) Wiring Regulations

IMPORTANT: This appliance is UKCA certificated for safety and performance. It is important that no modifications are made to this appliance, unless fully approved in writing by Johnson & Starley Ltd. If in doubt, please ring Johnson & Starley Ltd on Telephone 01604 762881.

4. SAFETY, ELECTRICAL, GAS & WATER INFORMATION

PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE COMMENCING WITH THE INSTALLATION

4.1 GENERAL SAFETY INFORMATION

- 4.1.1 Only use WarmCair original spare parts on this appliance. Failure to do so will invalidate the guarantee.
- 4.1.2 The manufacturer's instructions supplied must not be taken as overriding any statutory requirements.
- 4.1.3 No artificially softened water should be used to fill the central heating system.

4.2 POWER FLUSHING - When a radiator system is also connected.

- 4.2.1 The system can be damaged by debris entering the heat exchanger and reduce efficiency. It is recommended that the appliance is flushed, follow these guidelines as this will protect the unit and prolong its life.
- 4.2.2 It is important that the system is flushed thoroughly before the appliance is left to operate (as recommended in BS 7593) in order to maintain an efficiently operating heating system. For replacement installations, the system **MUST** be flushed with the old unit in situ, in order to prevent the appliance becoming a trap for system debris. Once the system has been flushed, an inhibitor (suitable for stainless steel heat exchangers) should be added. Appropriate inhibitors are available, for example Sentinel, Fernox and Salamader.

4.3 MAGNETIC AND NON MAGNETIC FITERS

For new and replacement installations a Magnetic & Non Magnetic filtration system must be fitted on all returns to the appliance.

- 4.3.1 Failure to carry out the above procedures will invalidate the guarantee!



4.4 ELECTRICAL INFORMATION

- 4.4.1 Ensure the mains supply voltage, frequency, number of phases and power rating comply with details on the rating label.
- 4.4.2 All wiring must be in accordance with the appropriate standards. The equipment must be supplied with a double pole isolator switch.

4.5 HANDLING THE UNIT

- 4.5.1 Ensure safety regulations and practices are adhered to when installing and using this equipment
- 4.5.2 The weight of this appliance exceeds that recommended for a one-man lift. It will therefore be necessary to gain assistance at times during the installation procedure.
- 4.5.3 It should be noted that this appliance may contain sharp edges. Care **MUST** be taken when handling the appliance to prevent injury.
- 4.5.4 Once the appliance has been fired beware that certain parts will be hot to the touch.
- 4.5.5 Do not install flues during rain, high winds or in severe weather conditions.

4.6 GAS SUPPLY

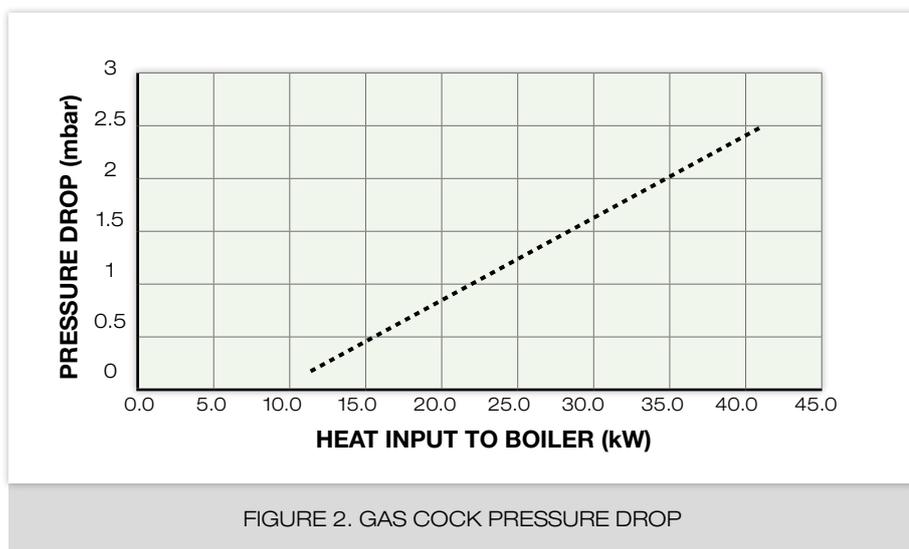
- 4.6.1 It is the responsibility of the Gas Installer to size the gas installation pipework in accordance with BS 6891. Whilst the principle of the 1:1 gas valve ensures the WarmCair Combined DHW range is able to deliver its full output at inlet pressures as low as 14mb, other gas appliances in the property may not be as tolerant. When operating pressures are found to be below the minimum meter outlet of 19mb these should be checked to ensure this is adequate for correct and safe operation.
- 4.6.2 Allowing for the acceptable pressure loss of 1mb across the installation pipework, it can be assumed that a minimum permitted operating pressure of 18mb will be delivered to the inlet of the appliance. (Reference BS 6400-1 Clause 6.2 Pressure Absorption).
- 4.6.3 The external gas cock could further reduce the operating pressure when measured at its test point. The pressure drop is relative to the heat input to the boiler (kW), refer to graph below.
IMPORTANT: Installation pipes must be fitted in accordance with BS 6891. In Ireland refer to IS.813.

4.7 WATER SUPPLY

- 4.7.1 Water connections to the unit should be by 22mm compression fittings that are suitable for the duty.

NOTE: UNDER NO CIRCUMSTANCES SHOULD ISOLATION VALVES BE FITTED.

IMPORTANT: It is recommended that the water system be drained and flushed prior to the installation of the unit. A strainer should be fitted upstream of the unit. See Paragraph 4.2.





GAS LEAKS

DO NOT OPERATE ANY ELECTRICAL SWITCHES, OR USE A NAKED FLAME TURN OFF THE GAS SUPPLY. VENTILATE THE AREA BY OPENING DOORS AND WINDOWS. CALL THE NATIONAL GAS EMERGENCY SERVICE ON

0800 11 1999

5. TECHNICAL DATA

TABLE 1		C16DW
Maximum weight lift	kg	76.5
Gas supply	mbar	2H - G20 - 20mbar
Gas connection	mm	15mm copper
Gas Injector size	mm	4.75mm
Heating flow and return	mm	22mm copper
Flue terminal diameter	mm	100mm (4")
Condense drain	mm	6mm ID
Electrical supply	V ~ Hz	230V ~ 50Hz
Electrical rating	W	215
External fuse rating	A	3
WARM AIR HEATING		
Nominal Rated Output	kW	16
Air on Temperature	°C	20
Air off Temperature	°C	67
Water Supply Temperature	°C	80
Water Return Temperature	°C	72
Water Flow Rate	l/s	0.4
Air Volume	m³/h	938

TABLE 2.		C16DW		
PERFORMANCE DATA		MAXIMUM	MINIMUM	
Burner CO² (%)	case off	9.4	8.5	
	case on	9.6	8.7	
		± 0.5		
PERFORMANCE DATA FOR WATER HEATING				
Input Q	Net	kW	24	4.7
	Gross	kW	26.6	5.21
Gas Consumption		m³/h	2.48	0.48
Output	Non condensing	kW	23.4	
	Condensing	kW	25.6	5.17
NO_x Classification		CLASS 5 34mg/kWh		
Recommended Central Heating set point		20 - 82°C		

ADDITIONAL DATA	
ELECTRIC POWER CONSUMPTION	100 W (at rated heating capacity), 30 W (at minimal cap.), 10 W (standby mode)
USEFUL EFFICIENCY	88.6 % (at rated heating capacity), 98.9 % (at minimum capacity)
ENVELOPE LOSS FACTOR	0
IGNITION BURNER POWER CONSUM.	0 W
EMISSIONS OF NITROGEN OXIDES	44 mg / kWh
EMISSION EFFICIENCY	83.97 %
SEASONAL SPACE HEATING ENERGY EFFIC.	81.1 %

Note: Gas consumption is calculated using a calorific value of 38.7 MJ/m³ gross or 34.9 MJ/m³ nett. To obtain the gas consumption at a different calorific value:

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

6. HEATER POSITIONING

- 6.1 This heater is not suitable for external installation unless it is protected from the elements by a suitable enclosure. The enclosure must provide the clearance for installation, servicing and maintenance as well as the correct level of ventilation. The selected position should allow for a suitable flue system to be installed.
- 6.2 When installed in a timber frame building guidance should be taken from the Gas Industry Publication IGE/UP-7 (Guide for Gas Installations in Timber Frame Housing).
- 6.3 BS 6798 gives details of the essential features for a compartment or cupboard where a gas appliance is to be installed. An existing cupboard may require modification.
- IMPORTANT:** This system can only be used in conjunction with an **indirect system** application.
- 6.4 If the heater is installed in a room containing a bath or shower it is important to locate the electrical switch in a position where it cannot be touched by anyone using the bath or shower. The current IEE Wiring Regulations (BS 7671) for England and electrical provision of the Building Regulations for Scotland gives details.
- 6.5 Room ventilation for the heater is not necessary as the heater draws its combustion air from the outside of the building, cupboard or compartment ventilation is not necessary providing that the minimum clearances are maintained. However, reference should be made to BS 5440 Pt. 2.
- IMPORTANT:** This appliance must be completely level. It **MUST NOT** lean in any direction. This will cause problems with the condense draining.

7. HEATER COMPARTMENT CLEARANCES

- 7.1 **IMPORTANT** - If the heater is to be fitted to an existing base duct (warm air plenum), always ensure that installation is carried out such that the rear of the heater is aligned with the rear of the base duct, so that any overhang or blanking off will be at the front. In any event, blanking plates must be mechanically secured and all joints sealed.
- 7.2 When the heater is fitted into a compartment, a minimum clearance from the compartment walls of 3mm (1/8") at the sides, rear and front must be left. Where clearances are less than 75mm, internal surface must be lined with non-combustible material and the compartment must be of a fixed rigid structure. However, there is no requirement for the use of non-combustible material at the front of the unit. Consideration should also be given to the space required for the removal and replacement of the filter tray and the entry of the gas and electrical supplies. If gas connections are made from a side entry, a minimum clearance of 75mm (3") is required at that side.
- 7.3 For service access, a minimum clearance of 500mm (20") is required at the front of the heater. Space must also be allowed, in a compartment installation, to permit the complete removal of the heater.
- 7.4 In airing cupboard installations, the part used as the air heater compartment must comply with the relevant section of BS 5864 and must be completely separated by either a non-combustible partition or a perforated metal partition with the perforations not exceeding 13mm (1/2"). The secondary flue must be a tight fit where it passes through the partition and must be suitably protected (see BS 5440: Part 1).
- 7.5 In understairs installations, the compartment must comply with the relevant section of BS 5864, provided that in addition all internal surfaces (including the base) are non-combustible or lined with non-combustible material. This requirement is applicable only to dwellings of more than two storeys.
- 7.6 In free-standing installations, (see instructions packed with top closure kit), only one or two walls will be in close proximity to the air heater; these must be non-combustible.
- 7.7 Where the air heater is to be installed onto a combustible surface and under-floor ducting used, a suitable base tray **MUST** be used in order to provide insulation.
- NOTE: where a base plenum is used no base tray is required!
- 7.8 Although two permanent ventilation openings are not required, consideration should be given to the amount of heat emitted by any ductwork present in the compartment, otherwise the compartment temperature could increase and will affect the safe operation of the appliance and its controls.

8. DUCT SYSTEM (See British Design Manual - Gas fired Warm Air Heating)

8.1 RETURN AIR

- 8.1.1 A room-sealed heater can be installed without positive return air ducting, provided that the path between the return air grille and the heater return air inlet is protected in such a manner that the required airflow is maintained at all times (BS5864).
- 8.1.2 The return air grille **MUST** have a free area of not less than 900 cm² (140 in²). It is recommended that the return air duct not be routed directly from the main living area, but from a convenient central area serving the remainder of the dwelling.
- 8.1.3 The return air system should be constructed of fire-resistant material where used. It is extremely important that the correct size of return air grilles and ducting is used. The return air duct area should not be less than 450 cm² (70 in²). If flexible duct is used the duct diameter should not be less than 300 mm (12") diameter.
- 8.1.4 An adequate and unobstructed return air path is essential from areas not served by a directly ducted return and to which warm air is delivered. All such rooms should be fitted with relief grilles which have a free area of 0.0088 m²/kW (1 in²/250 Btu/h) of heat supplied to the room. The only exceptions are kitchens, bathrooms and WCs.
- 8.1.5 The return air duct should allow for ease of removal for access to the flue.
- 8.1.6 All duct work in the room or internal space in which the heater is installed shall be mechanically secured and sealed with ducting tape.
- 8.1.7 If a return air duct is not to be fitted, the top of the unit must be suitably guarded to prevent blockage.

9. HEATING SYSTEM

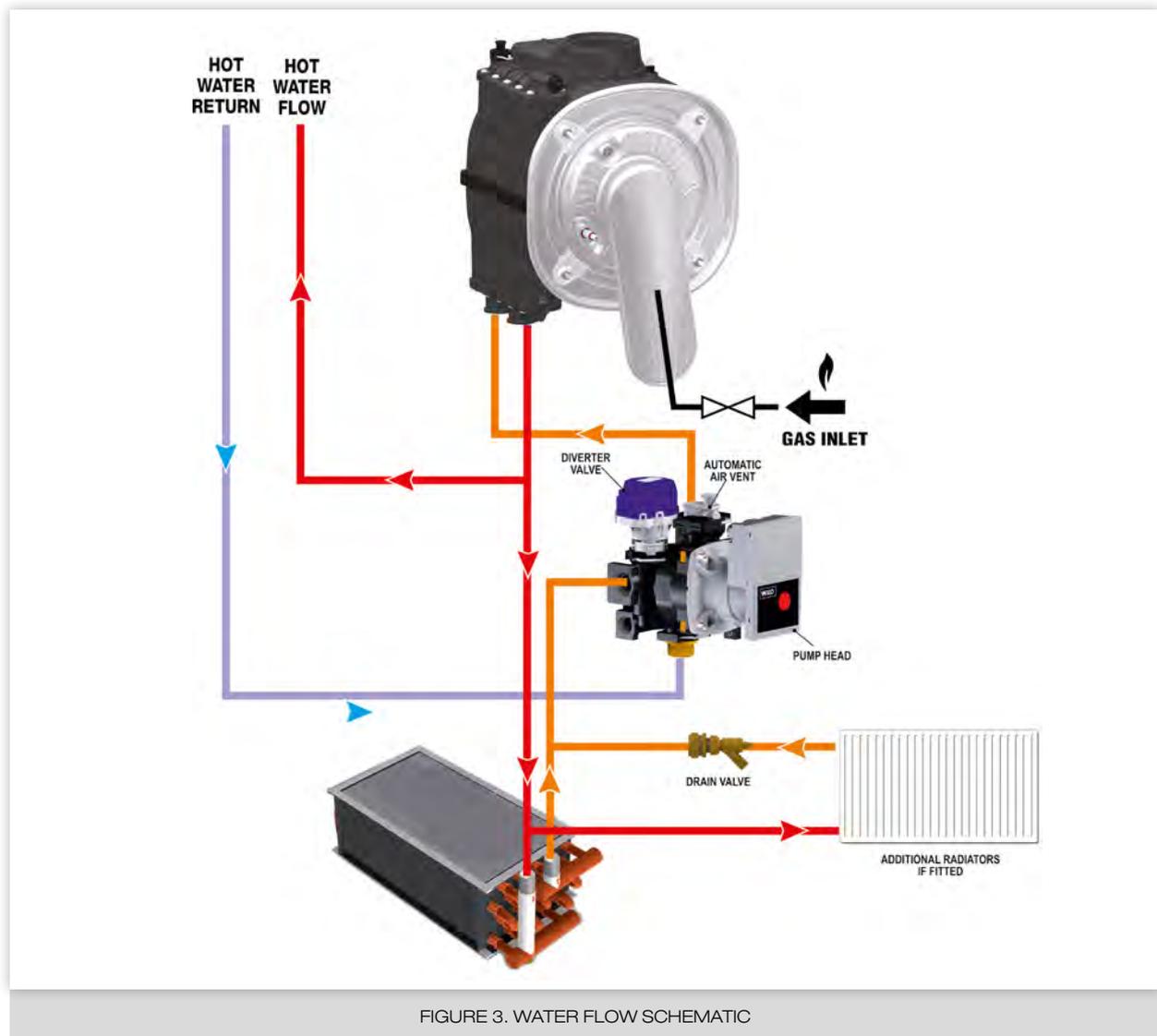
9.1 WARM DELIVERED AIR SYSTEM

- 9.1.1 All duct work, including riser ducts, should be fully insulated with 50mm (2") fibre-glass or similar. If short extended duct runs are taken below floor level these should be similarly insulated and in addition wrapped with a sound vapour proof barrier. They must also be protected from crushing.
- 9.1.2 The duct system should be carefully designed (as given in the guidelines in the British System Design Manual) to suit the needs of specific heating requirements and building layout. The type of duct system (e.g. radial/extended plenum/stepped) should be installed using the least number of fittings to minimise airflow resistance. The base duct, which equalises the air pressure to supply ducts, must be constructed to support the weight of the heater, which must be sealed using self-adhesive foam strip, ducting tape or sealing compound. All ducting and blanking plates must be mechanically secured and sealed.

9.2 ADDITIONAL RADIATOR SYSTEM IF FITTED

- 9.2.1 Any additional radiators must be connected to pipe tails provided as detailed in Figure 3.
- 9.2.2 The installation must comply with all relevant national and local regulations.
- All components of the system must be suitable for a working pressure of 3 bar and temperature of 110°C. Extra care should be taken in making all connections so that the risk of leakage is minimised.

