

For the installer

Instructions for installation and servicing
aquaPLUS



Gas fired room sealed fan assisted
combination boiler
with integrated 15 litre **power store**

VUI 362-7

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1 List of Contents

1.1 Contents included with boiler

Ensure that all contents are included before commencing installation.

DO NOT remove the boiler from the polystyrene base at this stage.

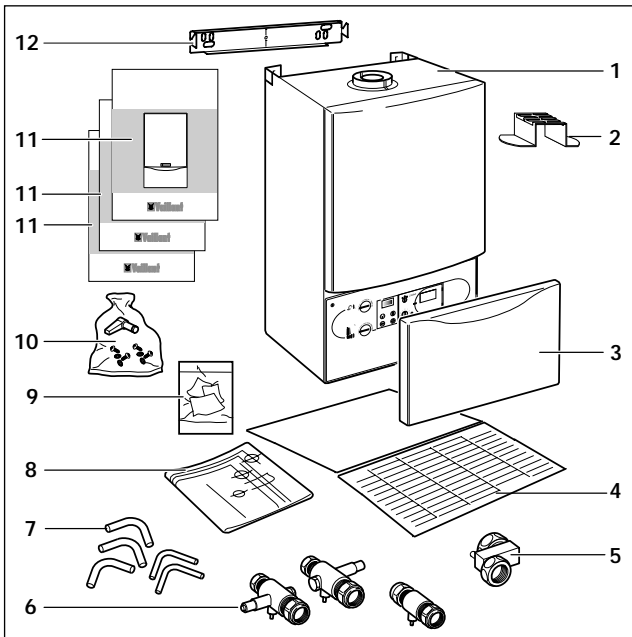


Fig. 1.1: Items supplied with unit

1.2 Installation accessories

Cold water supply pressure

If the cold water inlet pressure exceeds 6.0 bar an approved pressure reducer must be installed in the cold water inlet to the boiler, the setting of the reducer should be 4.0 bar.

Item	Quantity	Description
1	1	Boiler
2	1	Flue restriction ring
3	1	Controls cover door
4	1	Lower cover plate (packed in bottom packaging)
5	1	Cold water inlet valve
6	3	Flow and return service valve, gas service valve
7	5	Copper tails for gas and water pipework
8	1	Template
9	2	Guarantee Card and Benchmark log book
10	1	Installation and connection accessories and PRV packages incl. DHW outlet union nut
11	3	Installation and Servicing, Users and Flue Installation Instructions
12	1	Hanging bracket

Table 1.1: Items supplied with unit (aquaPLUS)

2 Introduction

2 Introduction

2.1 General Information

Note: This boiler must be installed and serviced by a competent person in accordance with the Gas Safety (Installation and Use) Regulations 1998. In the UK "CORGI" registered installers undertake the work to a safe and satisfactory standard.

aquaPLUS boiler

The aquaPLUS is a fully automatic, wall mounted, room sealed combination boiler for central heating and domestic hot water. The boiler has an integrated 15 litre stainless steel **power store** for enhanced domestic hot water delivery. Domestic hot water is supplied directly from the boiler, without requiring a copper cylinder, cold water tank, feed and expansion tank and associated pipework. Domestic hot water has priority over central heating.

The aquaPLUS boiler has an output for domestic hot water of 36.9 kW. The appliance is available in natural gas only.

aquaPLUS combination boilers incorporate a pre-heat facility that keeps the **power store** hot, providing an instantaneous delivery of domestic hot water.

The temperature in the domestic **power store** is limited by the boiler control system and it is not necessary to install a scale reducer on the cold mains to the boiler. However, in exceptionally hard water areas to prevent scale formation in the property hot water system pipework, a scale reducer may be fitted.

The heating system can be filled using the built-in filling loop contained within the boiler.

No asbestos, mercury or CFC's are included in any part of the boiler.

2.2 General Notes

The boilers have been designed for use with a sealed central heating system, and come fully tested and assembled with a built in circulating pump, expansion vessel and diverter valve. The boilers are not suitable for use on open vented systems.

The boilers are easily sited on any internal wall and can be installed with either a horizontal or vertical RSF (room sealed fan assisted) flue. Two types of flue systems are available, the standard concentric flue system (100 mm outside diameter) and a larger diameter concentric flue system (125 mm outside diameter) which allows longer flue lengths to be achieved. Flue extensions and additional bends and elbows are available for both flue systems to increase the siting flexibility.

The boilers are not suitable for external installation.

If desired, an inhibitor may be used in the system.

Guidance on the use of inhibitors is contained in these

instructions. All boilers have a built in diagnostic system which indicates the operational status of the boiler.

This feature provides key information to aid commissioning and fault finding.

2.3 Showers

Only thermostatically controlled showers must be fitted with aquaPLUS boilers to guard against the flow of water at too high a temperature and to ensure constant shower outlet water temperatures.

The data badge is fitted on the rear of the control panel.

See text of General Requirements for installation requirements or notes.



Vaillant Ltd. support the Benchmark initiative.

Within the information pack, you will find a Benchmark Log Book. It is very important that this is completed correctly at the time of installation, commissioning and handover to the user.


2.4 EC designation

aquaPLUS boilers carry the "CE" Mark. This demonstrates that the boilers fulfil the essential requirements of the Gas Appliance Directive (90/396/EEC) and the Gas Appliance (Safety) Regulations 1992.

The "CE" Mark also demonstrates that the boilers comply with the requirements of the Electromagnetic Compatibility Directive (89/336/EEC), the Low Voltage Directive (72/23/EEC), the Boiler Efficiency Directive (92/42/EEC) and the Boiler (Efficiency) Regulations 1993.

3 Boiler Specification

3.1 Technical data

aquaPLUS	VUI 362-7	Units
Maximum CH heat input (net)	35.2	kW
CH heat output range (80/60 °C)	10.5 - 32.0	kW
Maximum DHW heat input (net)	40.5	kW
DHW heat output	36.9	kW
DHW flow rate $\Delta T = 35$ °C rise (continuously)	15.1	l/min
DHW flow rate at factory set temperature rise ($\Delta T = 42$ °C)	13.7	l/min
Mains water pressure required for max. flow rate	0.7	bar
Minimum water flow rate	> 0	l/min
Mains water pressure required for min. flow rate	0.1	bar
Maximum water inlet pressure	6	bar
Inlet gas working pressure required (natural gas)	20	mbar
Gas supply (G20) Gross CV (s.t.)	37.8	MJ/m ³
Gas burner pressure max. rate	11.0	mbar
Gas burner pressure ignition rate	1.1	mbar
Gas rate max. DHW	4.3	m ³ /h
CH temperature flow range	35 - 82	°C
Minimum CH water flow (for 20 °C rise)	1375	l/h
Pump pressure available	250	mbar
Expansion vessel pre-charge pressure	0.75	bar
Maximum CH system pressure	3.0	bar
Hot-water convenience complying with EN 13203	***	-
Hot-water quantity complying with EN 13203		-
Specific hot-water quantity in 10 min ($\Delta T = 30$ K)	201	l/10 min
Perm. operating pressure on fresh-water side (PMW)	6	bar
Specific flow rate complying with EN 625 (D-value)	20.1	l/min
Weight empty/filled, approx.	56/76	kg
Primary water content	2.0	l
Electrical supply	240/50	V/Hz
External fuse	3	A
Case height	800	mm
Case width	440	mm
Case depth	497	mm

3 Boiler Specification

3.2 Boiler connections

Key:

- 1 Heating system return (22 mm tail)
- 2 Cold water connection with shut off valve (15 mm tail)
- 3 Gas connection (22 mm tail)
- 4 Hot water connection (15 mm tail)
- 5 Heating system flow (22 mm tail)
- 6 Flue outlet (100 mm flue with turret)
- 7 Hanging bracket

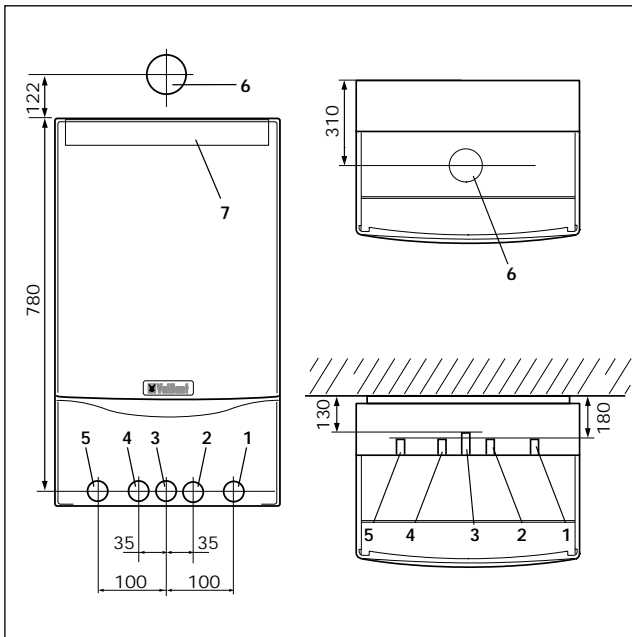


Fig. 3.1: Connection diameters

3.3 Functional Diagram

Key:

- 1 Air duct
- 2 Fan
- 3 **Power store**
- 4 Main heat exchanger
- 5 Temperature sensor (NTC I)
- 6 Temperature sensor (NTC III)
- 7 Diverter valve
- 8 DHW pressure relief valve
- 9 Temperature sensor (NTC IV)
- 10 DHW heat exchanger
- 11 DHW expansion vessel
- 12 DHW pump
- 13 Automatic bypass valve
- 14 CH flow service valve
- 15 Hot water outlet
- 16 Gas service valve
- 17 Cold water service valve
- 18 CH return service valve
- 19 Filling loop
- 20 Pressure relief valve
- 21 Aqua sensor (DHW flow switch)
- 22 Expansion vessel
- 23 Electronic box
- 24 Fully modulating automatic gas valve
- 25 Circulating pump
- 26 Automatic air vent
- 27 Modulating burner
- 28 Temperature sensor (NTC II)
- 29 Air pressure switch
- 30 Flue gas duct

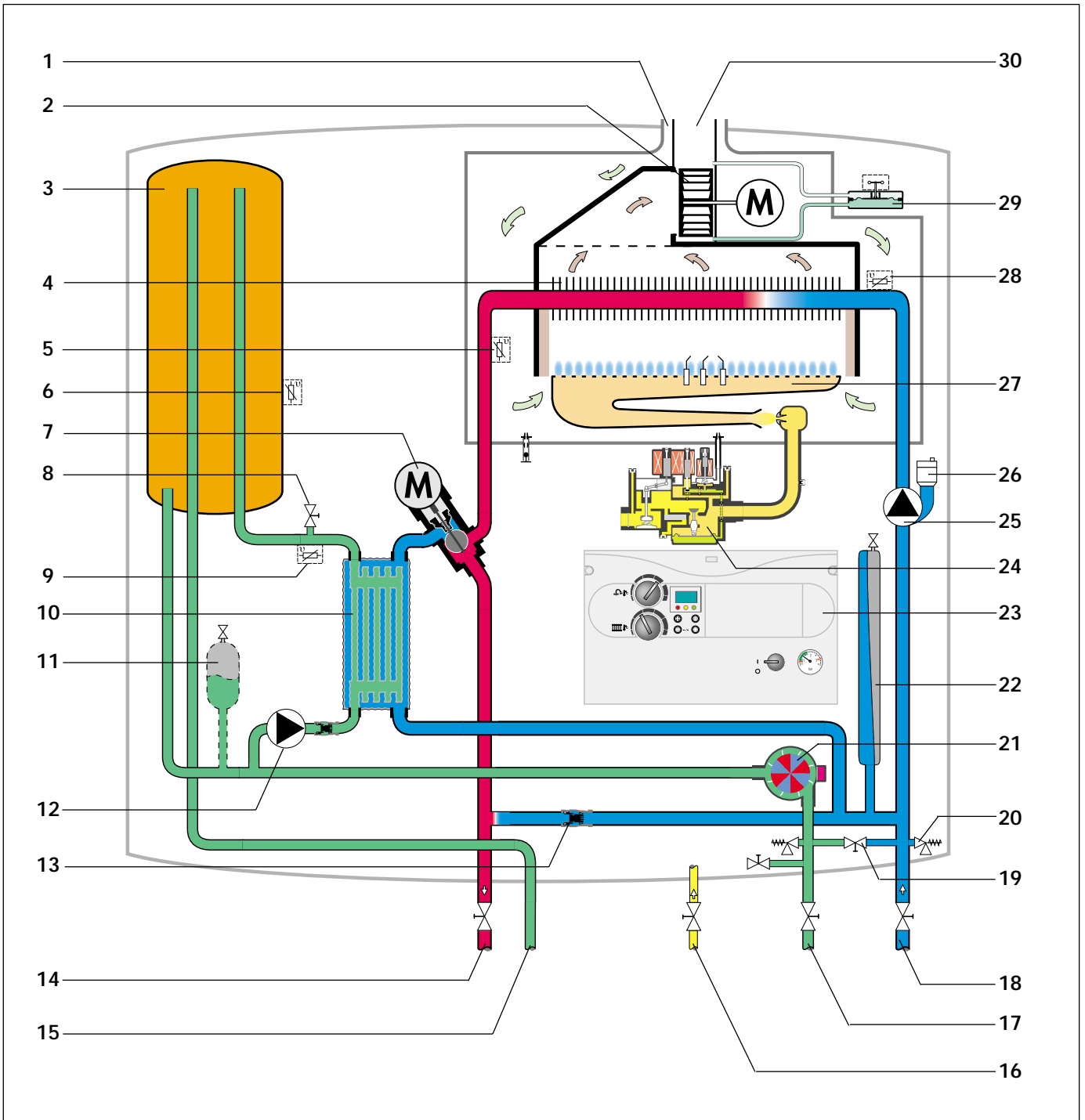


Fig. 3.2: Functional Diagram aquaPLUS

4 General Requirements

4 General Requirements

4.1 Preliminary remarks

This appliance should only be installed in conjunction with a Vaillant flue system.

Install the flue system as detailed in the separate flue installation instructions supplied with this boiler.

4.2 Related Documents

The installation of the boiler must be in accordance with the relevant requirements of Gas Safety (Installation and Use) Regulations 1998, Health and Safety Document No. 635 (The Electricity at Work Regulations 1989), BS7671 (IEE Wiring Regulations) and the Water Supply (Water Fittings) Regulations 1999, or the Water Bylaws 2000 (Scotland). It should also be in accordance with the relevant requirements of the Local Authority, Building Regulations, Building Regulations (Scotland), Building Regulations (Northern Ireland) and the relevant recommendations of the following British Standards, including current amendments to Approved Documents Part L and J:

BS 5440: Flues and ventilation of gas fired boilers not exceeding 70 kW net:

- Part 1: Flues
- Part 2: Ventilation

BS 5449: Specification for forced circulation hot water for domestic premises.

BS 5546: Specification for gas hot water supplies for domestic premises.

BS 6700: Services supplying water for domestic use within buildings and their curtilages.

BS 6798: Specification for installation of gas fired boilers not exceeding 70 kW input.

BS 6891: Specification for installation of low pressure gas pipework up to 28 mm (R1) in domestic premises (2nd family gas).

BS 7593: Treatment of water in domestic hot water central heating systems.

Institute of Gas Engineers Publication IGE/UP/7/1998: Guide for Installation in Timber Framed Housing.

Benchmark Code of Practice, Building Regulations Approved Documents Part L 2002, Part J 2002.



Important: The appliance must be installed and serviced by a competent person as stated in the Gas Safety (Installation and Use) Regulations 1998. In IE, the installation must be in accordance with the current edition of IS 813 'Domestic Gas Installations', the current Building Regulations and reference should be made to the current ETCI rules for electrical installation.

4.3 Boiler location

The location chosen for the boiler must permit the provision of a satisfactory flue termination. The location must also provide adequate space for servicing and air circulation around the boiler. The boiler may be installed in any room, although particular attention is drawn to the requirements of BS7671 (IEE Regulations) and, in Scotland, the electrical provisions of the Building Regulations (Scotland) and in IE the current edition of IS 813 and the current ETCI rules, in respect of the installation of a boiler in a room containing a bath or shower.

Note: Where a room sealed boiler is installed in a room containing a bath or shower, any electrical switch or boiler control utilising mains electricity should be so situated that it cannot be touched by a person using the bath or shower.

Where the installation of the boiler will be in an unusual location, special procedures may be necessary and BS 5546 and BS 6798 give detailed guidance on this aspect. The boiler must be mounted on a flat, vertical wall, which must be sufficiently robust to take the weight of the boiler. The boiler may be installed on a combustible wall, subject to the requirements of the Local Authorities and Building Regulations.

A compartment used to enclose the boiler must be designed and constructed specifically for this purpose. (An existing cupboard or compartment may be used provided that it is modified for the purpose). Details of essential features of cupboard/compartment design including airing cupboard installations are given in BS 6798.

If the boiler is to be fitted in a timber framed building, it should be fitted in accordance with Institute of Gas Engineers Publication IGE/UP/7/1998 "Guide for Gas Installation in Timber Framed Housing".

4.4 Gas Supply

- The gas supplier should ensure the availability of an adequate supply of gas.
- A gas meter may only be connected to the service pipe by the supplier of gas or their contractor.
- An existing meter should be checked to ensure that it is capable of passing the rate of gas supply required.
- Installation pipes should be fitted in accordance with BS 6891.
- Pipework from the meter to the boiler must be of an adequate size. Do not use pipes of a smaller size than the boiler gas connection (22 mm).
- The complete installation must be tested for soundness and purged as described in BS 6891.

4.5 Flue system

4.5.1 Top outlet flue system (100 mm outside diameter)

The top outlet horizontal flue system (Art. No. 303 807) is suitable for installations up to 720 mm measured from the centre of the boiler flue outlet to the outside face of the wall.

Flue extensions are available to extend this length up to 3.2 m.

Both 90° bends and 45° elbows are also available to increase siting flexibility.

A vertical flue system is also available (Art. No. 303 800).

Refer to flue system installation instructions for full details.

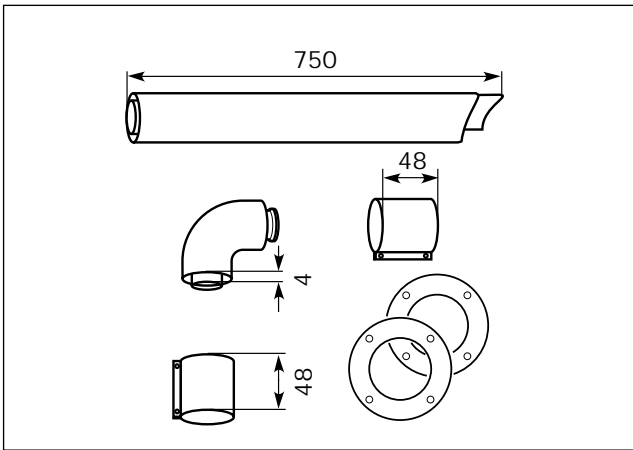


Fig. 4.1: Art.-No. 303 807

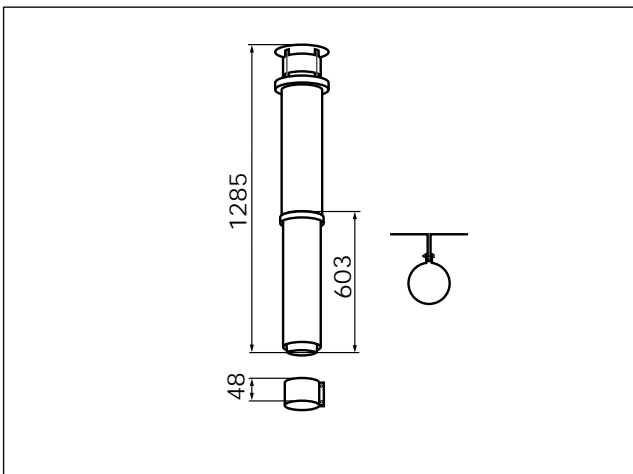


Fig. 4.2: Art.-No. 303 800

4.5.2 Extended top outlet flue system (125 mm outside diameter)

A top outlet horizontal flue system of 125 mm outside diameter is also available (Art. No. 303 609) and can be used to achieve flue lengths of 10 m.

Both 45° and 90° bends and elbows are also available to increase siting flexibility.

A vertical 125 mm concentric flue system is also available (Art. No. 303 600).

Refer to flue system installation instructions for full details.

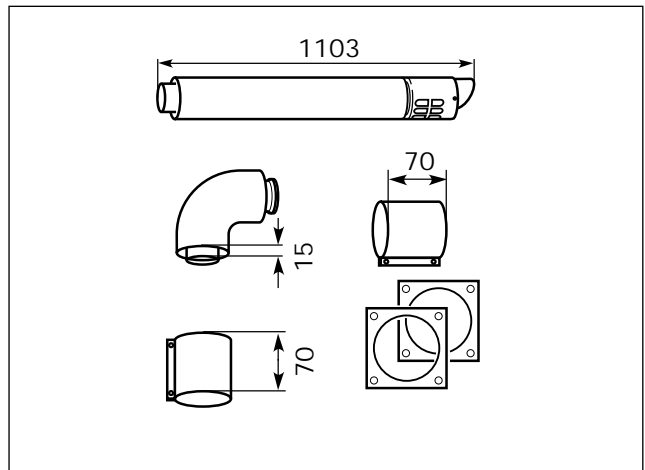


Fig. 4.3: Art.-No. 303 609

4 General Requirements

4.5.3 Flue termination

The following details refer to both flue systems.

- The terminal must be positioned such that the products of combustion can disperse freely at all times.
- In certain weather conditions a plume of water vapour may be visible from the flue terminal. Positions where this could be a nuisance should be avoided.
- If the terminal is fitted less than 2 m above a balcony, above ground or above a flat roof to which people have access then a suitable terminal guard, Model K3, must be provided and fitted (made by Tower Flue Components, Tonbridge, TN9 1TB).

