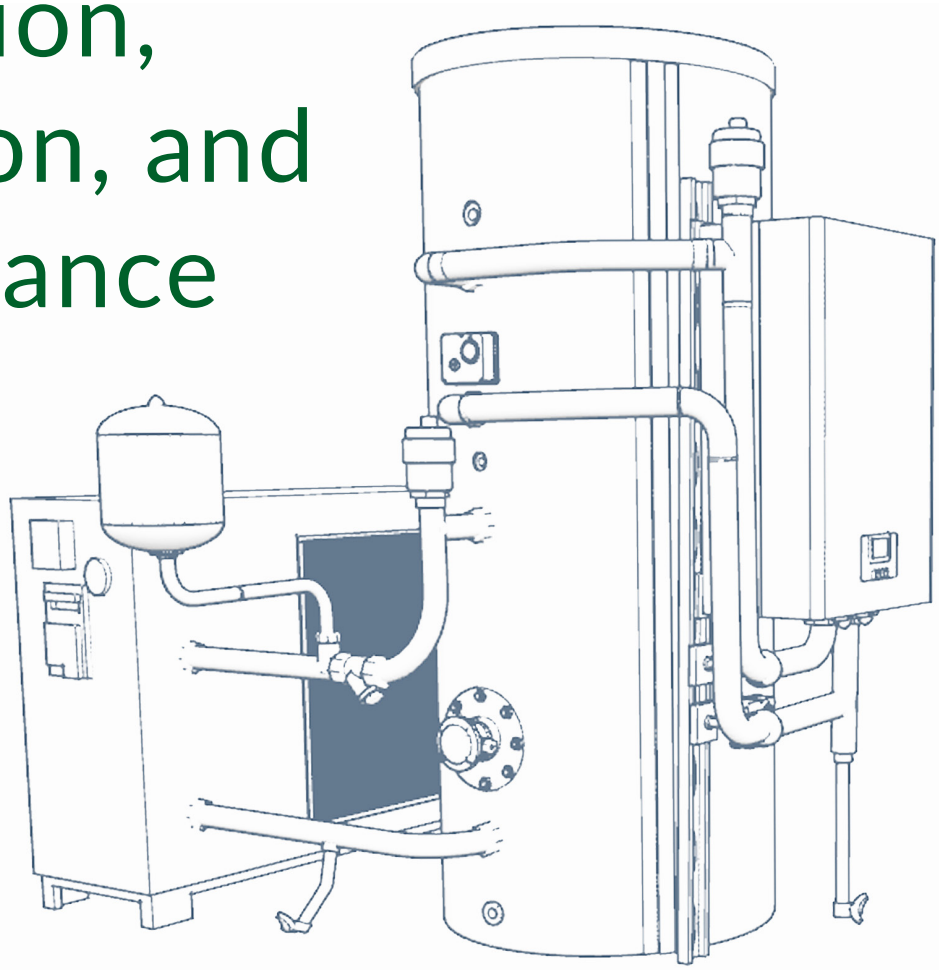
ADVECO
HOT WATER SPECIALISTS

Adveco FUSION

Packaged Electric Hot Water System

Installation, Operation, and Maintenance Manual



Warnings

This manual should be read and understood prior to installation or operation of any Adveco FUSION packaged hot water system. Failure to read this manual or follow its printed instructions may lead to personal injury, damage to the building, or damage to the water heating installation. All persons carrying out work on a FUSION hot water system must carry appropriate and current qualifications.

Equipment should be stored in a safe and dry place prior to installation to prevent damage.

How to Use This Manual

These instructions should be kept in a safe and accessible place near the equipment.

All general information, instructions and specifications listed within this manual apply to the full range of FUSION packaged hot water systems. Any information relevant to specific subtypes is contained within dedicated sections and is clearly identifiable by section titles.

For any queries or issues not covered by the scope of this manual, please contact the Adveco Technical Department using the contact details provided on page 49.

Glossary of Common Terms

Primary system: The sealed circulation circuits of the main system heat sources, i.e. the water within the electric boiler or air source heat pump. The primary circuits flow through heat exchangers within the hot water tank to transfer heat to the secondary system.

Secondary system: The free-flowing potable water side of the hot water, connected to the building cold water mains and running to the building outlets.

Redundancy: A level of reserve or backup heating capacity in a hot water system, typically present to ensure the availability of hot water in the event of a primary appliance failure.

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Company Reg : 09493966 T : 01252 551 540 E : enquiries@adveco.co I : www.adveco.co

System Description and Components

Adveco FUSION Packaged Hot Water Systems:

The Adveco FUSION is a range of electric, low carbon packaged hot water systems suitable for a wide range of commercial applications. The FUSION system offerings incorporate a variety of electric heat sources along with ancillary components designed to provide a complete and effective packaged hot water system suited to the needs of the application.

The FUSION is available in four differing configurations:

The **FUSION-E (FE)** package features an electric boiler as the primary heat source connected to a single-coil stainless steel hot water tank, supplied with all unvented and primary system ancillary components.

The **FUSION-Eplus (FEplus)** package features all the components of the FUSION-E package in addition to a backup electric immersion heater mounted in the hot water tank with a control panel featuring an automatic changeover and fault alert system. The additional immersion and controls serve to provide a level of redundancy to ensure continued operation for applications where an uninterrupted hot water service is essential.

The **FUSION-T (FT)** package expands the FUSION-E package to include a monobloc air source heat pump to serve as a renewable primary preheat source to a twin-coil hot water tank. The electric boiler connects to the upper coil as a top-up heat source to raise the preheated water to its final use and storage temperature. The FUSION-T is supplied with a central wiring station and unvented plus primary system ancillary components, and includes a destratification pump controlled by a time clock within the control panel.

The **FUSION-Tplus (FTplus)** package features all the components of the FUSION-T package in addition to a backup electric immersion heater mounted in the hot water tank with an upgraded control panel featuring an automatic changeover and fault alert system. The additional immersion and controls serve to provide a level of redundancy to ensure continued operation for applications where an uninterrupted hot water service is essential.

All FUSION packages are available in a range of pre-sized variants with options for air source heat pumps up to 12 kW, electric boilers up to 24 kW, reserve 6 kW immersion heaters, and stainless steel hot water tank sizes up to 750 litres. All hot water tanks feature right-hand or left-hand mounting bracket connections as standard, enabling compact indoor installations where the electric boiler can be mounted to the tank itself on the desired side. All packages include all required thermostats, sensors, gauges, pockets, valves, strainers, and expansion vessels, as well as pre-assembled pipework kits sized to each system type for rapid installation.

Note that pipework insulation and frost protection is not included and must be provided by the installer.

Installation Instructions

1. Responsibilities of the User

Hot water systems pose a potential risk for building occupants regarding temperature and biological risks. It is the responsibility of the building controller to assess the risk to the occupants of scalding or Legionella and put in place suitable steps to protect the occupants. The risk assessment must be carried out by someone suitably qualified. The following non-comprehensive list of documents and resources offer further guidance on responsibilities:

HSE ACoP L8
HSG274 Part 2
Health and Safety at Work Act
Workplace (Health, Safety and Welfare) Regulations
HTM 04 01 Part A and B
Building Regulations Part G
BS EN 806 All parts
BS 8558:2015
The Water Supply (Water Fittings) Regulations
CEN/TR 16355

And any other standards, laws, guidelines, or rules in force in the location of the installation, past or future, that are current at the time of installation. This installation manual complements these rules and must not be considered to override them in any way. Following the commissioning of a system and in compliance with the procedures and advice contained within this manual, responsibility lies with the building controller to maintain a safe standard of operation and regular maintenance procedures as required by the risk assessment. This includes ensuring that the installation is not operated at temperatures or pressures in excess of those stated on the equipment.

Failure to maintain a minimum of annual maintenance may void any and all warranties. Maintenance procedures should only be carried out by a suitably qualified person. For detailed maintenance information please consult the respective maintenance manuals for each major component part of your FUSION packaged system.

Adveco Ltd. advise that water heating systems in unoccupied premises, or ones that are subjected to long periods of shutdown, should be drained down to remove the risk of failure and/or damage occurring while the system is not being monitored. Refer to the draindown procedure found on page 48 or as detailed in the individual appliance manuals.

2. Responsibilities of the Installer / Designer

In compliance with the procedures and advice contained within this manual, responsibility lies with the installer to ensure that the equipment is correctly and safely installed in line with all local regulations and laws. In all cases, the relevant laws and regulations take precedence over the instructions contained within this manual.

Frost Protection: During normal working operation the system is protected against frost because it will be maintained at temperature, however consideration must be given to freezing of the water within the tank and pipework during periods of inactivity or shutdown. This is best dealt with by a frost thermostat (not supplied as standard) in the room to bring on the heat source and any secondary pumps at 5°C.

3. Requirements of the Installation

Any unvented cylinder installation should be notified to Building Control. This is best done through a Competent Persons Scheme by installers holding a valid unvented domestic hot water ticket.

The following documents set out the standards of installation that must be adhered to:

EN 806 All Parts
EN 8558:2015
The Water Supply (Water Fittings) Regulations
Electrical Equipment (Safety) Regulations
Building Regulations Part G

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Installation Instructions

4. Siting And Clearances

Choosing the Site

All equipment must be positioned to provide suitable clearances for access, maintenance, removal and replacement, and must include some means of leak protection or prevention. Suitable lighting must be available and an electrical isolation switch must be present within a reasonable distance of electrical appliances.
For a packaged FUSION hot water system, Adveco recommend clearances of no less than 600mm in front of the hot water tank connections and inspection port, with 200mm above the tank and 50mm around the rest of the tank circumference. The electric boiler should have a clearance of no less than 500mm in front of and above the appliance. For further details and requirements please refer to the individual appliance installation manuals.

Example clearances are shown overleaf in figures (1) for right-handed and figure (2) left-handed hot water tank and mounted boiler installations:

Setting up the Site

All component parts of the FUSION hot water system must be installed on a stable, level, fire resistant base or wall support (where applicable) capable of supporting the appliance(s) when full. Floor loading calculations should accommodate the total filled weight in addition to that of ancillary components, pipework, and fittings. For the weight of component parts, please consult the relevant appliance installation manual.

Siting the Hot Water Tank and the Boiler Mount Position

The Adveco ATSI and ATST are stainless steel hot water tanks with fixed internal heating coils. FUSION-E and Eplus systems feature an ATSI tank, which has one coil in the lower half of the tank. FUSION-T and Tplus systems feature an ATST tank, which has two coils, one each at high and low level. All tanks have been designed with all main connections at the front, and boiler mounting connections and spare sensor connections on both the left and right sides.

All hot water tanks are provided pre-fitted with insulation, which can be removed for the purposes of manoeuvring but which should be replaced and secured prior to the installation of pipework or ancillary equipment. For full hot water tank details please refer to the appliance Installation, Operation, and Maintenance Manual included with the tank or available online at www.adveco.co.

The availability of connections means that most installations will be suitable for siting the tank against a wall or in a corner. The electric boiler can be mounted on either the left or the right hand side of the hot water tank, as determined by the initial choice of fusion system purchased and the corresponding primary pipework kit orientation. When identifying the desired boiler mount position, consideration should be given to the required clearances and the layout of the surrounding area and equipment.

ATST tanks installed as part of a FUSION-T or FUSION-Tplus system should be sited with consideration to the position of incoming pipework from the externally sited monobloc air source heat pump. For further details on these systems, please refer to the installation instructions on pages:

FUSION-T: Page 30
FUSION-Tplus: Page 38

Additional System Components

Installation Instructions

4. Siting And Clearances

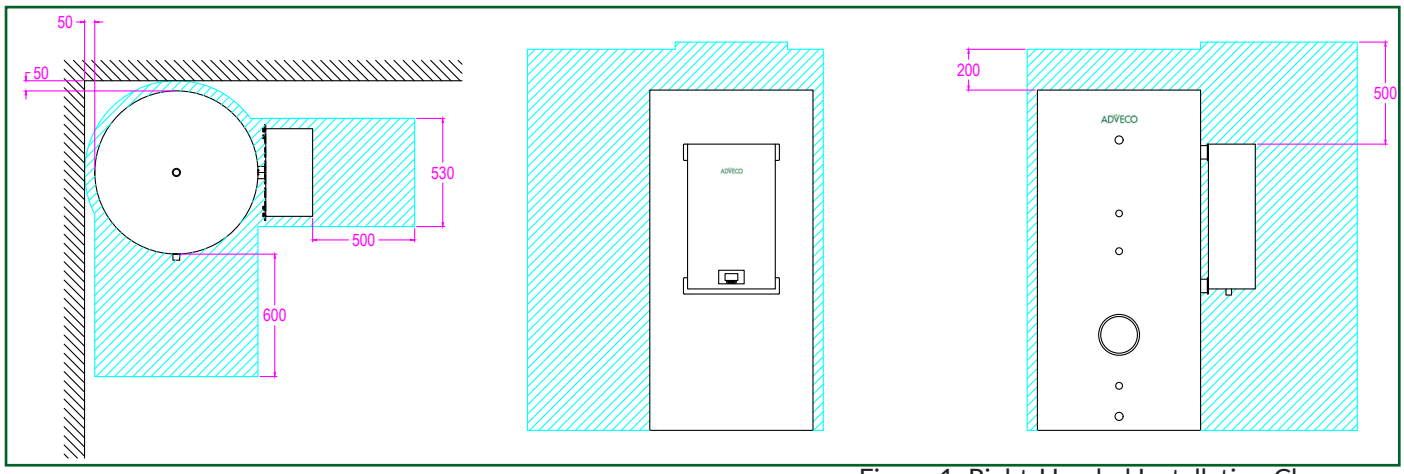

Figure 1: Right-Handed Installation Clearances

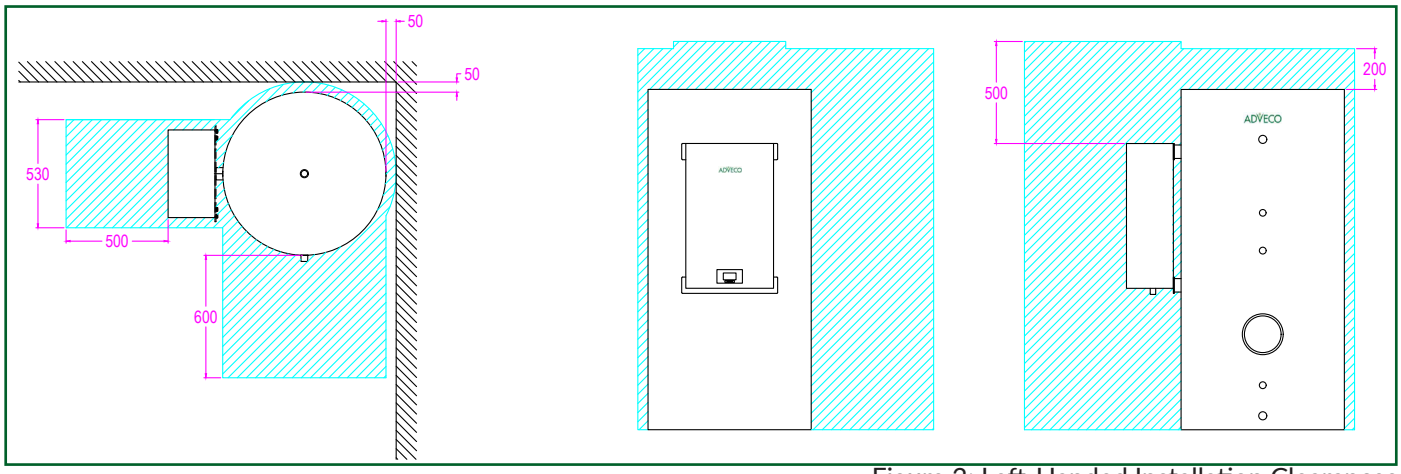

Figure 2: Left-Handed Installation Clearances

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Installation Instructions

5. Bracket Assembly, Unistrut Support, and Boiler Mounting

Warning: Exposed metal edges and heavy appliances. Safety gloves, personal protective equipment, and safe lifting practices are recommended when following these instructions.

FUSION packaged hot water systems are designed with the intent of mounting the electric boiler on to the side of the hot water tank. In the event that this is undesirable, please refer to the Ardent Premium Electric Boiler Installation, Operation, and Maintenance Manual supplied with the equipment or available online at www.adveco.co for specific boiler siting and installation instructions. The following instructions cover the setting up of the mounting brackets and pipework support for the electric boiler.

- Prepare the hot water tank connections: Following final siting of the hot water tank, the insulation covers from the desired mounting brackets must be removed (figure 3, 5). The tank insulation jacket can be unzipped as needed in order to access the hard black circular covers over the mounting bracket connections (figure 4). Once complete, ensure the tank insulation jacket is reseated and secured.

- Fit the boiler mounting brackets: The mounting brackets screw directly into the exposed mounting connections on the chosen side of the tank (figure 6). Pipe sealing thread or grease can be used to reduce binding and tightening between bracket and tank. The top bracket must be tight enough to support the weight of the boiler without moving, but should not be over-tightened. The correct orientation of the bracket will have the narrow pair of screw holes topmost. Ensure both brackets protrude an equal amount from the tank shell for best support of the boiler. Ensure both brackets are sturdy and level.

- Fit the unistrut support: The supplied length of unistrut is pre-fitted with screws, washers, and nuts loosely fitted into the correct locations for the chosen FUSION tank configuration. Position the unistrut to hang vertically behind the mounting brackets, aligned with the outermost left bracket screw holes for boilers mounted on the right hand side of the tank, or aligned to the outmost right bracket screw holes for boilers mounted on the left side of the tank. The unistrut should be orientated with the rubber lined clips at lower level and facing away from the tank, and with the screws on the unistrut level with the outermost screw hole on the brackets (figure 8). Remove the pre-fitted screws and use to affix the unistrut to each bracket. Ensure the hot water tank, unistrut, and brackets are all stable and secure.

- Fit boiler mounting bolts. Loosely screw the supplied pair of M8 bolts into the available (narrow) pair of screw holes in the top mounting bracket. Screw until only a few millimetres of thread remains visible (figure 7).

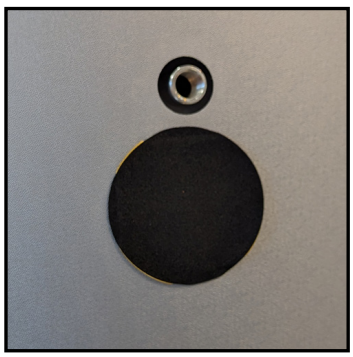

Figure 3

Figure 4

Figure 5

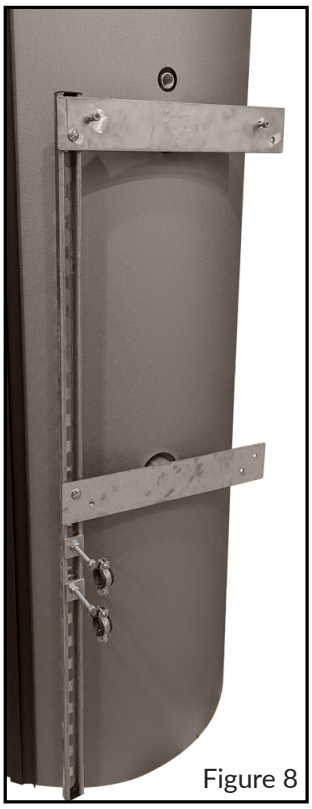

Figure 8

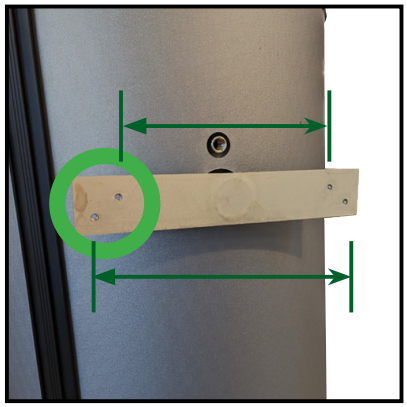

Figure 6

Figure 7

Mounting The Ardent Electric Boiler

- Remove boiler cover: The front casing of the electric boiler can be detached by removing the three front-aligned screws on each of the top and bottom of the boiler housing, circled below in green (figure 9). An internal earthing cable must be unclipped from inside the front casing before the cover can be fully removed. This cover and the internal earth cable must be re-fitted upon completion of the installation. Important: Do not remove the rear 3 screws securing the back side of the boiler housing, crossed out below in red.

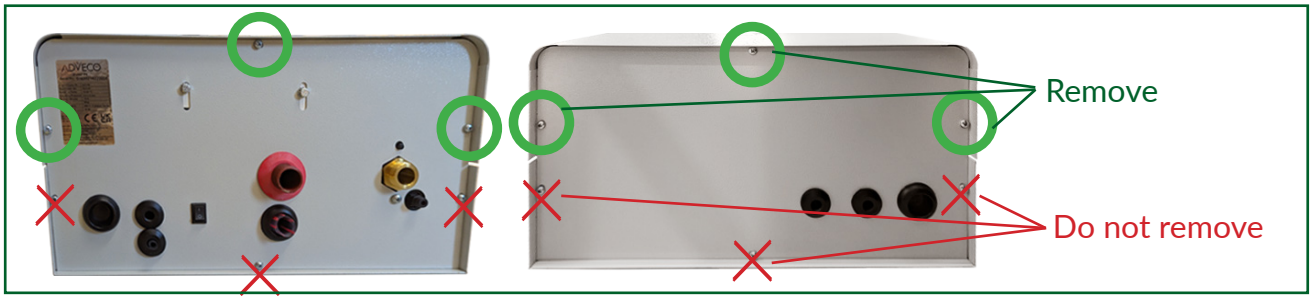

Figure 9

- Fit the boiler: Locate the mounting holes on the upper rear of the electric boiler. Carefully lift and align the holes to the M8 mounting bolts on the top bracket and push the boiler into place over the bolt heads (figure 10), then lower the boiler into place. Once lowered, tighten the bolts to secure the appliance. Ensure the boiler is sitting level and stable (figure 11).

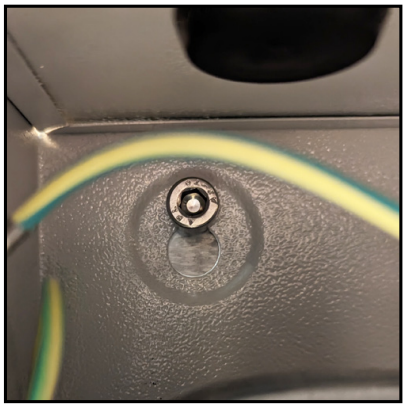

Figure 10

Figure 11

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Adveco Control Panel

The Adveco control panels supplied with FUSION-T, -Tplus, and -Eplus systems are wiring centres designed to provide power and controls to the FUSION installation. The control panel must be installed inside a building and be mounted on a stable and suitable vertical surface such as a wall or unistrut frame in a dry and secure area adjacent to the building water heating installation. The panel should be installed at an accessible height and must have suitable clearance around and in front to allow cable installation and maintenance access. Should the panel be installed away from the water heating installation, additional isolators must be installed and labelled near the installation and its components.

FUSION FT, FTplus, and FEplus Systems Only

Control panels supplied with FEplus and FTplus systems feature an SMS dial-out fault alert feature. It is recommended that control panels for these systems be installed in an above-ground area with good mobile reception for reliability of the internal GSM module. Basement installations or those in areas of poor mobile reception may require a remote or extended antenna.

FUSION FTplus and FEplus Systems Only

FPi32 Air Source Heat Pump

The Adveco FPi32 air source heat pump is a compact monobloc unit which must be installed outside a building in a well ventilated location. The appliance must be positioned with suitable clearances for unobstructed air flow and for maintenance access. Suitable drainage to evacuate condensation must be included around the installation location. To minimise potential noise pollution it is preferable to position the appliance away from living areas.
For locations liable to severe climate conditions such as snow and heavy rain, the appliance should be sited a minimum of 500mm above any predictable snow, flood, ice, or plant debris level.
For full details please refer to section 5 of the FPi ASHP Installation, User, and Maintenance Manual.

FUSION FT and FTplus Systems Only

Backup Electric Immersion Heaters

FEplus and FTplus systems are supplied with a direct electric immersion heater for use as a backup heat source. This immersion heater should be installed into the inspection flange opening of the hot water tank according to the installation instructions of the supplied Installation, Operation, and Maintenance Manual for the immersion heater.

Adveco recommends a service clearance of at least 500mm extending from the immersion heater installation location to facilitate removal, cleaning, and replacement of the immersion heater assembly.

FUSION FTplus and FEplus Systems Only

Installation Instructions

6. Secondary Pipework Installation

General

A standard installation will include the FUSION hot water tank as part of an unvented mains-fed system. All pipework should be correctly sized to carry the maximum simultaneous demand of hot water for the building. This may or may not be the same size as the cold feed connection.

Cold Feed

All cold feed pipework must be fitted with safety equipment to prevent overpressure and allow for the expansion of hot water in the system. This must include a check valve and a pressure relief valve set normally to the maximum working pressure of the tank, but no more than 1.5 bar higher than the maximum working pressure in line with the regulations set out in EN 8558 section 4.3.29.1.

All mains-fed systems should additionally include a pressure reducing valve and strainer. The standard kit supplied by Adveco has a variable pressure reducing valve with settings available between 1 bar and 5.5 bar. The domestic hot water pressure must exceed the primary system pressure at all times to protect against contamination of the secondary water in the unlikely event of a leak from a coil.

There must not be any type of isolation between the pressure relief valve and the vessel. Safety equipment should be installed at the cold inlet unless otherwise specified.

The cold feed equipment should be supplied as part of an unvented kit by Adveco Ltd., inclusive of an expansion vessel and temperature and pressure relief valve with a pressure setting at least 0.5 bar above the pressure relief valve setting but no more than 1.5 bar higher than the maximum working pressure of the tank, in line with EN 8558 section 4.3.29.1. A complete unvented kit has been supplied by Adveco as part of your chosen FUSION package, suitably sized for the packaged appliances in most operational circumstances.

The expansion vessel should be calculated to be roughly 5% of the total hot water system volume for systems operating at around 3 bar. Please contact the Adveco Design Department to obtain a full calculation if required, or for high pressure applications. The expansion vessel pressure must be set equal to the cold fill pressure of the system, and must be set with no pressure on the wet side of the membrane. The expansion vessel must be situated on the cold feed pipe. For tanks arranged in series, only one expansion vessel should be used at the beginning of the system. Consideration may be given to flow-through type expansion vessels for systems identified as high risk.

The expansion vessel branch can have a lock shield valve so long as the relief valve is not on the same branch.

Drain

The cold feed is located at the lowest part of the hot water tank to meet anti-Legionella requirements. A drain should be installed in the cold feed at the lowest point, before the connection to the tank. The drain valve shall be of suitable size to allow draining of the tank in a reasonable amount of time. It is recommended that a 1/4 turn lever valve and plug or cap are used and that the valve size be one size smaller than the cold feed connection size. A suitable drain or gulley should be provided to allow draining of the tank.

Vented Installations:

In case of a vented system the unvented kit can be omitted. From the hot flow there must be an uninterrupted open vent with no valves, of at least 19mm internal diameter, reaching above the water level of the cold water tank and discharging to a safe place (not into the cold tank). It is considered good practice to fit a temperature and pressure relief valve even on a vented system.