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



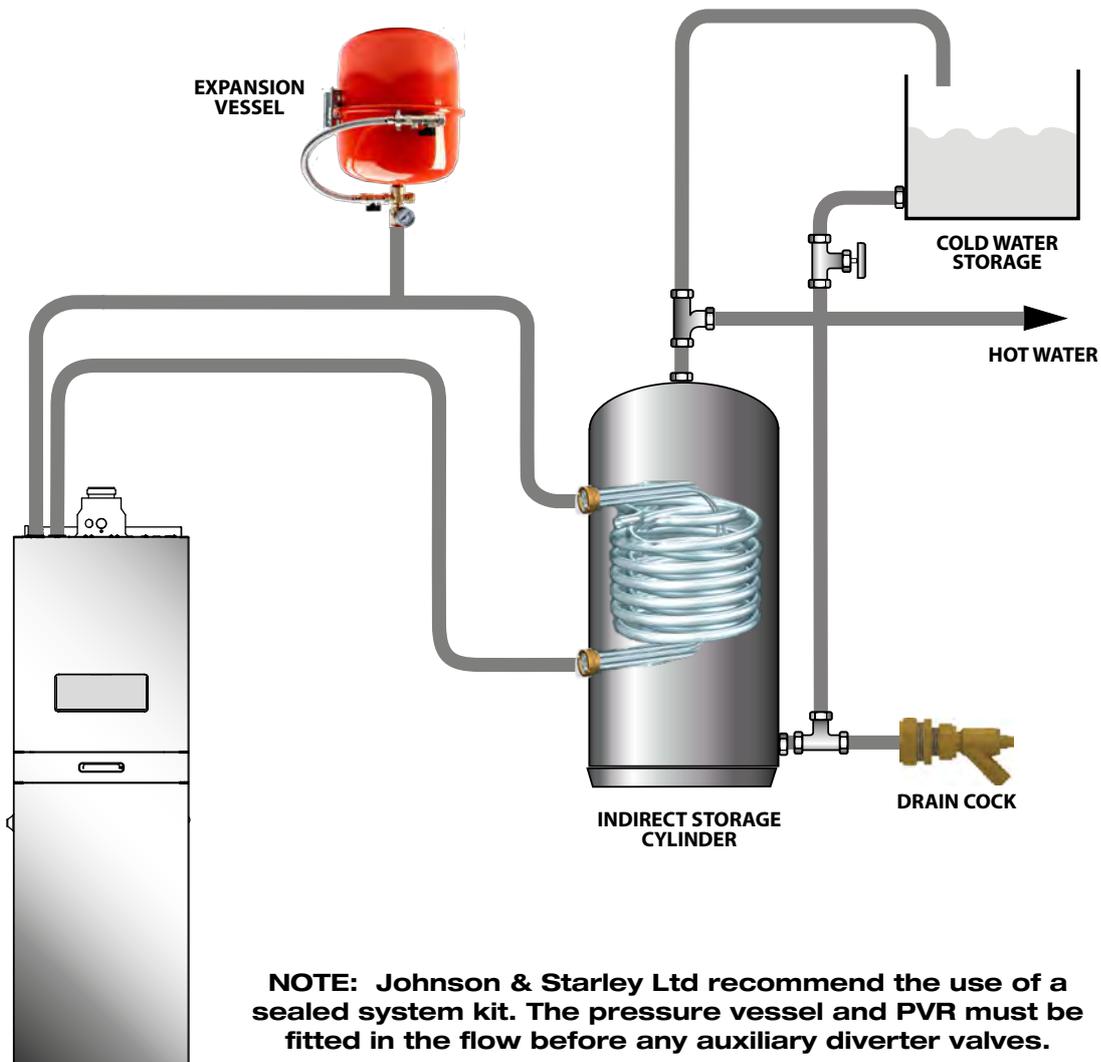


FIGURE 4. HOT WATER SYSTEM SCHEMATIC

9.3 PIPEWORK SIZING

In order to keep the noise of the system to a minimum, the velocity of water should be kept below 1.5 m/s and it should be noted that the appliance is designed to operate with a temperature differential of 20°C between flow and return. The maximum flow rates are 0.3 kg/s which, through a 22mm pipe, gives velocities of 1.00 m/s. Therefore, the recommended minimum pipe size is 22mm.

9.4 WATER TREATMENT

It is important that the system is flushed thoroughly before the appliance is left to operate (as recommended in BS 7593) in order to maintain an efficiently operating heating system and in accordance with the Benchmark Guidance Notes on Water Treatment in Central Heating Systems.

9.4.1 For replacement installations, the system **MUST** be flushed with the old boiler in situ, in order to prevent the boiler becoming a trap for system debris. Once the system has been flushed, an inhibitor (suitable for stainless steel heat exchangers) should be added.

9.4.2 Appropriate inhibitors are available, for example Sentinel, Fernox and Salamader. Failure to carry out the above procedure will invalidate the guarantee!

NOTE: Water supplied from a water softener **MUST NOT** be used unless a specially formulated corrosion inhibitor is added (see BS 6798)

IMPORTANT: This appliance can only be used with a Indirect heating System.

9.5 HOT WATER SYSTEM FOR DHW

9.5.1 A cylinder with a thermostat must be fitted.

9.5.2 Separate timing of DHW is required for connections see Figure 52.

10. FLUE INSTRUCTIONS

- 10.1 The WarmCair C16DW Condensing Air Heater is certified as a warm air heater with corresponding flue systems according to EU Directive 2009/142/EC on gas-fired devices. These installation instructions are covered by this certification and are referred to in the design approval test certificate.
- 10.2 The installation of the warm air heater and flue system must be in accordance with the Gas Safety (Installation and Use) Regulations 1998 and the Building Regulations. If no specific instructions are given, reference should be made to the relevant codes of practice.

THESE RELEVANT STANDARDS SHOULD BE FOLLOWED

- BS 5440:1 Flues and ventilation for gas appliances of rated heating input not exceeding 70kW (net) : Flues
- BS 5440:2 Flues and ventilation for gas appliances of rated heating input not exceeding 70kW (net) : Air Supply

Ensure all legislation, regulations and directives mentioned are observed.

- 10.3 The air/flue duct operates at very low temperatures therefore no clearance is necessary between the air duct and the adjacent services.
- 10.4 Ensure while installation work is being carried out that no debris such as swarf, filings or fragments of mortar are allowed to remain in the air/flue duct.

10.5 TYPE OF FLUE SYSTEMS

Two types of flue systems are available for the C10DW.

- i) The standard concentric flue system 60/100 (100mm diameter)
- ii) A Flexible flue kit (FFK 5) 60/100mm (100mm diameter) For further information contact the sale office at Johnson & Starley Ltd. Telephone 01604 762881.

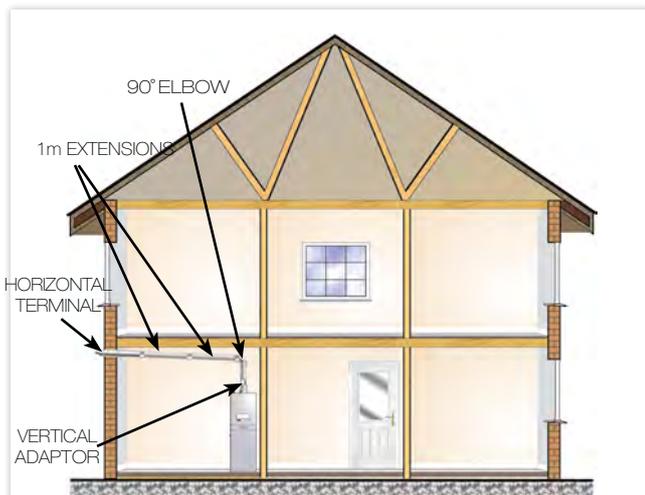


FIGURE 5. 60/100mm HORIZONTAL CONCENTRIC FLUE EXAMPLE

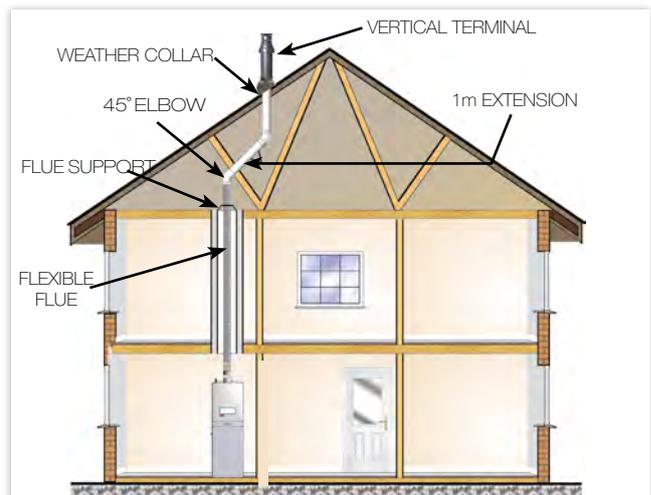


FIGURE 6. 60/100mm FLEXIBLE FLUE EXAMPLE

10.6 FLUE TERMINAL POSITIONS

- 10.6.1 The following information provides the general requirements for siting flue terminals. As part of the recommendation given in **BS 5440 Part 1**. For Ireland recommendations, see the current issue of I.S. 813 "Domestic Gas Installations." Also publication a "Guide for Gas Installations in Timber Framed Housing DM2" or consult your local gas region, **MUST** be consulted when installing the appliance into a timber-framed building.

NOTE: Due to the nature of the warm air heater, water vapour will discharge from the flue. This should be taken into account when siting the flue

- 10.6.2 Both the horizontal and vertical terminals must be positioned on the outside of the building and the free passage of air must be available at all times. It is not recommended to position the terminal close to projections especially under a balcony or near to a drainpipe.
- 10.6.3 Ensure that combustion products cannot enter the building where the heater is installed or near to any other building where doors or windows may be open.
- 10.6.4 Recommended terminal positions for both horizontal and vertical flues are shown and flue components and installation options are also detailed.
- 10.6.5 The flue **MUST NOT** be installed under a car port.



FIGURE 7. TERMINAL POSITIONS

TABLE 3	TERMINAL POSITION	MINIMUM DISTANCE
A	Directly below an opening, air brick, opening window etc	300mm
B	Above an opening, air brick, opening window, etc.	300mm
C	Horizontally to an opening, air brick, opening window etc.	300mm
D	Below gutters, soil pipes or drain pipes.	75mm
E	Below eaves.	200mm
F	Below balconies.	200mm
G	From a vertical drain pipe or soil pipe.	150mm
H	From an internal or external corner. Greater than 450mm protrusion.	300mm
I	Above ground, roof or balcony level.	300mm
J	From a surface facing the terminal.	600mm
K	From a terminal facing the terminal.	1,200mm
M	Vertically from a terminal on the same wall.	1,500mm
N	Horizontally from a terminal on the same wall.	300mm
Q	Above intersection with roof.	530mm
P	From a vertical structure on the roof	300mm
R	From the terminal to the boundary	300mm

10.7 FLUE REQUIREMENTS & GENERAL INFORMATION

- 10.7.1 Horizontal and vertical concentric flues (60/100mm diameter) with balanced terminals may be installed on all the WarmCair C16DW appliance.
- 10.7.2 If an extended horizontal flue is being used it must have a continuous fall back towards the appliance of 3° (52mm) per meter. This ensures that condensate runs back into the appliance from the flue system for safe discharge via the condensate waste pipe. Reference should be made to Table 5 for relevant part numbers.
- 10.7.3 The maximum length of flue permissible is 10 meters excluding terminal.
- 10.7.4 The minimum vertical flue length is 1.25m from the top of the appliance case to the top of the terminal.
- 10.7.5 Elbows may be fitted within the flue system with a corresponding reduction in overall flue length.
- 10.7.6 Guidelines for the maximum flue lengths are as follows.

EQUIVALENT HORIZONTAL FLUE LENGTHS

- Adaptor + 10 metres straight
- Adaptor + 1 x 90° Elbow + 8 metres straight lengths
- Adaptor + 2 x 90° Elbow + 6 metres straight lengths
- Adaptor + 3 x 90° Elbow + 4 metres straight lengths

When using 90° Elbows = 1 x 90° Elbow is equivalent to 2m Straight lengths

When using 45° Elbows = 2 x 45° Elbows are equivalent to 1 x 90° Elbow

10.8 EXTENDED HORIZONTAL FLUE CONFIGURATION EXAMPLE

NOTE: Vertical Appliance adaptor is fitted as part of the air heater.
Can be fitted to the left or the right.

ITEM	DESCRIPTION	QTY
1	Vertical 60/100mm Adaptor	1
2	Appliance Seal	1
3	EPDM Outside Wall Cover Plate	1
4	Inside Wall Cover Plate	1
5	100mm Diameter Clamps	-
6	Required Extension Flue Length	up to 8m
7	90° Elbow	1
8	800mm Horizontal Terminal	1

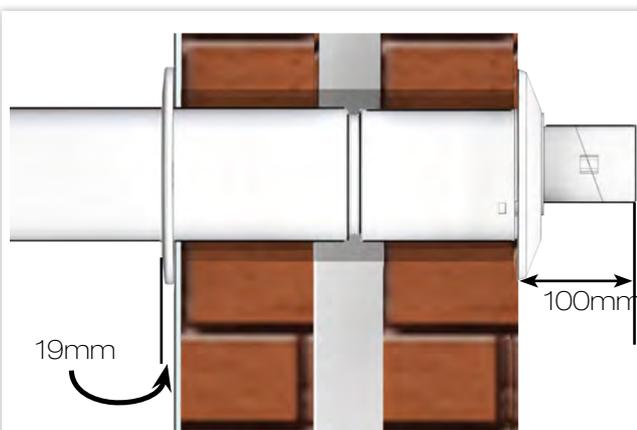
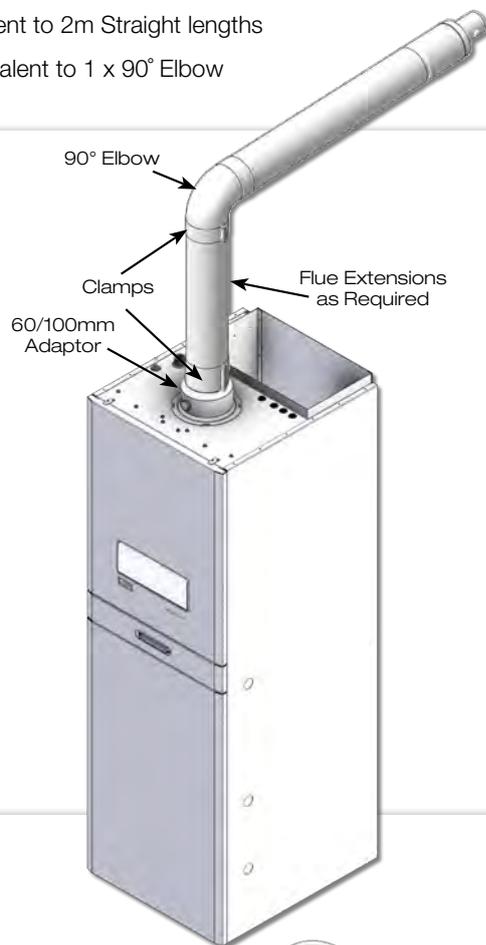


FIGURE 8. EXTENDED FLUE CONFIGURATION

ITEM	DESCRIPTION	QTY
1	Vertical 60/100mm Adaptor	1
2	Vertical Terminal	1
3	1m Extensions for required length	1

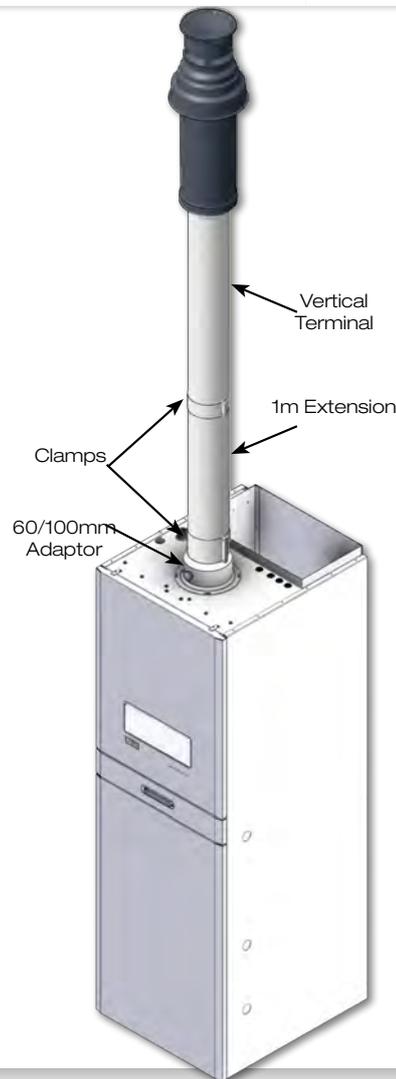
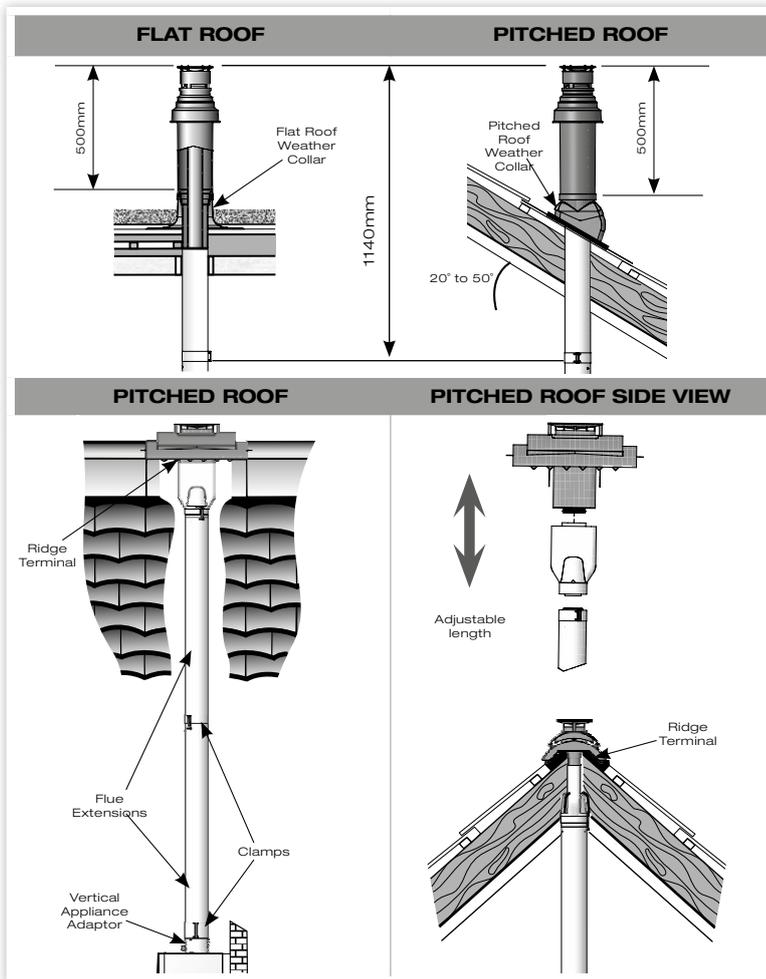


FIGURE 9. VERTICAL FLUE

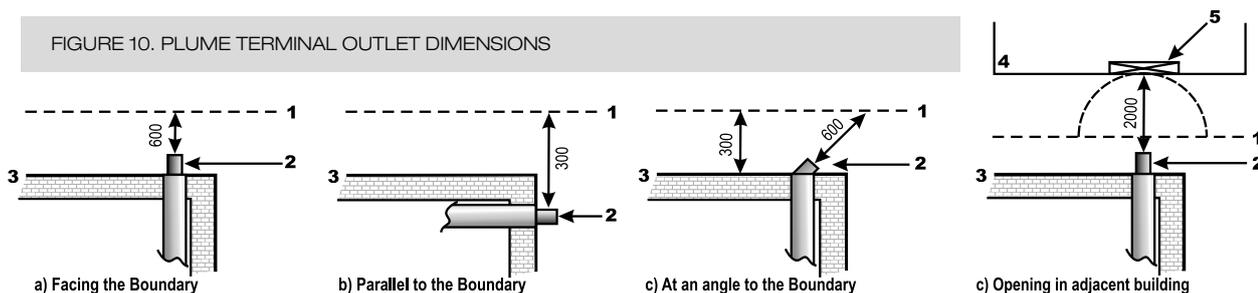
10.11 PLUME TERMINAL OUTLETS

10.11.1 A flue duct outlet of an appliance should be at least 600mm from the boundary line when facing it and at least 300mm from the boundary line when running parallel to it. (See Figure 6)

NOTE: When the flow of products is at an angle to the boundary, the 600mm dimension may be measured in the direction of the flow, as long as the terminal is not less than 300mm from the boundary.