Note: Vertical flues must not terminate within 600 mm of an openable window, air vent or any other ventilation opening.

The flue assembly shall be so placed or shielded as to prevent ignition or damage to any part of the building.

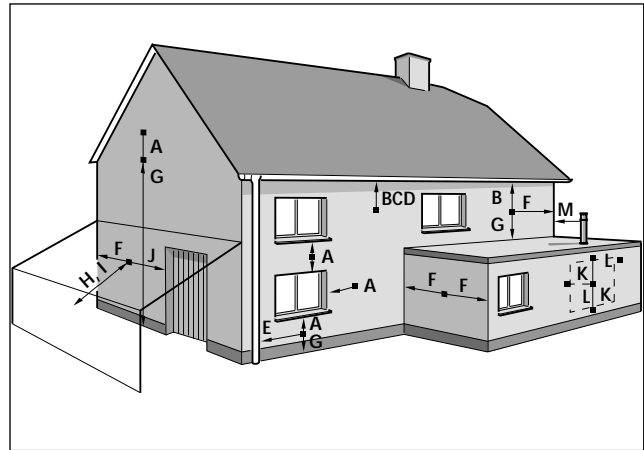


Fig. 4.4: Flue termination

	Terminal position for fan-assisted flue (minimum distance)	mm
A ¹⁾	Directly below an openable, above an opening or horizontal to an opening i.e. air brick, opening window or other, etc	300
B	Below gutters, soil pipes or drain pipes	25
C	Below eaves	25
D	Below balconies (below car port roof)	25
E	From vertical drain pipes and soil pipes	25
F	From internal or external corners	25
G	Above ground or balcony level	300
H	From a surface or boundary facing a terminal	600*
I	From a terminal facing a terminal	1200
J	From an opening in a car port (e.g. door, window) into a dwelling	1200
K	Vertically from a terminal on the same wall	1500
L	Horizontally from a terminal on the same wall	300
M	Distance from adjacent wall for vertical Flue	500

1) In addition, the terminal should not be nearer than 150 mm to an opening in the building fabric formed for the purpose of accommodating a built-in element such as a window.

* BS 5440-1 It is recommended that a fanned flue terminal should be positioned as follows: a) at least 2 m from an opening in a building directly opposite, and b) so that the products of combustion are not directed to discharge across a boundary.

4.6 Air supply

Detailed recommendations for air supply are given in BS 5440: Part 2.

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

4.7 Cupboard or compartment ventilation

The boilers are very high efficiency appliances. As a consequence the heat loss from the appliance casing during operation is very low. For cupboard or compartment installations it is therefore not necessary to provide any high or low level permanent air vents for cooling purposes.

4.8 Electrical supply

A 230 V, ~ 50 Hz single phase electricity supply fused to 3 Amp. must be provided in accordance with the latest edition of BS7671 (IEE Wiring Regulations) and any other local regulations that may apply. In IE, reference should be made to the current edition of the ETCI rules.

The method of connection to the mains electricity supply must provide a means of completely isolating the boiler and its ancillary controls. Isolation is preferably by the use of a fused three pin plug and unswitched shuttered socket outlet, both complying with the requirements of BS 1363. Alternatively, a 3 Amp. fused doublepole switch with a 3 mm contact separation on both poles may be used.

This appliance must be earthed.

4.9 Guide to system requirements

4.9.1 Water circulation system

Detailed recommendations for the water circulation system are given in BS 6798 and BS 5449: Part 1 (for small bore and micro bore central heating systems).

Pipework not forming part of the useful heating surface should be insulated to help prevent heat loss and possible freezing, particularly where pipes are run through roof spaces and ventilated underfloor spaces.

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

The boiler is suitable for use with minibore or microbore systems. Copper tubing to BS 2871: Part 1 should be used for water carrying pipework. All capillary joints in all DHW pipework must be made with lead free solder.

Particularly where a new boiler is to be fitted to an existing system, it is good practice that the system is thoroughly cleansed. This cleansing should take place prior to the fitting of the new boiler and be in accordance with BS 7593.

For advice on the application of system cleansers contact either Sentinel, Betz Dearborn Ltd. Widnes, Cheshire, WA8 8UD.

Tel: 0151 495 1861

or:

Fernox

Alpha-Fry Technologies

Tandem House

Marlow Way, Beddington Farm Road

Croydon CR0 4XS

Tel. 0870 601 5000

Fernox technical

help line 01799 550811

4.9.2 Filling and make up

The system can be filled using the built in filling loop. The connection must be removed when filling is completed. Where local Water Authority regulation does not allow temporary connection, a sealed system filler pump with break tank must be used. The heating system will not be filled automatically from the domestic hot water side.

(Alternative methods of filling sealed systems are given in BS 5449).

4.9.3 Pressure relief valve (central heating)

A pressure relief valve is provided with the boiler. This safety device is required on all sealed C.H. systems and is preset at 3 bar and provided with a 15 mm compression connection for a discharge pipe, which must be of no less than 15 mm in diameter. The Pressure Relief Valve must not be used for draining purposes.

4.9.4 Pressure relief valve (hot water)

Due to the **power store** fitted an additional hot water pressure relief valve is also incorporated in the boiler. This is provided with a 15 mm compression connection for a discharge pipe, which must be of no less than 15 mm in diameter. The pressure relief valve must not be used for draining purposes.

4.9.5 Pressure gauge

This is factory fitted to the boiler and indicates the primary circuit pressure to facilitate filling and testing.

4 General Requirements

4.9.6 Expansion vessel

The aquaPLUS incorporates a 10 litre expansion vessel which is suitable for a sealed heating system with a maximum water content of 100 litres.

If the nominal capacity of the built in expansion vessel is not sufficient for the heating system (for instance in case of modernization of old open systems) an additional expansion vessel can be installed external to the boiler. It should be fitted in the return pipe as close as possible to the boiler in accordance with BS 5449: Part 1.

Guidance on the sizing of an additional expansion vessel is given in Table 4.1.

Initial system pressure (bar)	Vessel Volume [L]	
	1.0	1.5
Pressure relief valve setting (bar)	3.0	
Total water content of system litres		
25	2.7	3.9
50	5.4	7.8
100	10.9	15.6
125	13.6	19.5
150	16.3	23.4
175	19.1	27.3
200	21.8	31.2
225	24.5	35.1
250	27.2	39.0
275	30.0	42.9
300	32.7	46.8
325	35.7	50.7
350	38.1	54.6
375	40.9	58.5
400	43.6	62.4
425	46.3	66.3
450	49.0	70.2
475	51.8	74.1
500	54.5	78.0
For system volumes other than those given above, multiply the system volume by the factor across	0.109	0.156

Table 4.1: Sizing of additional expansion vessel

4.9.7 Pump specifications

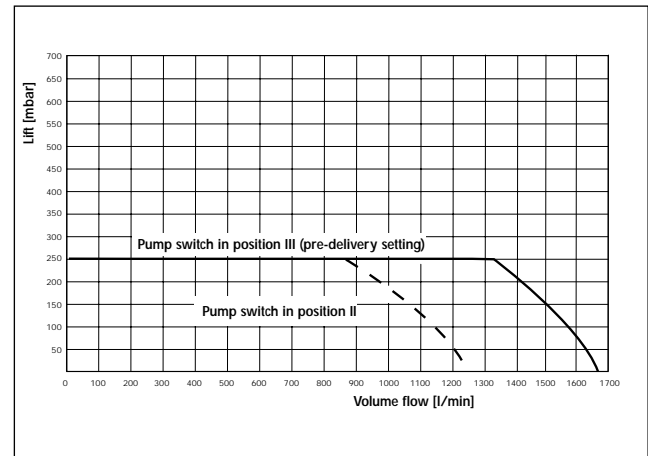


Fig. 4.5: Pump specifications

4.9.8 Circulating pump

The circulating pump is included in the boiler. The pump head available for the boiler is shown in Fig. 4.5.

4.9.9 System by-pass

An automatic system by-pass is included within the boiler. The boiler is suitable for use in systems with thermostatic radiator valves and no additional by-pass is required.

4.9.10 Venting

The boiler is fitted with an automatic air vent. Additional provision should be made to enable the heating system to be vented during filling and commissioning either by automatic air vents or manually.

5 Boiler Installation Sequence

5.1 General

5.1.1 Preparation of boiler location

Clearances required

Mount the boiler on a flat and vertical area of wall of sufficient area for the boiler plus the required clearances for installation and servicing. The clearances are as detailed below and are shown on the installation template supplied with the boiler:

- 150 mm below the boiler
- 5 mm on either side of the boiler
- 210 mm on top of the boiler
- 500 mm in front of the boiler*

* Clearance is only required to enable easier access to the boiler for servicing and may be provided by an openable door, etc.

Note: If the boiler is to be fitted in a timber framed building, it should be fitted in accordance with Institute of Gas Engineers Publication IGE/UP/7/1998 "Guide for Gas Installations in Timber Framed Dwellings".

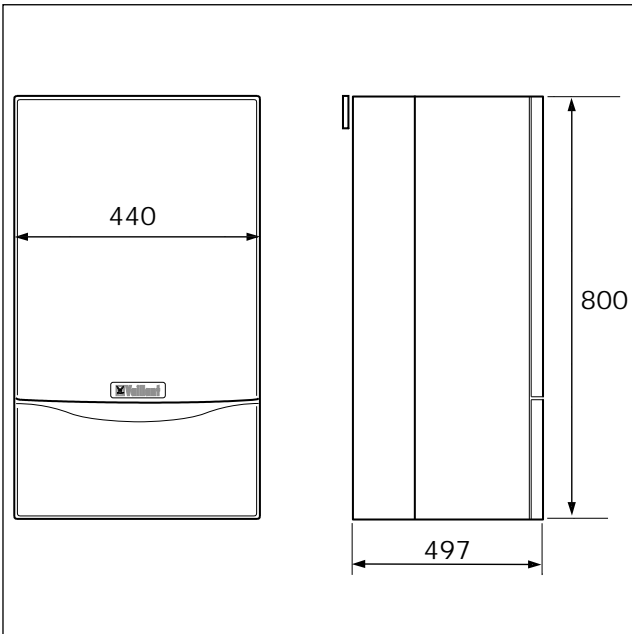


Fig. 5.1: Dimensions of boiler

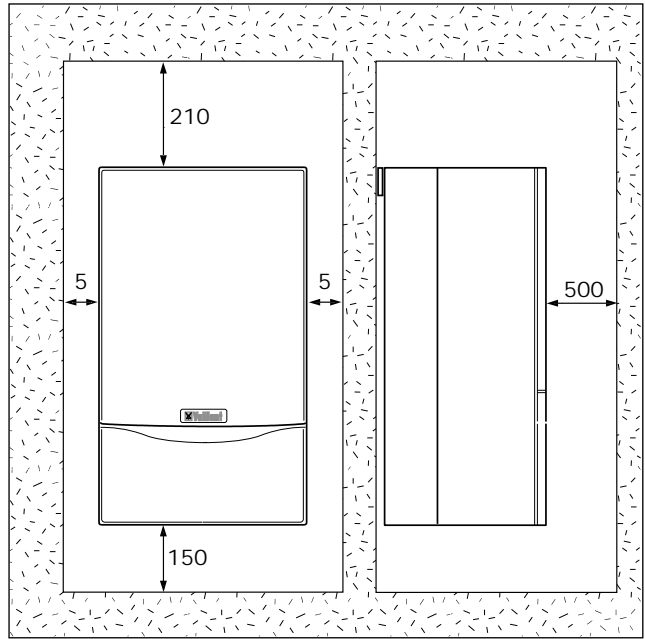


Fig. 5.2: Free space required for installation

5.1.2 Selecting position of boiler

Refer to "Boiler location" for information regarding siting the appliance. In general the boiler must be positioned such that:

- There is adequate space around the boiler for service and maintenance.
- The boiler can be correctly flued, i.e. the flue terminal position is sited in accordance with the flue termination section (see page 10) and the air/flue duct can be installed in accordance with the flue installation instructions supplied.
- All necessary pipework can be connected, including the pressure relief valves.

5 Boiler Installation Sequence

5.2 Using boiler template

Fix the paper template to the wall ensuring that the correct flue exit point has been identified, ensure that the template is vertical.

The template shows

- The position of the fixing holes for the boiler mounting bracket.
 - The position of the connections.
 - The position of the flue exit hole.
 - Upper hole (2) indicates top outlet flue with flue turret facing rearward.
- Mark the position of the hanging bracket fixing holes (1).
 - Drill 2 holes $\varnothing 10$ mm for the hanging bracket.

Note: Use alternative fixing holes where necessary.

Top outlet rear exit

Mark the centre of the selected air/flue duct and its circumference, e.g. by drilling through the template.

Other flue options

Flue instructions for other flue systems such as vertical RSF flues, flues run to the side of the boiler and the use of additional bends etc. are detailed in the flue installation instructions provided with the boiler. Remove the template from the wall and plug the drilled holes using the wallplugs supplied.

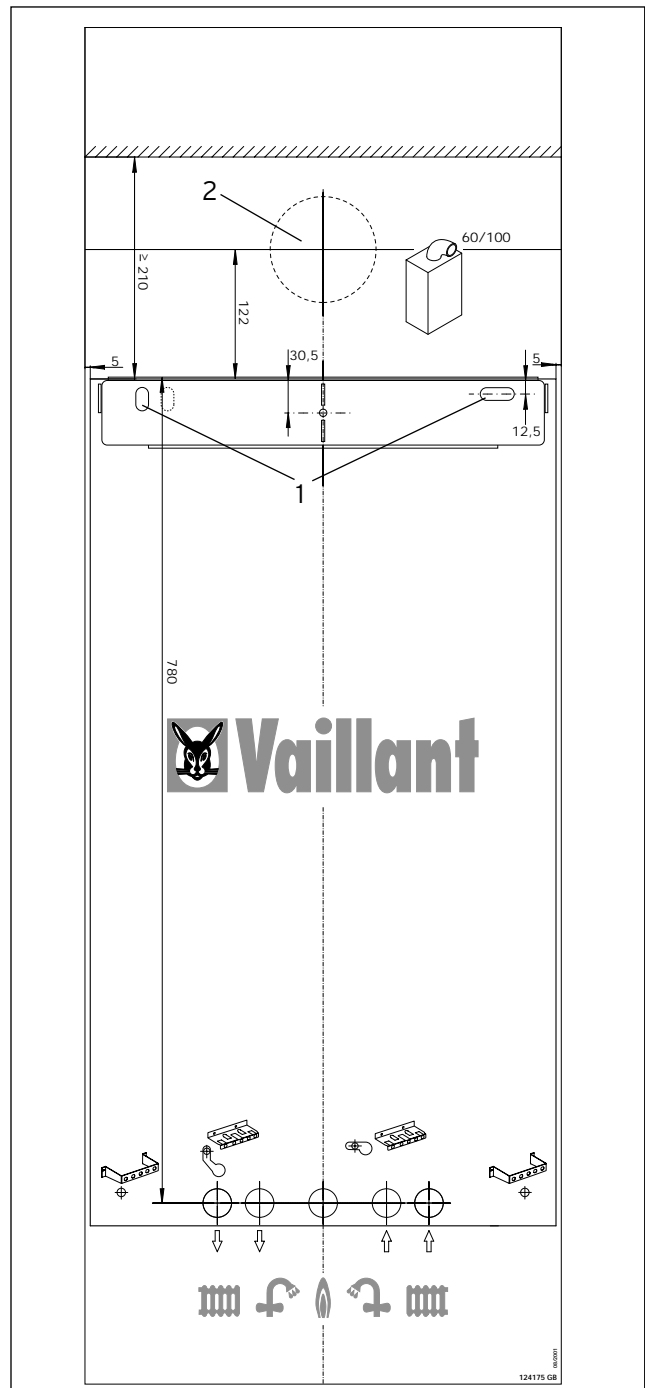


Fig. 5.3: Using Boiler template

5.3 Fitting the boiler hanging bracket

Fix the hanging bracket (2) to the wall using the fixings supplied. (it may be necessary to use additional or alternative fixings to ensure adequate support).

Note: If the boiler is to be fitted in a timber framed building ensure that the bracket is secured to a substantial part of the timber frame capable of taking the weight of the boiler.

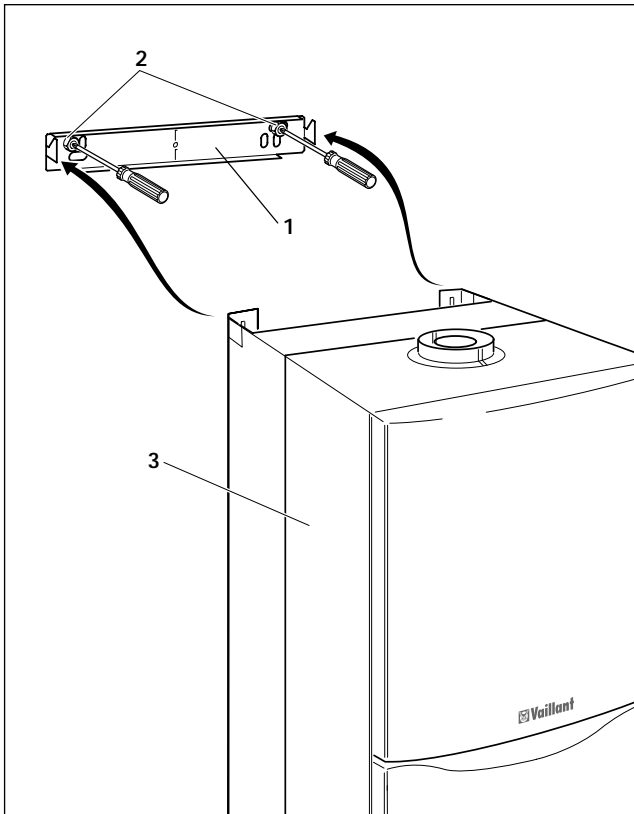


Fig. 5.4: Fitting the boiler

5.4 Install the flue system

Install the flue system (refer to separate air/flue duct installation instructions).

5.5 Fitting the boiler

- Lift the boiler (3) up to the wall so that it is slightly above the hanging bracket (1).

Note: Lift the boiler from either side at the centre of the bottom edge.

- Lower the boiler slowly onto the hanging bracket so that the slots at the rear of the boiler fully engage onto the hanging bracket (1).

5.6 Removing boiler casing

- Turn both securing fasteners (1) anti-clockwise by 90° to release control panel (2).
- Pull the case (3) forward at the bottom to disengage from the securing clips.
- Lift the case slightly to clear the top locations and pull forward to remove.

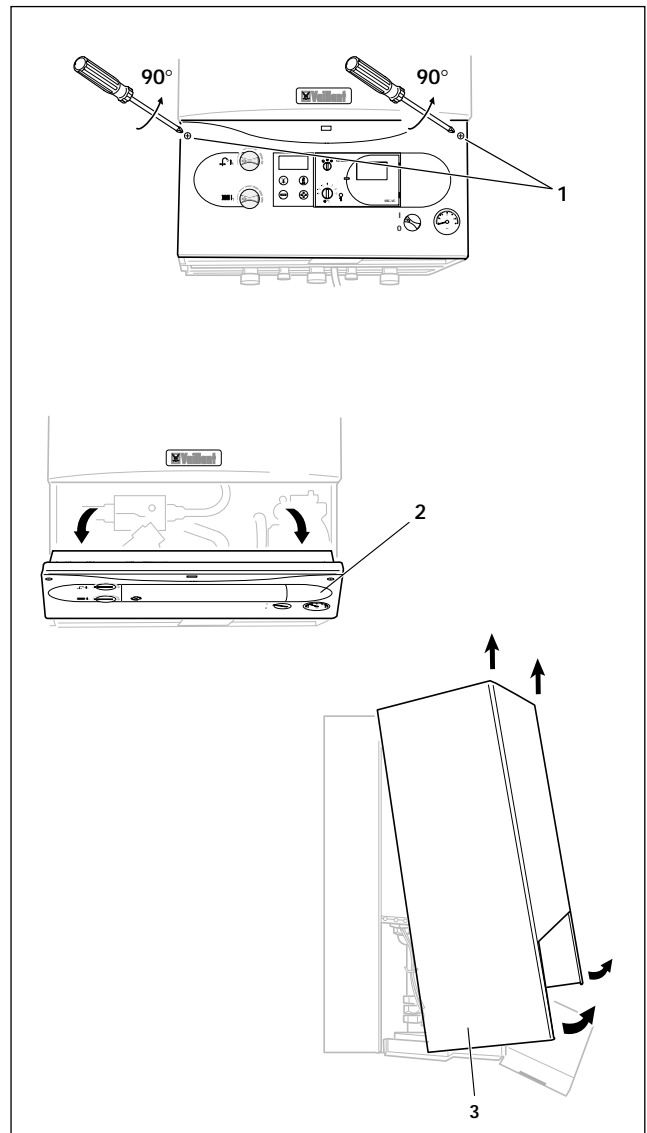


Fig. 5.5: Remove of boiler casing

5 Boiler Installation Sequence 5

5.7 Gas supply

- Connect the 15 mm compression gas service cock (1) and 22 mm copper outlet tail (3) as supplied with the appliance (2) and tighten.
- Connect a gas supply pipe of not less than 22 mm diameter to the copper tail.
- Tighten all connections.
(Ensure the gas supply pipework is adequately sized such that a 20 mbar gas pressure is available at the boiler inlet at full flow rate).