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Installation Instructions

From this point onwards, the installation instructions differ depending upon the type of FUSION system supplied. Please proceed to the relevant section for your chosen FUSION system.

FUSION-E

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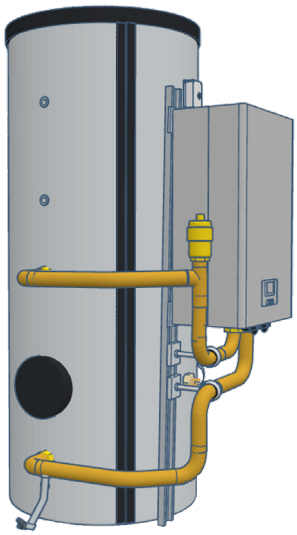

FUSION-Eplus

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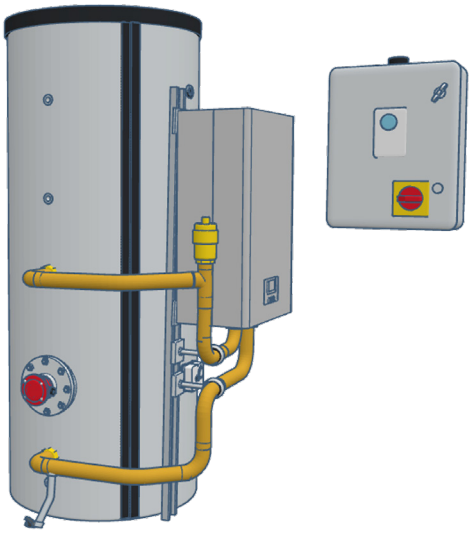

FUSION-T

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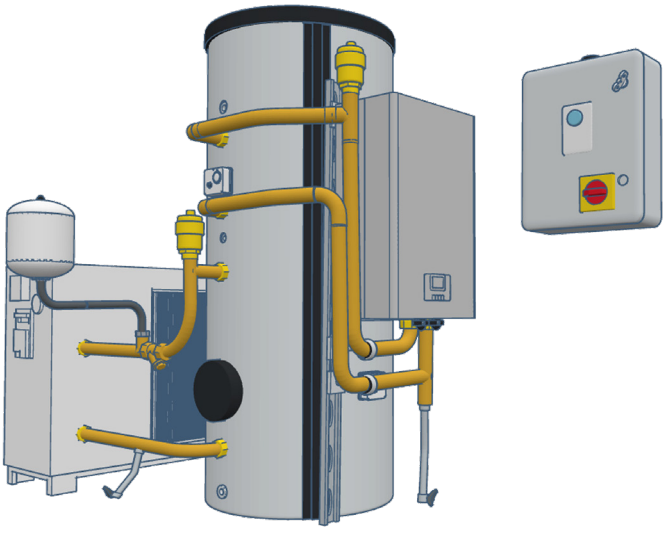

FUSION-Tplus

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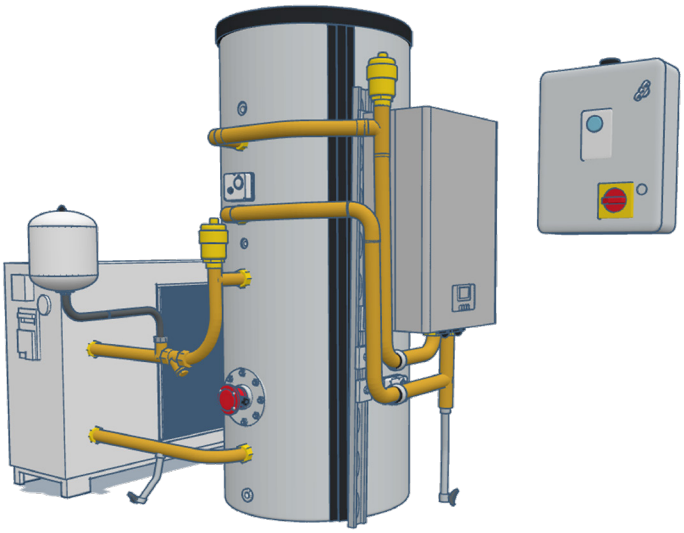
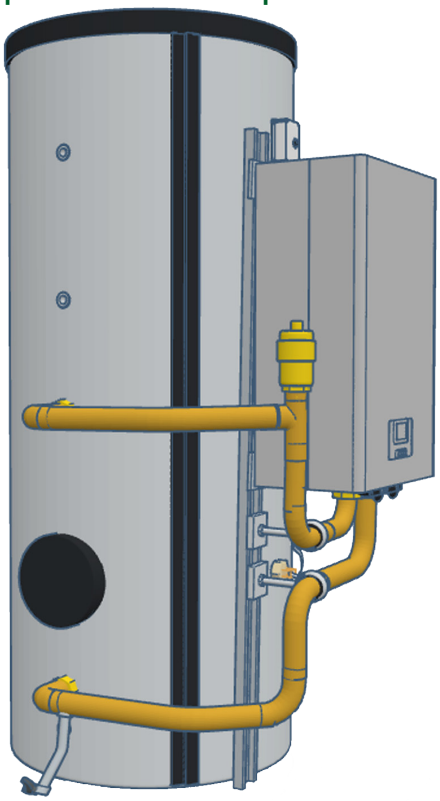


Installation Instructions: FUSION-E

7. FUSION-E System Description and Components



For full system schematics and wiring diagrams, please see Appendix *a*

Note: Example drawing for right-hand installations. This installation can be mirrored to the other side of the tank.

FUSION-E Package Component List:
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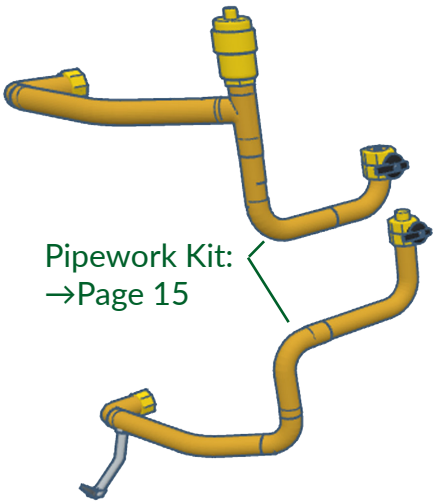

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Cold Feed:
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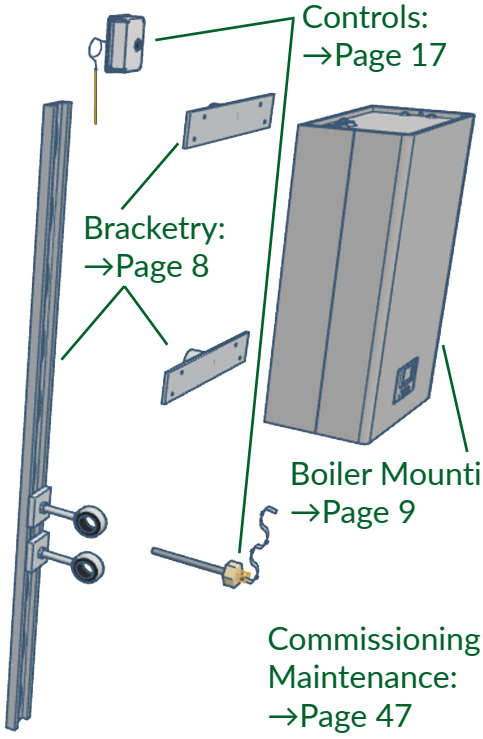

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Installation Instructions: FUSION-E

7. FUSION-E System Description and Components

The **FUSION-E (FE)** prioritises use of an electric boiler to provide a realiable, high capacity, and maintenance-friendly single-stage electric hot water system. The package features a simplified controls system used to provide power and integrate all components.

The FE is available in the following component configurations. Each configuration is available with left- and right-handed pipework kits for boiler mounting, suffixed with 'L' and 'R' respectively. For further details of each component, please contact Adveco.

FUSION FE Variant	Hot Water Tank Model	Electric Boiler Model	Ancillary Components
FE 300-9	ATSI 300	Ardent P9 (9 kW)	All FE systems: Boiler pipework kit (left or right handed) including union fittings 2x Boiler mounting brackets and bolts Unvented components kit: valve set, expansion vessel, temperature and pressure relief valve Temperature and pressure gauge Boiler system filling loop Automatic air vent Corrosion inhibitor 2x Sensor pockets and clips Overheat thermostat DHW Temperature sensor (packaged with boiler)
FE 300-12	ATSI 300	Ardent P12 (12 kW)	
FE 300-24	ATSI 300	Ardent P24 (24 kW)	
FE 400-9	ATSI 400	Ardent P9 (9 kW)	
FE 400-12	ATSI 400	Ardent P12 (12 kW)	
FE 400-24	ATSI 400	Ardent P24 (24 kW)	
FE 500-9	ATSI 500	Ardent P9 (9 kW)	
FE 500-12	ATSI 500	Ardent P12 (12 kW)	
FE 500-24	ATSI 500	Ardent P24 (24 kW)	
FE 580-9	ATSI 580	Ardent P9 (9 kW)	
FE 580-12	ATSI 580	Ardent P12 (12 kW)	
FE 580-24	ATSI 580	Ardent P24 (24 kW)	
FE 750-9	ATSI 750	Ardent P9 (9 kW)	
FE 750-12	ATSI 750	Ardent P12 (12 kW)	
FE 750-24	ATSI 750	Ardent P24 (24 kW)	

Installation Instructions: FUSION-E

8. Primary Pipework Installation

General

The FUSION packaged hot water system is supplied with a pre-assembled primary pipework kit (figure 12) designed and shaped to precisely fit the supplied hot water tank. The ATSI hot water tank supplied as part of FUSION-E systems features one fixed internal heat exchange coil in the lower half of the tank. The supplied primary pipework kit is sized to connect between the coil inlet/outlets and the electric boiler flow and return connections when mounted to the side of the tank.

For detailed installation instructions for each appliance in the FUSION-E system please consult the relevant product installation manual(s). For installation reference diagrams please refer to the system schematics included as appendix *a* at the rear of this manual.

Packaged Pipework Installation:

- Prepare tank connections and brackets: Remove any plastic dust caps or covers over the tank coil connections and loosen the screws of the rubber-lined clips on the unistrut frame (figure 13).
- Prepare boiler pipework: Each length of supplied pipework has been manufactured to the specific dimensions of the chosen tank for the corresponding boiler connection. Offer up the lengths of pipework to the mounted boiler and tank to identify the correct connections and orientations.
- For systems with hot water tanks of 580 litres or below, the hot water tank will have flat-faced connections on the coil inlet and outlets. For such systems, the pipework kit will be supplied with a pair of gaskets (figure 14). For hot water tanks over 580 litres, the coil connections are threaded and an appropriate thread sealant should be used instead of a gasket.
- Fit boiler pipework: Loosely fit each length of the boiler pipework kit to the relevant coil inlet or outlet connection on the hot water tank (figure 15). Connect the included valved ends to the boiler flow and return connections (figure 16), and secure the pipework using the rubber-lined clips on the unistrut (figure 17). Once correctly aligned, tighten and secure all connections and repeat for both sections of pipework.

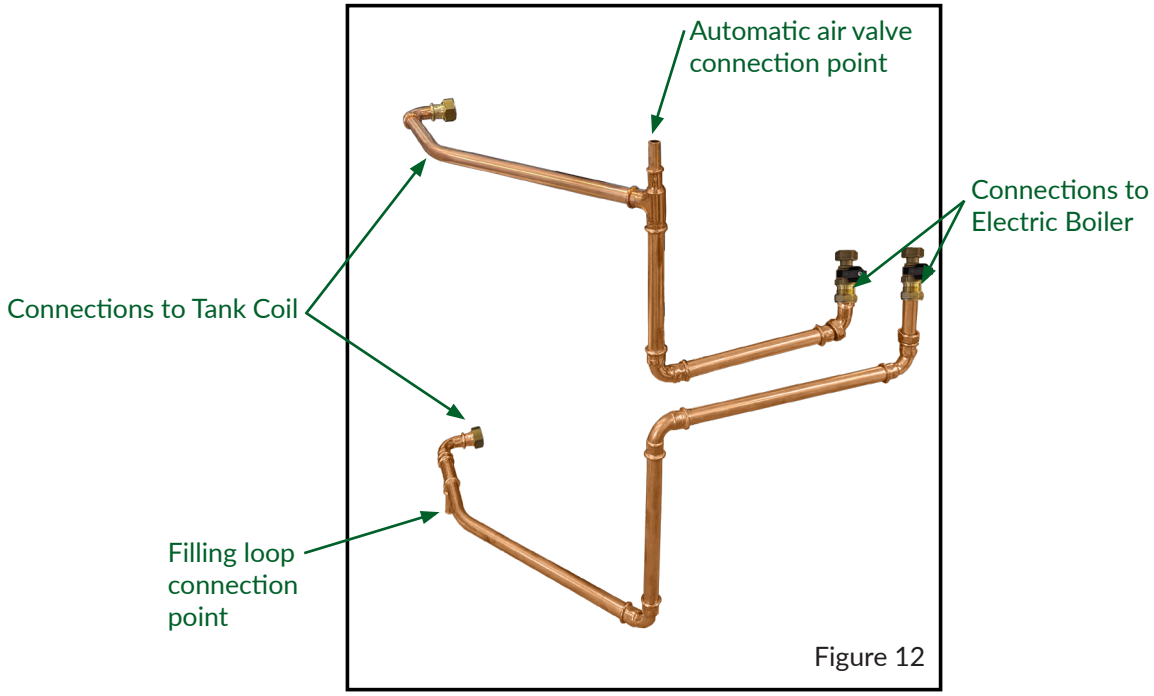

Figure 12

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Installation Instructions: FUSION-E

8. Primary Pipework Installation

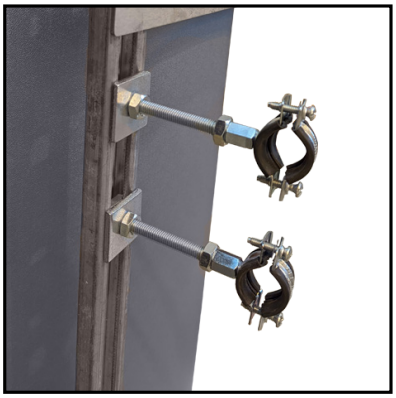

Figure 13

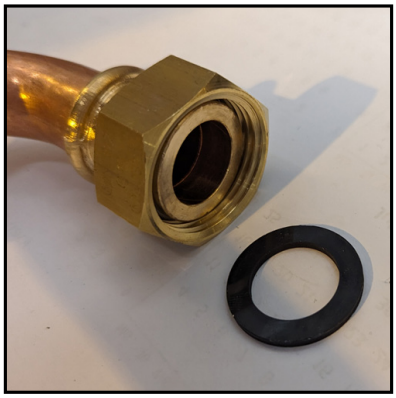

Figure 14

Figure 15

Figure 16

Figure 17

- Fit boiler air vent: The supplied automatic air vent and olive must be fitted to the available connection at the highest point of the pipework (figures 18, 19).
- Fit boiler filling loop: The supplied closed circuit filling loop must be fitted to the available connection at the lowest point of the pipework (figure 20).