10.11.2 It is recommended the terminals are not sited within 2m of an opening in an adjacent building or within 2m of the boundary facing the terminal if the plume is likely to cause a nuisance to a neighbour, e.g discharging over a walkway or patio.

FIGURE 10. PLUME TERMINAL OUTLET DIMENSIONS



10.12 CONVENTIONAL 60/100mm FLUE ACCESSORY PARTS No

TABLE 5.	DESCRIPTION	COLOUR	QTY	APPLICATION	PART No.
1	60/100 Standard Horizontal Flue Kit	White	1	Horizontal	1000-0020070
2	Turret	White	1	Horizontal	1000-0020020
3	800mm Horizontal Terminal	White	1	Horizontal	1000-0019830
4	Vertical Appliance Adaptor	White	1	Vertical	1000-0024940
5	90° Elbow	White	1	Horizontal & Vertical	1000-0018980
7	250mm Straight Extension	White	1	Horizontal & Vertical	1000-0018960
8	500mm Straight Extension	White	1	Horizontal & Vertical	1000-0018950
9	1000mm Straight Extension	White	1	Horizontal & Vertical	1000-0018940
10	2000mm Straight Extension	White	w	Horizontal & Vertical	1000-00025570
11	Flat Roof Weather Collar		1	Vertical	1000-0014900
12	Pitched Roof Collar	Black	1	Vertical	1000-0014890
13	Ridge Terminal	Grey/ Brown	1	Vertical	1000-0021030
14	Wall Fixing Bracket 100mm		1	Horizontal & Vertical	1000-0014970
15	1140mm Vertical Terminal	White/Black	1	Vertical	1000-0018930
16	Plume Management Kit	Black	1	Horizontal & Vertical	1000-0020730
21	Flexible Flue Kit 60/100mm	Black	1	Flexible	FFK5
33	Chimney Terminal Kit 60/100mm	Black	1	Vertical	1000-0026250
34	Skyline Terminal & Outer Flue Cowl	Black	1	Vertical	1000-0023990
35	Locking Ring	Grey	1	Vertical	1000-0026610
36	Flashing Ring	Grey	1	Vertical	1000-0026660
37	Chimney Cover Plate		1	Vertical	1000-0026600

11. CONDENSATE PUMP & DRAIN TUBE

11.1 CONDENSATE PUMP

11.1.1 Supplied with 6mm x 10m condensate tube. Condensate adaptor and 2 x clips

SAFETY NOTE: If the pump fails, the safety float switch will shut off the heater operation.

11.1.2 DO NOT HANDLE PUMP IN WET CONDITIONS OR WITH WET HANDS

11.1.3 TECHNICAL DATA

- Tank capacity : 0.5L
- High level safety cut out
- Outlet size 6mm I.D.
- Maximum water temperature: 60°
- Maximum noise level: 21 dB(A) at 1m

11.1.4 Where the tubing from the pump is connected directly to the soil stack or waste pipe, there must always be either a waste trap after the tubing connections, or a 75mm U trap formed within the tubing.

11.1.5 Where the tubing from the pump is connected to an external soil and vent stack extra care is necessary to ensure that the condensate pipe could not be blocked through the condensate freezing.

11.1.6 The tank pump uses small bore (6mm) flexible hose which can be routed above or below doors, windows and under kitchen cabinets.

IMPORTANT: Ensure the condensate tube is protected and cannot freeze in an unheated area.

11.2 CONDENSATE TUBE ROUTING OPTIONS

- Option A. Routing to outside drain via sink
- Option B. Routing to drain pipe via roof
- Option C. Routing to bath waste
- Option D. Routing to under floor to sink waste

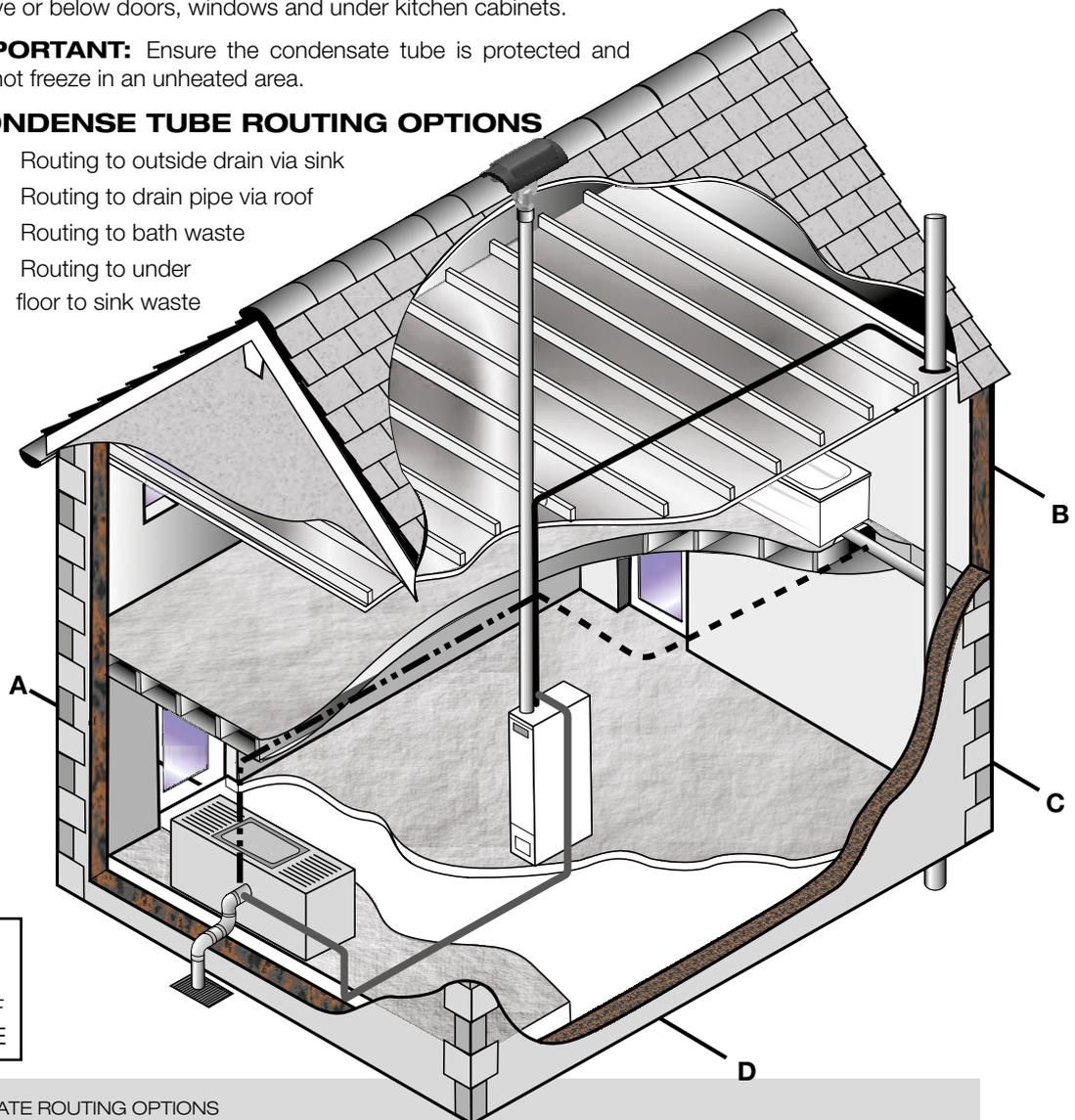
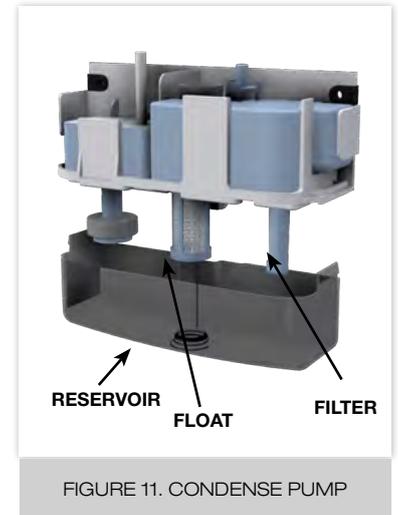


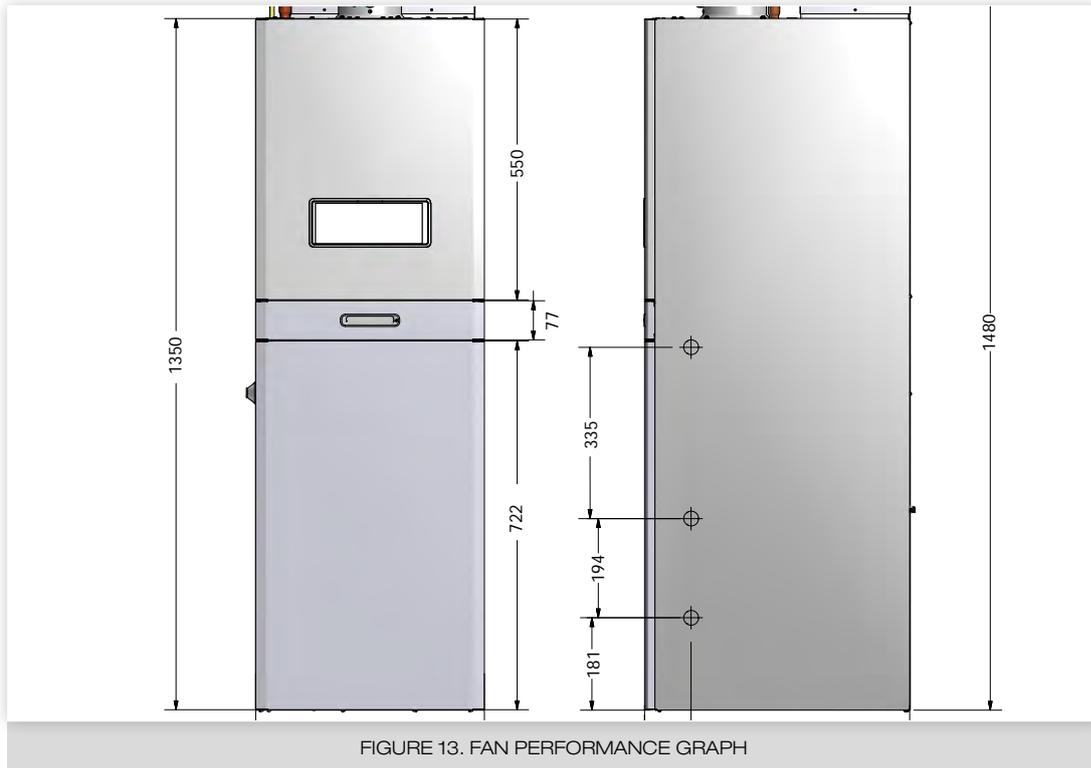
FIGURE 12. CONDENSATE ROUTING OPTIONS



12. ELECTRICAL

- 12.1 The appliance is supplied with PVC sheathed, 3 core (Brown-Blue-Green/Yellow) 0.75mm² CSA rated at 6A, connected to a terminal block and exiting through the casing at the top left hand front. The cable is suitable for a 230V 50Hz single phase supply.
- 12.2 The means of isolating the appliance **MUST** be via a double pole switch with a contact separation of at least 3mm in both poles, and fused at 3A. If switched live is fitted, a triple pole switch should be used.
- 12.3 A Thermista-stat is supplied with the unit, which is to be connected using PVC sheathed to BS 6500, 2 core cable of 0.5mm² CSA rated at 3A, to terminals 29 & 30 on the PCB in accordance with Figure 52 and **observing correct polarity.**

13. WARM AIR FAN PERFORMANCE



14. OPERATING MODES

- 14.1 Operating modes are covered in the User Instructions, ZZ1449 packed with the appliance, for both Domestic Hot Water and Central Heating.
- 14.2 For heating systems that include additional heating circuits e.g. radiators circuit instructions for use and installation will be provided within additional control packages provided.
- 14.3 For installations that include a solar water circuit to the domestic hot water cylinder instructions for use and installation will be provided within the solar heating kit.

15. DOMESTIC HOT WATER HEATING COMMISSIONING

15.1 CHECK GAS INSTALLATION

- 15.1.1 The whole of the gas installation, including the meter, should be inspected and tested for tightness and purged in accordance with the recommendations of BS. 6891. In Ireland refer to IS.813.
- 15.1.2 Purge air from the gas installation by the approved methods only.
- NOTE:** The combustion for this appliance has been checked, adjusted and preset at the factory for operation on the gas type defined on the appliance data plate. No measurement of the combustion is necessary. Do not adjust the air/gas ratio valve.
- 15.1.3 Having checked the heater has been installed in accordance with these instructions. The integrity of the flue system and the flue seals, as described in the Flue Installation section. Proceed to put the boiler into operation as follows:

15.2 CHECK THE OPERATIONAL GAS INLET PRESSURE

- 15.2.1 Set up the heater to operate at maximum rate by opening hot tap to maximum flow.
- 15.2.2 With the heat generator operating in the maximum rate condition check the operational gas pressure at the inlet gas pressure test point complies with the requirements. See figure 13.
- 15.2.3 Ensure that this inlet pressure can be obtained with all other gas appliances in the property working.

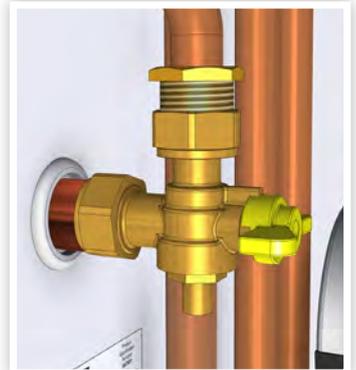


FIGURE 14.
GAS PRESSURE TEST POINT

15.3 AIR PURGE FUNCTION

- 15.3.1 On initial power up an air purge cycle is initiated.
- 15.3.2 Ensure air bleed valve is open.
- 15.3.3 Ensure air bleed valve is open on initial power up and air purge cycle is indicated.
- 15.3.4 During this function, heat demand is switched off and combustion fan will run at maximum for 120 seconds.
- 15.3.5 Also at the same time, the circulation pump will be switched on for 5 seconds and off for 5 seconds continuously.
- 15.3.6 Diverting 3 WV (three way valve) will be moved in CH position for the firsts 30 seconds, then in DHW position for 30 seconds, then in CH position for 30 seconds and finally in DHW position for 30 seconds.
- 15.3.7 In this way, air is expelled from the circuit. On completion of this function normal operation of the circulation pump will occur.
- 15.3.8 During the fan on period, there will be an indication on the LCD display:
- 15.3.9 Function can be skipped pressing K4 push button twice.
- This function can be activated by four conditions:
- If the controller is plugged in to the Mains for the first time.
 - After a manual reset to reset the lockout fault E03: High limit temperature protection.
 - When the central heating water pressure is built up to the normal level after the fault F37 or fault F40.
- 15.3.10 If there is no heat demand afterwards, the controller will switch to standby mode.

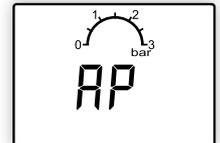


FIGURE 15.
AIR PURGE LED
READ OUT

15.5 RESET PROCEDURE - To reset boiler press the reset button 'K4' twice.

Item	Description
K1	+ Installer function only
K2	- Installer function only
K3	Installer information
K4	Reset
K5	Summer/Winter mode
K6	No Function
K7	No Function

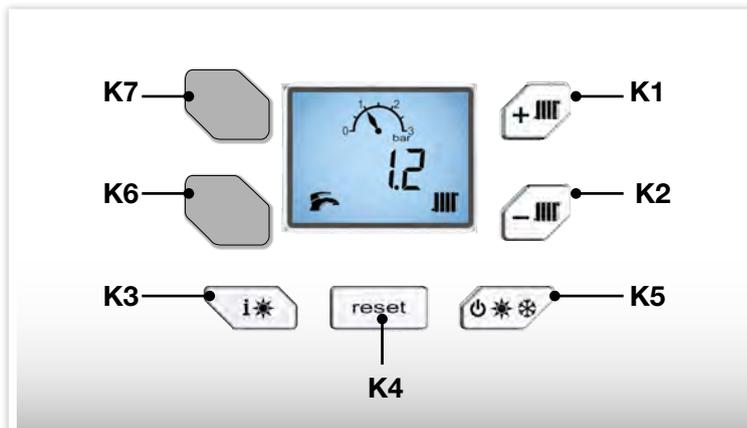


FIGURE 16. LED DISPLAY FUNCTIONS

16. INITIAL LIGHTING

16.1.1 Check that the system has been filled and the heat exchangers are not air-locked.

NOTE: It is important the burner is not operated before the system is fully vented of air.

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

16.1.2 Refit the boiler front panel. See paragraph 17.5.

16.1.3 Check that the electrical supply is OFF.

16.1.4 Check that the gas service cock is OPEN.

16.1.5 Slacken the screw in the inlet pressure test point and connect a gas pressure gauge via a flexible tube.

16.1.6 Switch the electricity supply ON and check all external controls are OFF. The heat generator will select 'self purge'

16.2 WARM AIR CENTRAL HEATING

16.2.1 Set the CH temperature to maximum and switch on external control. The heat generator control should now go through its ignition sequence until the burner is established.