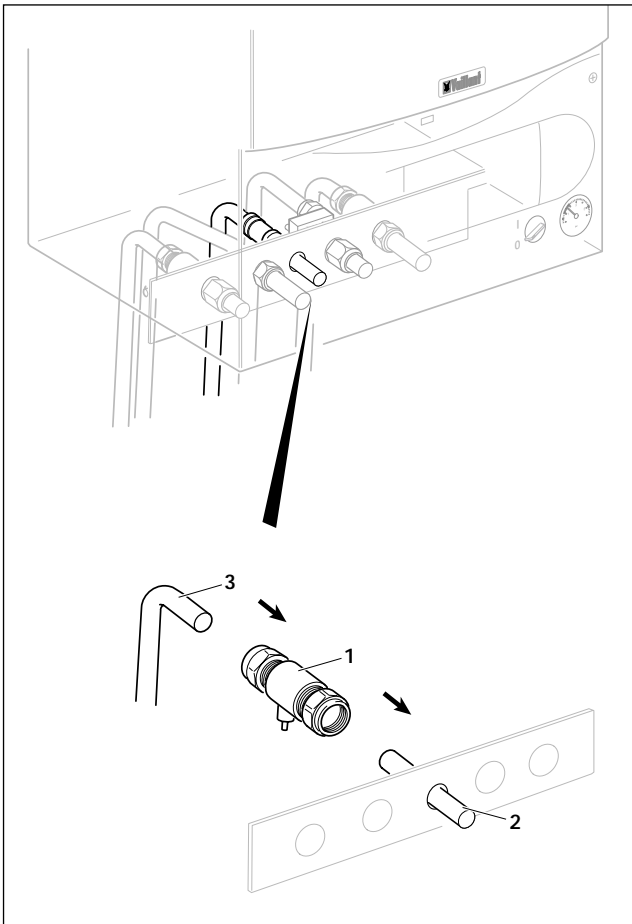


Fig. 5.6: Fitting the gas connection aquaPLUS

5.8 Cold water mains inlet and hot water outlet

Flush all foreign matter from the mains supply before connecting to the boiler.

- Connect the cold water service valve (1) to the cold inlet water connection (3) of the appliance with the washer (2) provided and tighten.
- Connect the 15 mm cold water inlet pipe copper tail (4) to the cold water service valve (1) and tighten.
- Connect the 15 mm hot water outlet copper tail (6) to the hot water outlet connection of the appliance (8) with the washer provided (7) and tighten.

Note: The hot water outlet union nut is packed in with the PRV fitting pack.

- Connect the cold water service pipe and hot water outlet pipework to the copper tails.

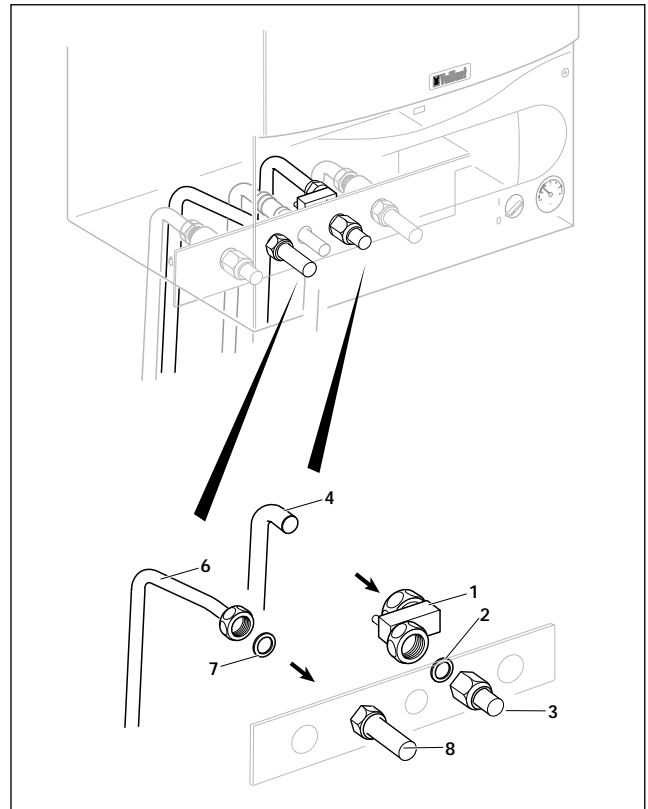


Fig. 5.7: Fitting the hot and cold water connections aquaPLUS

5.9 Central heating flow and return pipework

Before connecting the heating circuit to the boiler appliance, all pipework and radiators must be thoroughly flushed to remove any installation debris.

- Connect the central heating flow (6) and return (1) service valves to the appliance (8 and 3) with the washers provided (2 and 7) and tighten the nuts. Ensure that the valve spindles face downwards and the drain points face to either side of the boiler.
- Connect the 22 mm copper pipe tails to the service valves as shown in the illustration and tighten the nuts.
- Connect the central heating pipework to the flow (9) and return (4) tails.

Pressure Relief Valves (central heating and domestic hot water)

Connect discharge pipes not less than 15 mm diameter to the outlet of these valves.

The discharge pipework should be as short as possible and installed with a continuous fall away from the boiler. The pipes should terminate in a position which ensures that any discharge of water or steam from the valves cannot create a hazard to persons in or about the premises, or cause damage to any electrical components or external wiring, and the point of discharge should be safe and clearly visible.

5.10 Connect the flue system to the boiler

- Refer to separate air/flue duct installation instructions included with the boiler.

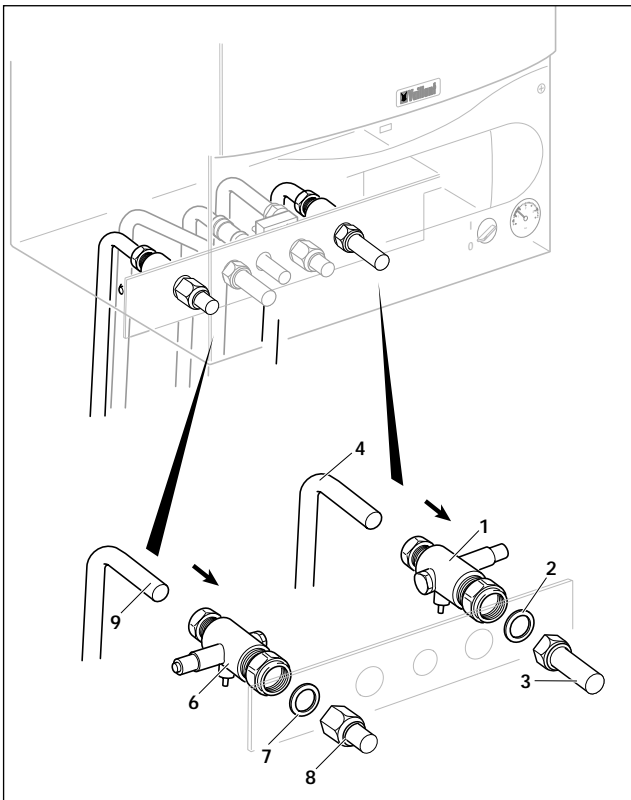


Fig. 5.8: Central heating flow and return pipework aquaPLUS

5 Boiler Installation Sequence 5

5.11 Electrical installation

General requirements

Important: All electrical work shall be carried out by a competent person and shall comply with BS7671 (IEE Regulations).

The boiler is supplied for connection to 230 V, ~ 50 Hz supply fused at 3 A rating.

Connection to the mains supply shall be made via a fused 3 pin plug to an unswitched shuttered socket, both complying to the requirements of BS1363.

(Alternatively, connection may be made via a 3 A fused double pole isolator having a contact separation of at least 3 mm in all poles and supplying the boiler and controls only).

The point of connection to the mains supply must allow complete electrical isolation of the boiler and its ancillary controls. It should be readily accessible and adjacent to the boiler. A 3 core flexible cord according to BS6500 tables 6, 8 or 16 (3 x 0.75 to 3 x 1.5 mm²) should be used.

Warning: This appliance must be earthed.

Note: DO NOT use boiler terminal connections 7-8-9.

Important: Ensure that all cords pass through the cable clamps in the rear of the control box and are securely fixed. Ensure that the power supply is connected such that the current carrying conductors become taut before the earth conductor should the supply cord slip from the cable clamp.



Warning!

Mains connection terminals L and N remain live even when the boiler on/off control is switched off.

5.12 Connection to the main supply

- Lower the control panel.
- Unclip the terminal box cover (1) from the control panel (2).
- Feed the power supply cord in to the appliance as shown (Fig 5.10).
- Use cable clamps.
- Connect the power supply cord as follows (Fig. 5.11, on page 20).
 - Green/yellow (earth) wire boiler terminal Earth sign
 - Blue (neutral) wire boiler terminal N
 - Brown (live) wire boiler terminal L

Note: DO NOT use boiler terminal connections 7-8-9.

- Refit the terminal box cover by pushing into place until it clips back into position.
- Raise the control panel and secure in place.

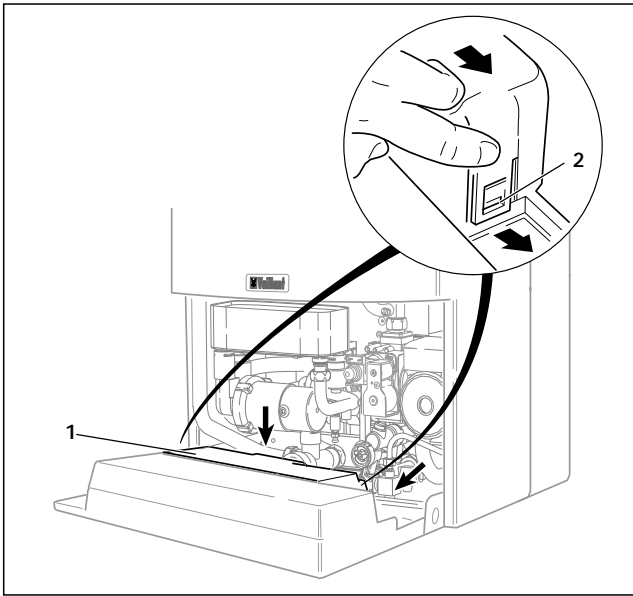


Fig. 5.9: Exposed rear view of switchgear cabinet

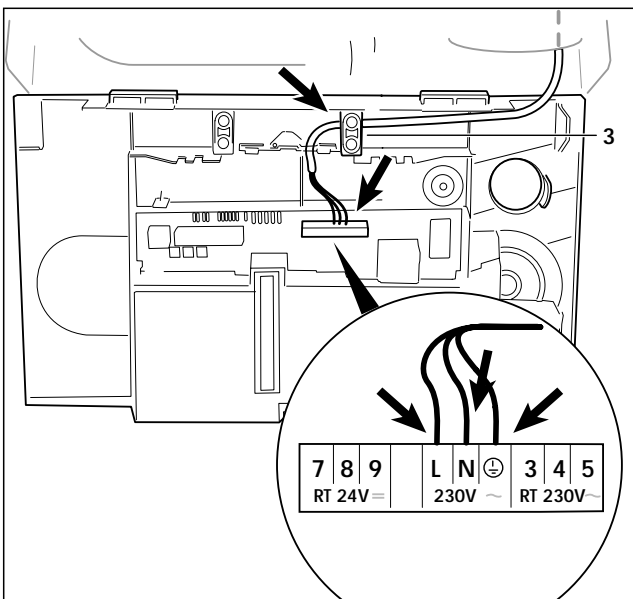


Fig. 5.10: Wiring system

5.13 Electronic board layout

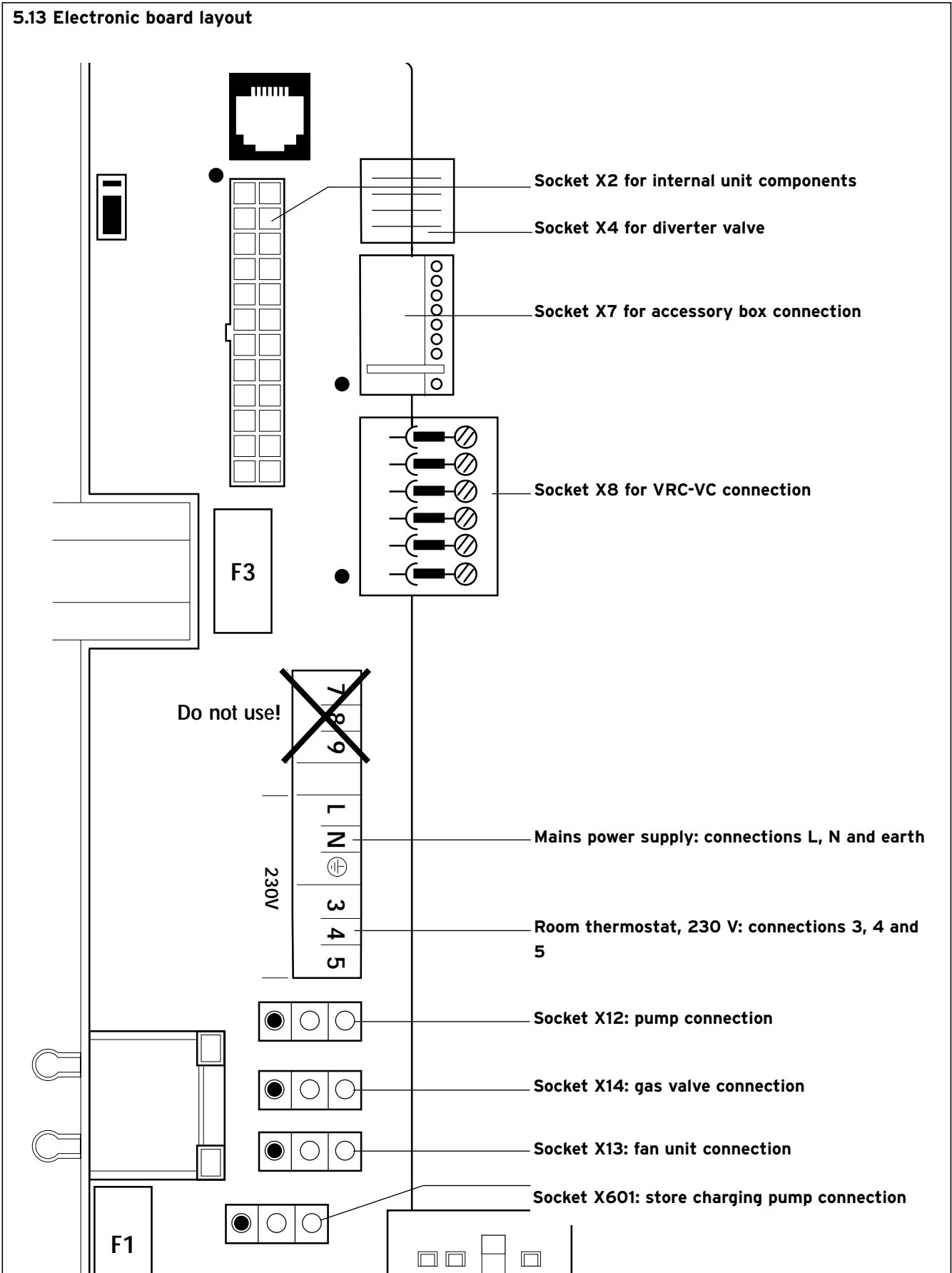


Fig. 5.11: Connection wiring

5.14 Controls

External electrical controls

The boiler terminals 3, 4 and 5 are for connecting external electrical controls such as a time switch and/or room thermostat.

Terminals 3 and 4 are linked together when the boiler is supplied. If external controls are used, this link must be removed, and the controls connected across terminals 3 and 4.

Terminal 5 is an additional neutral connection for external neutrals such as from the anticipator of a room thermostat.

Connection of external controls

Connection details for programmable room thermostats.

Fig. 5.12 shows the connection details where a programmable room thermostat (time switch with built in room thermostat) is used to control the boiler.

Important: The arrowed numbers indicate connection into the relevant terminal in the boiler terminal strip.

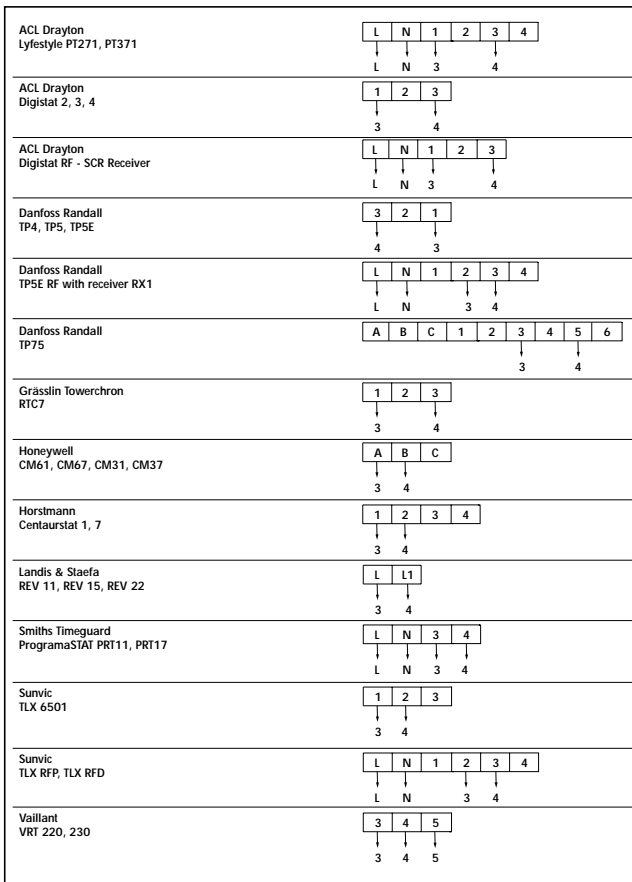


Fig. 5.12 Connection details for programmable thermostats

Connection details for external time switches and boiler terminal strip.

Fig. 5.13 shows the connection details where a time switch is used without a room thermostat to control the boiler.

Important: The arrowed numbers indicate connection into the relevant terminal in the boiler terminal strip.

If a room thermostat is to be connected in addition to a time switch the wire between the time switch "ON" terminal and boiler terminal 4 should be broken by the contacts of the room thermostat (see schematic layout, Fig. 5.14).

Vaillant optional plug in timer accessories

Refer to the instructions supplied with the optional accessories for connection details.

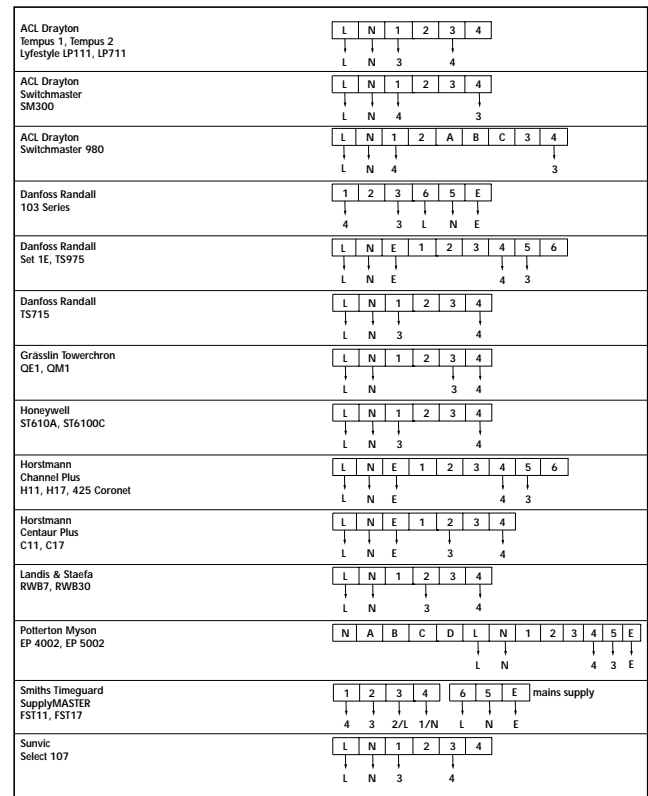


Fig. 5.13 Connection details for time switch

Upon completion of all electrical connections refit the terminal box cover by pushing into place. The cover is secured by two locking clips.

5 Boiler Installation Sequence 5

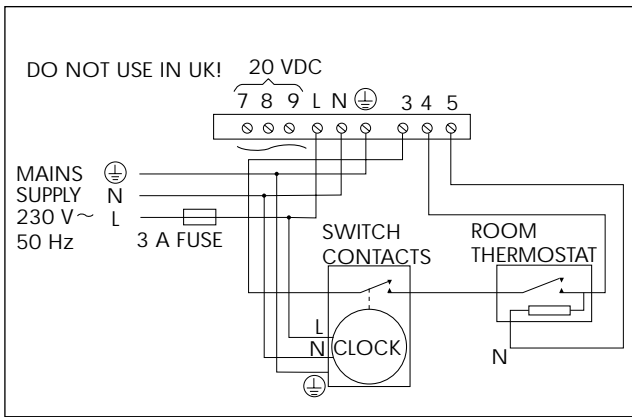


Fig. 5.14

5.15 Thermostatic radiator valves

The boiler has a built-in automatic bypass valve making it ideal for use in systems with thermostatic radiator valves (no separate system bypass is required). For optimum fuel economy it is recommended that where TRV's are used they are used in conjunction with a programmable room thermostat or separate timer and room thermostat to ensure complete boiler shut down when the heating demand is satisfied. (The radiator in the room containing the room thermostat should not be fitted with a TRV).

5.16 Frost protection

The boiler has an integral frost thermostat which is designed for protection of the boiler. To protect remote or exposed parts of the heating system or property additional frost protection measures must be taken such as the installation of an external frost thermostat. This frost thermostat should be connected across the boiler terminals 3 and 4, in parallel with any external heating controls.

Note: External frost protection cannot be used when plug in timers have been fitted.

5.17 Circulating pump

The boiler incorporates a built in circulating pump that is fully prewired (no additional wiring is necessary). The pump incorporates an automatic overrun period after the boiler switches off.

5.18 Anti-cycling 'economiser' control

The boiler incorporates a built in anti-cycling control to ensure that energy wasteful short cycling of the boiler cannot occur. This control prevents the boiler from re-igniting for a preset period of 5 minutes after central heating operation (the hot water operation is unaffected by this control and hot water can be drawn at any time).

Note: To temporarily override the anti-cycling control turn the main boiler on/off switch to the off position "0" and then back to the on position "I" after a few seconds.