Figure 18

Figure 19

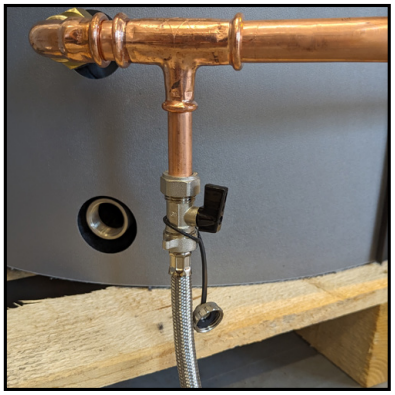

Figure 20

Installation Instructions: FUSION-E

9. Electrical Installation and Controls

General

Every hot water tank featuring a heat source must be fitted with a method of temperature control and overheat protection. Temperature control can be achieved either by a control thermostat in the tank, a sensor, or a differential control between the tank temperature and the heat source. This must be set to ensure a hot water storage temperature of at least 60°C throughout the tank. The temperature control setting should be subject to a risk assessment in accordance with local building regulations. In most cases, it is recommended to fit thermostatic mixing valves on all outlets for personal use.

The temperature control method and secondary return configuration should be designed to provide a water temperature at outlets of at least 50°C (55°C in healthcare premises) within one minute, and a minimum return temperature of 50°C.

Every tank that contains a heat source must be fitted with a non-self-resetting overheat thermostat capable of preventing heat entering the tank from all sources, by either stopping the primary flow or by turning off the heat source. Stopping the primary flow may be achieved by a spring-loaded zone valve, or by turning off the pump, providing that thermosiphoning cannot occur.

The Adveco FUSION-E packaged hot water system is supplied with the required control sensor and overheat thermostat for the safe and efficient operation of the system. These should be installed according to the instructions below and the system schematic and wiring diagram included as appendix *a* at the rear of this manual.

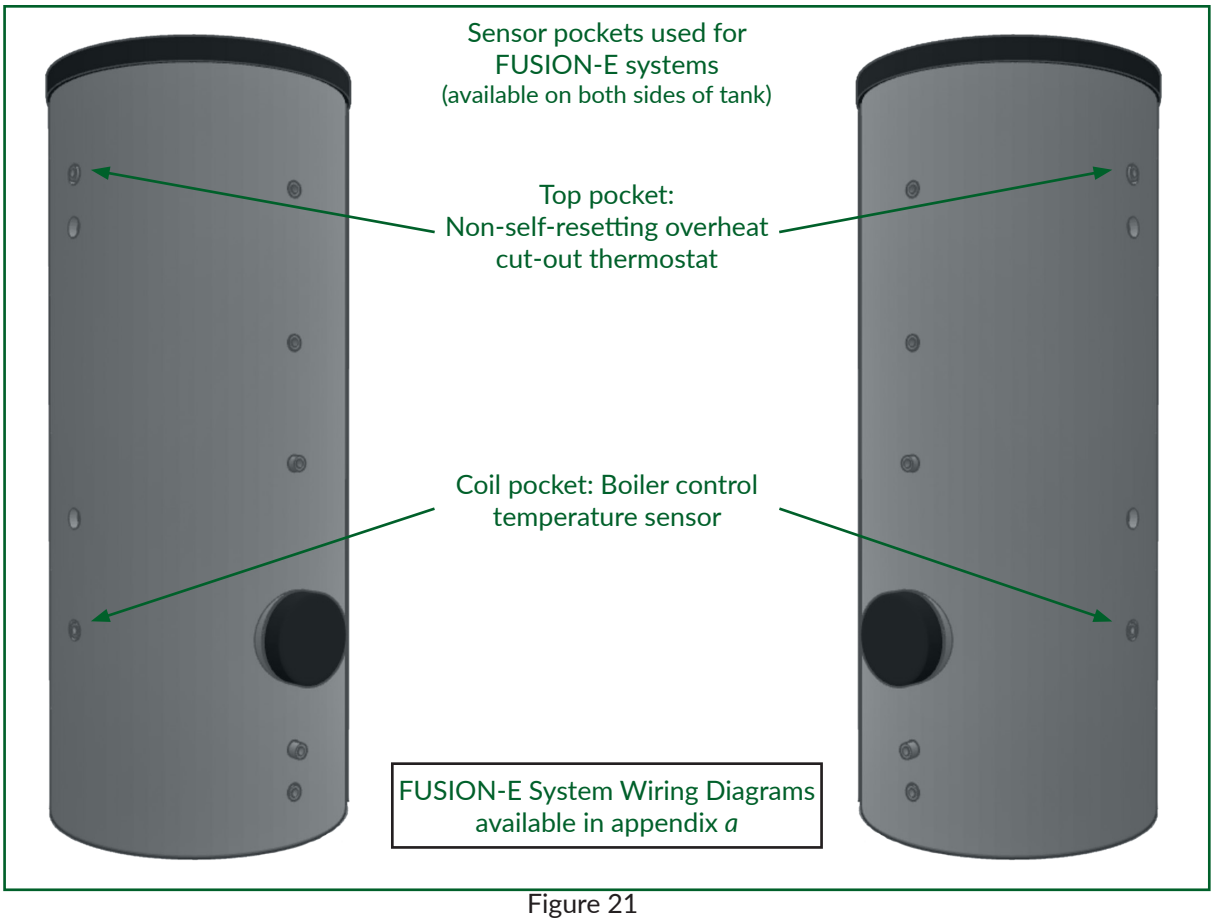

Figure 21

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Installation Instructions: FUSION-E

9. Electrical Installation and Controls

FUSION-E Systems:

The Adveco Ardent electric boiler is packaged with a control sensor which should be installed into a sensor pocket level with the lower coil of the hot water tank. The system is also supplied with a single non-self-resetting overheat thermostat which must be installed into a sensor pocket at the top of the hot water tank.

- Fit sensor pockets: Fit the supplied chrome sensor pockets, using an appropriate thread sealant as necessary, into the hot water tank (figure 22). One pocket should be installed into the sensor connection on the side of the tank at high level, above the boiler mounting brackets, and one at low level into the coil sensor connection nearest to the electric boiler (figure 21).
- Install boiler overheat thermostat: The front cover of the overheat thermostat should be removed using the 4 screws on the housing (circled green, figure 23). Use an insulated 2-core cable and the supplied insulated crimp ring connectors to secure the ends of each wire to the correct positions as indicated on the thermostat wiring diagram. Connect the other end of the cable into the electric boiler terminals (figure 24) as outlined in the appliance installation manual. Secure the cable to and refit the thermostat housing. This non-self-resetting thermostat can be seated in the cavity in the lower left of the electric boiler casing (figure 25). The black capillary phial can be run up inside the boiler casing, behind the wiring panel or expansion tank if desired, and should exit the casing through the rubber glands in the lid of the boiler housing. Insert the capillary phial into the topmost sensor pocket, at high level above the boiler brackets (figure 26), and gently secure with a wire clip (figure 27).
- Install boiler control sensor: The electric boiler is supplied as standard with a "temperature sensor for buffer" (figure 28). This should be connected to the electric boiler terminals (figure 24) as outlined in the appliance installation manual. The cable should exit the boiler casing at low level and the capilliary sensor should be inserted into the closest available lower coil sensor pocket on the tank (figures 21, 29), and gently secured with a wire clip (figure 27)

Note: The below controls procedure may differ for systems where BMS or other external time controls are used. In such cases, a standalone control thermostat should be installed into the tank and connected to the Room Thermostat connection of the boiler terminals.

Figure 22

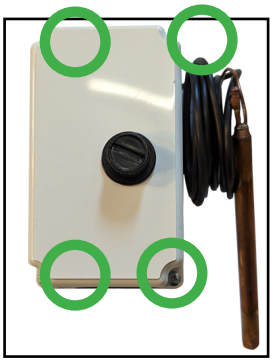

Figure 23

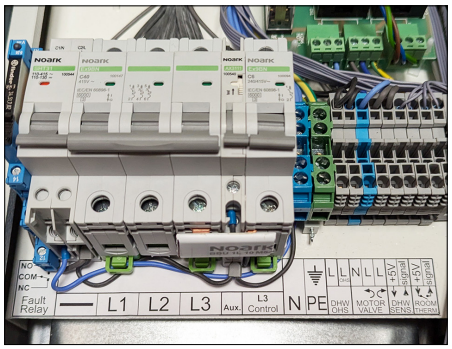

Figure 24

Figure 25

Figure 26

Figure 27

Figure 28

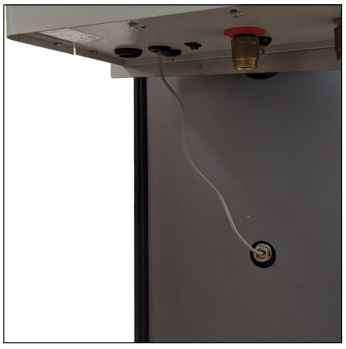

Figure 29

Installation Instructions: FUSION-E

10. Secondary Return Pipework

A secondary return is the best way to ensure that there is hot water at the outlets in a short amount of time. In some cases this could be done with trace heating, but the amount of electricity necessary to do this must be considered. In some small systems it is not necessary to use either, and the hot water can flow directly to the taps. The water at the furthest outlet must be 50°C within one minute (55°C in healthcare premises), although this may not be acceptable to all users and a secondary return arrangement should be considered for waiting times of longer than 20 seconds. In all cases, site legionella protection policy takes precedence over this document.

The secondary return pump should be sized to give a suitable flow of hot water around the system to ensure the returning temperature is at least 50°C. The pipework must be insulated. The pump must have a check valve on the positive side of the return pump to prevent cold flow to the hot outlets.

For FUSION-E systems featuring ATSI hot water tanks, the secondary return pipework should connect into the cold feed to the hot water tank, blending with the incoming mains before the water reaches the lower coil of the tank. For further details, refer to the FUSION-E system schematic included as appendix *a* at the rear of this manual.

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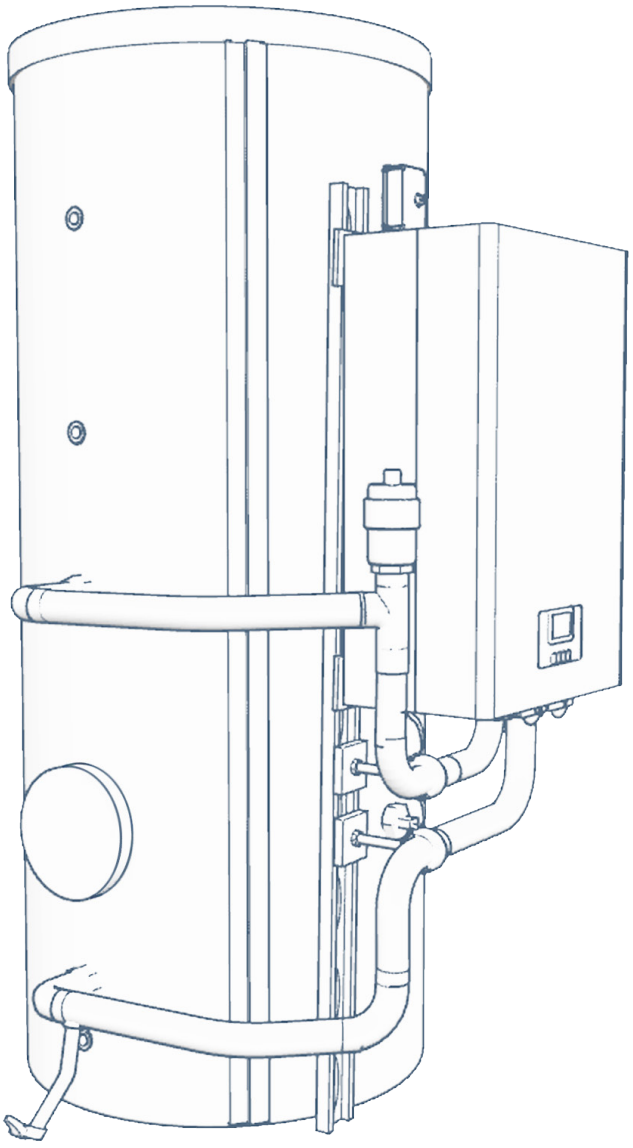
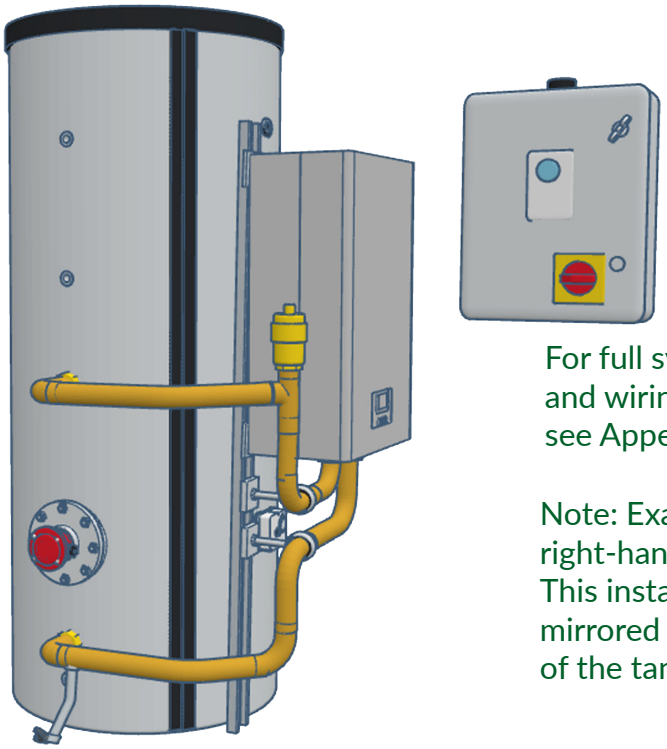
End of FUSION-E Installation Instructions

For FUSION system operation and maintenance instructions,
please turn to page 47.