16.2.2 If the heat generator does not light code E-01 will be displayed.

16.2.3 Reset the heat generator (see paragraph 15.5). The heat generator will repeat its ignition sequence. If reset occurs 5 times within 15 minutes then F-15 will be shown. If power is removed this will be reset.

16.2.4 When the burner is established the display will show the 'flame symbol'.

16.2.5 Ensure that the CH external controls are calling for heat. The burner should light.

16.2.6 Gas Rate: Check the heat generator gas rate when the heat generator is at full CH output.

Check at the gas meter, with no other appliance in use. Refer to Tables 2 for gas rates.

16.2.7 Set the central heating external controls to OFF. The burner should go off and the pump continue to run for two minutes

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



FIGURE 17.
LED READ OUT

16.3 WATER CIRCULATION SYSTEM

16.3.1 With the system still hot, turn off the gas, water and electricity supplies to the boiler and drain down to complete the flushing process.

NOTE: A flushing solution should be used during the flushing procedure. Flushing solutions: Fernox Superfloc, Sentinel X300 (new systems) or X400 (existing systems). Refer to paragraph 8.8.

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

16.3.3 Reset the system initial pressure to the design requirement.

16.4 BALANCE THE SYSTEM (if radiator system is fitted)

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

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

16.4.2 Check the condensate drain for leaks and check that it is discharging correctly.

16.4.3 Finally, set the controls to the User's requirements.

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

16.5 CENTRAL HEATING WATER TEMPERATURES

Temperatures can be selected using the CH thermostat
See Table 5.

16.5.1 Set water differential to 20°C using lockshield valve or equivalent.

16.5.2 Check fan stops when water cools to minimum temperature.

Button Setting	CH Flow Temperature °C
Max	80
Min	45

17. WARM AIR HEATING COMMISSIONING

- 17.1 Ensure the heater is correctly filled with water and all air vented from the flow and return circuits.
- 17.2 Switch on electrical supply.
- 17.3 Setting maximum speed.**
- Remove the PCB cover plate.
 - Make a short across summer vent connections on the PCB interface and adjust the fan speed as required using a small screwdriver on the warm air PCB to turn the relevant pot. Remove the short.
- 17.4 Setting minimum fan speed.**
- Make a short across the pipe sensor or minimum fan adjustment of PCB interface and adjusted the fan speed as required, using a small screwdriver on the warm air PCB to turn the relevant pot. Remove short.
- 17.5 WITH THERMISTA-STAT FITTED**
- 17.5.1 Turn up thermista-stat to call for heat.
- 17.5.2 With the water at the required temperature ensure fan starts. (When the display shows 62° to 68°.)
- 17.5.3 Allow the system to warm up and check temperature rise across unit is 40°C.
- 17.5.4 Set water differential to 20°C using lockshield valve or equivalent.
- 17.5.5 Turn off thermista-stat and check there is NO 230V on switch live out.
- 17.5.6 Check fan stops when water cools to minimum temperature.
- 17.6 WITH NO THERMISTA-STAT FITTED**
- 17.6.1 With the water at the required temperature ensure fan starts. (The display shows 62° to 68°.)
- 17.6.2 Allow the system to warm up and check temperature rise across unit is 40°C.

18. HANDING OVER

- 18.1 Hand the User Instructions to the householder and explain his/her responsibilities under the relevant national regulations.
- 18.2 Explain and demonstrate the lighting and shutting down procedures.
- 18.3 The operation of the heater and the use and adjustment of all system controls should be fully explained to the householder, to ensure the greatest possible fuel economy consistent with the household requirements of both heating and hot water consumption. Advise the User of the precautions necessary to prevent damage to the system and to the building, in the event of the system remaining inoperative during frosty conditions.
- 18.4 Explain the function and the use of the boiler heating.
- 18.5 Explain the function of the heater fault mode. Emphasise that if a fault is indicated refer to "Fault Codes" in the User Guide.
- 18.6 Explain and demonstrate the function of time and temperature controls, radiator valves etc., for the economic use of the system.
- 18.7 If a timer is fitted draw attention to the Users.
- 18.8 Explain heater reset procedure.
- 18.9 After installation and commissioning please complete the Commissioning Checklist before handover to the customer. For Ireland, it is necessary to complete a "Declaration of Conformity" to indicate compliance to I.S. 813.

IMPORTANT:

- 18.10 A comprehensive service should be carried out ANNUALLY. Stress the importance of regular servicing by a Gas Safe Registered Engineer. In Ireland servicing work must be carried out by a Registered Gas Installer (RGI).
- 18.11 Inform the householder of the guarantee/registration found within the folder pack and the requirement to register it to receive the full benefit of the warranty.



19. SERVICING & MAINTENANCE

19.1 SERVICING SCHEDULE

NOTE: It is a statutory requirement that ALL work is carried out by a “competent person” which in normal circumstances would be a GAS SAFE registered engineer.

19.1.1 For the very latest copy of literature for servicing & maintenance instructions, visit our website www.johnsonandstarley.co.uk - where you can download the information.

WARNING. ALWAYS TURN OFF THE GAS SUPPLY AT THE GAS SERVICE COCK, AND SWITCH OFF AND DISCONNECT THE ELECTRICITY SUPPLY TO THE APPLIANCE BEFORE SERVICING.

19.1.2 Combustion testing must be carried out by a competent person using a combustion analyser conforming to BS 7927.

19.1.3 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.

19.1.4 It is the law that any service work must be carried out by a Gas Safe Registered Engineer. In Ireland service work must be carried out by a Registered Gas Installer (RGI).

19.2 INITIAL INSPECTION

19.2.1 Light the heat generator and carry out a pre-service check, noting any operational faults.

19.2.2 Check the flue terminal (and terminal guard if fitted) is undamaged and clear of any obstruction.

19.2.3 Check all water and gas joints for signs of leakage. Remake any suspect joints ensuring a gas tightness check is carried out if applicable and the water system is correctly refilled and vented.

19.3 SERVICING SEQUENCE

NOTE: In order to carry out either servicing or replacement of components the heaters front panel must be removed. paragraph 19.5 & 19.10

- ① 19.3.1 Remove the combustion air fan (CAF) and clean. Check the main injector for blockage or damage.
- ② 19.3.2 Clean and check the main burner and electrodes.
- ③ 19.3.3 Visually check the combustion chamber in the heat exchanger, removing any debris.
- ④ 19.3.4 Remove the Air Circulation Fan (ACF), inspect and clean. For Air filter refer to 19.3.15
- ⑤ 19.3.5 Inspect and clean the Air Heat Exchanger.
- ⑥ 19.3.6 Remove and clean the condensate pump and condensate trap.
- ⑦ 19.3.7 Remove and clean the air filter.
- 19.3.8 Check that the flue terminal is unobstructed and that the flue system is sealed correctly. See paragraph 19.4.
- 19.3.9 After completing the servicing or exchange of components always test for gas tightness.
- 19.3.10 When work is complete the front panel MUST be correctly refitted, ensuring that a good seal is made.

DO NOT OPERATE THE APPLIANCE IF THE FRONT PANEL IS NOT FITTED.

- 19.3.11 Check the gas consumption.
- 19.3.12 Check combustion by connecting the flue gas analyser to the flue gas sampling point as shown in the diagram and measure CO & CO₂.

If the CO/CO₂ ratio is greater than 0.004 and the integrity of the complete flue system and combustion circuit seals have been verified and the inlet gas pressure (and gas rate) have been verified, then contact Johnson & Starley Ltd.

- 19.3.13 Once the service is complete, fill in the relevant section in the Benchmark Checklist located at the back of this book.

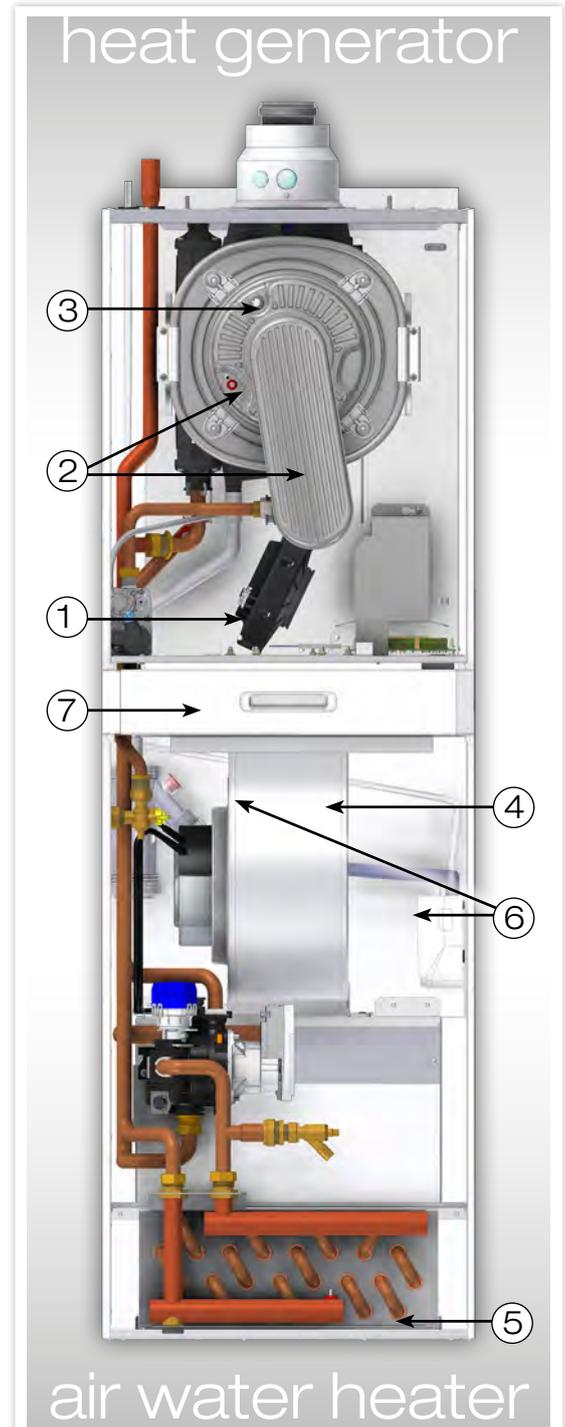


FIGURE 18. SERVICING SEQUENCE

19.4 FLUE INSPECTION & CHECKS

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

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

Competence to carry out the check of combustion performance

NOTE: BS 6798 Specification for installation and maintenance of gas-fired boilers of rated input not exceeding 70kW net advises that:

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

19.4.1 After completing the servicing or exchange of components, always test for gas tightness and carry out functional checks as described above.

19.4.2 When work is complete, check the condition of the sealing foam in the inside of the front doors panels. When the door is refitted you must make ensure a good seal is made.

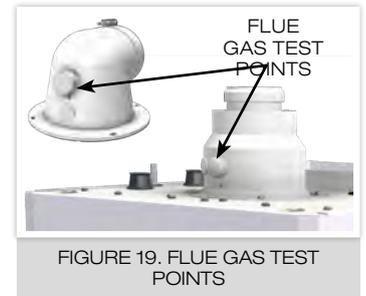


FIGURE 19. FLUE GAS TEST POINTS

GAINING ACCESS TO THE HOT WATER HEATER

(Upper Section)

19.5 AIR FILTER REMOVAL

19.5.1 The air filter is removed by sliding it out from the front of the unit.

19.5.2 Check that the air filter is being regularly cleaned in accordance with the User's Instructions.

19.6 UPPER PANEL REMOVAL

19.6.1 To remove the upper panel remove the air filter.

19.6.2 Remove the two fixing screws, slacken the second two screws and pull panel forward and swing open. Refit in reverse order.

19.6.3 To refit upper panel slide panel up into the two location lugs reposition and replace the two screws.

19.7 CONTROL PANEL

19.7.1 Remove the air filter, upper door and lower door (see Paragraph 19.10) to access the control panel fixing screws.

19.7.2 Remove the 2 central fixing screws securing the control panel to the diaphragm.

19.7.3 Slacken off the second 2 screws under the diaphragm, this will allow the control panel to swing down.

19.7.4 Refit in reverse order.



FIGURE 2. CONTROL PANEL



FIGURE 21. SWING DOWN CONTROL PANEL



FIGURE 22. FILTER SCREWS & DOOR LUGS

19.8 COMBUSTION AIR FAN

Refer to paragraph 19.5 & 19.6

- 19.8.1 Disconnect the electrical leads from the fan.
- 19.8.2 Remove the pressure differential tube.
- 19.8.3 Remove the red securing clip and slide fan backwards off the Venturi.
- 19.8.4 Refit in reverse order.

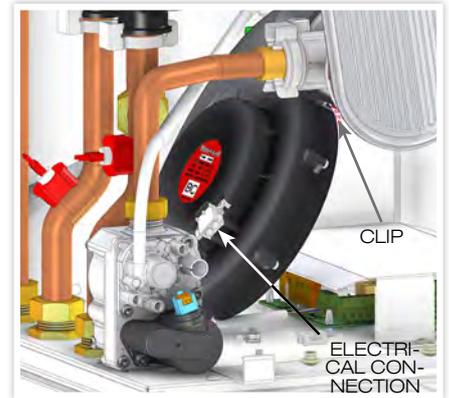


FIGURE 23.
COMBUSTION AIR FAN REMOVAL

19.9 BURNER ASSEMBLY

Refer to paragraphs 19.5 and 19.6

- 19.9.1 Remove the gas pipe securing clip from the Venturi.
- 19.9.2 Remove the ignition/detection lead. See Figure 35.
- 19.9.3 Remove the 4 burner fixing nuts. See Figure 34.
- 19.9.4 Lift out the burner from the combustion chamber.
- 19.9.5 Brush off any deposits that may be on the burner with a soft brush. Inspect the ignition/detection electrode and check the electrode gaps.
- 19.9.6 Inspect the sealing gasket around the burner for any signs of damage. Replace if necessary.
- 19.9.7 Refit in reverse order.



FIGURE 24.
BURNER ARM & WATER HEAT EXCHANGER

19.10 WATER HEAT EXCHANGER

Refer to paragraphs 19.5 to 19.8.

- 19.10.1 Inspect the inside of the combustion chamber, with a soft brush remove any deposits that may have occurred. Flush with clean water. DO NOT use any chemicals.
- 19.10.2 Inspect the heat exchangers insulation at the front and back of the combustion chamber for any signs of damage, then it must be replaced.
- 19.10.3 If there are any signs of damage on the flue outlet then this must be replaced.
- 19.10.4 Refit in reverse order.

GAINING ACCESS FOR SERVICING THE HEAT GENERATOR (Lower section)

19.11 LOWER PANEL REMOVAL

- 19.11.1 To remove the lower panel remove the air filter.
- 19.11.2 Remove the two fixing screws and pull panel forward and up to remove.
- 19.11.3 To refit, slot panel back into position. Replace the two screws.



FIGURE 25.
DOOR REMOVAL

19.12 AIR CIRCULATION FAN

- 19.12.1 Remove the air filter and lower panel.
- 19.12.2 Disconnect the 2 inline connectors on the fan assembly.
- 19.12.3 Release the screws securing the fan and withdraw.
- 19.12.4 Remove all dust from both the impeller and motor and taking care not to disturb the balance of the fan.
- 19.12.5 Refit or replacement is in reverse order.



FIGURE 26.
AIR CIRCULATION FAN

19.13 AIR HEAT EXCHANGER

Refer to section 19.10

19.13.1 Peel back the magnetic panel to gain access into the air heat exchanger.

19.13.2 Check the heat exchanger airways are free from obstructions. If necessary, clean with a vacuum cleaner from the air inspection panel, taking care to not damage the airways.

CAUTION: THE ELEMENTS OF THE HEAT EXCHANGER ARE VERY FRAGILE.

19.13.3 Check the condition of the external strainer, cleaning as necessary.

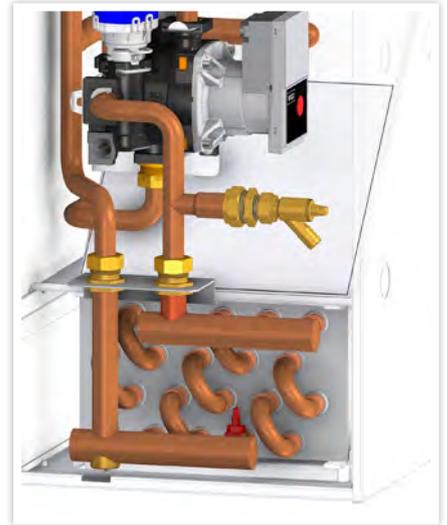


FIGURE 27.
AIR HEAT EXCHANGER.

19.14 CONDENSATE PUMP

Refer to section 19.10

19.14.1 Disconnect the mains.

- a. Disconnect the condensate pipes.
- b. Unscrew the 2 screws on the bracket and slide the Condensate Pump out.
- c. Be careful as this will contain water.