5.19 Automatic pump spin control (APS)

The boiler incorporates a built in control which will spin the built in circulating pump and operate the diverter valve once in a 24 hour period. This control helps to prevent seizure when the boiler is not operated for a period of time. This control is not active when the power supply to the appliance is turned off.

5.20 Anti legionella protection

If the temperature in the **power store** does not rise above a certain limit in a set time period, the boiler will operate and charge the store to protect against legionella.

Note: Very hot water will be discharged during tapping after this operation.

6 Commissioning Part I

6.1 Preliminary electrical checks

Check the electrical installation by carrying out short circuit, earth continuity and resistance to earth tests and a check for correct polarity.

6.2 Gas supply

The complete gas installation including the gas meter must be inspected, tested for soundness and purged in accordance with BS 6891. In IE the current edition of IS 813.

The gas supply to the boiler can be purged by slackening the gas service valve beneath the boiler. Ensure that there is adequate ventilation, extinguish all naked flames and do not smoke whilst purging. After purging, the gas service valve connection must be retightened and tested for soundness. (The boiler itself does not require purging as this will be done by the automatic burner sequence control).

6.3 Cold water supply

Open all domestic hot water taps supplied by the boiler, turn on the mains water supply to the boiler and open the mains water isolating valve below the boiler. Water will now flow through the boiler to the hot taps. Starting with the lowest tap supplied, turn the hot taps off one at a time until the hot water pipework is purged of air.

Check all hot and cold water pipework for leaks.

6.4 Filling the heating system

Proceed as follows to fill the system:

- Open all radiator valves on the system.
- Check flexible filling loop is connected.
- Locate the filling valve handle on the cold water inlet filling valve as shown (1).
- Open valve (1) fully.
- Remove filling valve handle and locate on return filling valve (1).
- Open the valve slowly and fill the unit with water until the required pressure has been achieved (2).
- Turn off valve (1).
- Remove valve handle and refit on cold water inlet filling valve (1).
- Fully close valve (1).
- Bleed the air from the radiators.
- The boiler is equipped with an automatic air release valve. To allow this to vent the boiler, the cap top must be slackened by 1-2 turns. (This cap must be left slackened during operation to ensure any residual air or system gases are released).

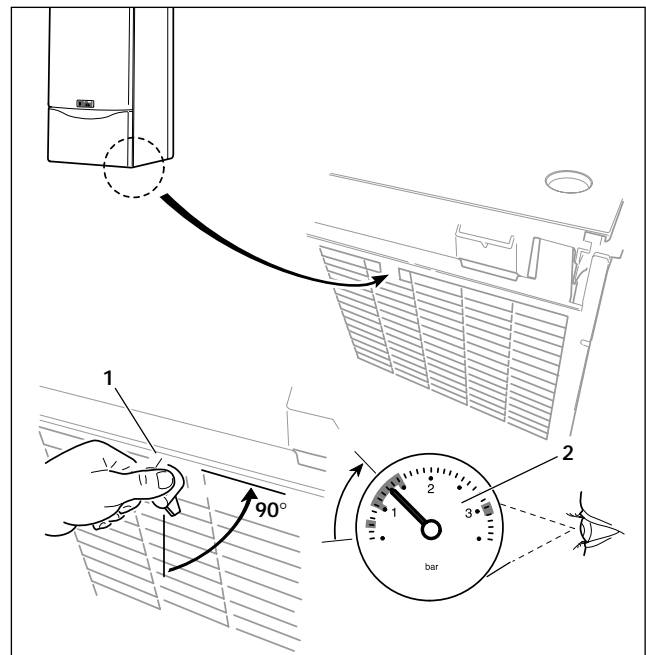


Fig. 6.1: Filling aquaPLUS boiler

6.5 Initial system flush ("cold")

The whole of the heating system must be flushed out at least twice: once cold, and once hot as instructed later.

- Open all radiator and heating valves and the boiler CH service valves and drain the heating system and boiler completely from the lowest points of the system via 1/2" BSP drain taps (opened full bore to remove any installation debris prior to lighting the boiler).
- Refill the heating system.
- Check the operation of the pressure relief valve by rotating the knob on the valve.
- Now check the water pressure in the unit again (and add more water if necessary).
- Close the filling valves (1) and disconnect the temporary connection.

7 Gas supply adjustments (Commissioning Part II)

7 Gas supply adjustments (Commissioning Part II)

7.1 Gas inlet working pressure

To check the gas inlet working pressure:

- Lower the front panel of the boiler.
- Lower the control panel.
- Slacken the sealing screw (1) located at measuring point "P.IN".
- Attach U-gauge to the inlet test point on the gas valve (2).
- Ensure that the gas service valve is open.
- Turn off the boiler at the main ON/OFF control.
- Press and hold the "+" button while pressing the button turn the main ON/OFF control to the "I" ON position.
- Continue holding "+" button until display alternates between "P1, P2, P3, P11, P12 and P13". Release "+" button.
- Press "+" button until "P1" (full gas rate) is shown in display.
- Press "i" button to operate boiler at full gas rate.
- Check that the U-gauge is reading in the range between 18 and 20 mbar. If the pressure is not within this range this should be investigated before continuing with the commissioning procedure. Lower pressures than this range are indicative of an incorrectly sized or partially blocked gas supply.
- Switch off the boiler at the main ON/OFF control.
- Remove U-gauge, tighten test point sealing screw (1).
- Test for soundness.
- Record appliance working gas inlet pressure (mbar) in the Benchmark Installation, Commissioning and Service Log Book.

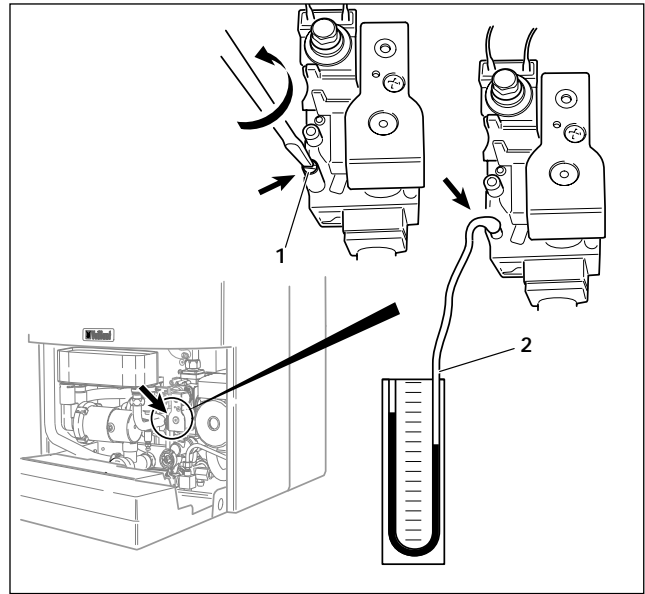


Fig. 7.1: Checking the inlet pressure (gas-flow pressure)

7.2 Main burner pressure

The burner pressure on this appliance has been factory set and does not require adjustment. To check the main burner pressure connect the U-Gauge as follows.

- Remove front case and combustion chamber cover.

Note! All measurements and adjustments to the gas valve must be done with the combustion chamber cover removed.

- Slacken the sealing screw (1a) at test point on the burner inlet gas pipe and attach one arm of a U-gauge (2a) to the test point.
- Turn off the boiler at the main ON/OFF control.
- Press and hold the "+" button, while pressing the button turn the main ON/OFF control to the "1" ON position.
- Continue holding "+" button until display alternates between "P1, P2, P3, P11, P12 and P13". Release "+" button.
- Press "+" button until "P1" is shown in the display. "P1" indicates the maximum gas rate and "P2" indicates the ignition rate.
- Press "i" button to operate boiler at maximum gas rate.

Check that the burner pressure is correct as shown in table 7.7, page 30 for the appropriate boiler. To cancel selected "P1" or "P2" mode press the "i" and "+" buttons simultaneously.

Measure the domestic hot water burner operating pressure (mbar), the heat input (kW), the inlet/outlet domestic hot water temperatures (°C) and flow rate (l/min) by fully opening a hot water tap and record details in the boiler logbook.

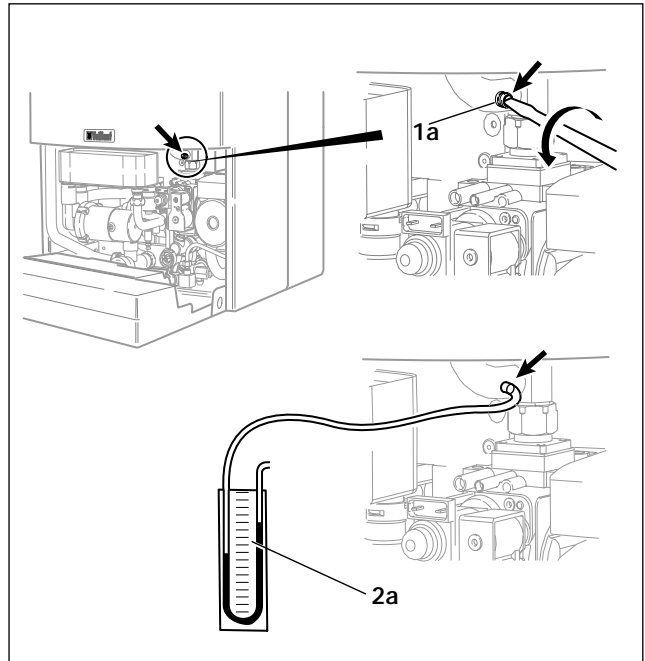


Fig. 7.2: Connecting the U-tube pressure gauge

7 Gas supply adjustments (Commissioning Part II)

7.3 Adjusting to the maximum heat load (nominal load)

- Remove the cap (1).
- Set the DHW temperature control to maximum and fire the boiler at full rate by fully opening a hot water tap.
- Turn off the boiler at the main ON/OFF control.
- Press and hold the "+" button, while pressing the button turn the main ON/OFF control to the "1" ON position.
- Continue holding "+" button until display alternates between "P1, P2, P3, P11, P12 and P13". Release "+" button.
- Press "+" button until "P1" (full gas rate) is shown in display.
- Press "i" button to operate boiler at full gas rate.
- Using a 10 mm spanner turn nut (2) to adjust the burner operating pressure.
 - Turn the nut (2) clockwise to increase the nominal load
 - Turn the nut (2) anticlockwise to decrease the nominal load.
- Adjust the burner pressure until it matches the maximum output as detailed in table 7.7, page 30.
- Now turn the 10 mm nut (2) anticlockwise until the burner pressure drops by approx. 0.3 - 0.4 mbar. Nominal load is now correctly adjusted.
- Refit the plastic cap (1).

Warning!
The plastic cap (2) must be fitted for the gas valve assembly to function correctly.

- Turn off the hot water tap.
- To cancel selected "P1" or "P2" mode press the "i" and "+" buttons simultaneously.

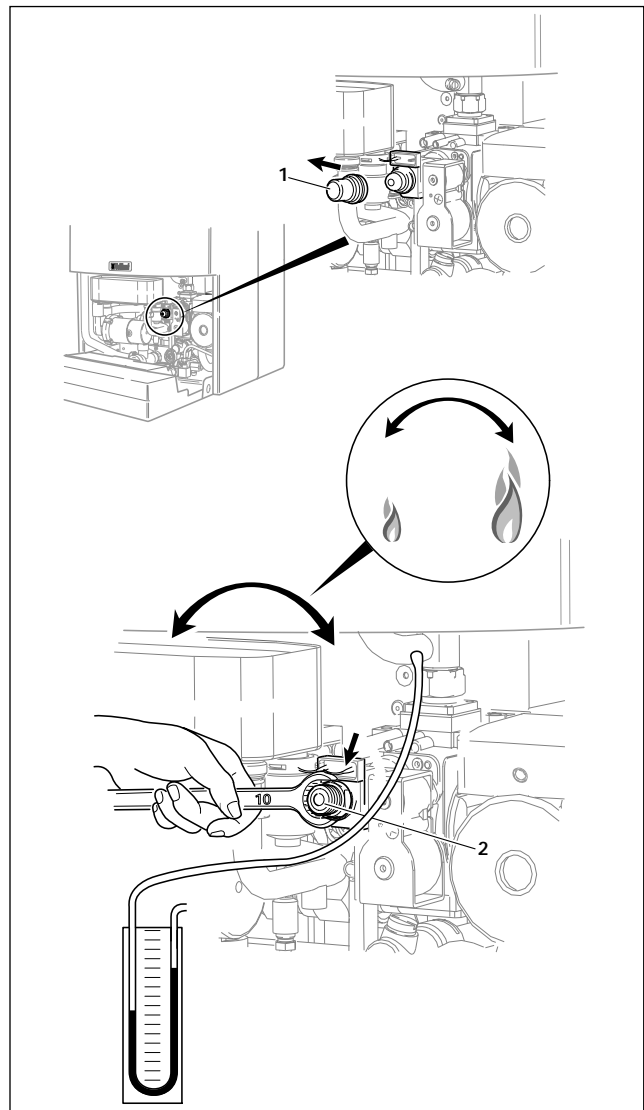
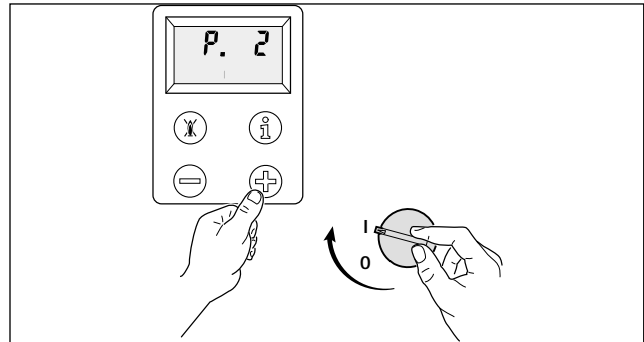


Fig. 7.3: Setting the maximum heating load (nominal load)

7.4 Adjusting the ignition rate

- Undo screw and remove the cap (1).
- Disconnect the modulating coil wires from the gas valve, set the DHW temperature control to maximum and fire the boiler at full rate by fully opening a hot water tap.
- Turn off the boiler at the main ON/OFF control.
- Press and hold the "+" button, while pressing the button turn the main ON/OFF control to the "1" ON position.
- Continue holding "+" button until display alternates between "P1, P2, P3, P11, P12 and P13". Release "+" button.
- Press "+" button until "P2" (ignition rate) is shown in display.
- Press "i" button to operate boiler at full gas rate.
- Use a suitably sized screwdriver to turn the inner screw (2).
 - Turn the screw (2) clockwise to increase the ignition rate
 - Turn the screw (2) anticlockwise to decrease the ignition rate
- Adjust the burner pressure until it matches the ignition rate in table 7.7, page 30.
- Turn off the hot water tap and reconnect the wires to the modulating regulator.
- To cancel selected "P1" or "P2" mode press the "i" and "+" buttons simultaneously.

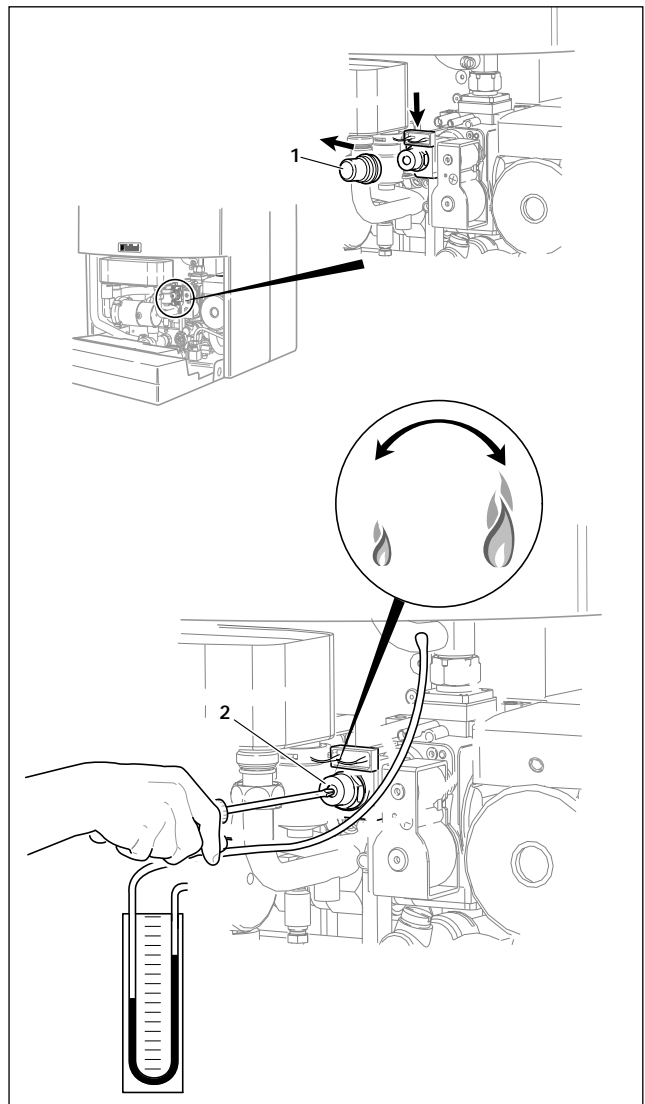
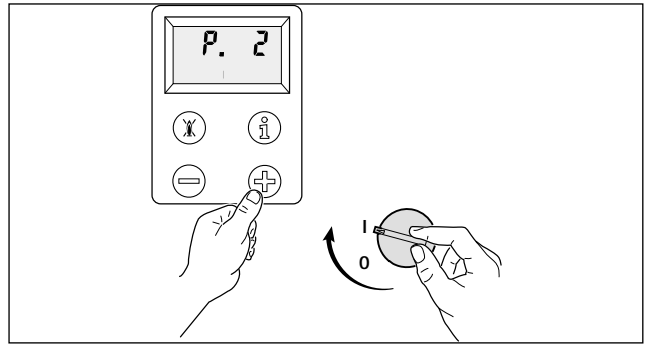


Fig. 7.4: Adjusting the ignition gas quantity

Warning!
 The main burner pressure must be rechecked after adjusting the ignition rate.

Refit cap (1) and replace screw. Re-check ignition and main burner pressures. After completion of these tests tighten the sealing screw and check all joints and test points for soundness.

7 Gas supply adjustments (Commissioning Part II)

7.5 Adjusting the central heating output (range rating)

The boilers are fully modulating for central heating, and it is therefore not necessary to range rate the boiler. However, if desired, it is possible to range rate the boiler, as follows:

- Connect the U-gauge to check burner pressure.
- Use Table on page 30 to determine the central heating output required.
- Identify required range rating setting and note main burner pressure in mbar for that output.
- Turn on the central heating.
- Ensure that any thermostatic radiator valves are open and set to high.
- Simultaneously press and release the "+" and "-" buttons to activate burner pressure mode.
- The boiler will light at the factory set nominal gas rate.

Warning!
DO NOT open any hot water tap while carrying out this procedure.

- Check that the U-gauge reading corresponds to the maximum burner pressure as detailed on the table.
- Adjust central heating output range as shown on page 29.

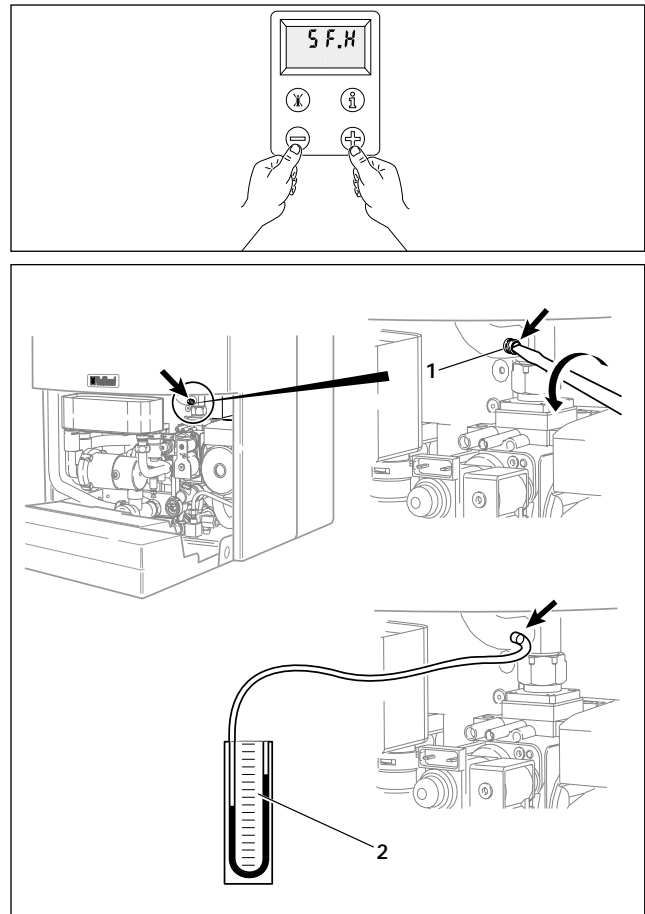
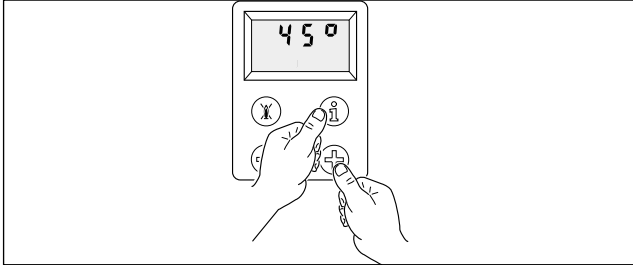


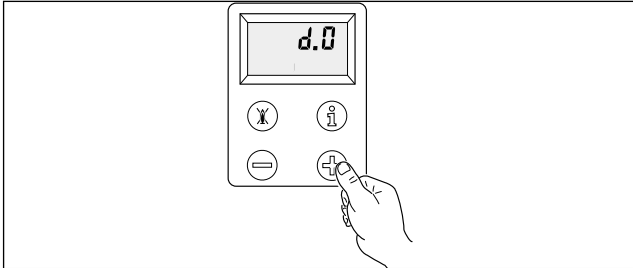
Fig. 7.5: Using nozzle pressure to check and adjust the heating system partial load

Note! Following adjustment of the central heating output, the new output can be checked using the gas rate table as detailed.