Installation Instructions: FUSION-Eplus

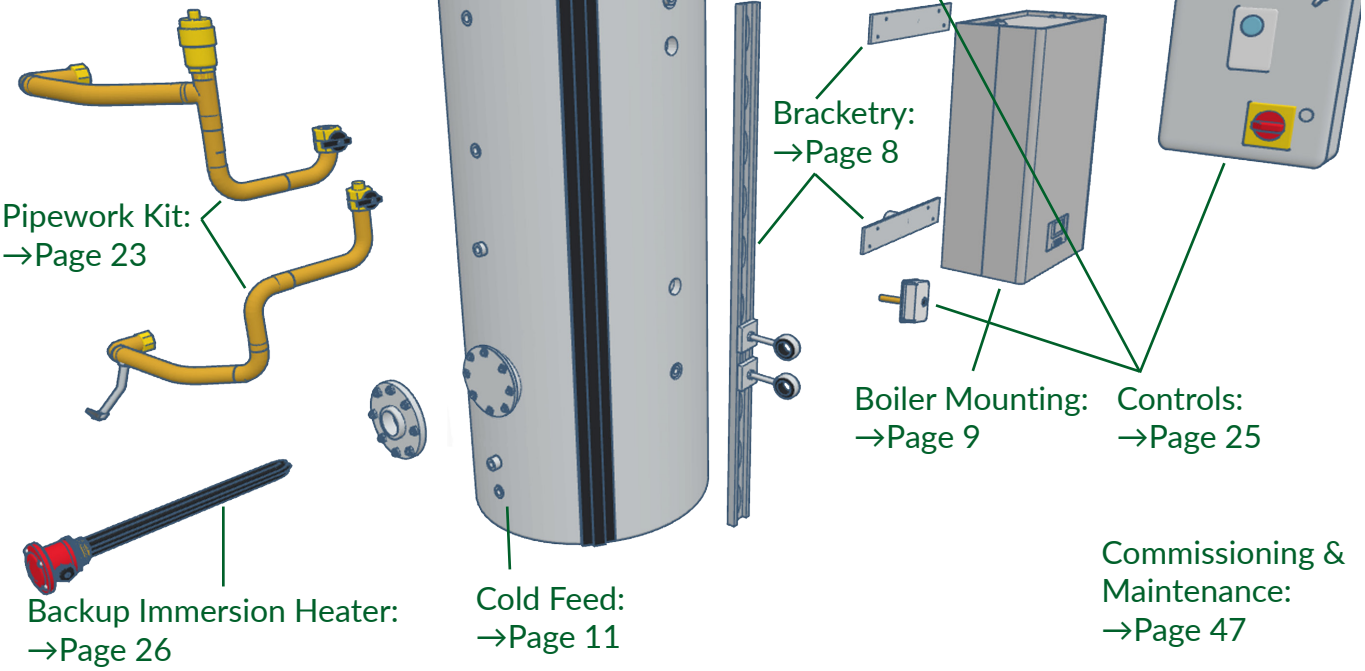
7. FUSION-Eplus System Description and Components



For full system schematics and wiring diagrams, please see Appendix *b*

Note: Example drawing for right-hand installations. This installation can be mirrored to the other side of the tank.

FUSION-Eplus Package Component List:
→Page 22



Pipework Kit:
→Page 23

Bracketry:
→Page 8

Boiler Mounting:
→Page 9

Controls:
→Page 25

Backup Immersion Heater:
→Page 26

Cold Feed:
→Page 11

Commissioning & Maintenance:
→Page 47

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Installation Instructions: FUSION-Eplus

7. FUSION-Eplus System Description and Components

The **FUSION-Eplus (FEplus)** prioritises use of an electric boiler to provide a realiable, high capacity, and maintenance-friendly single-stage electric hot water system. Additionally, the package features an automatically activated backup immersion heater and associated control functions to reduce the likelihood of a hot water system interruption in the event of a primary appliance fault.

The FEplus is available in the following component configurations. Each configuration is available with left- and right-handed pipework kits for boiler mounting, suffixed with 'L' and 'R' respectively. For further details of each component, please contact Adveco.

FUSION FEplus Variant	Hot Water Tank Model	Electric Boiler Model	Ancillary Components
FEplus 300-9	ATSI 300	Ardent P9 (9 kW)	All FEplus systems: Boiler pipework kit (left or right handed) including union fittings 2x Boiler mounting brackets and bolts Unvented components kit: valve set, expansion vessel, temperature and pressure relief valve Temperature and pressure gauge Boiler system filling loop Automatic air vent Corrosion inhibitor 6kW Backup immersion heater with stainless steel adaptor plate Control thermostat Overheat thermostat 1x Sensor pocket Pre-wired control panel with backup changeover and fault alert system
FEplus 300-12	ATSI 300	Ardent P12 (12 kW)	
FEplus 300-24	ATSI 300	Ardent P24 (24 kW)	
FEplus 400-9	ATSI 400	Ardent P9 (9 kW)	
FEplus 400-12	ATSI 400	Ardent P12 (12 kW)	
FEplus 400-24	ATSI 400	Ardent P24 (24 kW)	
FEplus 500-9	ATSI 500	Ardent P9 (9 kW)	
FEplus 500-12	ATSI 500	Ardent P12 (12 kW)	
FEplus 500-24	ATSI 500	Ardent P24 (24 kW)	
FEplus 580-9	ATSI 580	Ardent P9 (9 kW)	
FEplus 580-12	ATSI 580	Ardent P12 (12 kW)	
FEplus 580-24	ATSI 580	Ardent P24 (24 kW)	
FEplus 750-9	ATSI 750	Ardent P9 (9 kW)	
FEplus 750-12	ATSI 750	Ardent P12 (12 kW)	
FEplus 750-24	ATSI 750	Ardent P24 (24 kW)	

Installation Instructions: FUSION-Eplus

8. Primary Pipework Installation

General

The FUSION packaged hot water system is supplied with a pre-assembled primary pipework kit (figure 30) designed and shaped to precisely fit the supplied hot water tank. The ATSI hot water tank supplied as part of FUSION-Eplus systems features one fixed internal heat exchange coil in the lower half of the tank. The supplied primary pipework kit is sized to connect between the coil inlet/outlets and the electric boiler flow and return connections when mounted to the side of the tank.

For detailed installation instructions for each appliance in the FUSION-Eplus system please consult the relevant product installation manual(s). For installation reference diagrams please refer to the system schematics included as appendix *b* at the rear of this manual.

Packaged Pipework Installation:

- Prepare tank connections and brackets: Remove any plastic dust caps or covers over the tank coil connections and loosen the screws of the rubber-lined clips on the unistrut frame (figure 31).
- Prepare boiler pipework: Each length of supplied pipework has been manufactured to the specific dimensions of the chosen tank for the corresponding boiler connection. Offer up the lengths of pipework to the mounted boiler and tank to identify the correct connections and orientations.
- For systems with hot water tanks of 580 litres or below, the hot water tank will have flat-faced connections on the coil inlet and outlets. For such systems, the pipework kit will be supplied with a pair of gaskets (figure 32). For hot water tanks over 580 litres, the coil connections are threaded and an appropriate thread sealant should be used instead of a gasket.
- Fit boiler pipework: Loosely fit each length of the boiler pipework kit to the relevant coil inlet or outlet connection on the hot water tank (figure 33). Connect the included valved ends to the boiler flow and return connections (figure 34), and secure the pipework using the rubber-lined clips on the unistrut (figure 35). Once correctly aligned, tighten and secure all connections and repeat for both sections of pipework.

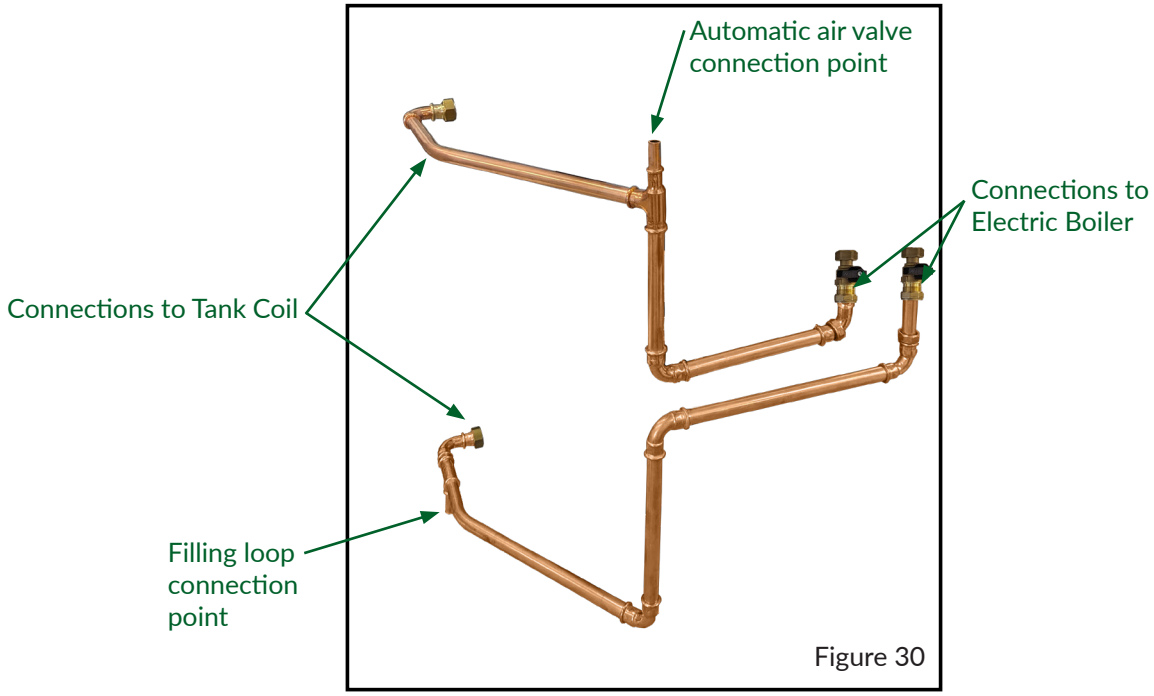

Figure 30

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Installation Instructions: FUSION-Eplus

8. Primary Pipework Installation

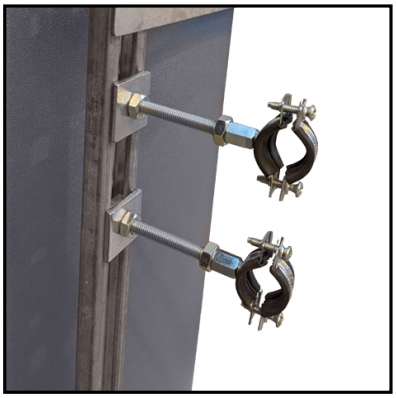

Figure 31

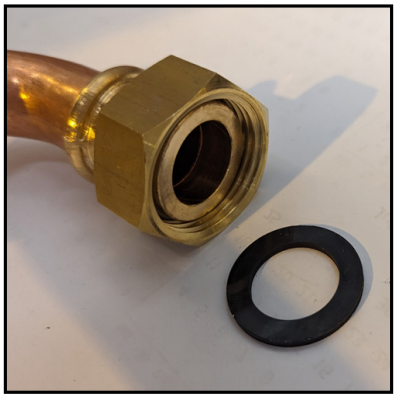

Figure 32

Figure 33

Figure 34

Figure 35

- Fit boiler air vent: The supplied automatic air vent and olive must be fitted to the available connection at the highest point of the pipework (figures 36, 37).
- Fit boiler filling loop: The supplied closed circuit filling loop must be fitted to the available connection at the lowest point of the pipework (figure 38).