19.14.2 Check for debris in the pump tank. Remove any material that might block the condensate pipes or condensate tube.

19.14.3 Clean the holding tank, filter and floats with warm water and soap. Rinse completely when finished.

19.14.4 Check the inlet and outlet pipe ensuring there are no restrictions in the tubing.

19.14.5 Check filter is in correct position when refitting and the float is sitting in the correct position.

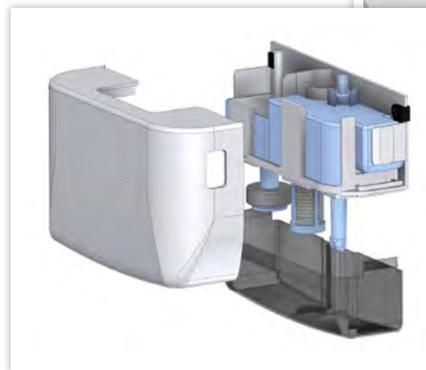


FIGURE 28.
AIR HEAT EXCHANGER

19.15 CONDENSATE TRAP

Refer to section 19.10

19.15.1 Remove the Air Circulation Fan. See paragraph 19.11.

19.15.2 Pull off the rubber pipe noting the position.

19.15.3 Remove the trap and clean by removing the top cap and clean float.

19.15.4 Reassembly and refit in reverse order.

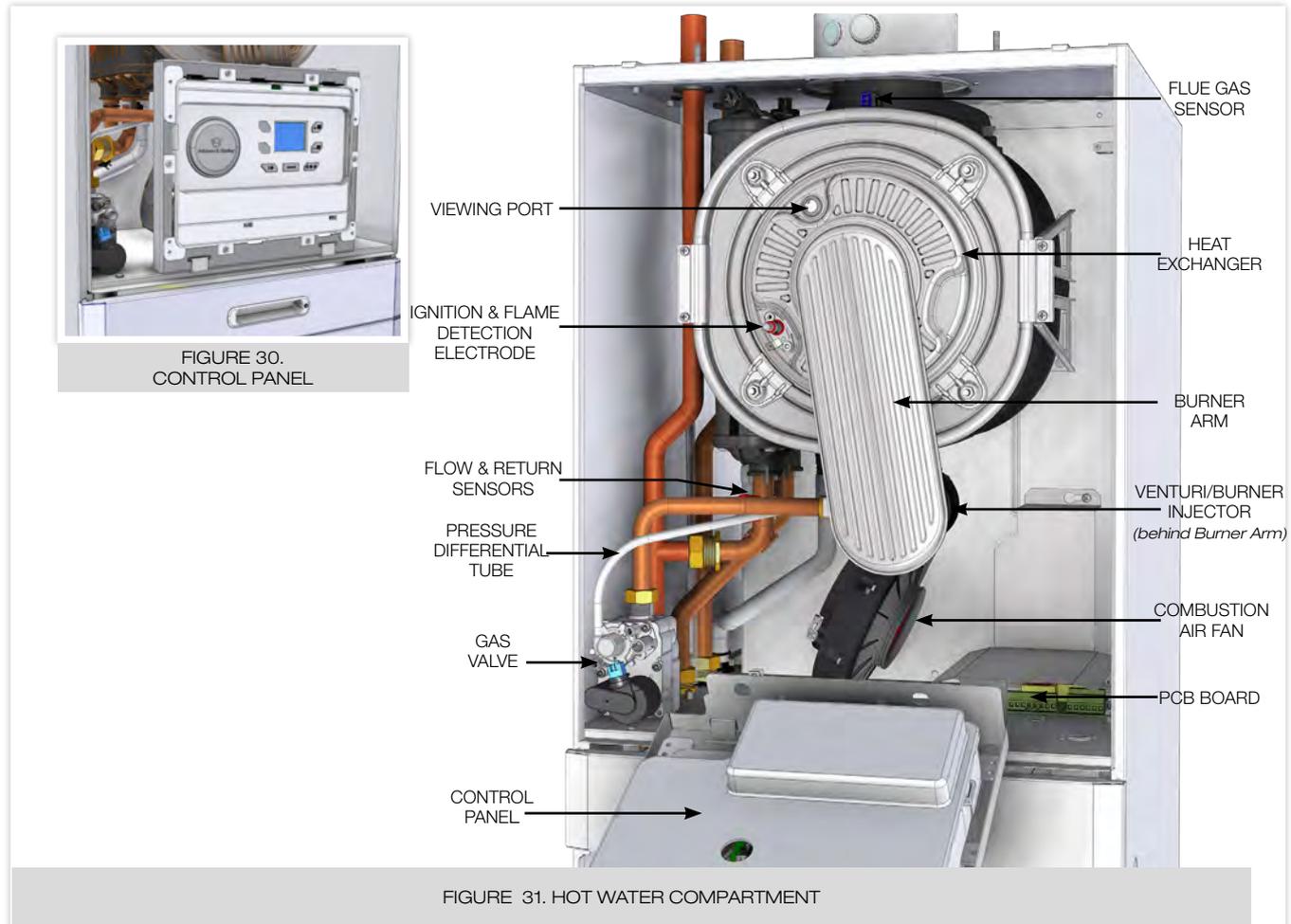


FIGURE 29.
CONDENSATE PUMP & TRAP

20. PARTS REPLACEMENT

20.1 IMPORTANT: Before commencing with any part replacement the appliance should be isolated from the electrical supply and the gas service cock on the appliance closed.

- 20.1.1 All parts that are removed should be replaced and refitted in reverse order, ensuring correct seals are made and wires are connected correctly.
- 20.1.2 Remove any debris from within the appliance.
- 20.1.3 When gas-carrying components are replaced the appliance must be tested for gas tightness.
- 20.1.4 On completion carry out a full functional test of all appliance components and ensure system controls are operating correctly.



PART REPLACEMENTS WITHOUT DRAINING THE SYSTEM

20.2 CONTROL PANEL

Refer to paragraph 19.5 and 19.6.

- 20.2.1 Undo the back of the control panel and disconnect the wiring and unplug all lead connections.
- 20.2.2 Refit in reverse order.
- 20.2.3 Reconnect all wiring and plug connections.

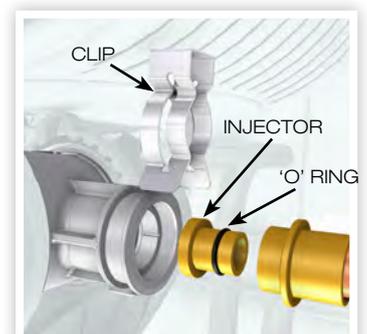
20.3 BURNER INJECTOR

- 20.3.1 Refer to paragraph 19.5 and 19.6
- 20.3.2 Swing down control panel.
- 20.3.3 Remove the gas pipe securing clip from Venturi. See Figure 36.
- 20.3.4 Undo the gas pipe union from the gas valve.
- 20.3.5 Withdraw gas pipe from Venturi.
- 20.3.6 Remove injector from gas pipe.
- 20.3.7 Replace and refit in reverse order.

20.4 COMBUSTION AIR FAN

Refer to paragraph 19.5 and 19.6

- 20.4.1 Disconnect the electrical leads from the fan.
- 20.4.2 Remove the pressure differential tube.
- 20.4.3 Remove the red securing clip and slide fan backwards off the Venturi.
- 20.4.4 Replace and refit in reverse order.



20.5 BURNER ASSEMBLY

Refer to paragraph 19.5 and 19.6

- 20.5.1 Remove the gas pipe securing clip from the Venturi.
- 20.5.2 Unclip the ignition/detection lead.
- 20.5.3 Remove the 4 burner fixing nuts.
- 20.5.4 Carefully lift out the burner from the combustion chamber.
- 20.5.5 Replace the sealing gasket around the burner.
- 20.5.6 Replace with new burner assembly.
- 20.5.7 Refit in reverse order.

20.6 FLOW & RETURN THERMISTOR SENSORS

- 20.6.1 Refer to paragraph 19.5
- 20.6.2 Unclip the flow thermistor at the front, from the flow pipe and disconnect the red wire. Withdraw from the heater.
- 20.6.3 Unclip the return thermistor at the rear, from the return pipe and withdraw it from the heater.
- 20.6.4 Disconnect the blue wires.
- 20.6.5 Reconnect the electrical leads to the new thermistors and reassemble in reverse order, ensuring that the thermistors are securely fitted to the pipes on the thermistor locator tabs as shown.
- 20.6.6 Check the operation of the heater. See Section 15.

20.7 IGNITION/DETECTION ELECTRODE

- 20.7.1 Refer to paragraph 19.5
- 20.7.2 Remove the 2 screws holding the ignition electrode to the combustion chamber.
- 20.7.3 Remove the electrode.
- 20.7.4 Check dimensions as shown. Fit the new ignition electrode, using the new gasket supplied.
- 20.7.5 Refit in reverse order.
- 20.7.6 Check the operation of the heater. See Section 15

20.8 GAS VALVE

- 20.8.1 Refer to paragraph 19.5 & 19.10.
- 20.8.2 Unplug the electrical lead and pressure differential tube connection from the gas control valve.
- 20.8.3 Undo the union nut on the outlet of the gas control valve, rotate out of the way.
- 20.8.4 Undo the gas inlet pipe union at the inlet to the gas control valve.
- 20.8.5 Remove screws retaining the valve to the diaphragm and lift the valve forwards.
- 20.8.6 Fit the new gas control valve ensuring the two sealing washers are in place and reconnect gas and electrical connections.
- 20.8.7 Check operation of the heater. See Section 15.

20.9 WARM AIR PCB

- 20.9.1 Refer to paragraph 19.5
- 20.9.2 Remove the PCB cover.
- 20.9.3 Disconnect the wiring at the PCB terminal block.
- 20.9.4 Release the 4 clips securing the PCB and withdraw the panel.
- 20.9.5 Replacement and refit is in reverse order.

20.10 PCB INTERFACE

- 20.10.1 Refer to paragraph 19.5
- 20.10.2 Remove the PCB box cover.
- 20.10.3 Unplug all lead connections to the PCB assembly
- 20.10.4 Disconnect all the wires.
- 20.10.5 Release the 4 corner clips securing the PCB and withdraw the panel.
- 20.10.6 Fit new PCB and reconnect all plug and wire connections.
- 20.10.7 Check operation of the heater. See Section 15.



FIGURE 33. BURNER ASSEMBLY

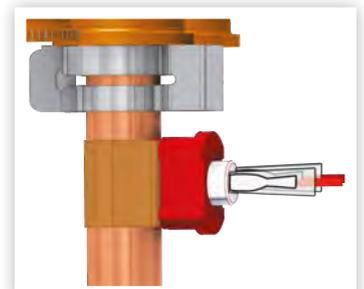


FIGURE 34. THERMISTOR SENSOR

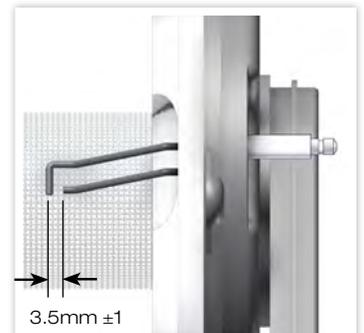


FIGURE 35. ELECTRODE GAP



FIGURE 36. GAS VALVE

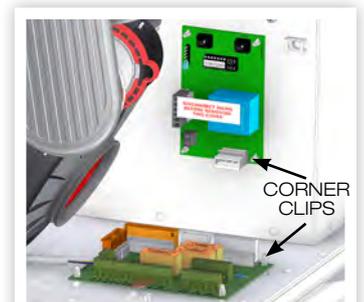


FIGURE 37. PCB INTERFACE

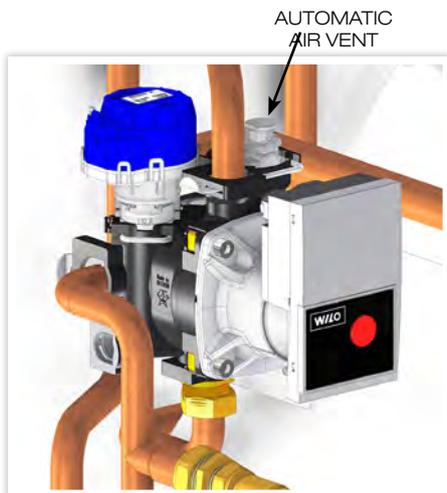


FIGURE 38. PUMP/DIVERTER ASSEMBLY

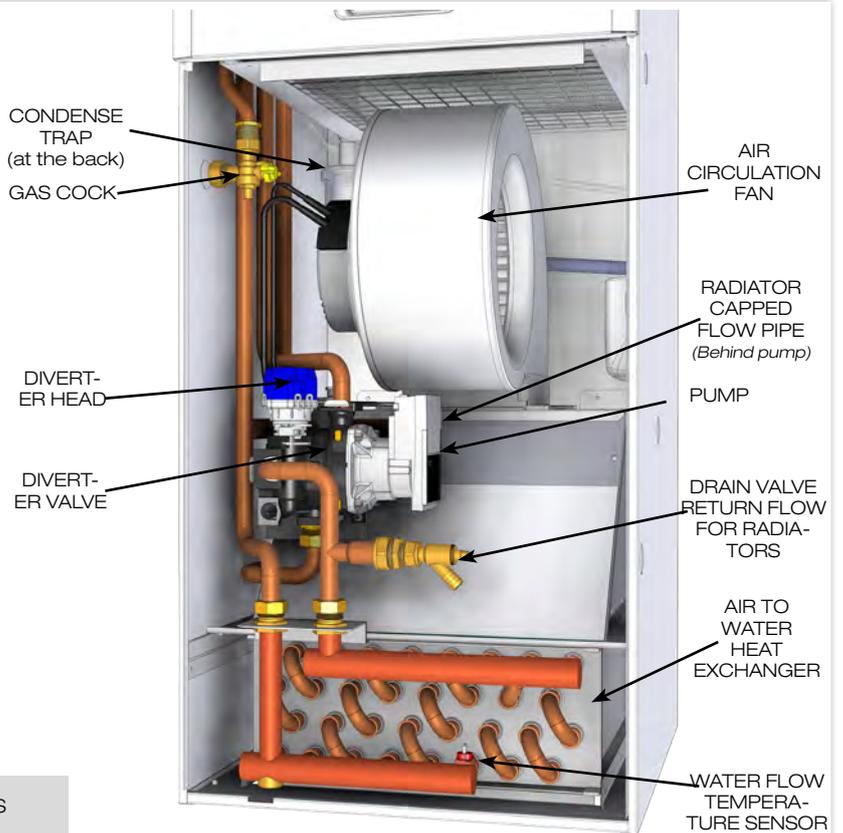


FIGURE 39. AIR WATER HEATER COMPONENTS

20.11 AIR CIRCULATION FAN

Refer to paragraph 19.10.

- 20.11.1 Disconnect the 2 inline connectors on the fan assembly.
- 20.11.2 Release the screws securing the fan and withdraw.
- 20.11.3 Replace and refit in reverse order.

20.12 CONDENSATE PUMP

Refer to paragraph 19.10

- 20.12.1 Disconnect the mains
- 20.12.2 Disconnect the condensate pipes
- 20.12.3 Unscrew the 2 screws on the bracket and slide the condense pump out.
- 20.12.4 Be careful as this will contain water.
- 20.12.5 Replace and refit in reverse order.

20.13 CONDENSATE TRAP

Refer to paragraph 19.10

- 20.13.1 Pull off the rubber pipe noting the position.
- 20.13.2 Unscrew the top pipe from the trap.
- 20.13.3 Unclip the trap and replace.
- 20.13.4 Refit in reverse order.

20.14 DIVERTER ACTUATOR HEAD

Refer to paragraph 19.10

- 20.14.1 Unplug the electrical connections.
- 20.14.2 Pull out the retaining clip and lift diverter head from body of the valve.
- 20.14.3 Replace and refit in reverse order.
- 20.14.4 Check the operation of the appliance.

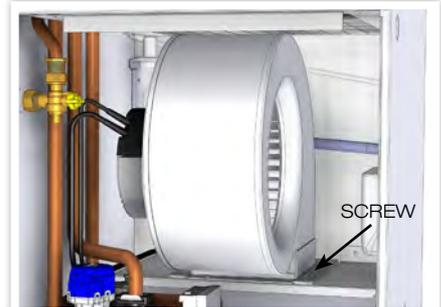


FIGURE 40. AIR CIRCULATION FAN



FIGURE 41. CONDENSATE PUMP & TRAP



FIGURE 42. DIVERTER HEAD REMOVAL

PART REPLACEMENTS BY DRAINING THE SYSTEM

20.15 DRAINING THE APPLIANCE

- 20.15.1 To drain the appliance, attach a length of hose to the drain point then open the drain valve.
- 20.15.2 Replace the necessary component.
- 20.15.3 After replacement close the drain valve and open all isolation valves and refill the system.
- 20.15.4 Ensure that all air locks are expelled, and check for water soundness.

20.16 PUMP HEAD

Refer to paragraph 19.10. Drain appliance. See section 20.15.

- 20.16.1 Disconnect the electrical lead from the pump head.
- 20.16.2 Remove the 4 Allen screws securing the pump head and remove.
- 20.16.3 The Red Dial on the pump head is set to maximum
- 20.16.4 Replace and refit in reverse order.
- 20.16.5 Refill and check operation of the appliance.

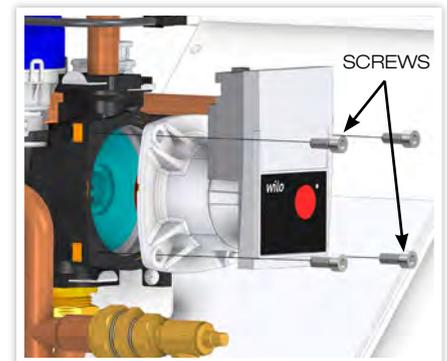


FIGURE 43.
PUMP HEAD REMOVAL

20.17 DIVERTER CARTRIDGE

Refer to paragraph 19.10 Drain appliance. See section 20.15.

- 20.17.1 Remove the diverter head.
- 20.17.2 Pull out the retaining clip and lift out the mechanism.
- 20.17.3 Replace and refit in reverse order.
- 20.17.4 Refill and check operation of the appliance.

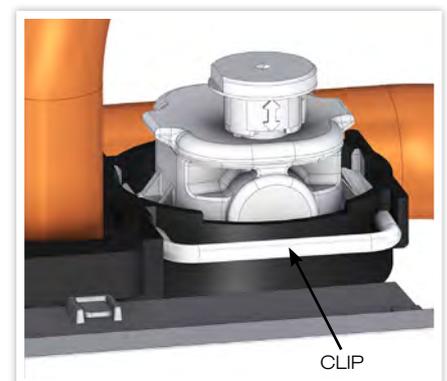


FIGURE 44.
AUTOMATIC AIR VENT REMOVAL

20.18 AUTOMATIC AIR VENT

Refer to paragraph 19.10 Drain appliance See section 20.15.

- 20.18.1 Remove the air vent head clip and lift upwards
- 20.18.2 Replace and refit in reverse order.
- 20.18.3 Refill and a check operation of the appliance.

20.19 AIR HEAT EXCHANGER

Refer to paragraph 19.10 Drain appliance. See section 20.15.

- 20.19.1 Disconnect the water flow temperature sensor.
- 20.19.2 Release the flow and return pipe nuts to loosen off the pipe.
- 20.19.3 Release the clip and remove the heat exchanger by sliding it forward.

NOTE: There will still be water in the heat exchanger.

- 20.19.4 Replacement and refit in reverse order.
- 20.19.5 Refill and check operation of the appliance.