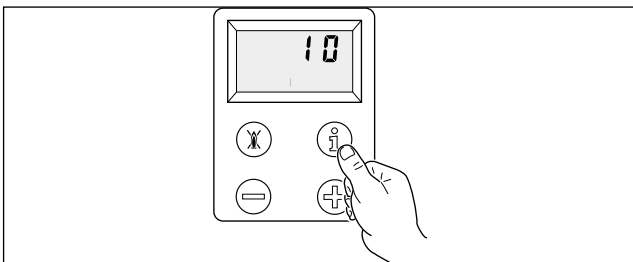
1 Simultaneously press the "i" and "+" buttons keys.



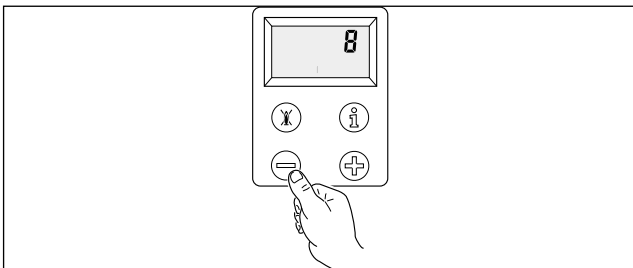
2 Keep the "+" button pressed until "d.0" is displayed. (The display runs from "d.0" to "d.99" before restarting again at "d.0".)



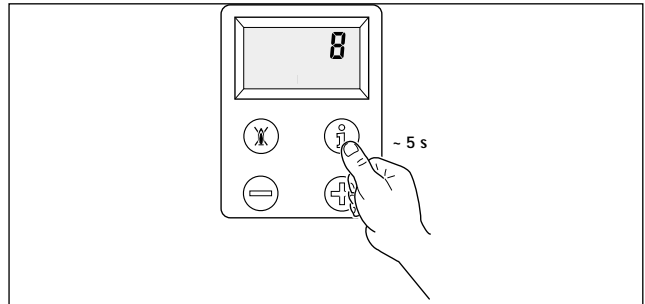
3 Press the "i" button and a value between 1 and 15 will be displayed.



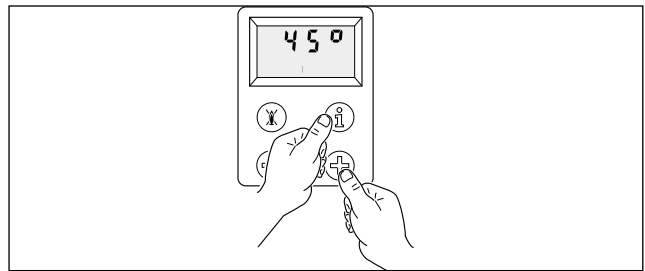
4 Use the "+" or "-" buttons to increase or decrease the value. Observe the U-gauge as the button is pushed and stop pushing when the required main burner pressure has been achieved.



5 After setting, press and hold the "i" button for five seconds or until the display stops flashing. The new setting value is now memorised. The new main burner pressure can now be checked. If the new output is not correct repeat steps 3 to 5.



6 To return to normal mode, press the "i" and "+" buttons simultaneously. The adjustment mode is also cancelled if no button is pushed for a period of four minutes.



- Record central heating burner pressure in the Benchmark Log Book along with the heat input (kW) and temperature difference between flow and return.

7 Gas supply adjustments (Commissioning Part II) 7

7.6 Checking the gas valve mid setting point

To ensure the most efficient operation of the boiler a gas valve mid setting point is necessary.

This mid setting point has been factory set and adjustment of this point is only required after exchanging either the electronic circuit board or gas valve or converting the boiler to another gas type.

To check the mid setting point proceed as follows.

- Turn off the boiler at the main ON/OFF control.
- Press and hold the "+" button while pressing the button turn the main ON/OFF control to the "I" ON position.
- Continue holding "+" button until display starts to alternate between the P numbers (P1, P2, P3, P11, P12 and P13).
Release "+" button.
- Press "+" button until "P3 " (mid setting point) is shown in display.
- Press "i" button to operate boiler at mid setting point.
- The burner pressure should now read the mid setting point pressure for the gas type used, as detailed in the table below.

Gas type	Mid setting point pressure
Natural Gas (G20)	5.3 mbar
LPG (G30/31)	15.3 mbar

If the mid setting point pressure is incorrect it can be adjusted as follows.

Turn off the boiler at the main ON/OFF control.

- Press and hold the "+" button while pressing the button turn the main ON/OFF control to the "I" ON

position.

- Continue holding "+" button until display starts to alternate between the P numbers (P1, P2, P3, P11, P12 and P13).
Release "+" button.
- Press "+" button until "P11 " (for natural gas) or "P 13" (for LPG) is shown in display.
- Press "i" button to operate boiler at mid setting point.
- The mid setting point burner pressure is now adjusted by pushing the "+" button until the gauge equals the pressure as detailed in the table below.

Program No.	Gas type	Mid setting point
P.11	Natural Gas (G20)	5.3 mbar
P.12	Not applicable for GB	-
P.13	LPG (G30/31)	15.3 mbar

Note!

The "-" button has no function in this mode, if the required pressure is exceeded during set up, this operation should be recommenced from the beginning.

When the pressure is correct, to save the setting to memory, press and hold the "i" button until the display stops flashing.

To cancel selected mode press the "i" and "+" buttons simultaneously.

Re-check ignition and main burner pressures. After completion of these tests tighten the sealing screw and check all joints and test points for soundness.

7.7 Burner pressure and gas rate

Burner Pressure aquaPLUS		Ignition rate	Output [kW]									
Delivered Gas			10.5	12.0	16.0	18.0	20.0	24.0	28.0	30.0	33.0	36.9
Natural gas 2H Main burner jet mark ²⁾ 7/120 Setting-up program: P11	Burner pressure ¹⁾ [mbar] for G20	1.1	1.1	1.4	2.4	2.9	3.6	5.0	6.7	7.5	9.0	11.0
	mid. setting point pressure: 5.3 mbar											
L.P.G. 3+ Main burner jet mark ²⁾ 7/072 Setting-up program: P13	Burner pressure ¹⁾ [mbar] for G30	2.8	2.8	3.5	5.9	7.3	8.9	12.6	16.8	19.1	22.9	28.2
	Burner pressure ¹⁾ [mbar] for G31 mid. setting point pressure: 15.3 mbar	3.5	3.5	4.4	7.3	9.1	11.1	15.6	20.8	23.7	28.3	34.9

Gas Rate aquaPLUS		Output [kW]									
Delivered Gas		10,5	12,0	16,0	18,0	20,0	24,0	28,0	30,0	33,0	36,9
Natural gas 2H Main burner jet mark ²⁾ 7/120	Gas rate ¹⁾ [m ³ /h] for G20	1.3	1.4	1.9	2.2	2.4	2.8	3.3	3.5	3.9	4.3

¹⁾ 15 °C, 1013 mbar, dry

²⁾ The nozzles are stamped with the mark shown in this table. The marking corresponds to the nozzle hole diameter multiplied by 100.

7.8 Fit boiler casing

- Carefully push case (1) onto the boiler such that the locating points either side at the top of the boiler engage. Push the casing onto the securing clips at the bottom of the boiler.
- Close control panel (2).
- Secure control panel by turning both securing fasteners (3) clockwise by 90°.
- Close front door (4).
- Open the punch-out holes in the cover panel (6) for the pipework installation.
- Fit the bottom cover (6).

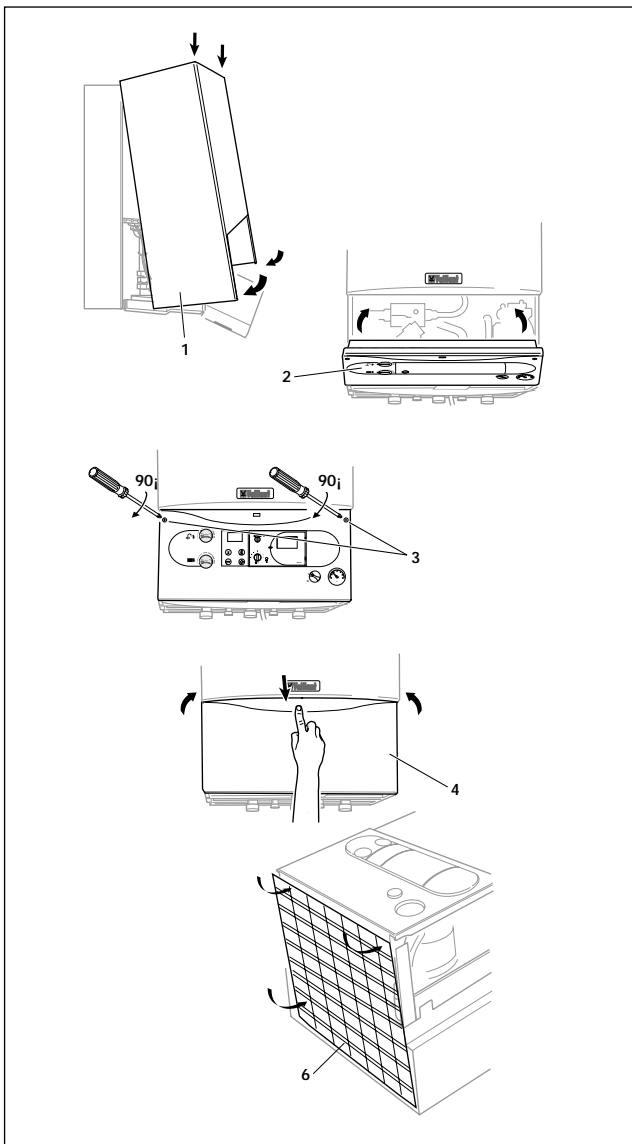


Fig. 7.6: Fit boiler casing

8 Functional checks (Commissioning Part III)

8 Functional checks (Commissioning Part III)

8.1 Functional checks

Once the unit has been installed and the gas supply has been checked, operate the system to ensure that it is working correctly.

- Operate the system, following the operating instructions supplied with the boiler.
- Check the system for water leaks and escaping gas.
- Check that the flue has been correctly installed, according to the fitting instructions supplied with the flue assembly.
- Check the burner for correct ignition and flame picture.
- Check the hot water system for correct operation.
- Check the heating system for correct operation.

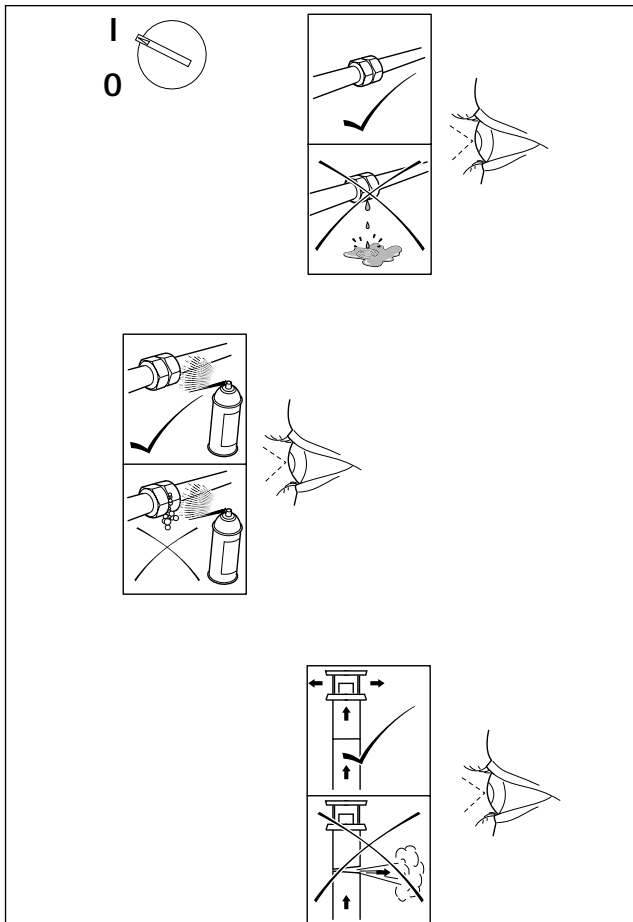


Fig. 8.1: Test for correct functioning

This appliance is fitted with a display unit that uses symbols to show the current operating status of the boiler. Additionally to this the status of the boiler can be checked using the Status Mode.

8.2 Hot-water supply

- Activate the system.
- Fully open one of the hot water taps in the system.
- Press the "i" key.

Status code "S.14" appears on the display to indicate that the hot-water supply is functioning correctly.

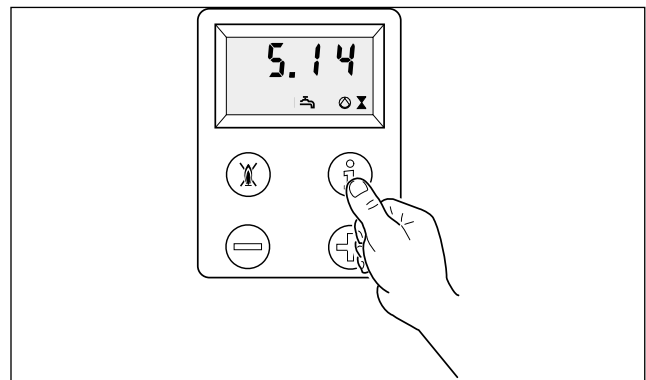


Fig. 8.2: Display indication while hot water is being supplied

8.3 Power store filling mode

Note: The power store is delivered turned off and must be turned on during commissioning.

- Activate the system.
- Ensure that the hot water thermostat is set to the required heat level.
- Press the "i" key.

Status code "S.24" appears on the display if the tank is being recharged.

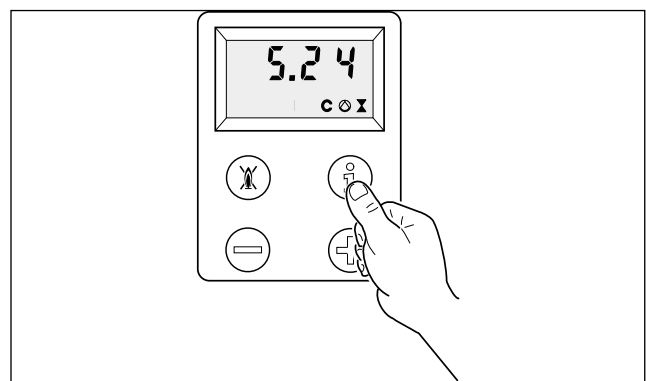


Fig. 8.3: Display indication during power store filling mode

8.4 Heating mode

- Activate the system and ensure the tank is fully charged.
- Ensure that the heating system is calling for heat.
- Press the "i" key.

Status code "S.4" appears on the display to indicate that heating is functioning correctly.

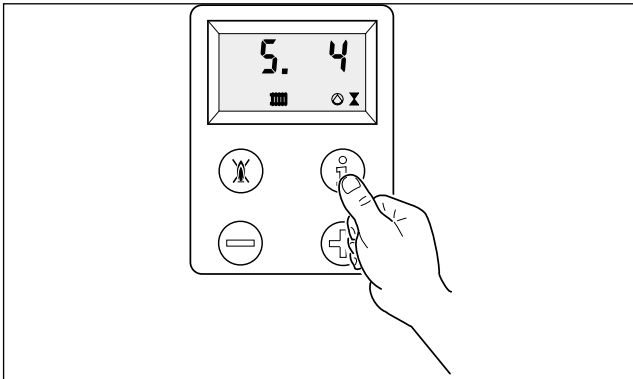


Fig. 8.4: Display indication during heating

8.5 Adjusting pump speed

The unit is fitted with a two-speed pump. The pump is delivered with the switch (1) set to position III.



Important note!

The boiler should only be operated at pump setting III because the heating capacity for hot water is reduced when operated at pump setting II!

It is possible, however, to change the pump setting from Level III to Level II manually when there is noise coming from the heating system.

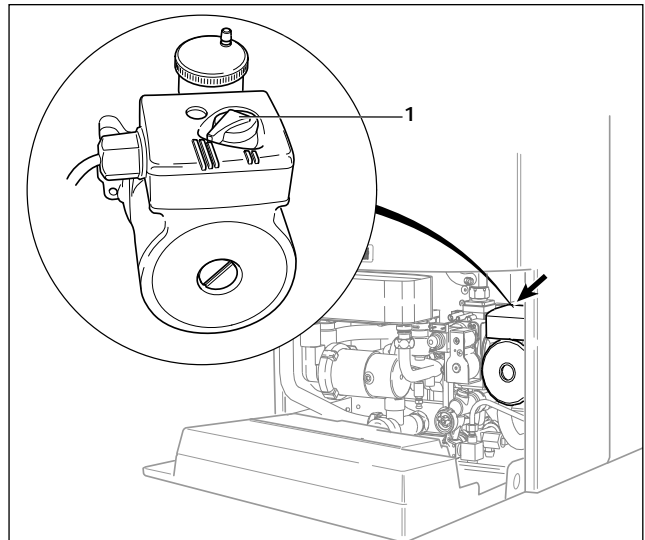


Fig. 8.5: Pump speed

8.6 Final system flush ("Hot")

Turn on the boiler for central heating and allow the boiler and system to reach operating temperature. Check that the heating system is watertight. Turn the boiler off and rapidly drain both boiler and system while still hot.

Refill the system and release all air. Release water from the system until the system design pressure of 1.0 bar is attained.

(The actual reading on the pressure gauge should ideally be 0.5 bar plus an additional pressure corresponding to the highest point of the system above the base of the boiler - 10 m head equals an additional 1 bar reading on the pressure gauge. The minimum pressure should not be less than 1 bar in any installation.)

If the system is to be treated with an inhibitor it should be applied at this stage in accordance with the manufacturers instructions.

Further information can be obtained from Sentinel, Betz Dearborn Ltd.,

Tel: 0151 4951861

or

Fernox, Alpha-Fry Technologies,

Tel: 0870 6015000.

Disconnect the temporary filling connection.

Refit the boiler casing.

Attach the bottom cover to the boiler by securing with the two screws provided. It may be necessary to apapt the bottom cover by removing the easy break sections.

8.7 Handing over to the user

Set the maximum radiator temperature control to the desired setting.

Set the maximum hot water temperature control to the desired setting.

Instruct the user in the safe and efficient operation of the boiler, in particular the function of

- The boiler on/off control
- The maximum radiator temperature control
- The maximum hot water temperature control
- The pressure gauge

Show the user how to operate any external controls.

Explain to the user the importance of having the boiler regularly serviced by a competent servicing company. To ensure regular servicing, it is strongly recommended that arrangements are made for a Maintenance Agreement. Please contact Vaillant Service Solutions (0870 6060 777) for further details.

Ensure the boiler log book is fully completed and leave with the end user. Failure to install and commission this appliance to the manufacturers instructions may invalidate the warranty (Note: This does not affect your statutory rights).

Leave the user instructions, the boiler log book and the installation and servicing instructions with the user.

Note: Leave the Benchmark Log Book with the end user.

8.8 Anti legionella protection

Advise the user that if the **power store** is turned off or if the domestic hot water thermostat is at a low setting the boiler will operate daily to charge the store and protect against legionella (the **power store** is turned off during production).

Note: Very hot water will be discharged during tapping after this operation.

9 Servicing**9.1 Initial Inspection**

To ensure the continued safe and efficient operation of the boiler it is recommended that it is checked and serviced as necessary at regular intervals. The frequency of servicing will depend upon the particular installation conditions and usage, but in general once per year should be adequate. It is the law that all servicing work is carried out by a competent person (Corgi registered).

Important: Before starting any maintenance work:

- Isolate the mains electricity supply by disconnecting the plug at the socket outlet (if there is only an isolating switch remove the fuse from the switch).
- Turn OFF the gas supply at the gas service valve fitted to the boiler.
- Always test for gas soundness and always carry out functional checks after any service work and after exchanging any gas carrying component.
- Always check earth continuity, polarity and resistance to earth with a multimeter after any service work and after exchanging any electrical component.

Note: The boiler is fitted with a combustion analysis test point on the combustion chamber cover. A suitable combustion analyser can be connected to this point to establish the combustion performance of the boiler.

Before commencing any servicing or maintenance work, carry out an initial inspection of the system as follows:

- Inspect the flue, pipework and electrical connections for indications of damage or deterioration.
- Inspect the air supply and ventilation arrangements of the installation.
- Check the heating and water system, in particular the condition of radiator valves, evidence of leakage from the heating system and dripping hot water taps.

9.2 Functional check of boiler operation

- Carry out a functional check of the boiler operation as previously detailed.
- Remove the appliance casing as detailed on page 15 and operate the boiler by fully opening a hot water tap. Inspect the burner operation through the viewing window. Check that the flames are evenly covering the surface of the burner. Inspect for signs of excessive flame lift or sooting.

9.3 Cleaning the burner and primary heat exchanger

- Turn off the boiler.
- Isolate the electrical supply to the boiler.
- Remove the boiler case as described on page 15.
- Turn off the gas service valve.
- Turn off the boiler CH service valves.
- Turn off the cold water inlet service valve.
- Release the three clamps (1), remove the combustion chamber cover (2) and then remove the flue gas connector (2a) on the fan.
- Remove the retaining spring (3).
- Remove both plugs (4) and two tubes (5) from the fan assembly.
- Remove the fan assembly (6).
- Remove the four screws (7) and detach the front cover panel from the combustion chamber (8).
- Check the burner (9) and heat exchanger fins (10) and remove any loose deposits with a soft brush.
- Reassemble in reverse order.

Check central heating expansion vessel.

Note: It is not necessary to carry out the following check every year - a check every three years should be sufficient.