Figure 36

Figure 37

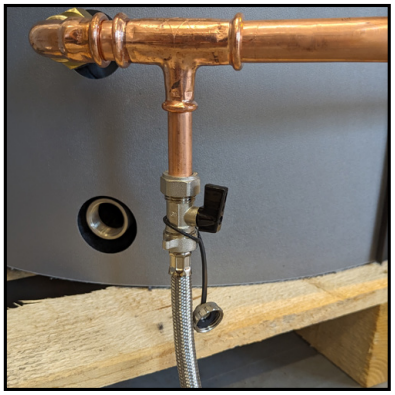

Figure 38

Installation Instructions: FUSION-Eplus

9. Electrical Installation and Controls

General

Every hot water tank featuring a heat source must be fitted with a method of temperature control and overheat protection. Temperature control can be achieved either by a control thermostat in the tank, a sensor, or a differential control between the tank temperature and the heat source. This must be set to ensure a hot water storage temperature of at least 60°C throughout the tank. The temperature control setting should be subject to a risk assessment in accordance with local building regulations. In most cases, it is recommended to fit thermostatic mixing valves on all outlets for personal use.

The temperature control method and secondary return configuration should be designed to provide a water temperature at outlets of at least 50°C (55°C in healthcare premises) within one minute, and a minimum return temperature of 50°C.

Every tank that contains a heat source must be fitted with a non-self-resetting overheat thermostat capable of preventing heat entering the tank from all sources, by either stopping the primary flow or by turning off the heat source. Stopping the primary flow may be achieved by a spring-loaded zone valve, or by turning off the pump, providing that thermosiphoning cannot occur.

The Adveco FUSION-Eplus packaged hot water system is supplied with the required dual control and overheat thermostat for the safe and efficient operation of the system. This should be installed according to the instructions below and the system schematics and wiring diagram included as appendix *b* at the rear of this manual.

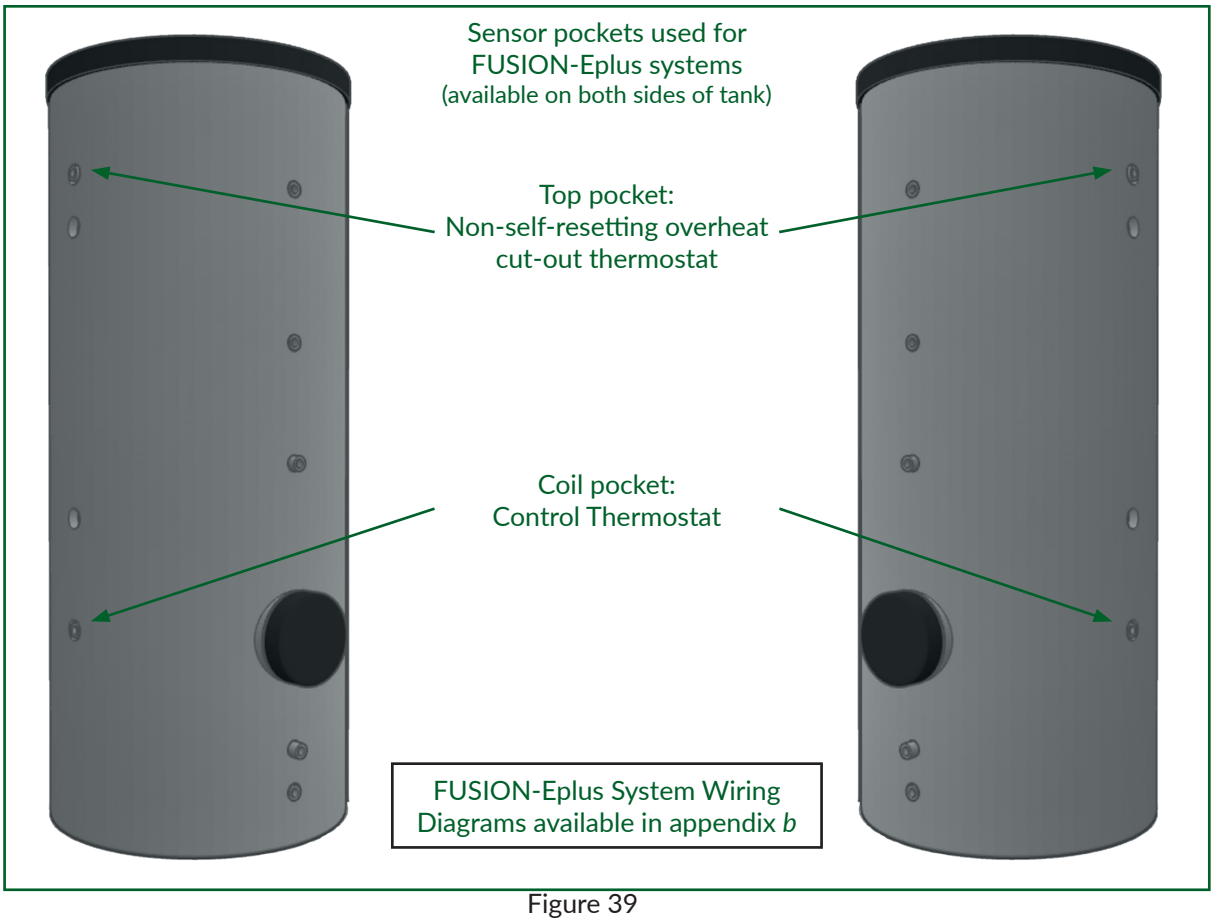

Figure 39

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Installation Instructions: FUSION-Eplus

9. Electrical Installation and Controls

FUSION-Eplus Systems:

The Adveco Ardent electric boiler is packaged with a control sensor which should not be used with the FUSION-Eplus system arrangement. Instead, the system is supplied with separate control and overheat thermostats. The control thermostat should be installed into a sensor pocket level with the lower coil of the hot water tank. The overheat thermostat should be installed into a sensor pocket at high level.

FUSION-Eplus systems are supplied with a control panel to accept wiring connections and provide power and switching to the installation.

- Fit sensor pockets: Fit the supplied stainless steel sensor pockets (figure 40), using an appropriate thread sealant as necessary, into the hot water tank. One should be installed into the sensor connection on the side of the tank at high level, near to the boiler mounting brackets, and one at low level into the coil sensor connection nearest to the electric boiler (figure 39).

- Install boiler control and overheat thermostats: The electric boiler should be controlled using the supplied control thermostat (figure 41) installed into the chrome sensor pocket at the level of the tank coil. The overheat thermostat (figure 42) should be installed into the chrome sensor pocket at high level. The thermostat housings can be mounted over the end of the corresponding pocket (figure 43). Each thermostat should be wired into the supplied system control panel in accordance with the panel wiring diagram.

Figure 40

Figure 41

Figure 42

Figure 43

- Fit backup immersion heater: Locate the clean-out inspection flange of the hot water tank and remove the insulation cover and flange blanking plate. Replace with the supplied immersion heater adaptor flange plate (figure 44) containing a central threaded connection, using the supplied gasket and the original bolts from the tank, tightened in a diametrically opposed sequence to ensure an even tension across the flange plate. The immersion heater element (figure 45) can be screwed in and sealed using an appropriate thread sealant.

Figure 44

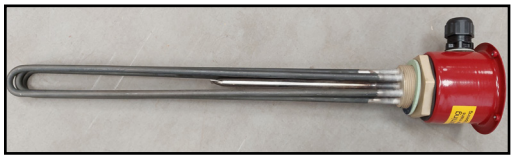

Figure 45

Installation Instructions: FUSION-Eplus

9. Electrical Installation and Controls

- Connect immersion heater thermostats: The backup immersion heater is supplied with a single internal control and overheat thermostat (figure 46) pre-fitted within the element housing in a factory fitted pocket. This thermostat is acceptable to use for low power immersion heaters used for backup purposes, and should be connected to the Adveco control panel backup immersion heater control connections according to the panel wiring diagram. For further details please refer to the supplied Immersion Heater Criticial Installation Requirements document and control panel wiring diagram included with the panel or available online at www.adveco.co.

- Check and complete control panel wiring: The control panel is supplied with all internal wiring complete and ready to accept the final connections to and from the plant equipment. All thermostat wiring should connect to the relevant terminals in the Adveco control panel according to the panel wiring diagram supplied with the system and included as appendix *b* at the rear of this manual. Refer to the control panel wiring diagram and appliance manuals to identify and complete any further required connections.

Figure 46

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Installation Instructions: FUSION-Eplus

10. Secondary Return Pipework

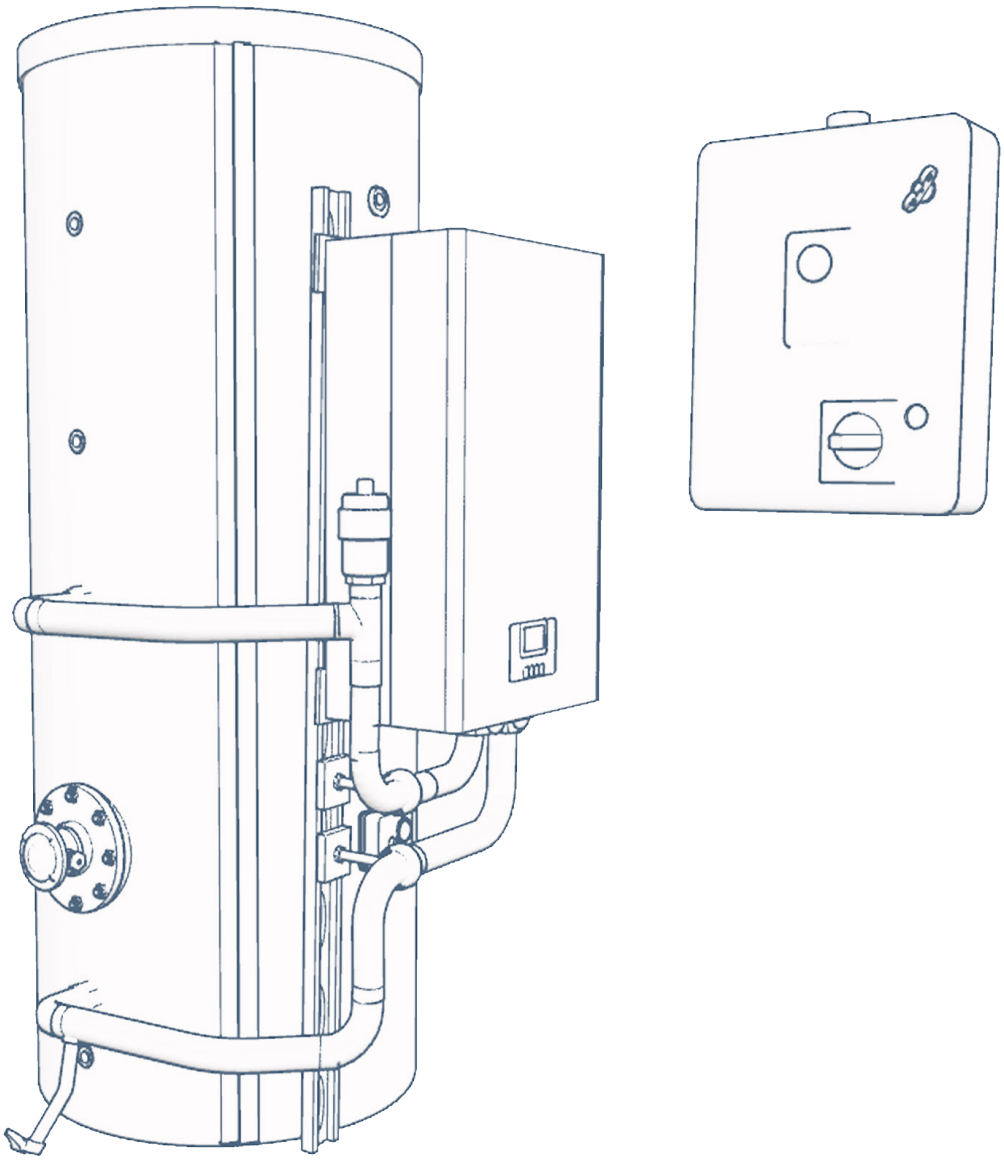
A secondary return is the best way to ensure that there is hot water at the outlets in a short amount of time. In some cases this could be done with trace heating, but the amount of electricity necessary to do this must be considered. In some small systems it is not necessary to use either, and the hot water can flow directly to the taps. The water at the furthest outlet must be 50°C within one minute (55°C in healthcare premises), although this may not be acceptable to all users and a secondary return arrangement should be considered for waiting times of longer than 20 seconds. In all cases, site legionella protection policy takes precedence over this document.

The secondary return pump should be sized to give a suitable flow of hot water around the system to ensure the returning temperature is at least 50°C. The pipework must be insulated. The pump must have a check valve on the positive side of the return pump to prevent cold flow to the hot outlets.

For FUSION-Eplus systems featuring ATSI hot water tanks, the secondary return pipework should connect into the cold feed to the hot water tank, blending with the incoming mains before the water reaches the lower coil of the tank. For further details, refer to the FUSION-Eplus system schematic included as appendix *b* at the rear of this manual.

End of FUSION-Eplus Installation Instructions

For FUSION system operation and maintenance instructions,
please turn to page 47.