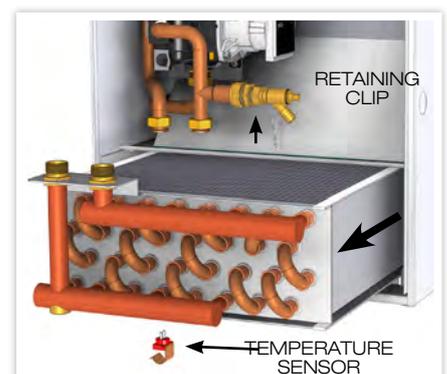
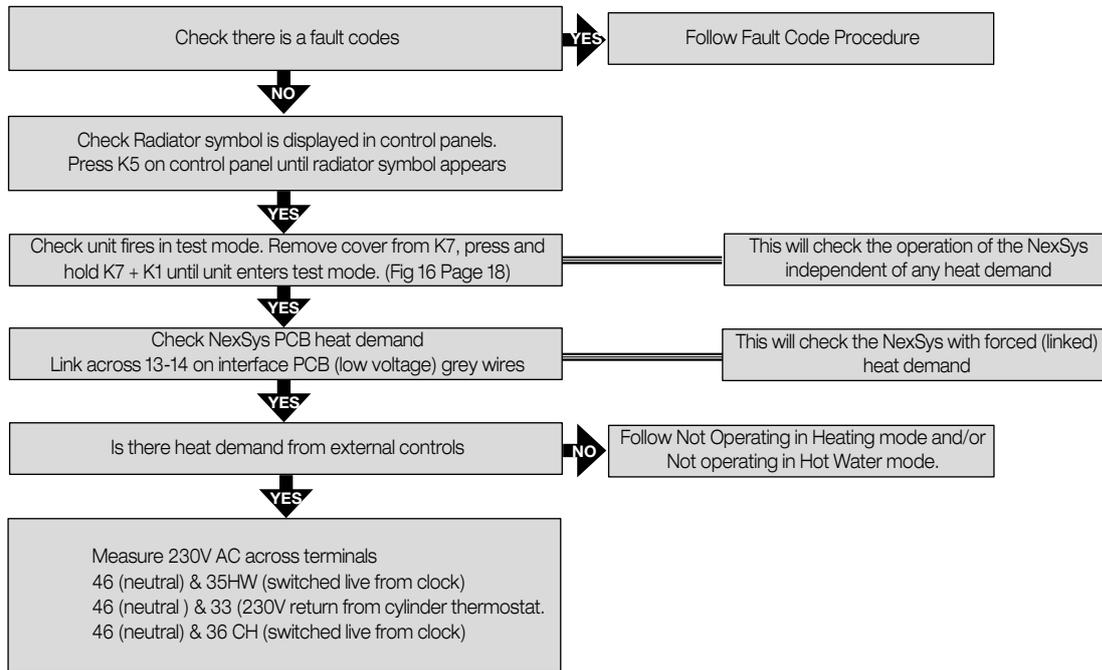


FIGURE 45.
AIR TO WATER HEAT EXCHANGER
REMOVAL

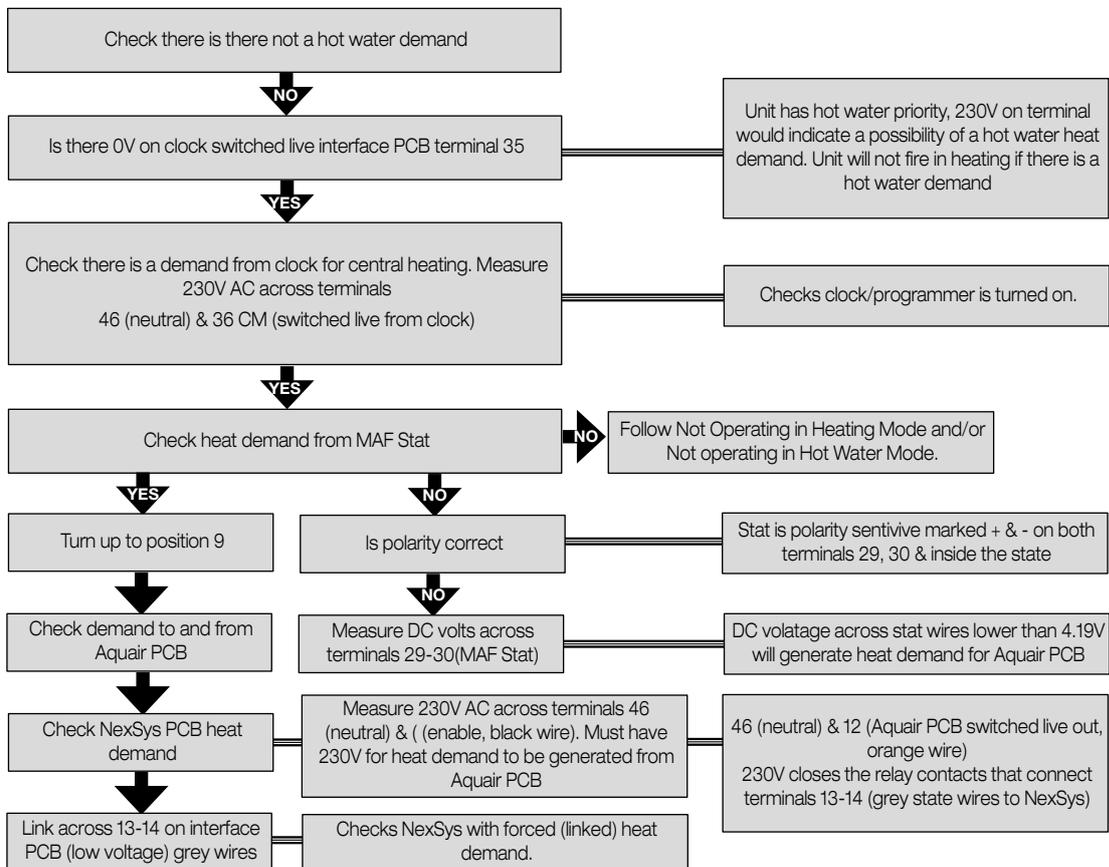
21. FAULT FINDING FLOWCHARTS & BLOCKING CODES

Should a fault occur, the boiler will shut down and these error codes will be displayed.

UNIT DOES NOT FIRE

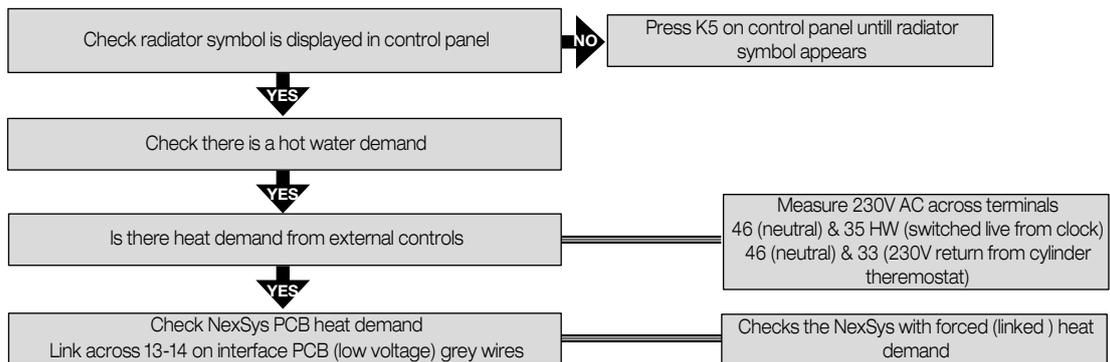


NOT OPERATING IN HEATING MODE

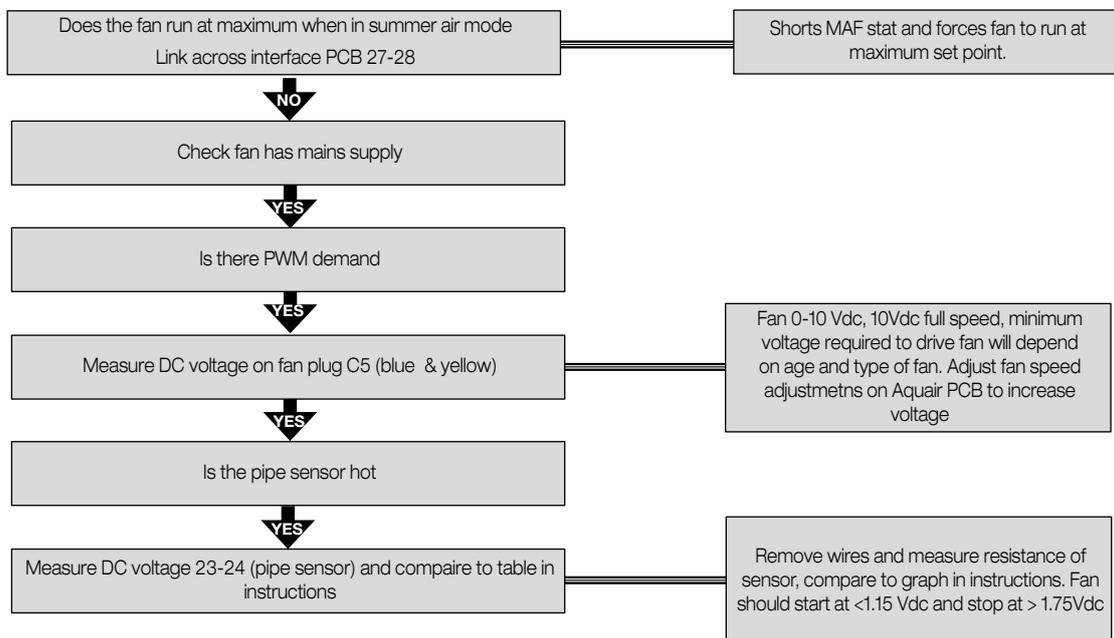


FAULT FINDING.

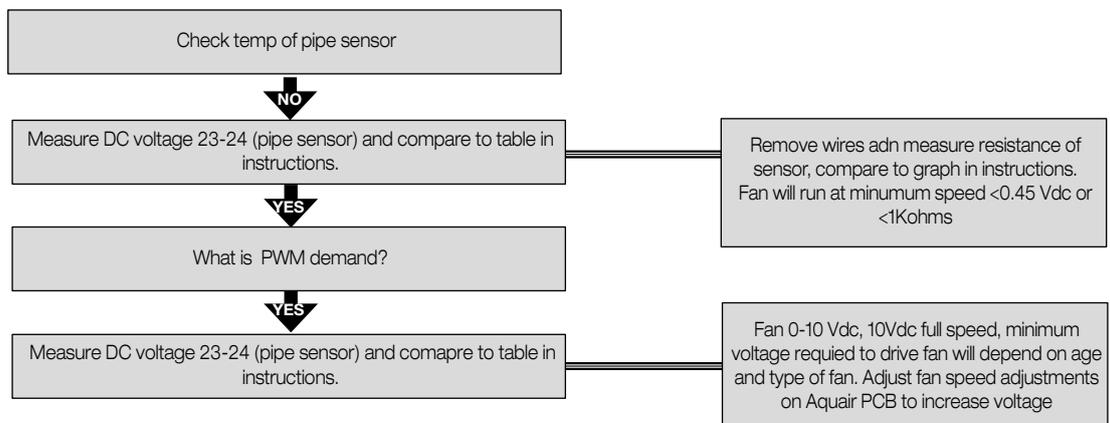
NOT OPERATING IN HOT WATER MODE



CIRCULATING FAN NOT WORKING

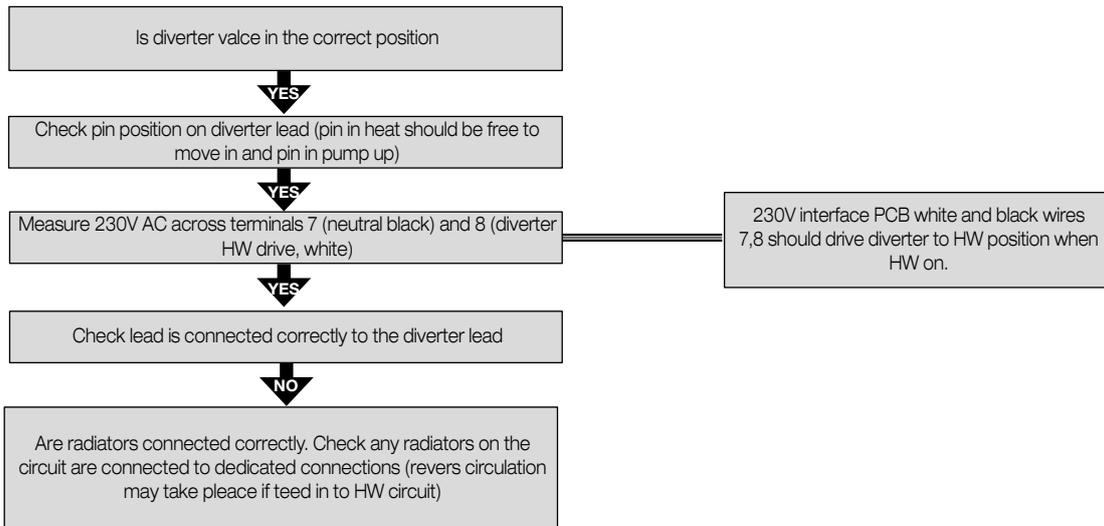


CIRCULATING FAN DROPPING UNEXPECTEDLY TO MINIMUM SPEED.

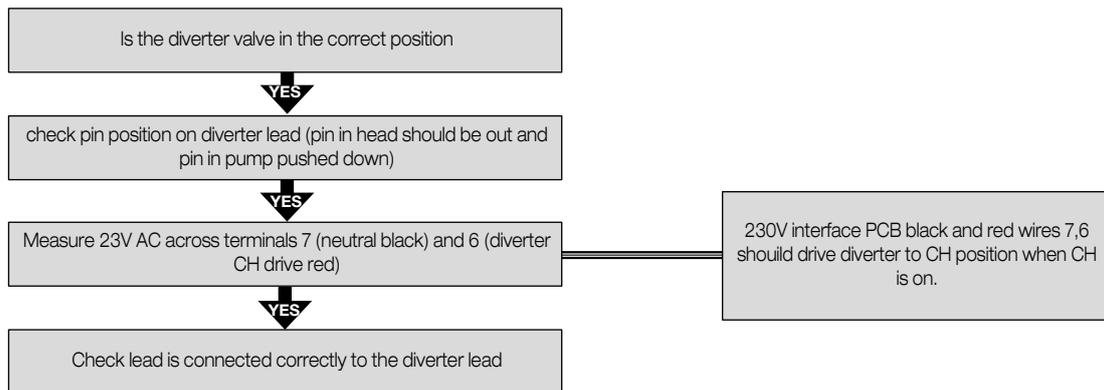


FAULT FINDING.