- Release the system water pressure from the boiler.
- Remove valve cap from expansion vessel charge point.
- Check that the internal charge pressure of expansion vessel is between 0.7 - 0.9 bar. If pressure is lower than this the vessel should be re-pressurised using an air pump.
- Refit valve cap.
- Open central heating service valves and re-pressurise the boiler and heating system if necessary.
- Open the gas service valve.
- Turn on the mains power supply.
- Operate the boiler and carry out soundness, safety and function checks.
- Complete the service interval record section in the log book and leave with the user.

9.4 Draining the domestic hot water system (if required)

- Turn off the cold water supply at the cold water service valve.
- Release the pressure in the boiler by opening the hot water taps.
- The **power store** can now be drained from the two drain points under the boiler (one on the cold water inlet pipe, the other on the outlet pipe of the domestic hot water heat exchanger).

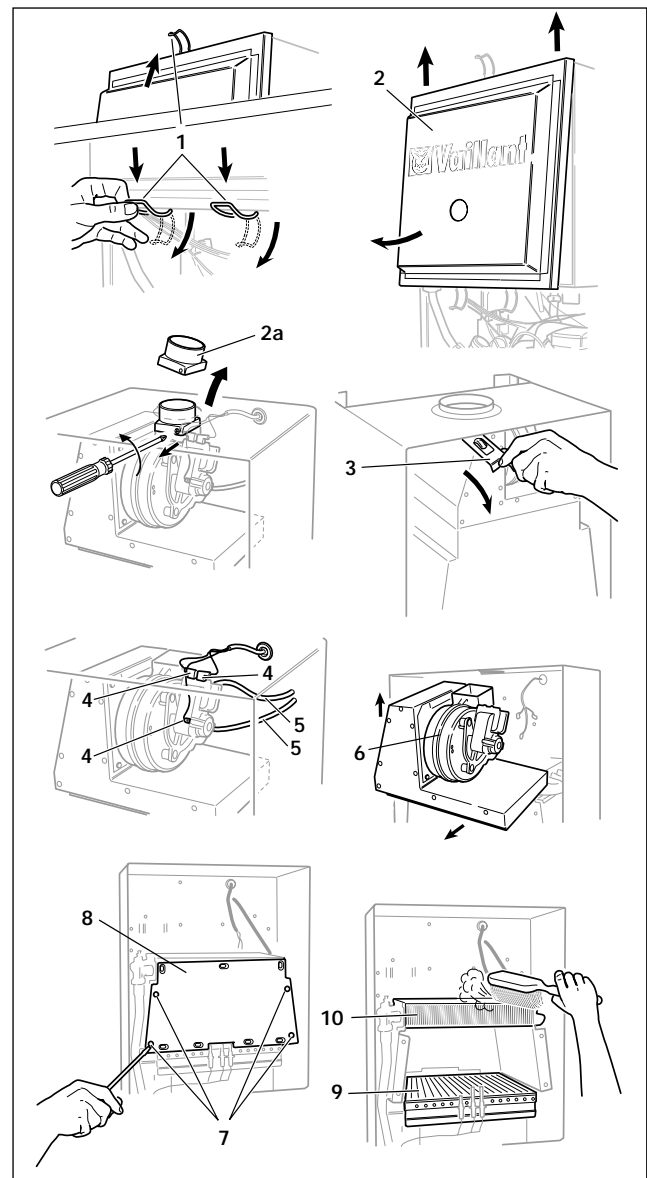


Fig. 9.1: Cleaning the burner and primary heat exchanger

10 Fault finding

10 Fault finding

10.1 Introduction

The aquaPLUS boilers have an inbuilt advanced multifunction diagnostic display to assist with fault finding in the unlikely event of a boiler malfunction. The display features the following four modes:

Normal Mode

Under normal conditions the boiler display will show the boiler flow temperature, this indicates that the boiler is operating correctly after an internal self check.

Status Mode

The status display is helpful in diagnosing faults where a fault code is not displayed.

Diagnostic Mode

In order to assist with the pinpointing of a particular fault it is possible to use the boiler display in a diagnostic mode to interrogate the boiler about the status of certain components.

Fault Mode

Should a fault develop in the boiler the display will show a fault code indicating what the problem may be.

Display key:

- 1 Fan speed malfunction
- 2 Heating demand
- 3 Hot-water demand
- 4 **Power store** on (Comfort mode)
- 5 Pump on
- 6 Gas valve on
- 7 Actual Heating-system flow temperature (e.g. 50 °C)
or
Displaying of a status/error code
- 8 Correct burner operation (normal flame) or
lock out (crossed-out flame)

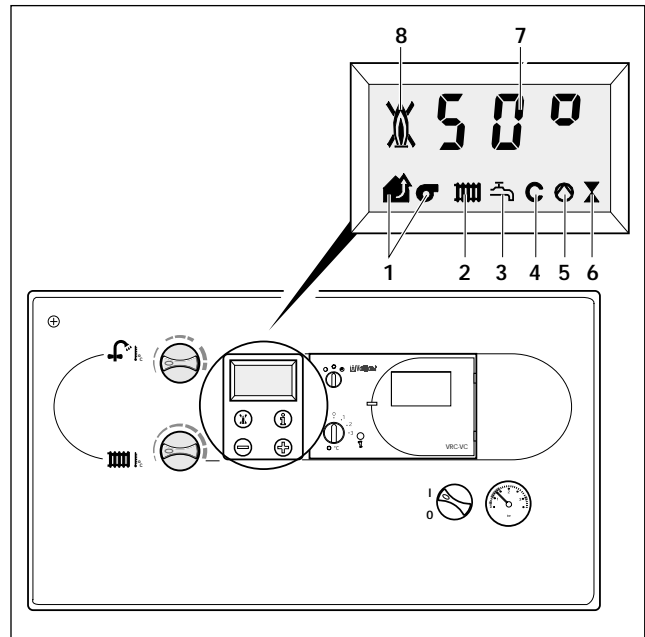


Fig. 10.1: Display indications

10.2 Logical fault finding procedure

These checks must be carried out before attempting to use the fault finding guide.

1. Carry out electrical safety checks (See Section 'Preliminary Electrical Checks').
2. Check that the external electricity supply to the boiler is on, and a supply of 230 V~ is present between boiler terminals 'L' and 'N'.
3. Check that the gas supply to the boiler is on, that it has been correctly purged and that an inlet pressure of 20 mbar is available at the gas valve. (See Section 'Gas Supply').
4. Ensure the heating system is full of water and charged to between 1 and 1.5 bar. If not, refill and vent the system. (See Section 'Filling the heating system'). Ensure boiler flow and return service valves are open.
5. Check that the main on/off control is set to the 'on' position.
6. Set the central heating temperature to maximum.
7. Set the domestic hot water temperature to maximum.
8. Check that all external controls are on and calling for heat (if, no external controls are fitted, boiler terminals 3 and 4 must be linked). Check that the boiler anti-cycling economiser is not engaged.

10.2.1 Procedure

Note: Always check the operation of the boiler for central heating first before checking hot water operation. Do not open a hot water tap unless instructed to do so by the fault finding guide.

1. If a fault code is showing in the boiler display follow the fault finding charts referring also to the fault code and diagnostic mode tables.
2. If the boiler is not functioning correctly and a fault code is not showing in the boiler display follow the fault finding charts referring also to the status mode table.

3. Note: If the boiler display is completely blank initially check the two fuses (Isolate the electrical supply before checking the fuses, spare fuses are located on the inside of the control box rear cover).

To access the various modes press the buttons on the control panel as follows:

Mode	To display the required mode	To return to Normal mode
Status mode	Press "i" button	Press "i" button
Diagnostic mode	Press the "i" and "+" button simultaneously	Press the "i" and "+" button simultaneously

Please note: If no key is pressed for approx. 4 minutes the display will automatically change back to Normal mode.

10 Fault finding

10.3 Status Mode

The status mode provides information about the current operating status of the boiler.

To display status mode proceed as follows:

- Press the "i" button below the display, and a status code will appear in the display indicating the current operational status of the boiler (see table below).

To cancel the status code mode proceed as follows:

- Press the "i" button below the display
or
- Do not press any key for approximately four minutes. The display will now revert back to showing the current flow temperature.

Display	Indication
S.00	No heat demand (heating operation)
S.01	Fan running (heating operation)
S.02	Pump running (heating operation)
S.03	Ignition sequence (heating operation)
S.04	Burner ignited (heating operation)
S.05	Fan and water pump over run (heating operation)
S.06	Fan over run (heating operation)
S.07	Pump over run (heating operation)
S.08	Anti cycling mode (heating operation)
S.10	Hot water demand (hot water operation)
S.11	Fan running (hot water operation)
S.13	Ignition sequence (hot water operation)
S.14	Burner ignited (hot water operation)
S.15	Fan and water pump over run (hot water operation)
S.16	Fan over run (hot water operation)
S.17	Pump over run (hot water operation)
S.20	Store recharging
S.21	Fan running (store charging)
S.23	Ignition sequence (store charging)
S.24	Burner ignited (store charging)
S.25	Fan and water pump over run (store charging)
S.26	Fan over run (store charging)
S.27	Pump over run (store charging)
S.28	Anti cycling mode (store charging)
S.30	No heating demand from external controls
S.31	Summer mode (heating control knob in off position)
S.32	Main heat exchanger anti freeze protection due to fan speed deviation too great
S.33	Check air/flue system
S.34	Frost protection mode
S.36	No heating demand from external controls
S.39	Contact thermostat has been activated (under floor systems)
S.53	Delay mode due to lack of water in system (~2,5 mins.)
S.54	Delay mode due to flow temperature gradient too steep (approx 10 mins.)

Table 10.1: Status modes

10.4 Diagnostic Modes

In order to assist with the pinpointing of a particular fault it is possible to use the boiler display in a diagnostic mode to interrogate the boiler about the status of certain components.

- Press the "i" and "+" buttons below the display simultaneously. The display will now show "d.00".
- Use "+" or "-" buttons to scroll up or down to the desired diagnostic number.
- Press "i" button to display the corresponding diagnostic information.

- If necessary, you can now alter the value by pressing "+" or "-" buttons. (When altering values display will flash). Press and hold the "i" button to save the value to memory, when the value is saved the display will stop flashing.

Diagnostic mode is cancelled as follows:

- Press the "i" and "+" buttons simultaneously or
- Do not press any key for approximately four minutes. The display will now revert back to showing the current flow temperature.

Display	Indication	Displayed values/adjustment values
d.00	Part load setting	0...30
d.01	Water pump over run	1, 2, 3, ...60 min (factory-adjusted to 5 min)
d.02	Maximum burner anti cycling period at 20 °C flow temperature	8 - 60 min (factory-adjusted to 15 min)
d.03	Actual hot water temperature	in °C
d.04	Actual tank temperature	in °C
d.05	Flow temperature setting	in °C
d.06	Target value for hot water temperature	in °C
d.08	External controls heat demand	0 = open, no demand, 1 = closed, demand
d.10	Pump status	1 = on, 0 = off
d.11	External pump status	1 = on, 0 = off
d.12	DHW pump - status	100 = on, 0 = off
d.13	DHW circulation pump (external)	1 = on, 0 = off
d.21	Flame rectification	1 = on, 0 = off
d.22	Domestic hot water demand	1 = on, 0 = off
d.23	Summer/winter function (control knob)	1 = winter, 0 = summer
d.24	Air pressure switch	1 = on, 0 = off
d.25	Storage tank status	1 = on, 0 = off
d.30	Gas valve status	1 = on, 0 = off
d.33	Required value of the rotary speed of the fan	r.p.m.
d.34	Actual value of the rotary speed of the fan	r.p.m.
d.35	Diverter valve position	0 = heating, 1 = hot water
d.37	Modulator current	in mA
d.40	Actual flow temperature	in °C
d.41	Actual return temperature	in °C
d.50	Maximum flow temperature	in °C
d.60	Number over heat cut off operations	
d.61	Number of lock outs	
d.64	Average ignition time	in s

Table 10.2: Diagnostic modes 1 of 2

10 Fault finding

Display	Indication	Displayed values/adjustment values
d.65	Maximum ignition time	in s
d.67	Remaining burner anti-cycling period	in min
d.68	Number of unsuccessful attempted 1st ignitions	
d.69	Number of unsuccessful attempted 2nd ignitions	
d.71	Maximum target value for heating system flow temperature	0 = 82 °C, 1 = 87 °C (factory-adjustment: 82 °C)
d.72	Pump over run time after filling hot water store	0, 1, 2,250 s (factory-adjustment: 80 s)
d.76	Gas type set	H36 (nat gas) P36 (LPG) E36 (E+gas). Factory setting H36
d.79	Anti- legionella protection mode activated	1 = no, 0 = yes
d.80	Number of heating system operating hours (total)	in h
d.81	Number of hot water system operating hours (total)	in h
d.82	Number of heating system cycles (total)	
d.83	Number of hot water system cycles (total)	

Table 10.3: Diagnostic Modes 2 of 2

10.5 Fault codes

Fault codes take priority over all other display functions in the event of a system fault occurring.

If multiple faults occur, the corresponding fault codes are displayed alternately for about two seconds each.

10.6 Fault memory

The fault memory stores details of the ten most recent faults.

- Press the "i" and "-" buttons simultaneously.

- Use the "+" button to scroll back through the list of memorised errors.

To cancel fault error memory display mode, proceed as follows:

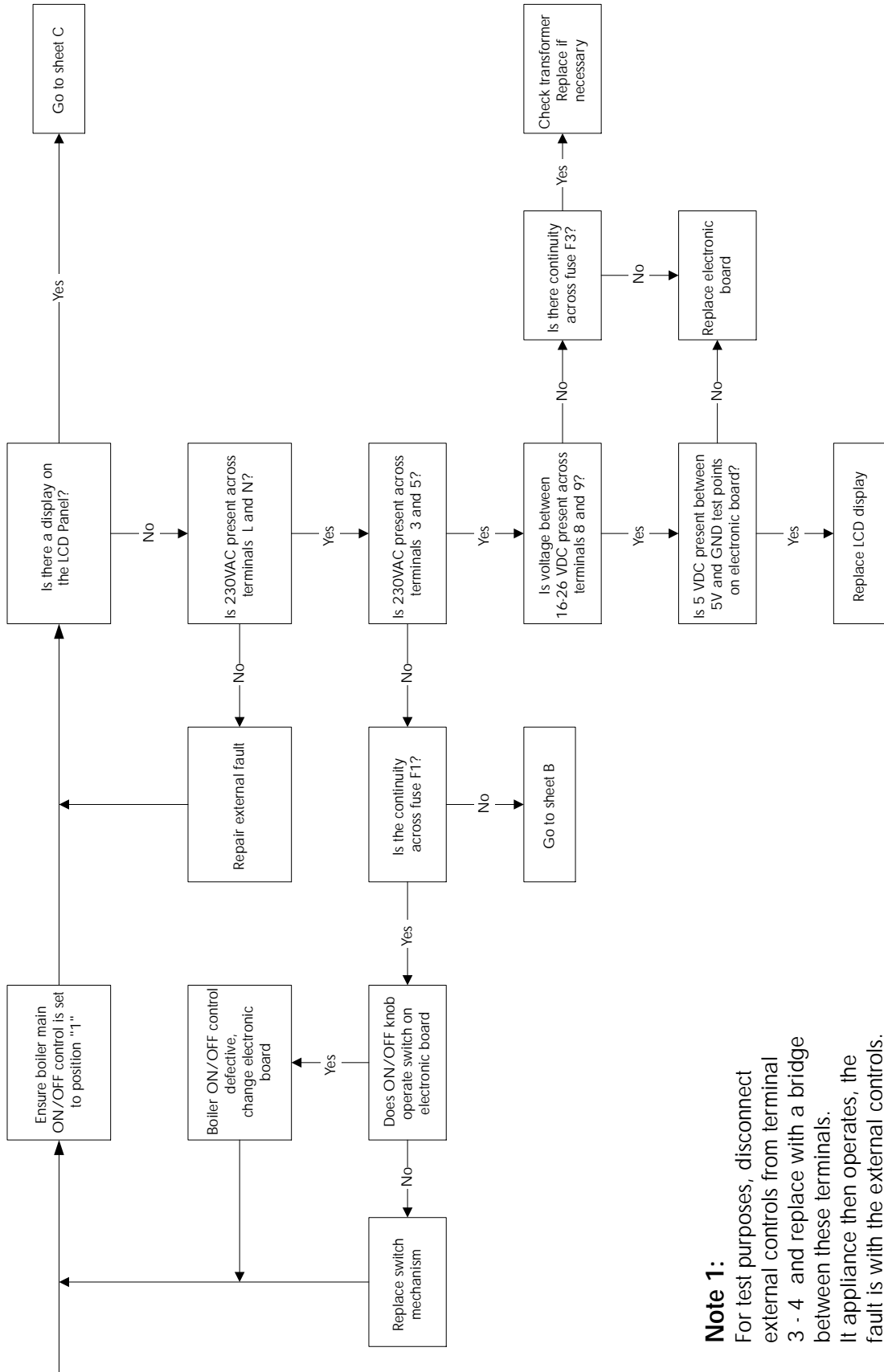
- Press the "i" button below the display.
or
- Do not touch any key for about four minutes. The display will now revert back to showing the current flow temperature.

Display	Indication	Cause
F.00	Flow-NTC: NTC broken; NTC cable broken; Defective connection at NTC, Defective connection at electronics	Flow-NTC cable defective/broken NTC faulty
F.01	Return NTC: NTC broken; NTC cable broken; Defective connection at NTC, Defective connection at electronics	Return-NTC cable defective/broken NTC faulty
F.02	DHW-NTC: NTC broken; NTC cable broken; Defective connection at NTC; Defective connection at electronics	DHW- NTC cable defective/ broken NTC faulty
F.03	Tank-NTC: NTC broken; NTC cable broken; Defective connection at NTC; Defective connection at electronics	Tank- NTC cable defective/ broken NTC faulty
F.10	Short circuit - flow-NTC (<130 °C)	NTC-plug shorted to casing, NTC defective
F.11	Short circuit - return-NTC (<130 °C)	NTC-plug shorted to casing, NTC defective
F.12	short circuit DHW- NTC	NTC- plug shorted to casing, NTC defective
F.13	short circuit tank- NTC	NTC- plug shorted to casing, NTC defective
F.20	Over heat cut off activated	Maximum temperature exceeded
F.22	Dry fire protection	No water in appliance, pump cable defective, pump blocked or defective, pump output too low
F.23	Dry fire protection (difference between flow and return NTC's too large)	No water in appliance, pump cable defective, pump blocked or defective, pump output too low
F.24	Dry fire protection (temperature gradient of flow NTC too steep)	Air in boiler/system, pump blocked or defective, pump output too low
F.27	No demand to gas valve	Electronic board defective; Gas valve defective
F.28	Boiler goes to lock out	No gas; Insufficient gas; Incorrect gas valve adjustment; Electrode defective; Ignition lead defect; Electronic igniter defective
F.29	Flame extinguished re-ignition unsuccessful	Gas supply absent or insufficient
F.32	Main heat exchanger anti freeze protection mode due to fan speed deviation too great	Check fan control cables/connections; Defective fan control cable;
F.33	Main heat exchanger anti freeze protection mode due to no switching signal from the air pressure switch	Check air pressure switch, fan, fan supply or flue system
F.37	The rotary speed of the fan is too high or too low	Air pressure switch defect; fan defect; electronics defect
F.41	No setting for the type of gas is stored	Set gas type in PCB (see page 30)
F.42	Faulty cable loom	Faulty or incorrect loom fitted
F.43	Faulty cable loom	Faulty or incorrect loom fitted
F.60	Electronic fault	Electronics defect
F.61	Electronic fault	Electronics defect
F.62	Flame rectification present 4 secs. after gas valve turns off	Check gas valve, burner tubes and injectors or electronics defect
F.63	EMC fault	EMC or electronics defect
F.64	Sensor or electronics fault	Check NTC's/connections or electronics defect
F.65	PCB processor temperature too high	Check earth connection or electronics defect
F.66	Display fault	Display defect; fault in the connection to the display; electronics defect
F.67	Electronic fault	Electronics defect

Table 10.4: Fault codes

Sheet A

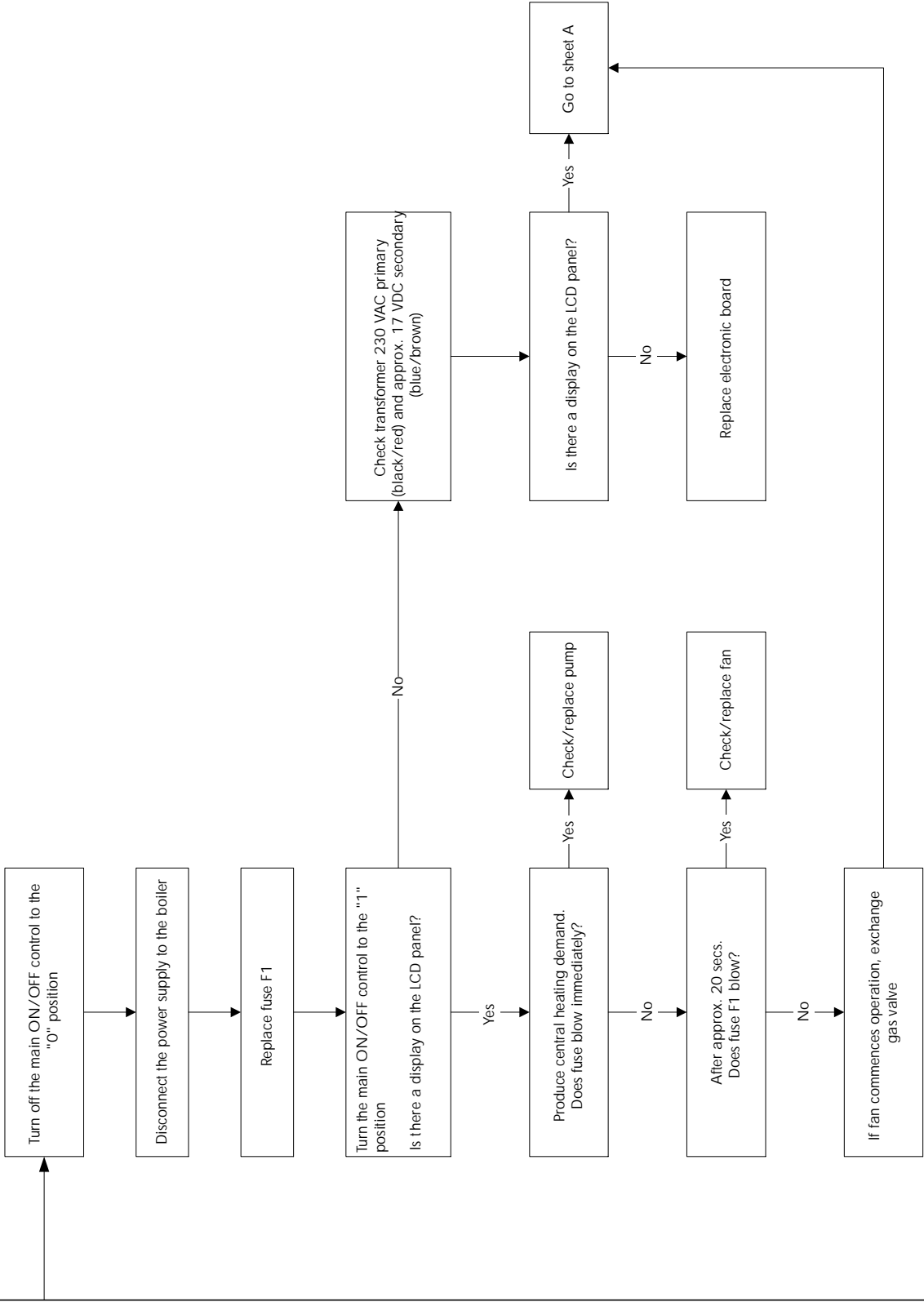
Check electrical supply, appliance fuses and on/off control



Note 1: For test purposes, disconnect external controls from terminal 3 - 4 and replace with a bridge between these terminals. It appliance then operates, the fault is with the external controls.