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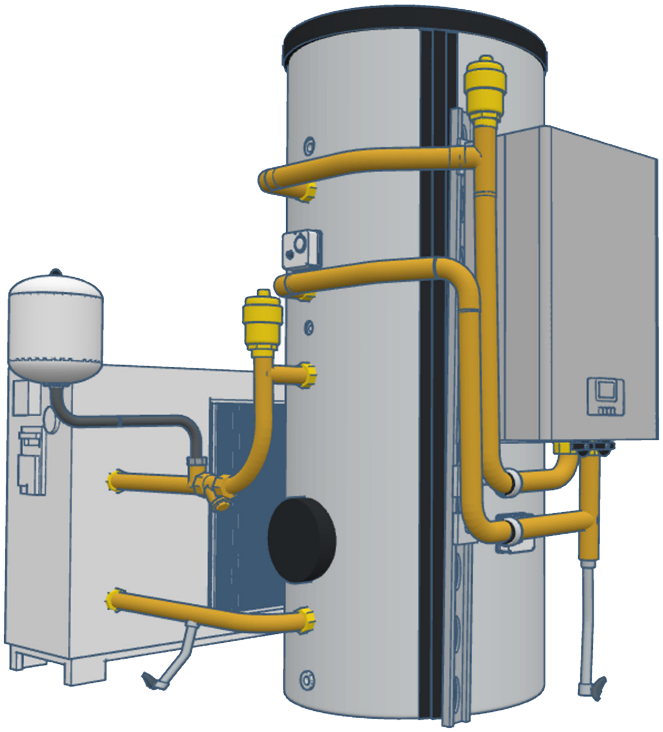
Installation Instructions: FUSION-T

7. FUSION-T System Description and Components



For full system schematics and wiring diagrams, please see Appendix *c*

Note: Example drawing for right-hand installations. This installation can be mirrored to the other side of the tank.

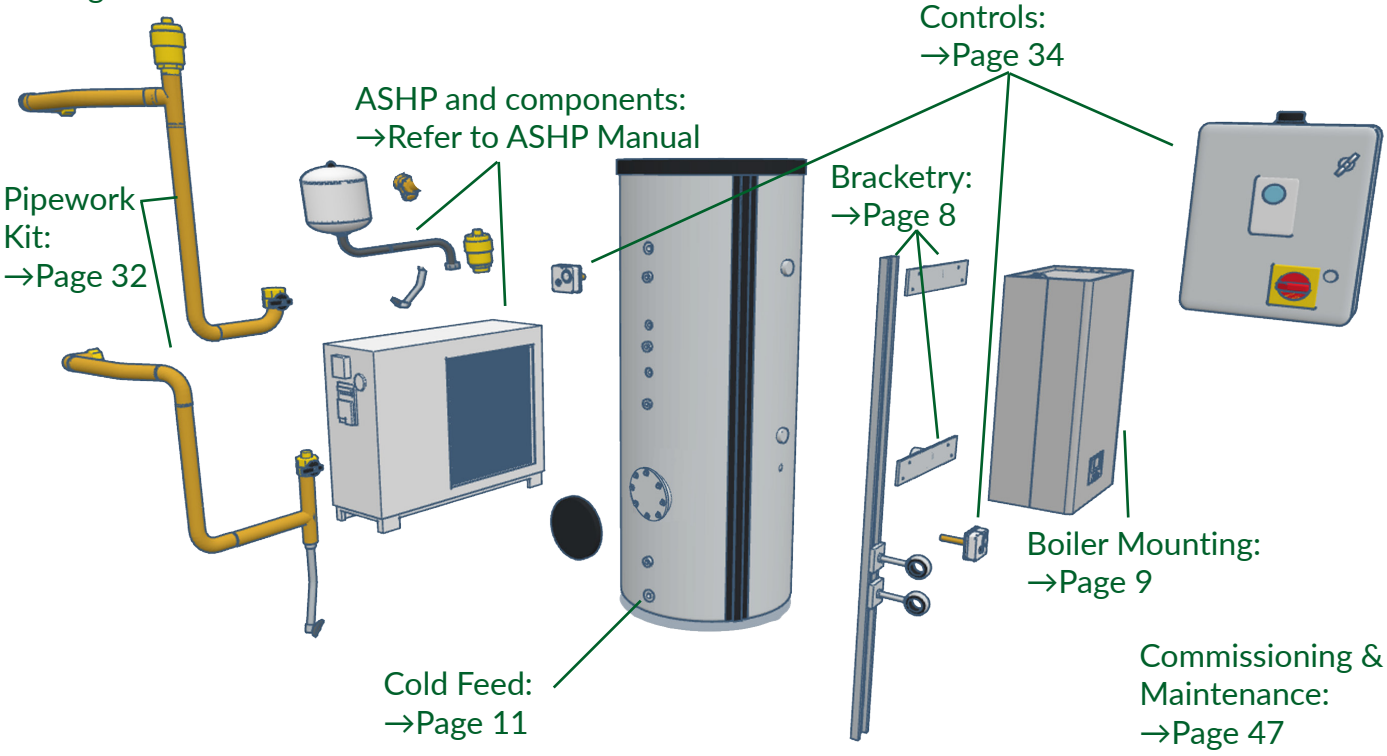
FUSION-T Package Component List:
→Page 31

Controls:
→Page 34

ASHP and components:
→Refer to ASHP Manual

Pipework Kit:
→Page 32

Bracketry:
→Page 8



Boiler Mounting:
→Page 9

Cold Feed:
→Page 11

Commissioning & Maintenance:
→Page 47

Installation Instructions: FUSION-T

7. FUSION-T System Description and Components

The **FUSION-T (FT)** prioritises use of an air source heat pump to maximise overall heating efficiency, with preheated water brought up to final storage and use temperature using an electric boiler for increased power, reliability, and system longevity.

The FT is available in the following component configurations. Each configuration is available with left- and right-handed pipework kits for boiler mounting, suffixed with 'L' and 'R' respectively. For further details of each component, please contact Adveco.

FUSION FT Variant	Hot Water Tank Model	Heat Pump Model	Electric Boiler Model	Ancillary Components
FT 300-14	ATST 300	FPi32-6 (4.72 kW)	Ardent P9 (9.00 kW)	
FT 300-17	ATST 300	FPi32-6 (4.72 kW)	Ardent P12 (12.00 kW)	
FT 300-18	ATST 300	FPi32-12 (8.62 kW)	Ardent P9 (9.00 kW)	
FT 300-19	ATST 300	FPi32-9 (6.85 kW)	Ardent P12 (12.00 kW)	
FT 300-22	ATST 300	FPi32-6 (4.72 kW)	Ardent P24 (16.81 kW)	
FT 300-24	ATST 300	FPi32-12 (8.62 kW)	Ardent P24 (15.41 kW)	
FT 400-17	ATST 400	FPi32-6 (4.72 kW)	Ardent P12 (12.00 kW)	
FT 400-18	ATST 400	FPi32-12 (8.62 kW)	Ardent P9 (9.00 kW)	
FT 400-19	ATST 400	FPi32-9 (6.85 kW)	Ardent P12 (12.00 kW)	
FT 400-21	ATST 400	FPi32-12 (8.62 kW)	Ardent P12 (12.00 kW)	
FT 400-24	ATST 400	FPi32-6 (4.72 kW)	Ardent P24 (19.12 kW)	
FT 400-26	ATST 400	FPi32-12 (8.62 kW)	Ardent P24 (17.67 kW)	
FT 500-17	ATST 500	FPi32-6 (4.72 kW)	Ardent P12 (12.00 kW)	
FT 500-18	ATST 500	FPi32-12 (8.62 kW)	Ardent P9 (9.00 kW)	
FT 500-21	ATST 500	FPi32-12 (8.62 kW)	Ardent P12 (12.00 kW)	
FT 500-24	ATST 500	FPi32-6 (4.72 kW)	Ardent P24 (19.12 kW)	
FT 500-26	ATST 500	FPi32-12 (8.62 kW)	Ardent P24 (17.67 kW)	
FT 750-17	ATST 750	FPi32-6 (4.72 kW)	Ardent P12 (12.00 kW)	
FT 750-18	ATST 750	FPi32-12 (8.62 kW)	Ardent P9 (9.00 kW)	
FT 750-21	ATST 750	FPi32-12 (8.62 kW)	Ardent P12 (12.00 kW)	
FT 750-29	ATST 750	FPi32-6 (4.72 kW)	Ardent P24 (24.30 kW)	
FT 750-33	ATST 750	FPi32-12 (8.62 kW)	Ardent P24 (24.30 kW)	

All FT systems:
Boiler pipework kit (left or right handed) including union fittings
2x Boiler mounting brackets and bolts
Control panel
Destratification pump
Unvented components kit: valve set, expansion vessel, temperature and pressure relief valve
2x Dual control and overheat thermostats
2x Sensor pockets
Temperature and pressure gauges
2x Boiler system filling loops
2x Automatic air vents
Strainer
Corrosion inhibitor
ASHP expansion vessel

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Installation Instructions: FUSION-T

8. Primary Pipework Installation

General

The FUSION packaged hot water system is supplied with a pre-assembled primary pipework kit (figure 47) designed and shaped to precisely fit the supplied hot water tank. The ATST hot water tank supplied as part of FUSION-T systems features two fixed internal heat exchange coils, one in the lower half of the tank and one in the upper half. The supplied primary pipework kit is sized to connect between the upper coil inlet/outlets and the electric boiler flow and return connections when mounted to the side of the tank, allowing the boiler to provide high-grade heat to the top of the tank.

The lower coil of the hot water tank should be connected to the air source heat pump to provide renewable low-grade heat to the lower half of the tank. The air source heat pump pipework is not supplied as part of the FUSION hot water kit, and should be built to suit the ASHP installation location and site layout and in accordance with the air source heat pump installation manual.

For detailed installation instructions for each appliance in the FUSION-T system please consult the relevant product installation manual(s). For installation reference diagrams please refer to the system schematics included as appendix *c* at the rear of this manual.

Packaged Pipework Installation:

- Prepare tank connections and brackets: Remove any plastic dust caps or covers over the tank upper coil connections and loosen the screws of the rubber-lined clips on the unistrut frame (figure 48).
- Prepare boiler pipework: Each length of supplied pipework has been manufactured to the specific dimensions of the chosen tank for the corresponding boiler connection. Offer up the lengths of pipework to the mounted boiler and tank to identify the correct connections and orientations.
- For systems with hot water tanks of 580 litres or below, the hot water tank will have flat-faced connections on the coil inlet and outlets. For such systems, the pipework kit will be supplied with a pair of gaskets (figure 49). For hot water tanks over 580 litres, the coil connections are threaded and an appropriate thread sealant should be used instead of a gasket.

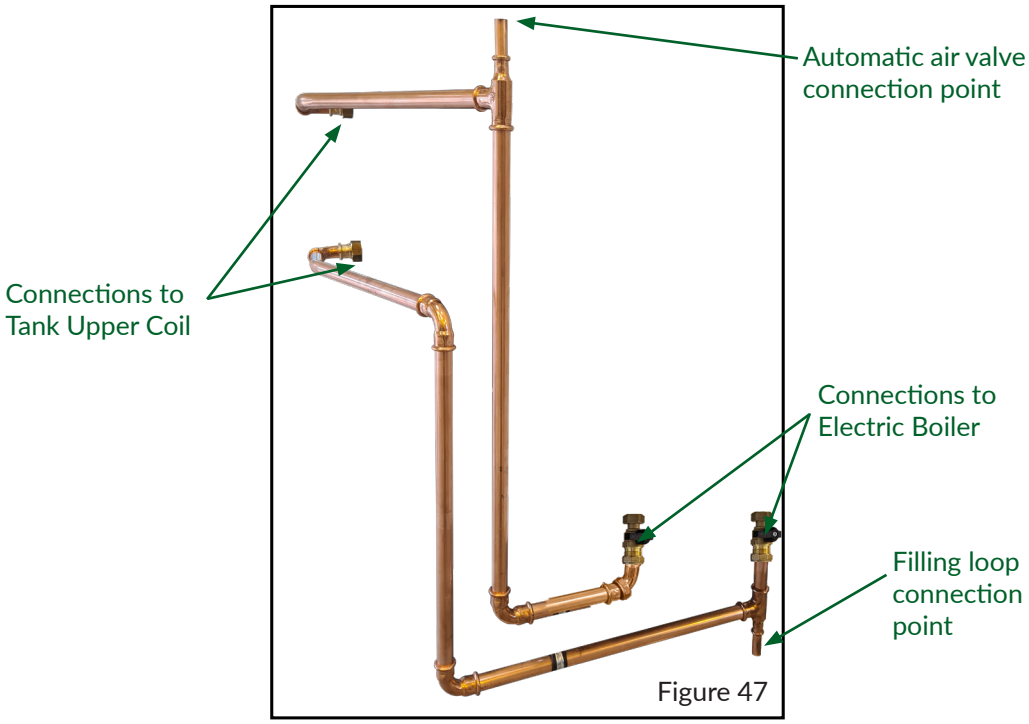

Figure 47

Installation Instructions: FUSION-T

8. Primary Pipework Installation

- Fit boiler pipework: Loosely fit each length of the boiler pipework kit to the relevant coil inlet or outlet connection on the hot water tank (figure 50). Connect the included valved ends to the boiler flow and return connections (figure 51), and secure the pipework using the rubber-lined clips on the unistrut (figure 52). Once correctly aligned, tighten and secure all connections and repeat for both sections of pipework.

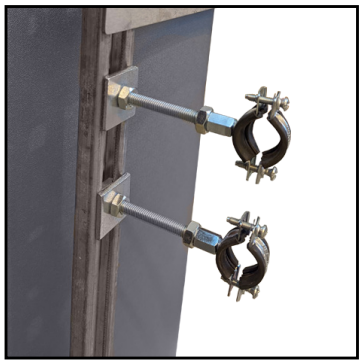

Figure 48

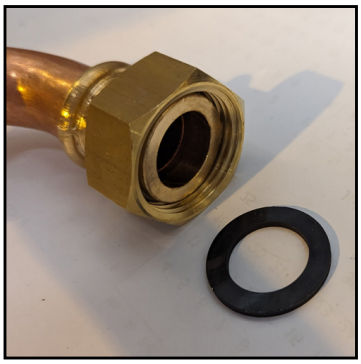

Figure 49

Figure 50

Figure 51

Figure 52

- Fit boiler air vent: The supplied automatic air vent and olive must be fitted to the available connection at the highest point of the pipework (figures 53, 54).
- Fit boiler filling loop: The supplied closed circuit filling loop must be fitted to the available connection at the lowest point of the pipework (figure 55).