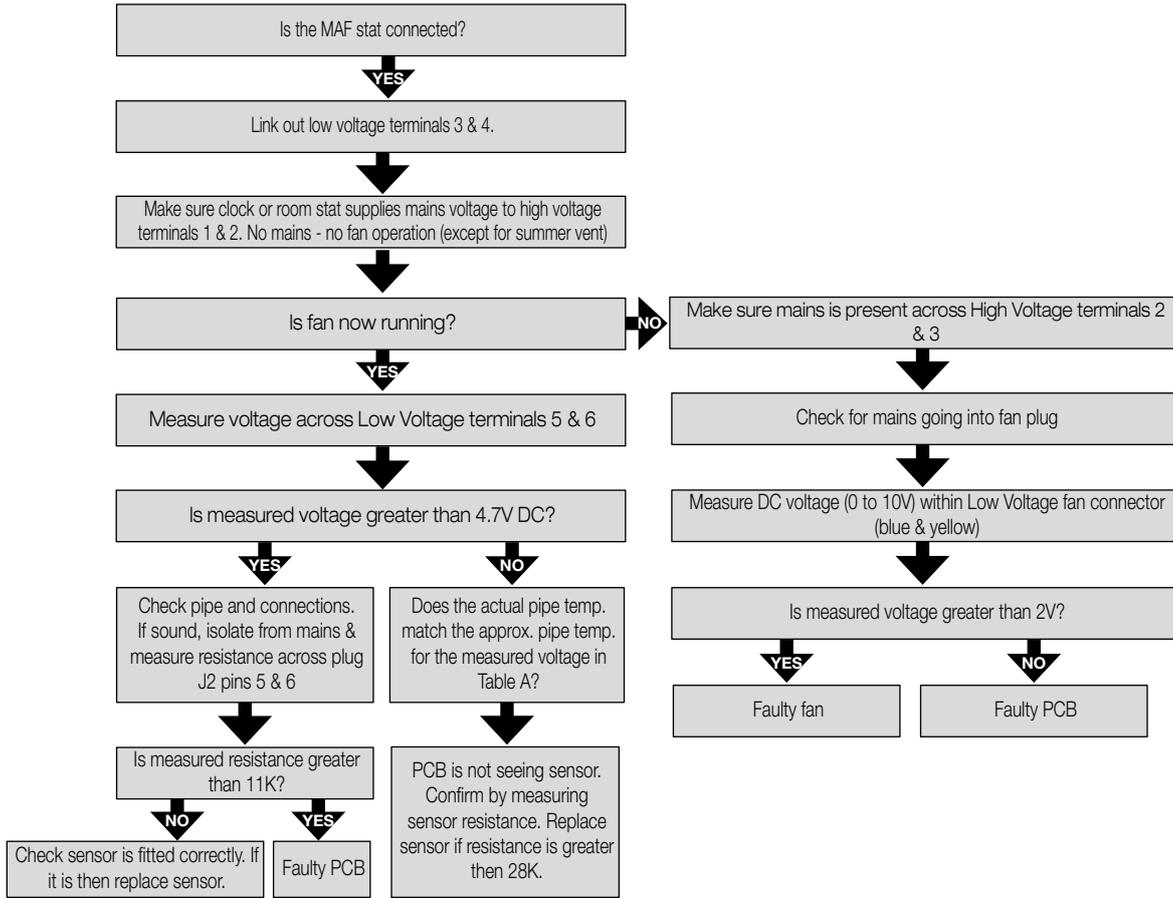
HEATING COMES ON IN HOT WATER DEMAND



HOT WATER COMES ON IN CENTRAL HEATING MODE



FAN NOT OPERATING WHEN PIPE IS ABOVE 60°C

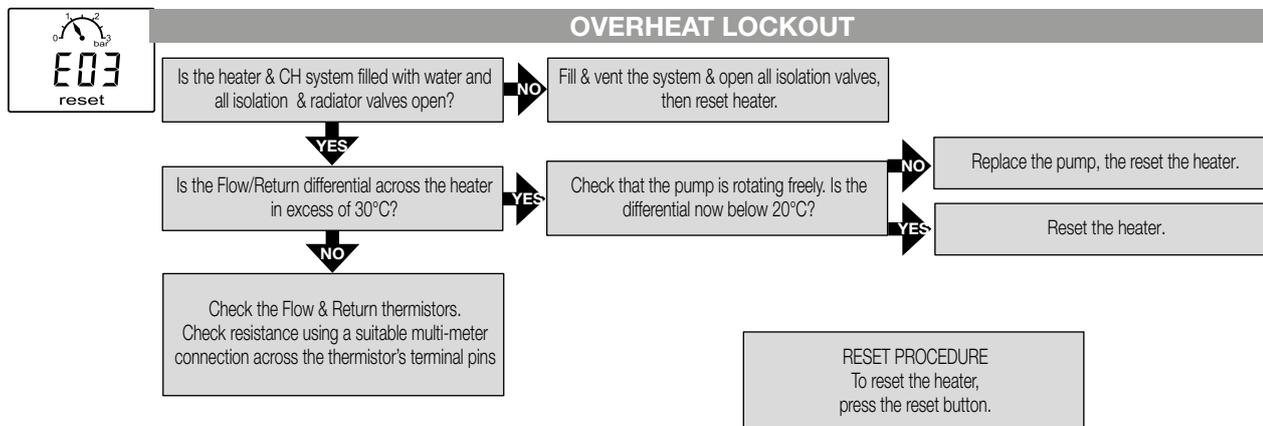
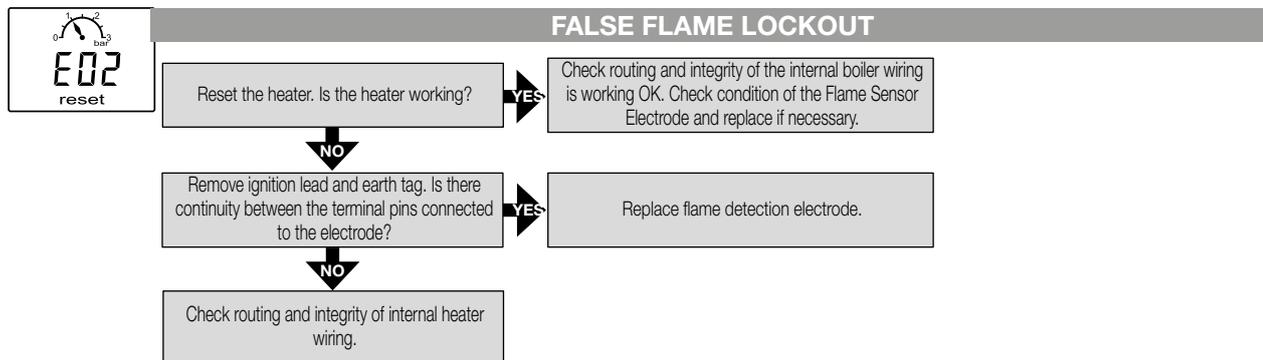
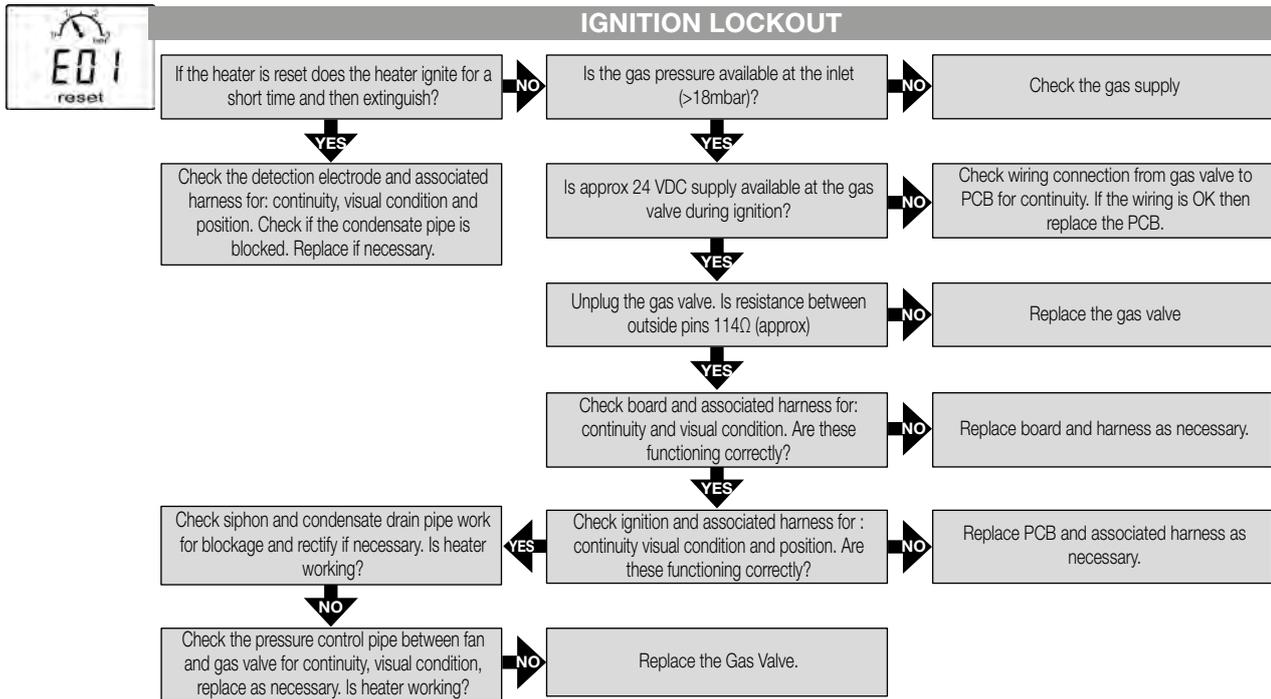


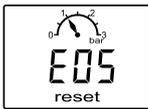
DC VOLTAGE ACROSS PIPE SENSOR	APPROX. PIPE TEMP. °C	DC VOLTAGE ACROSS PIPE SENSOR	APPROX. PIPE TEMP. °C	DC VOLTAGE ACROSS PIPE SENSOR	APPROX. PIPE TEMP. °C	DC VOLTAGE ACROSS PIPE SENSOR	APPROX. PIPE TEMP. °C
3.24	10	2.13	33	1.26	56	0.73	79
3.19	11	2.08	34	1.23	57	0.71	80
3.14	12	2.04	35	1.20	58	0.70	81
3.09	13	1.99	36	1.17	59	0.68	82
3.04	14	1.95	37	1.15	60	0.66	83
2.99	15	1.91	38	1.12	61	0.65	84
2.94	16	1.87	39	1.09	62	0.63	85
2.89	17	1.83	40	1.07	63	0.63	86
2.84	18	1.79	41	1.04	64	0.60	87
2.79	19	1.75	42	1.02	65	0.59	88
2.75	20	1.71	43	0.99	66	0.58	89
2.70	21	1.67	44	0.97	67	0.56	90
2.65	22	1.63	45	0.95	68	0.55	91
2.60	23	1.59	46	0.92	69	0.54	92
2.55	24	1.56	47	0.90	70	0.53	93
2.50	25	1.52	48	0.88	71	0.51	94
2.45	26	1.49	49	0.86	72	0.50	95
2.40	27	1.45	50	0.84	73	0.49	96
2.36	28	1.42	51	0.82	74	0.48	97
2.31	29	1.39	52	0.80	75	0.47	98
2.26	30	1.35	53	0.78	76	0.46	99
2.22	31	1.32	54	0.76	77	0.45	100
2.17	32	1.29	55	0.75	78		

TABLE 4

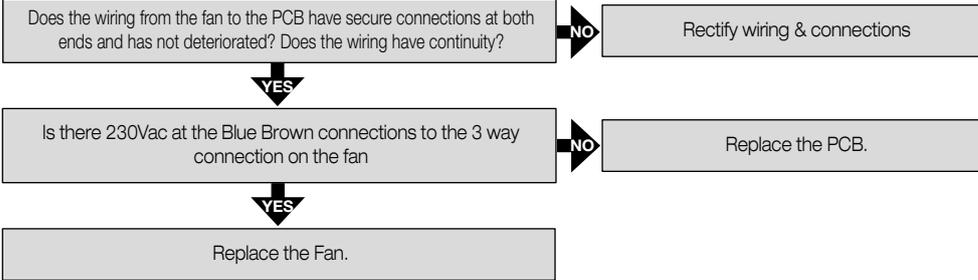
HOT WATER FAULT FINDING - BLOCKING CODES

Should a fault occur, the heater will shut down and these blocking codes will be displayed.





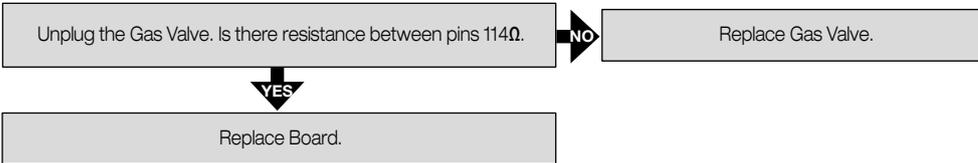
FAN FAULT



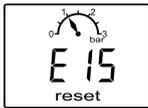
FLAME CIRCUIT FAILURE



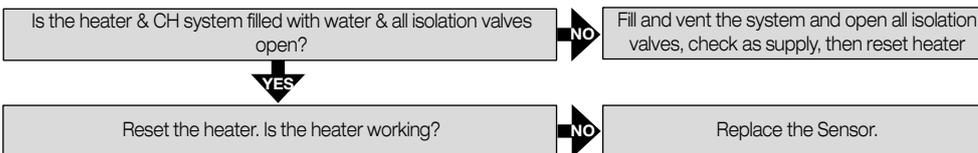
VALVE FEED BACK ERROR



EEPROM LOCKOUT

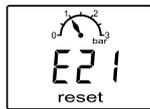


FLOW/RETURN SENSOR DRIFT ERROR



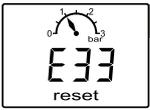
SENSOR STUCK LOCKOUT





ADC LOCKOUT

Replace the PCB.



RETURN THERMISTOR FAULT

Remove the return thermistor from the CH return pipe and disconnect the wires. Check the resistance using a suitable multi-meter connected across the thermistor's terminal pins. Is the thermistor valve correct?

NO

Fit a new Thermistor.

YES

Is the wiring securely connected to the low voltage 9 way connector X5 on the PCB?

NO

Check and replace wiring as necessary.

YES

Replace the PCB.



FLOW THERMISTOR FAULT

Is the wiring securely connected to the Flow thermistor?

NO

Securely connect the wiring to the flow Thermistor.

YES

Disconnect the wiring from the Flow Thermistor. Check the resistance using a suitable multi-meter connected across the Thermistor's terminal pins. Is the Thermistor value correct?

NO

Fit new Thermistor.

YES

Is the wiring securely connected to the low voltage 9 way connector X5 on the PCB?

NO

Check & replace as necessary.

YES

Replace the PCB.

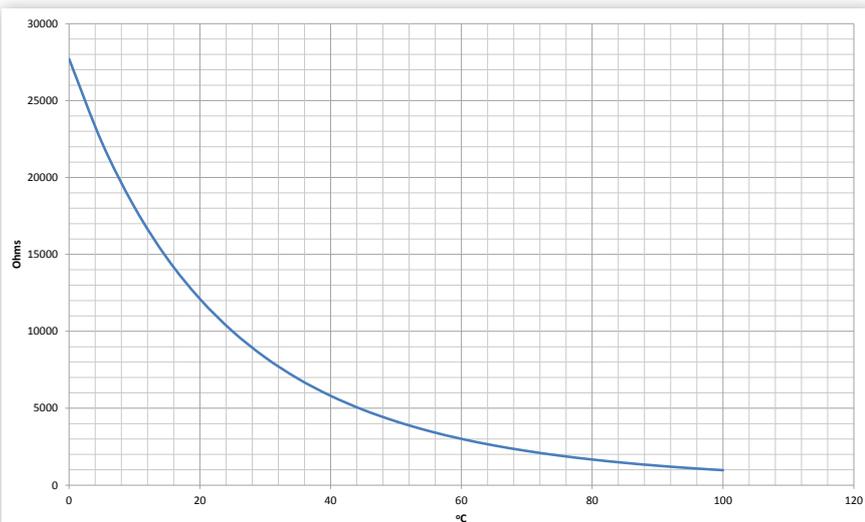


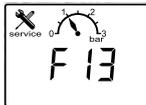
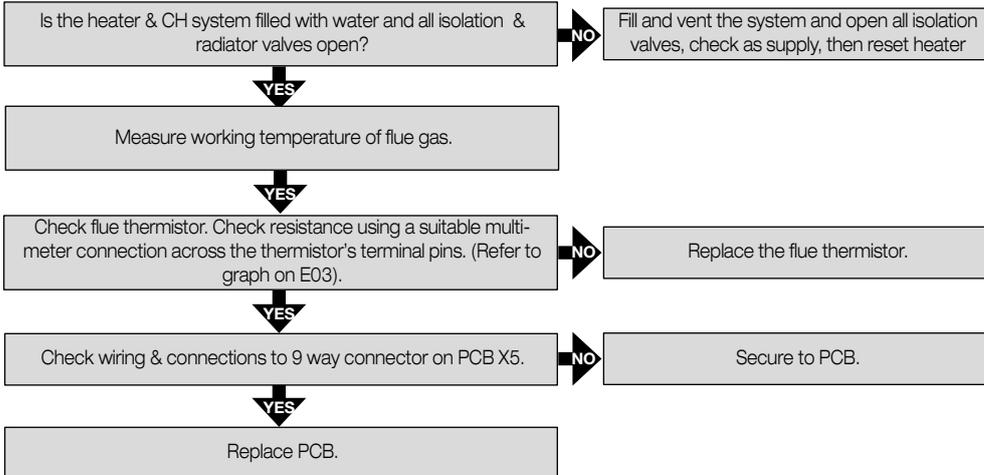
FIGURE 46. SENSOR TEMPERATURE/RESISTANCE DIAGRAM

BLOCKING CODES

Should a fault occur, the boiler will shut down and these blocking codes will be displayed.

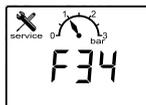


EXHAUST GAS TEMPERATURE TOO HIGH

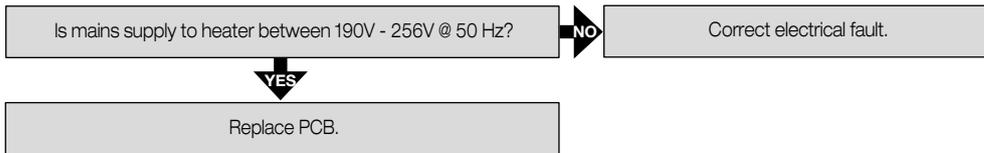


REMOTE RESET LOCKOUT

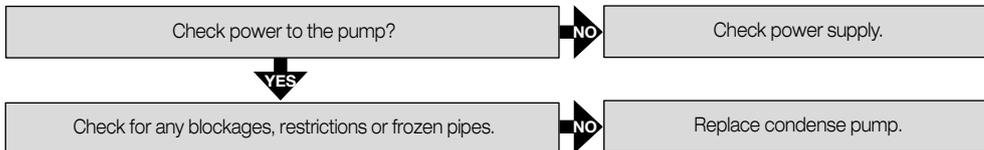
Turn power on and off, reset heater. The heater will correct original lockout error.