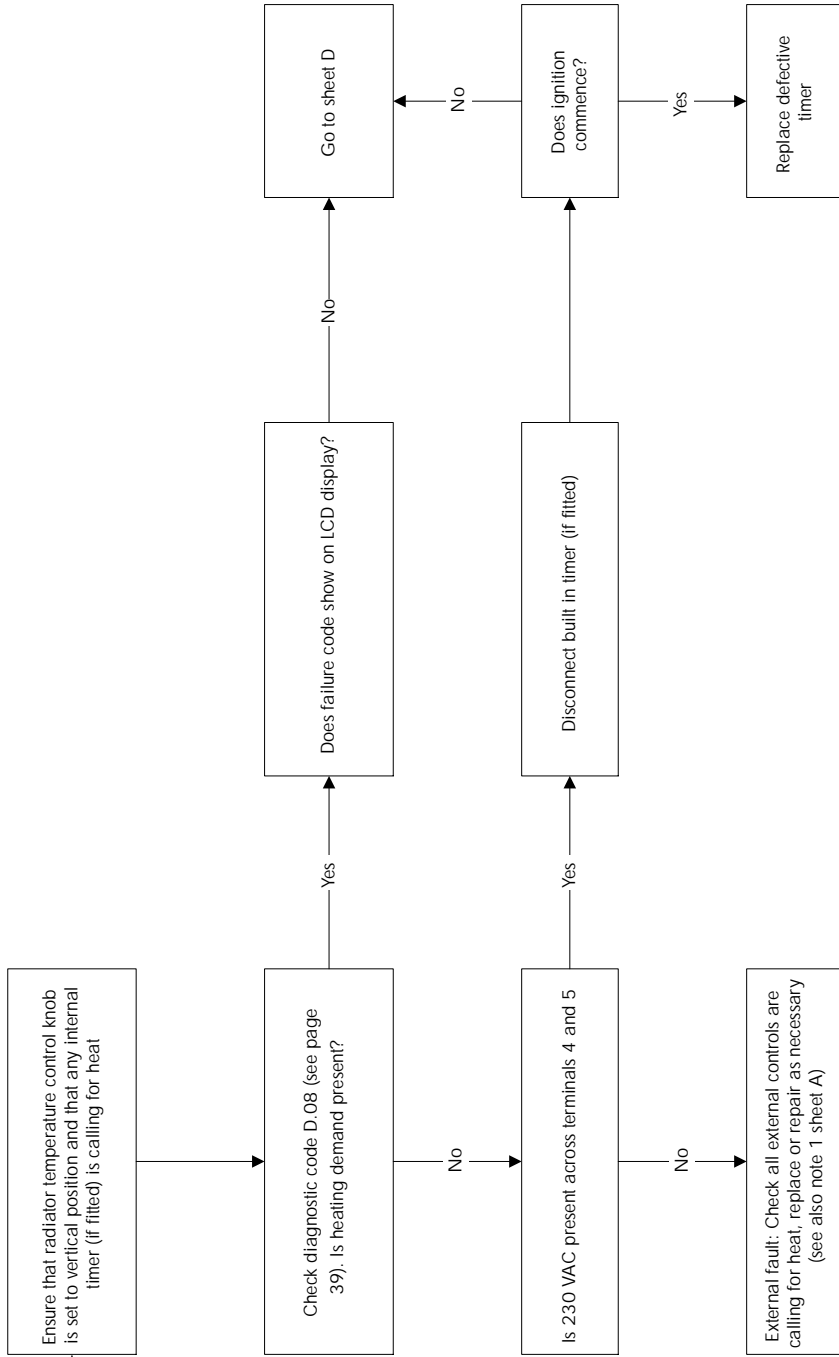
Sheet B

Check operation of pump and fan



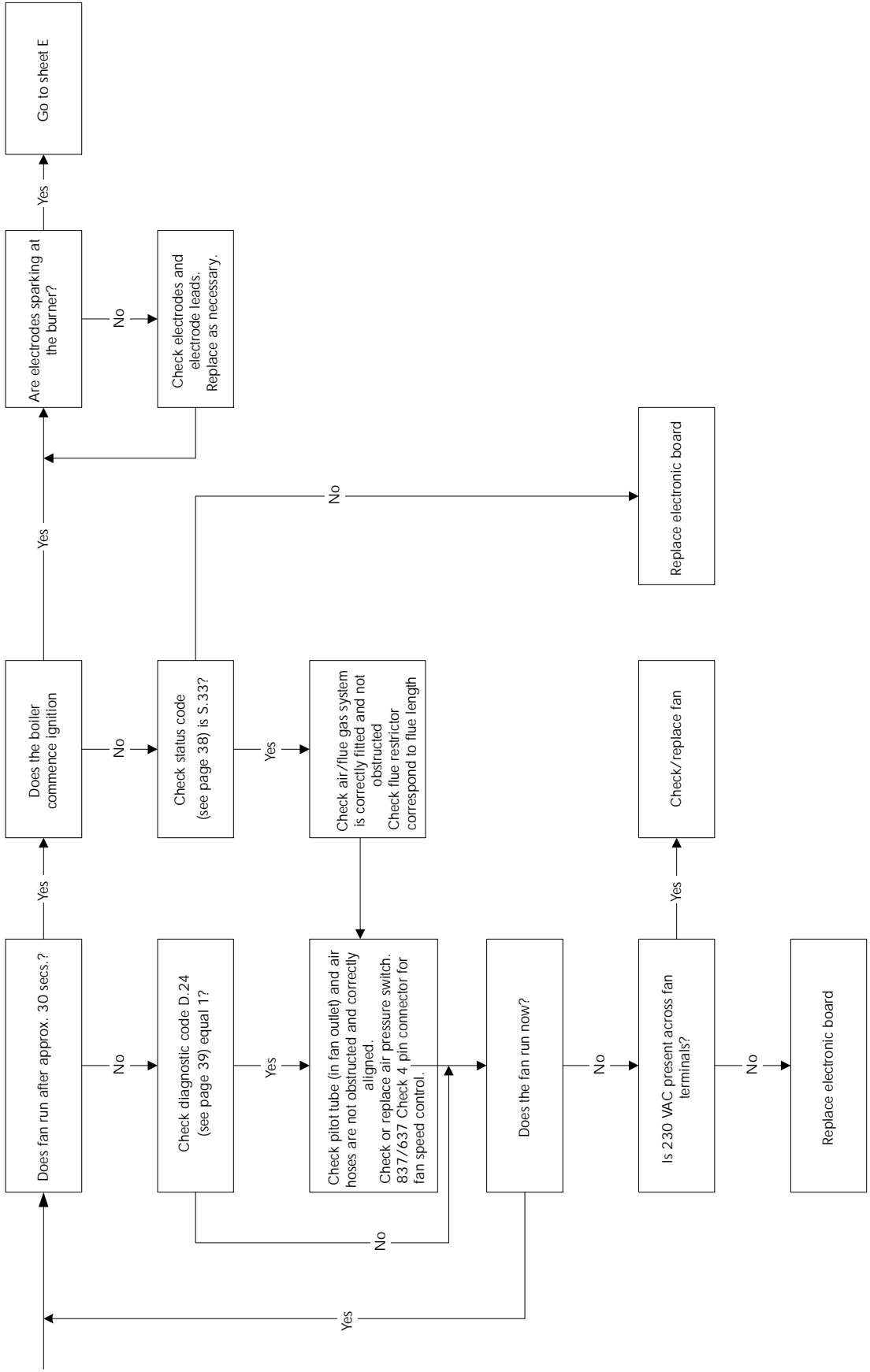
Sheet C

Check central heating and controls



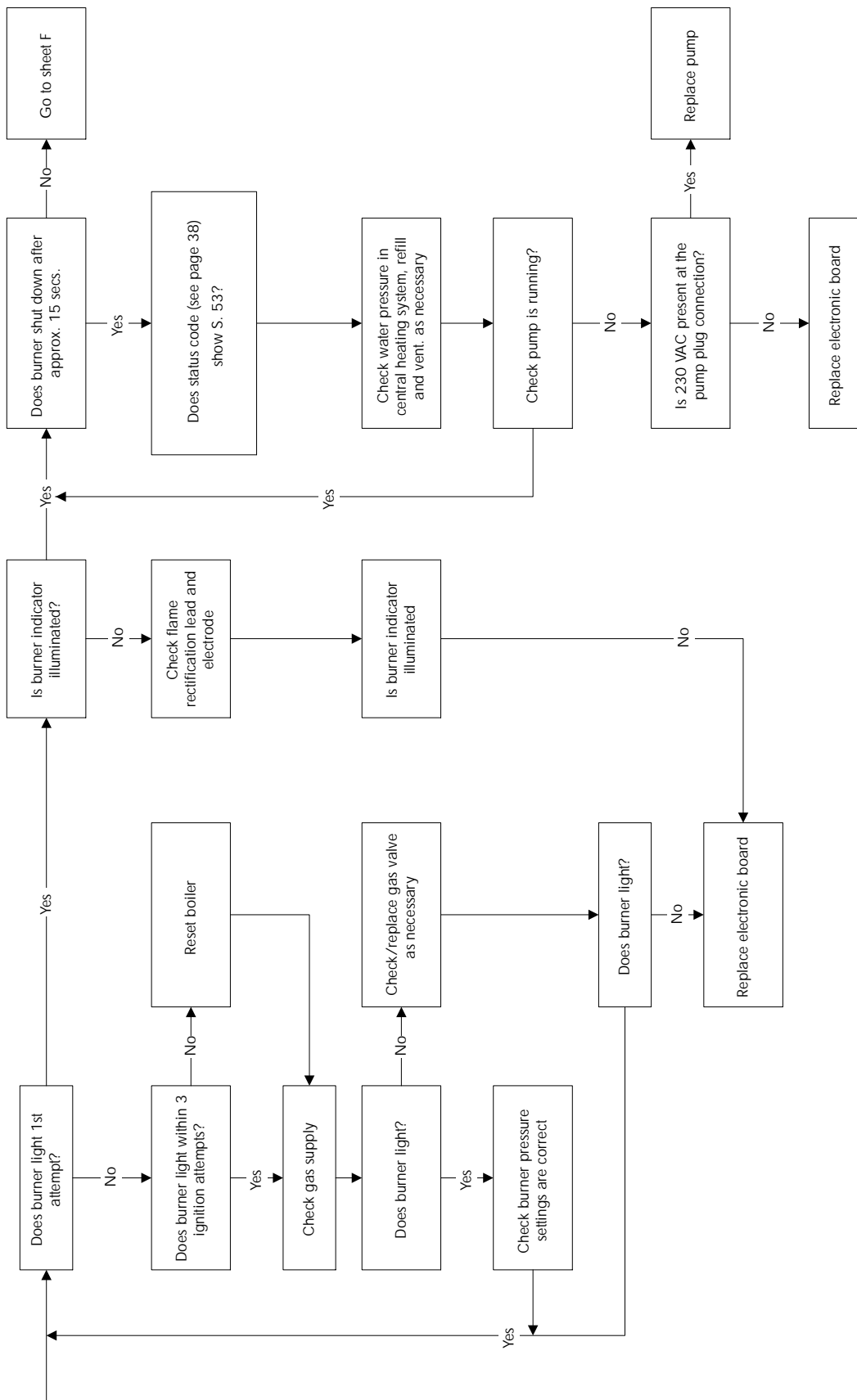
Sheet D

Check flue and ignition system



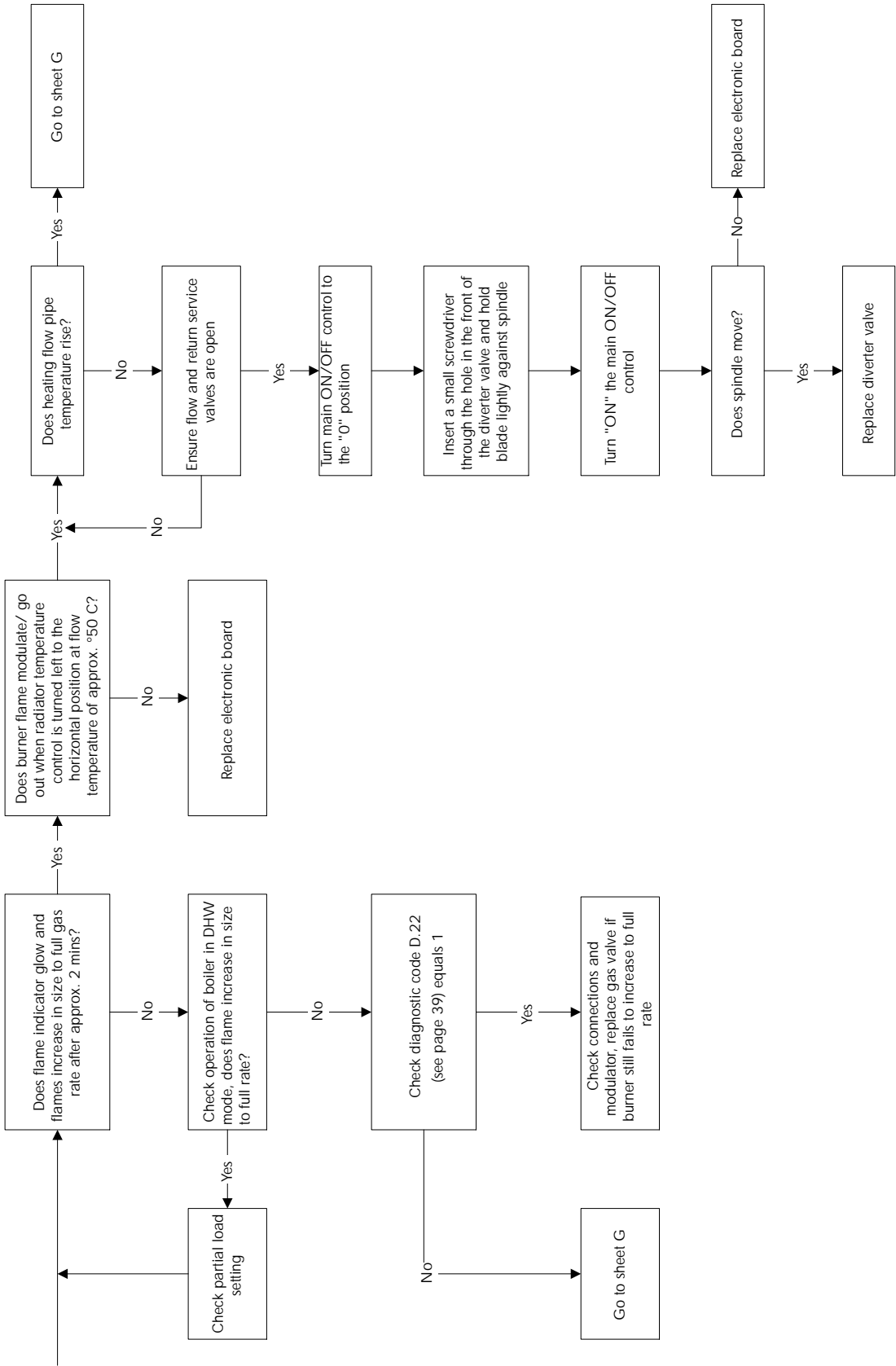
Sheet E

Check gas valve and central heating system pressure



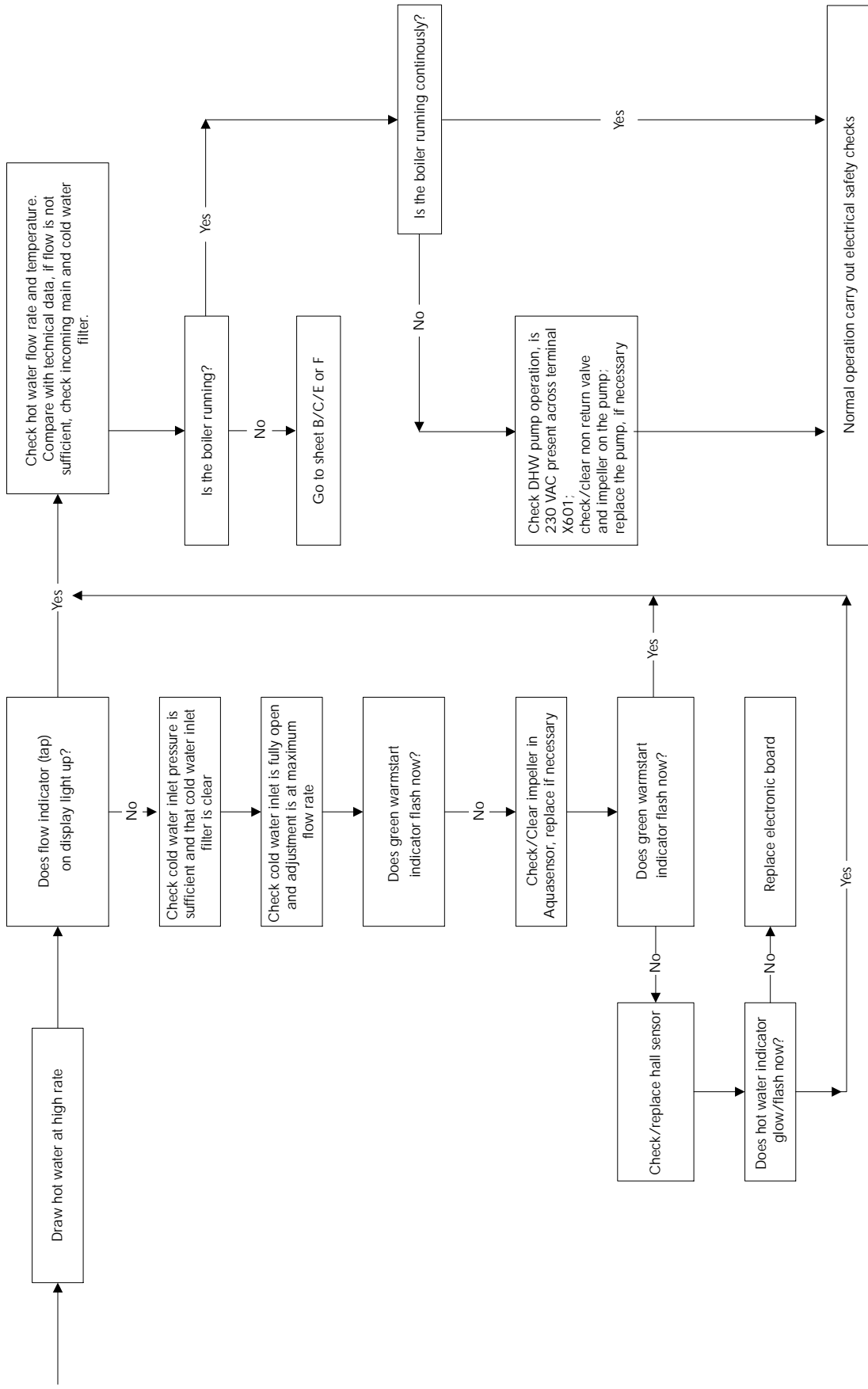
Sheet F

Check operation of burner and modulation



Sheet G

Check D.H.W operation



11 Diagrams

11.1 Functional Flow diagram: aquaPLUS VUI 362-7

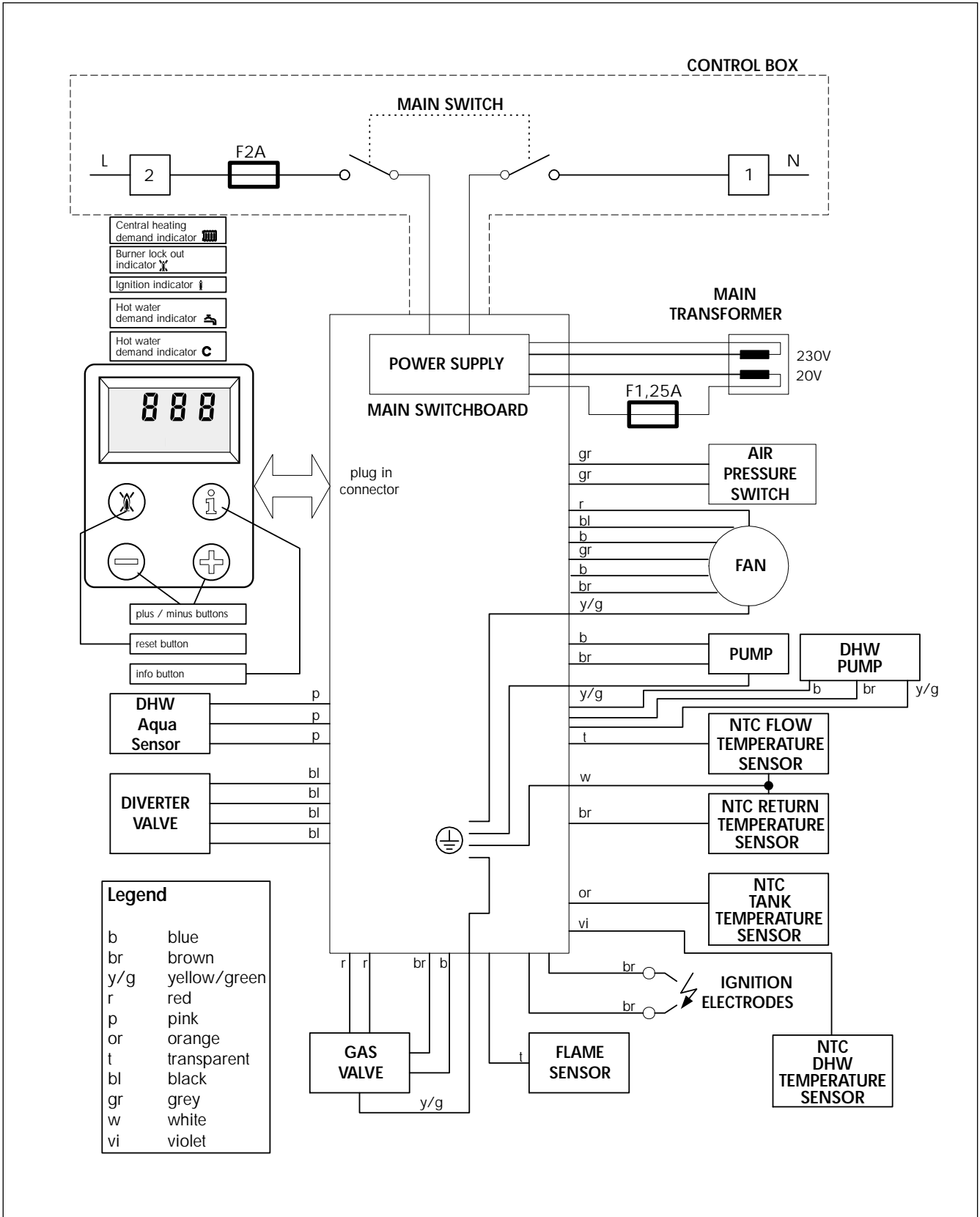


Fig. 11.1: Functional Flow diagram VUI 362-7

11 Diagrams

11.2 Wiring diagram: aquaPLUS VUI 362/7

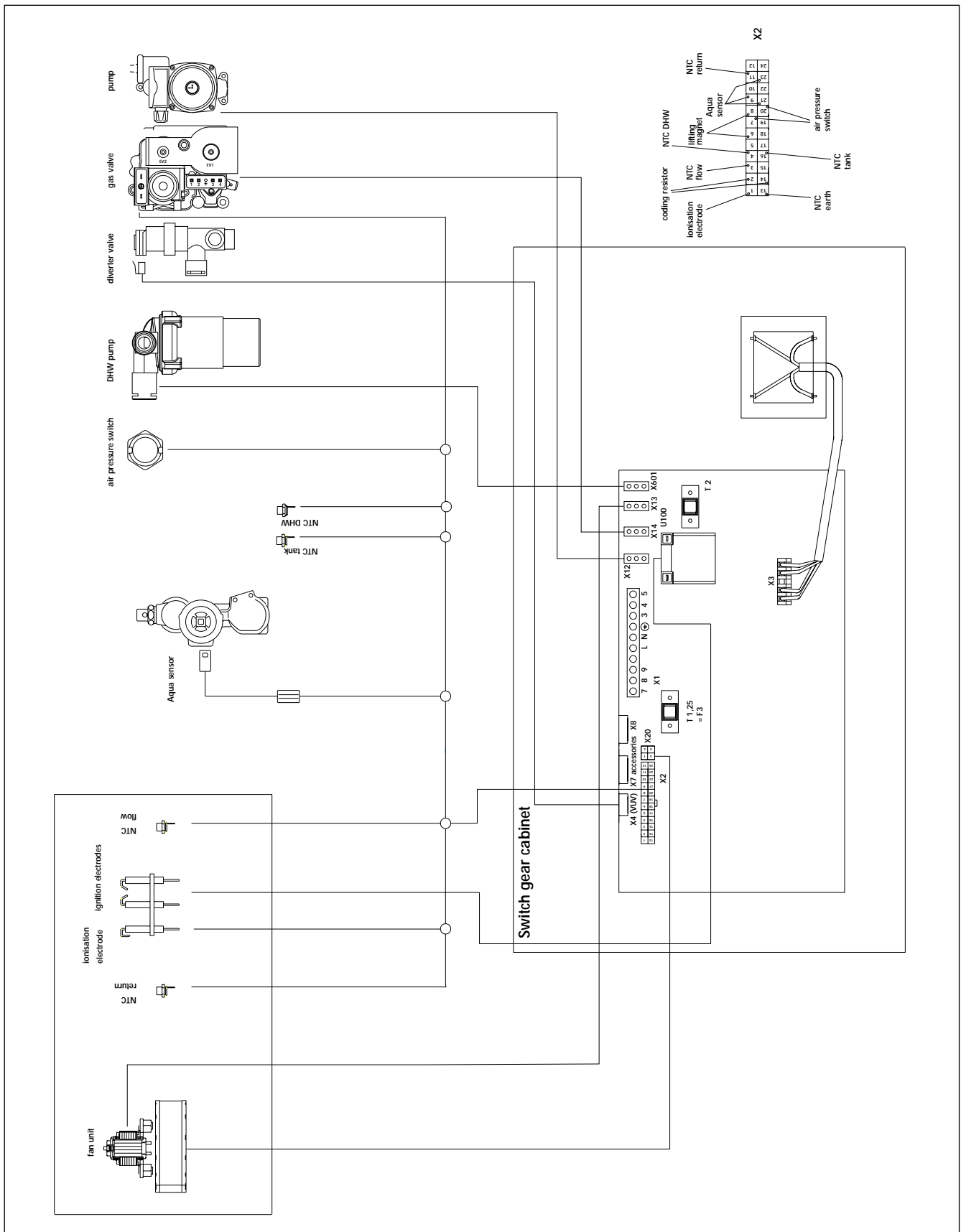


Fig. 11.2: Wiring diagram aquaPLUS

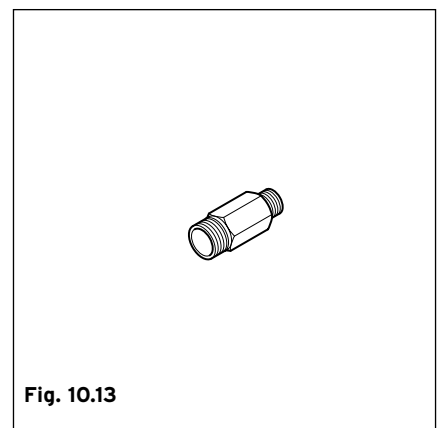
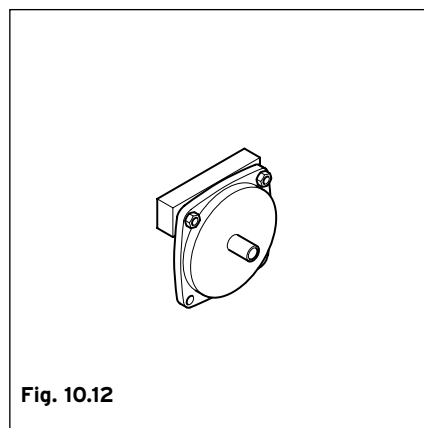
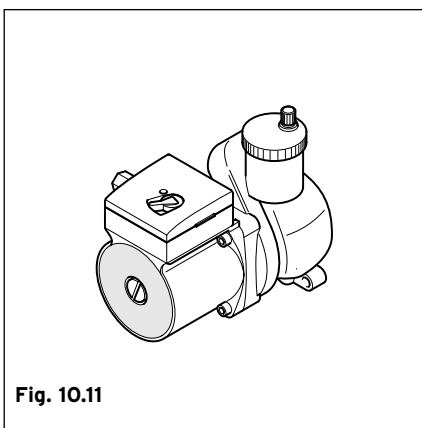
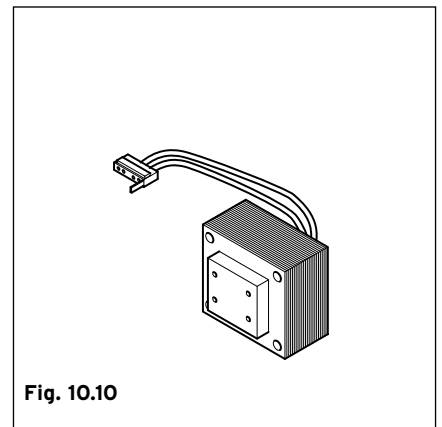
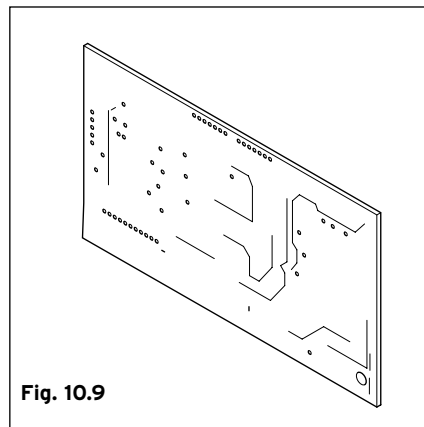
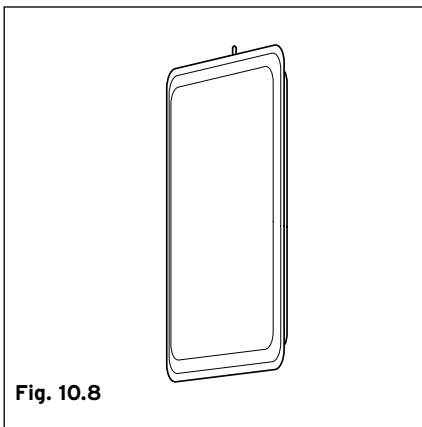
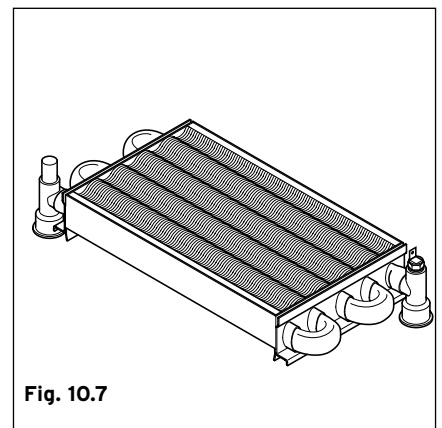
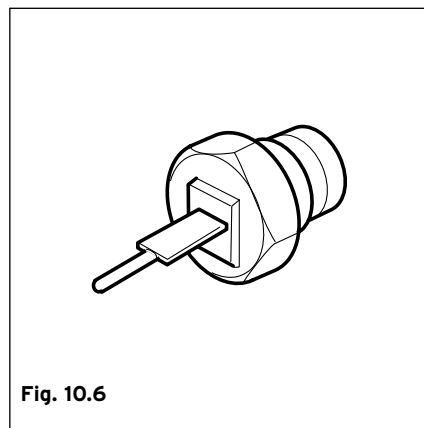
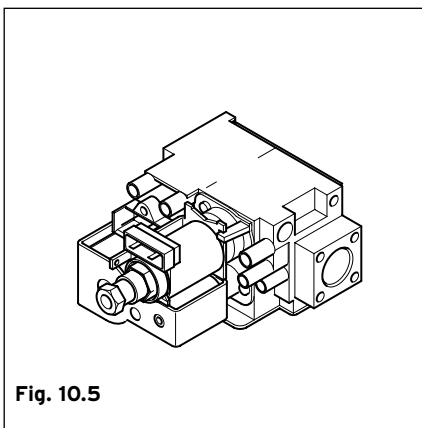
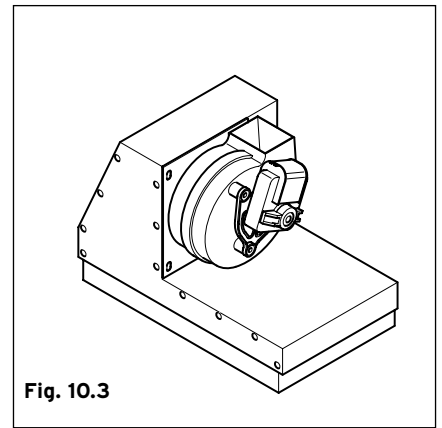
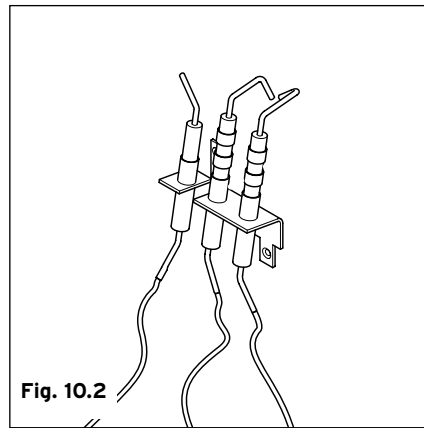
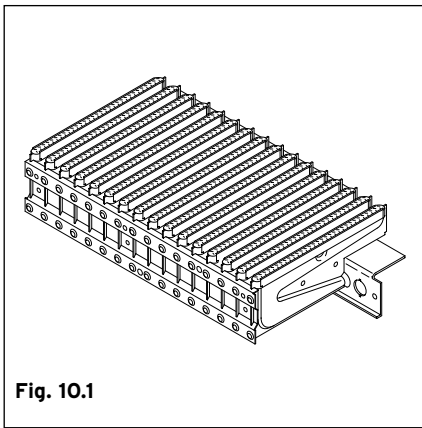
12 Short parts list

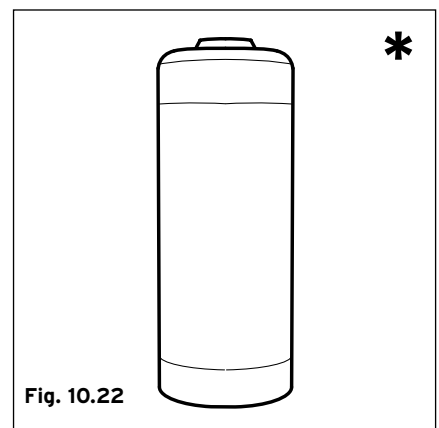
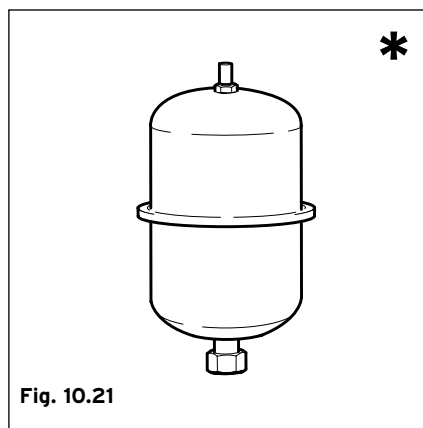
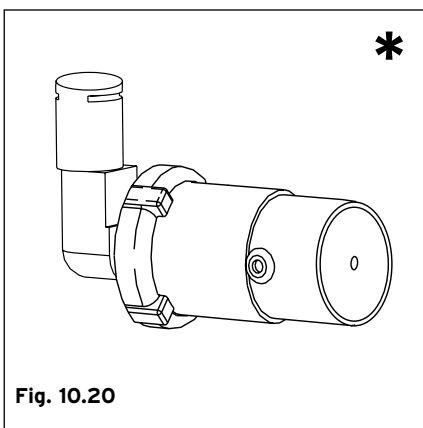
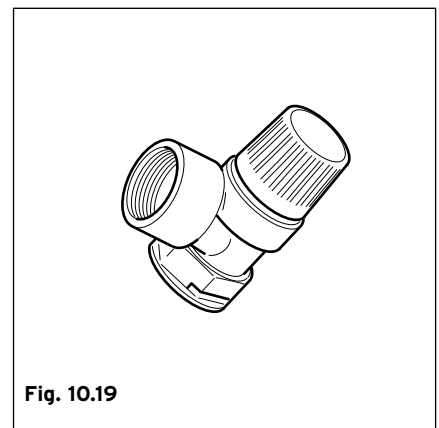
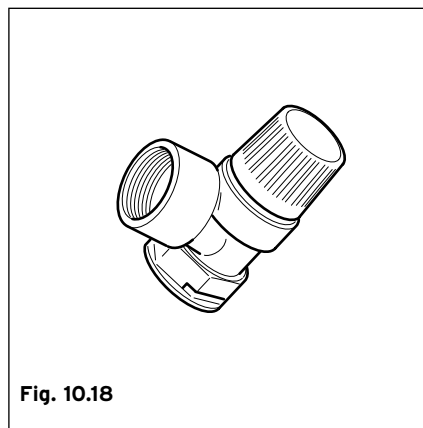
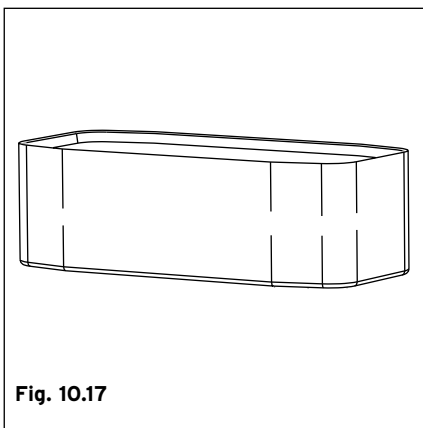
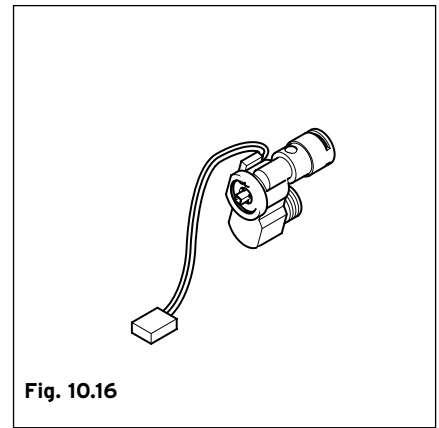
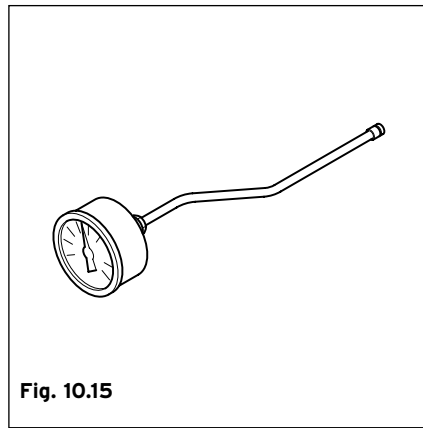
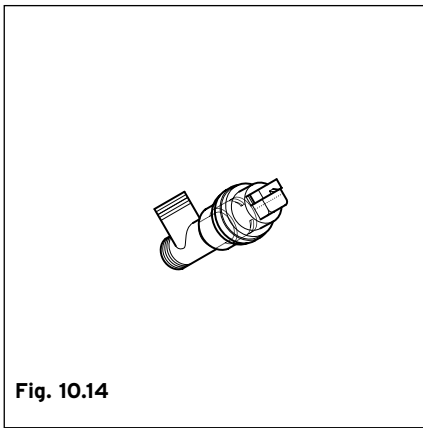
Description	Part No.	Key No.
Burner	Burner chamber group: 031 532 Distributor tube: Natural gas: 126 795 LPG: 126 796	Fig. 10.1
Ignition electrode	090 709	Fig. 10.2
Fan	190 215	Fig. 10.3
Gas valve	Natural gas: 053 462 LPG: 053 463	Fig. 10.5
Flow-NTC/Return-NTC Storage tank-NTC Warmstart-NTC	252 805	Fig. 10.6
Main heat exchanger	065 087	Fig. 10.7
Expansion vessel (10 l) (heating)	181 079	Fig. 10.8
Switch and control board	130 821	Fig. 10.9
Main transformer	287 450	Fig. 10.10
Pump	160 928	Fig. 10.11
Air pressure switch	050 577	Fig. 10.12
Automatic bypass	150 246	Fig. 10.13
Diverter valve	252 457	Fig. 10.14
Pressure gauge	101 271	Fig. 10.15
Aqua sensor	194 819	Fig. 10.16
DHW heat exchanger	064 724	Fig. 10.17
Pressure relief valve (heating)	190 732	Fig. 10.18
Pressure relief valve (DHW)	190 745	Fig. 10.19
DHW pump*	255 031 (Motor incl. impeller) 092 001 (Impeller housing incl. check valve)	Fig. 10.20
DHW expansion vessel (1,0 l)*	181 081	Fig. 10.21
Hot water store	15 l content: 064 072	Fig. 10.22

Table 12.1: Short parts list

* For these components, please observe the associated installation and removal instructions relating to spare parts.

12 Short parts list





* For these components, please observe the associated installation and removal instructions relating to spare parts.

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