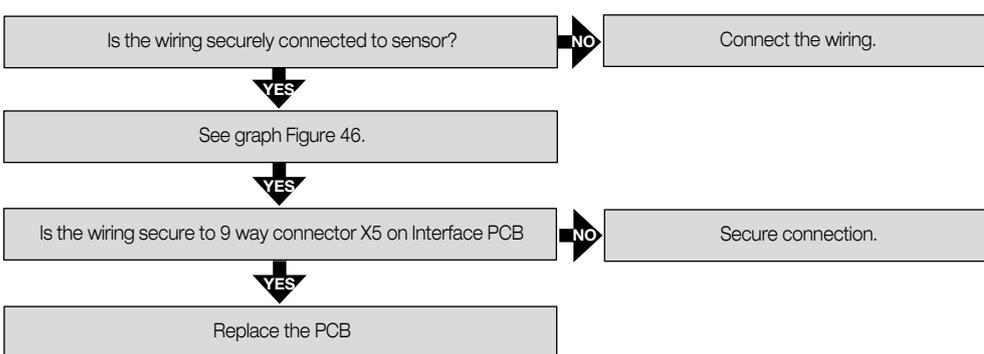
LOW POWER SUPPLY FROM MAINS



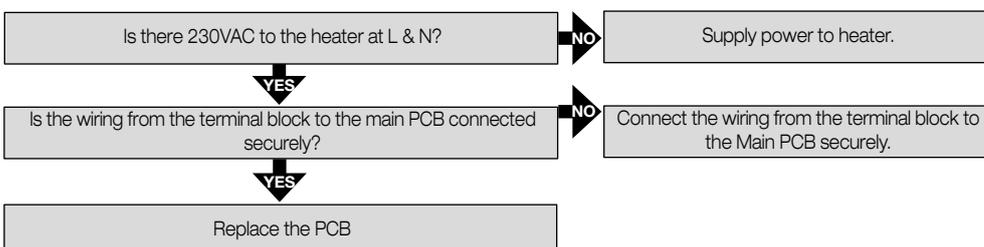
CONDENSATE PUMP SAFETY FLOAT SWITCH



FLUE TEMPERATURE SENSOR LOCKOUT



NO DISPLAY



22. FUNCTIONAL WIRING DIAGRAMS

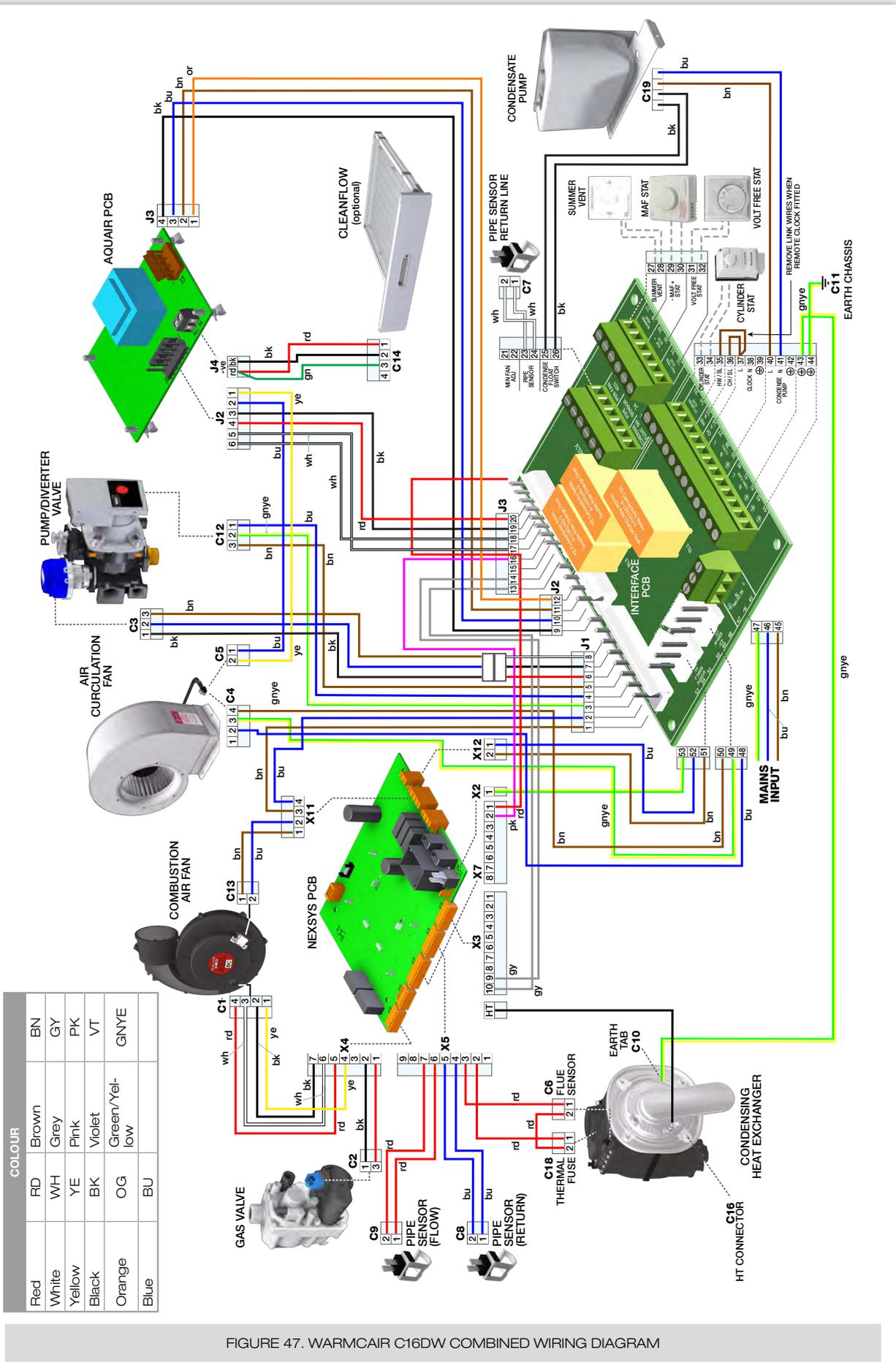


FIGURE 47. WARMCAIR C16DW COMBINED WIRING DIAGRAM

23. DIMENSIONS

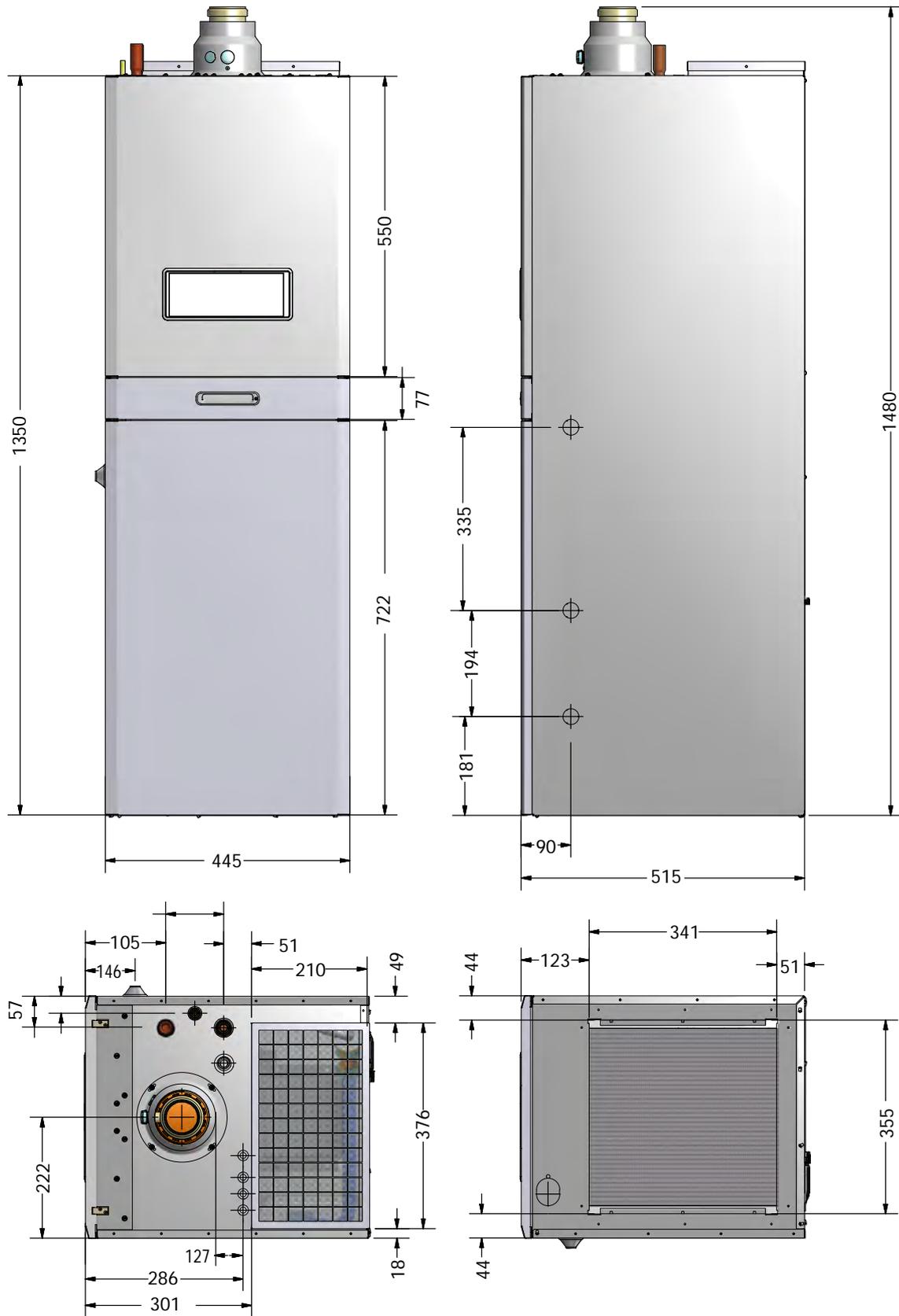


FIGURE 48. WARMCAIR C16DW COMBINED DIMENSIONS

24. SPARES DIAGRAMS

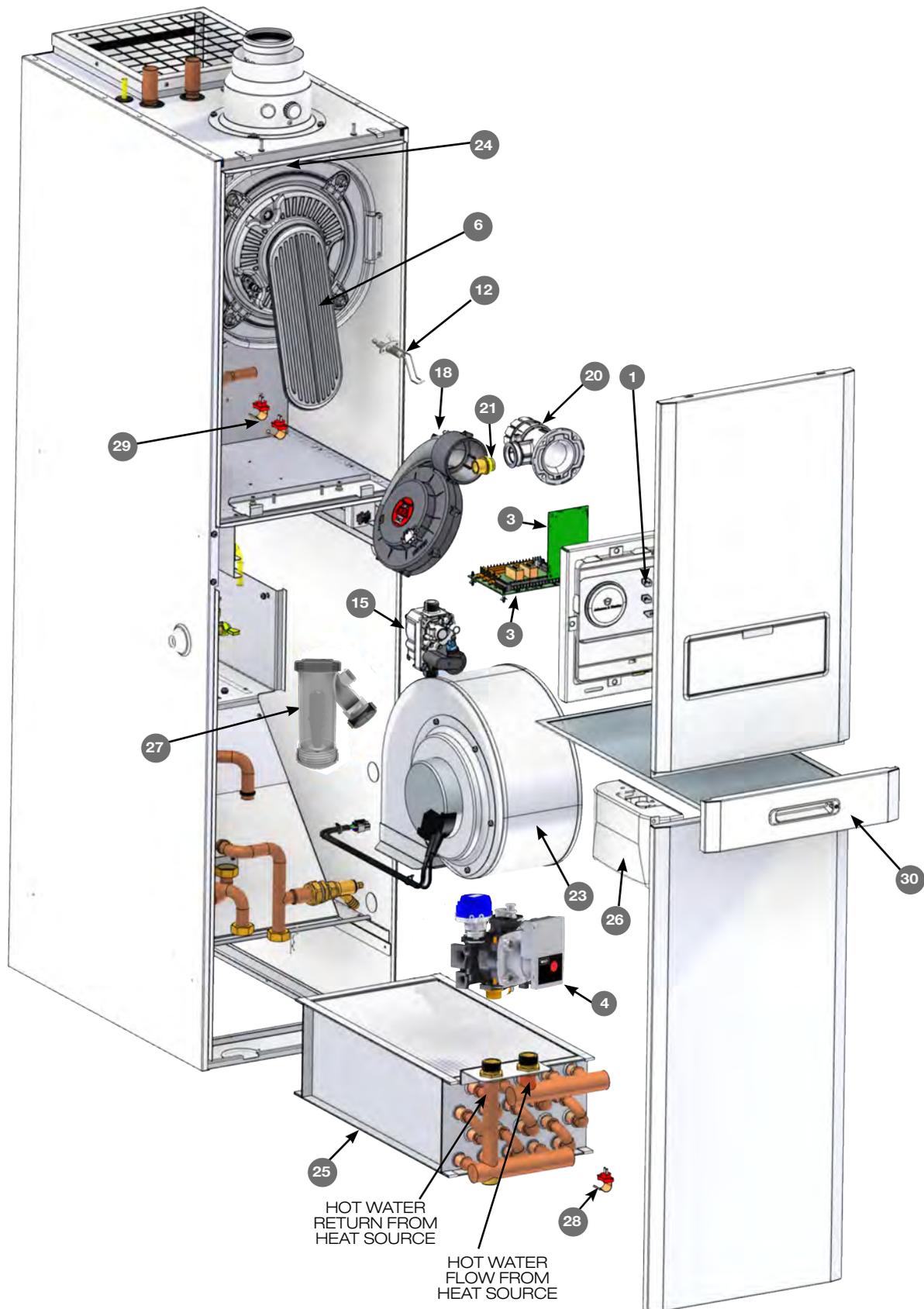
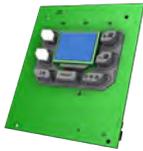
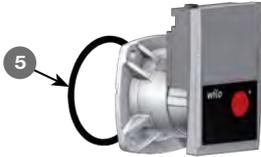
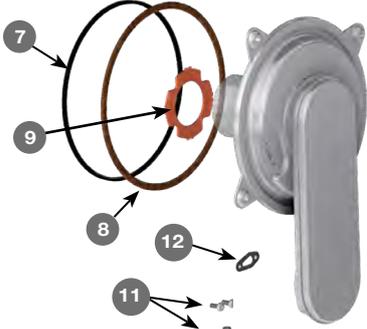
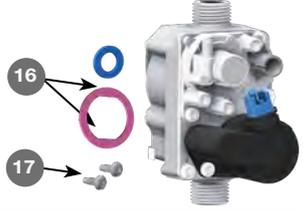
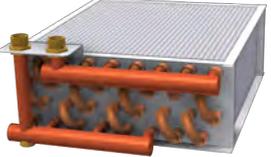


FIGURE 48. WARMCAIR C10DW COMBINED EXPLODED DIAGRAMS

25. LIST OF SPARES

ITEM	DESCRIPTION	QTY	PART No.	G. C. No.	
1	PCB Nexsys Boiler Control	1	1000-0527185	J24-704	
2	PCB Assembly (Aquair)	1	1000-0526275	J24-745	
3	PCB Interface	1	1000-0527035	J21-741	
4	PWM High Efficiency Pump Head <i>Includes 5</i>	1	1000-0531015		
5	<i>Pump Head Gasket</i>	1	1000-1508935	J21-281	
6	Burner Arm Assembly <i>Includes 7 - 11</i>	1	1000-0711815	J21-311	
7	<i>Burner Arm Fibre Seal Braid Gasket</i>	1	1000-1509000	J21-236	
8	<i>Burner Door Seal</i>	1	1000-1509860	J21-237	
9	<i>Venturi Gasket</i>	1	1000-1508630	J21-243	
10	<i>M5 Screws</i>	2	1000-3003330	J21-244	
11	<i>M5 Nuts</i>	2	1000-3003820	J21-238	
12	Ignition/Detection Electrode <i>Includes 13 & 14</i>	1	1000-0711785	J21-229	
13	<i>Electrode Gasket</i>	1	1000-2501275	H38-677	
14	<i>M4 x 8 Torx Screws</i>	2	1000-3003395	J21-240	
15	Gas Valve <i>Includes 16 & 17</i>	1	1000-0710925	J21-261	
16	<i>Sealing Washer</i>	2	1000-3004280	J21-231	
17	<i>M4 X 10 Screws</i>	2	1000-3000100		
18	Combustion Air Fan <i>Includes 19</i>	1	1000-0526415	J21-313	
19	<i>Combustion Air Fan Clip</i>	1	1000-0711745	J21-245	
20	Venturi (034) <i>Includes 9</i>	1	1000-0710785	J21-316	

ITEM	DESCRIPTION	QTY	PART No.	G. C. No.	
21	Injector (4.75) <i>Includes 22</i>	1	1000-0711135	J21-318	
22	'O' Ring	1	1000-2501860	J21-235	
23	Air Circulation Fan	1	1000-0525395	J24-684	
24	Flue Gas Sensor	1	1000-0526525	J21-253	
25	Air To Water Heat Exchanger	1	AQ16-0138005	J24-736	
26	Condensate Pump	1	1000-0023085	J24-746	
27	Condensate Trap	1	1000-0024525	J24-749	
28	Return Water Temperature Sensor <i>(water to air heat exchanger)</i>	1	1000-0526505	J24-758	
29	Flow/Return Water Temperature Sensor	1	1000-0526515	J21-334	
30	Air Filter	1	C16DW-0138005	J24-715	

26. LIST OF ANCILLARIES

WARMCAIR C16DW ANCILLARY'S			
	Description	Product Code	
1	Cleanflow Air Filter	CF16W	
2	Filter Replacement Pads (Pack of 6)	A0212X0212	
3	Return Air Kit	RAK16W	
4	Base Duct IKit	WBX16W	
5	Top Slot Fix Panel Kit	TS16W	
6	Top Slot Fix & Grille Kit	TSG16W	
7	Top Closure Kit (x 1 panel)	TC10W	
8	Top Closure Kit (x 2 panels)	TC16W	

Benchmark Commissioning & Guarantee Validation Service Record

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

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

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



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

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

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CONDENSING WARM AIR COMMISSIONING CHECKLIST AND GUARANTEE VALIDATION RECORD

Address:											
Warm Air Heater make and model:											
Warm Air Heater serial number:											
Commissioned by (PRINT NAME):						Gas Safe registration number:					
Company name:						Telephone number:					
Company email:						Company address:					
										Commissioning date:	
Heating and hot water systems complies with the appropriate Building Regulations?											Yes
Optional: Building Regulations Notification Number (if applicable)											
Time, temperature control and boiler interlock provided for central heating and hot water:											Yes
WATER QUALITY (DW Models)											
The system has been flushed, cleaned and a suitable inhibitor applied upon final fill, in accordance with BS7593 and the warm air heater manufacturers instructions.											Yes
What system cleaner was used?						Brand:			Product:		
What inhibitor was used?						Brand:			Product:		
Primary water system filter		Pre-existing		Fitted		Not required					
CENTRAL HEATING MODE measure and record (as appropriate)											
Gas rate (for combination boilers complete DHW mode gas rate)						m ³ /hr		or		ft ³ /hr	
Central heating output left at factory settings?						Yes				No	
If no, what is the maximum central heating output selected?						kW					
Dynamic gas inlet pressure						mbar					
Central heating flow temperature						°C					
Central heating return temperature						°C					
System correctly balanced/rebalanced?						Yes					
DOMESTIC HOT WATER MODE Measure and record (DW Models)											
Gas rate						m ³ /hr		or		ft ³ /hr	
Dynamic gas inlet pressure at maximum rate						mbar					
Cold water inlet temperature						°C					
Hot water has been checked at all outlets						Yes				Temperature °C	
CONDENSATE DISPOSAL											
The condensate drain has been installed in accordance with the manufacturers' instructions and / or BS5546/BS6798											Yes
Point of termination				Internal				External (only where internal termination impractical)			
Method of disposal				Gravity				Pumped			
ALL INSTALLATIONS											
Record the following		At max rate		CO ppm		CO ₂ %		CO/CO ₂ Ratio			
		At min rate (where possible)		CO ppm		CO ₂ %		CO/CO ₂ Ratio			
Where possible, has the flue integrity check been undertaken in accordance with the manufacturers' instructions and/or BS5546/BS6798 and are readings correct											Yes
The operation of the heater and system controls have been demonstrated to and understood by the customer											Yes
The manufacturers' literature, including Benchmark Checklist and Service Record, has been explained and left with the customer											Yes
Commissioning Engineer's signature											
Customer's signature (To confirm satisfactory demonstration and receipt of the manufacturers' literature)											

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SERVICE RECORD

It is recommended that your heating system is serviced regularly and that the appropriate Service Interval Record is completed.

Service Provider

Before completing the appropriate Service Record below, please ensure you have carried out the service as described in the manufacturer's instructions. Always use the manufacturer's specified spare part when replacing controls.

SERVICE 01					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 02					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 03					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 04					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 05					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 06					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 07					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 08					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 09					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 10					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

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SERVICE RECORD

It is recommended that your heating system is serviced regularly and that the appropriate Service Interval Record is completed.

Service Provider

Before completing the appropriate Service Record below, please ensure you have carried out the service as described in the manufacturer's instructions. Always use the manufacturer's specified spare part when replacing controls.

SERVICE 11					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 12					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 13					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 14					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 15					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 16					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 17					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 18					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 19					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

SERVICE 20					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record:	At max. rate:	CO	ppm	AND	CO ₂ %
	At min. rate: (Where Possible)	CO	ppm	AND	CO ₂ %
Comments:					
Signature					

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NOTES:

A large rectangular area with a dotted border, intended for writing notes.



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