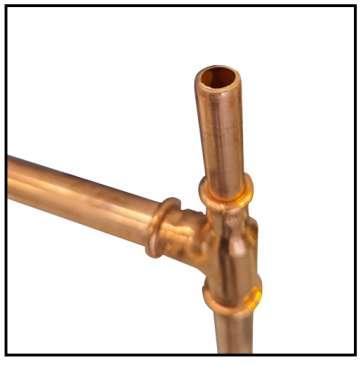

Figure 53

Figure 54

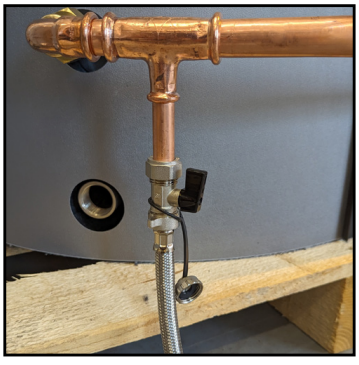

Figure 55

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Installation Instructions: FUSION-T

9. Electrical Installation and Controls

General

Every hot water tank featuring a heat source must be fitted with a method of temperature control and overheat protection. Temperature control can be achieved either by a control thermostat in the tank, a sensor, or a differential control between the tank temperature and the heat source. This must be set to ensure a hot water storage temperature of at least 60°C throughout the tank. The temperature control setting should be subject to a risk assessment in accordance with local building regulations. In most cases, it is recommended to fit thermostatic mixing valves on all outlets for personal use.

The temperature control method and secondary return configuration should be designed to provide a water temperature at outlets of at least 50°C (55°C in healthcare premises) within one minute, and a minimum return temperature of 50°C.

Every tank that contains a heat source must be fitted with a non-self-resetting overheat thermostat capable of preventing heat entering the tank from all sources, by either stopping the primary flow or by turning off the heat source. Stopping the primary flow may be achieved by a spring-loaded zone valve, or by turning off the pump, providing that thermosiphoning cannot occur.

The Adveco FUSION-T packaged hot water system is supplied with the required dual control and overheat thermostats for the safe and efficient operation of the system. This should be installed according to the instructions below and the system schematics and wiring diagram included as appendix *c* at the rear of this manual.

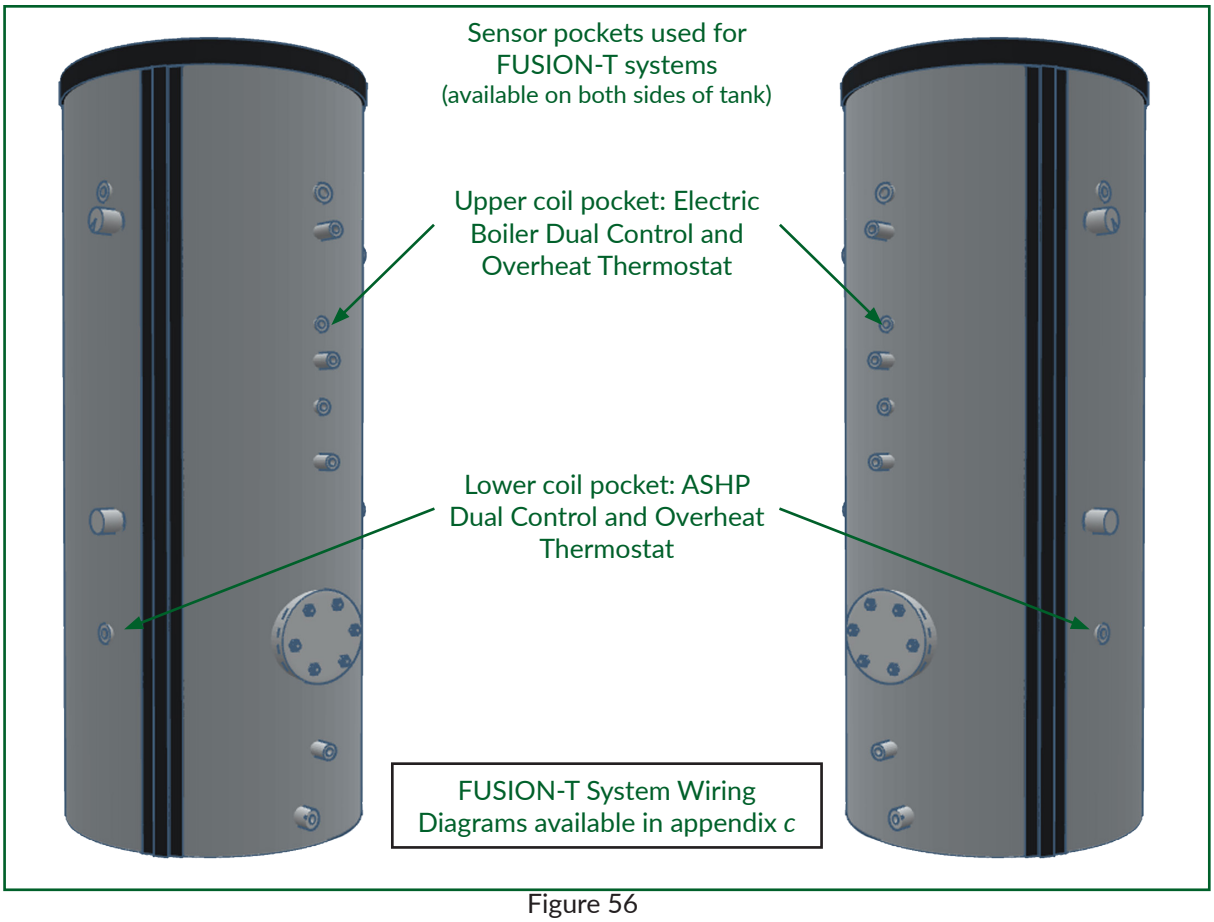

Figure 56

Installation Instructions: FUSION-T

9. Electrical Installation and Controls

FUSION-T Systems:

The Adveco Ardent electric boiler is packaged with a control sensor which should not be used with the FUSION-T system arrangement. Instead, the system is supplied with a dual control and overheat thermostat contained within a single housing which should be installed into a sensor pocket level with the upper coil on the front of the hot water tank. The Adveco FPi air source heat pump should be controlled by a second dual control and overheat thermostat installed into a sensor pocket level with the lower coil of the hot water tank, available on either side of the tank as required by the installation siting. FUSION-T systems are supplied with a control panel to accept wiring connections and provide power and switching to the installation.

- Fit sensor pockets: Fit one of the supplied stainless steel sensor pockets (figure 57), using an appropriate thread sealant as necessary, into the hot water tank upper coil sensor connection located on the front of the hot water tank. Fit the second supplied chrome sensor pocket to the lower coil sensor connection on the desired side of the hot water tank, with consideration to the eventual cable course between the sensor pockets and the nearby Adveco control panel.

- Install boiler control and overheat thermostat: The electric boiler should be controlled using the supplied combined control and overheat thermostat (figure 58) installed into the sensor pocket on the front of the tank at the level of the upper coil. The two phials of the thermostat should be pulled taut and inserted as far as possible into the tank thermostat pocket. The thermostat housing can be mounted over the end of the pocket (figure 59).

- Install air source heat pump control and overheat thermostat: The ASHP should be controlled using the supplied combined control and overheat thermostat (figure 57) installed into the sensor pocket at the level of the lower tank coil. The two phials of the thermostat should be similarly pulled taut and inserted as far as possible into the tank thermostat pocket and the thermostat housing can be mounted over the end of the pocket (figure 58).

Figure 57

Figure 58

Figure 59

- Check and complete control panel wiring: The control panel is supplied with all internal wiring complete and ready to accept the final connections to and from the plant equipment. All thermostat wiring should connect to the relevant terminals in the Adveco control panel according to the panel wiring diagram supplied with the system and included as appendix *f* at the rear of this manual. Refer to the control panel wiring diagram and appliance manuals to identify and complete any further required connections.

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Installation Instructions: FUSION-T

10. Secondary Return Pipework

A secondary return is the best way to ensure that there is hot water at the outlets in a short amount of time. In some cases this could be done with trace heating, but the amount of electricity necessary to do this must be considered. In some small systems it is not necessary to use either, and the hot water can flow directly to the taps. The water at the furthest outlet must be 50°C within one minute (55°C in healthcare premises), although this may not be acceptable to all users and a secondary return arrangement should be considered for waiting times of longer than 20 seconds. In all cases, site legionella protection policy takes precedence over this document.

The secondary return pump should be sized to give a suitable flow of hot water around the system to ensure the returning temperature is at least 50°C. The pipework must be insulated. The pump must have a check valve on the positive side of the return pump to prevent cold flow to the hot outlets.

For FUSION-T systems featuring the twin-coil ATST hot water tank, the secondary return pipework should enter the hot water system in the middle of the tank, above the level of the ASHP-fed lower coil, and below the upper coil fed by the electirc boiler. For further details, refer to the FUSION-T system schematic included as appendix *c* at the rear of this manual.

11. Shunt / Destratification Pump

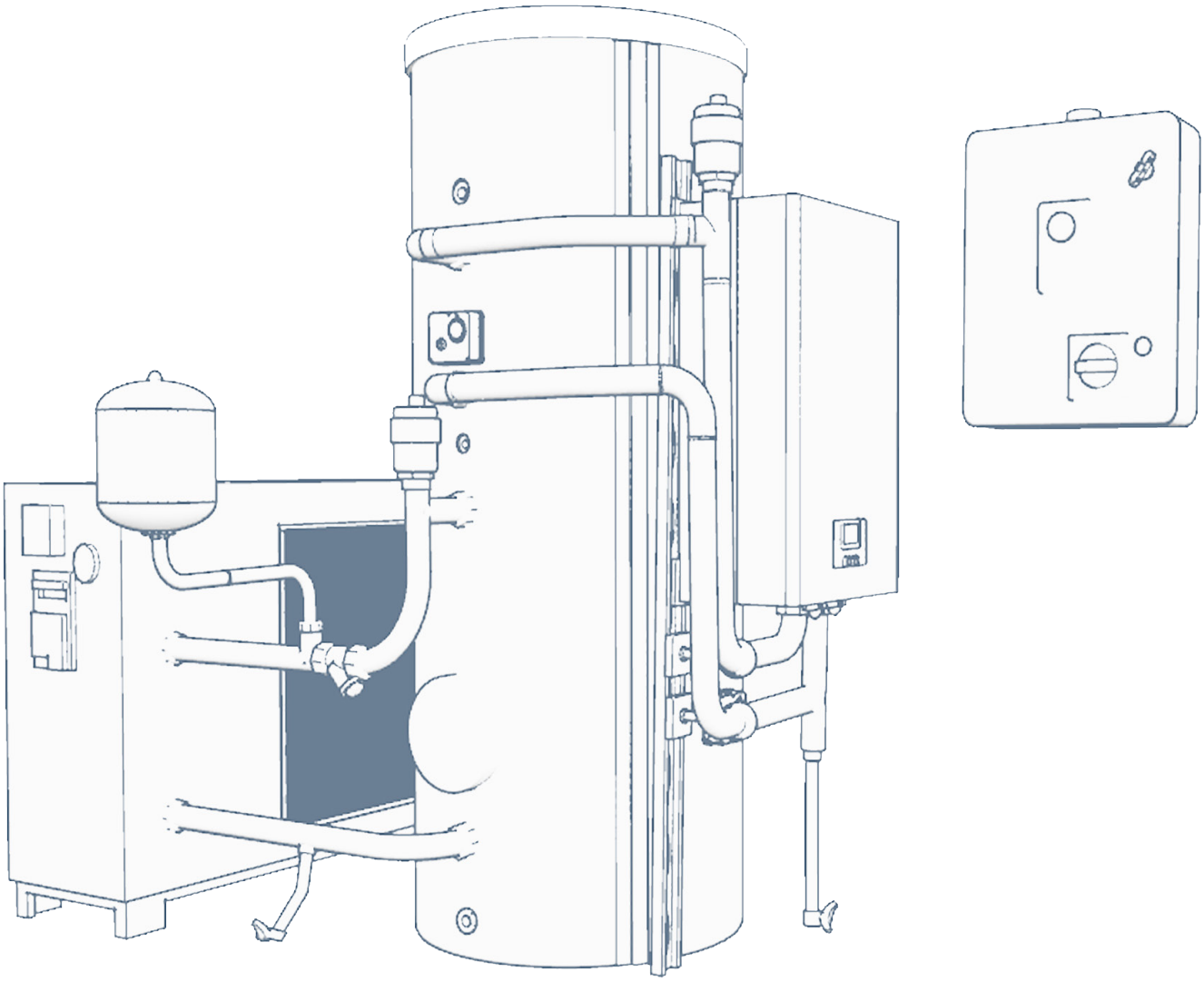
In installations where the secondary return is piped into the cold feed, it may be considered that all requirements for destratification or purging are met. This must be confirmed by site Legionella risk assessment.

In installations without secondary returns, or when it is piped into the centre of the tank, it is advised that the tank is entirely heated to 60°C for at least one hour per day. This should be done with a destratification pump piped from the outlet to the inlet. The Adveco FUSION-T system is supplied with an ancillary destratification pump which can be controlled through a dedicated timeclock in the supplied control panel.

The destratification pump timeclock should be set to run at a low demand period of the day, while the heat source is on, for long enough that the bottom of the tank will achieve 60°C for one hour. In installations with multiple heat sources, a destratification pump should not run permanently.

End of FUSION-T Installation Instructions

For FUSION system operation and maintenance instructions,
please turn to page 47.



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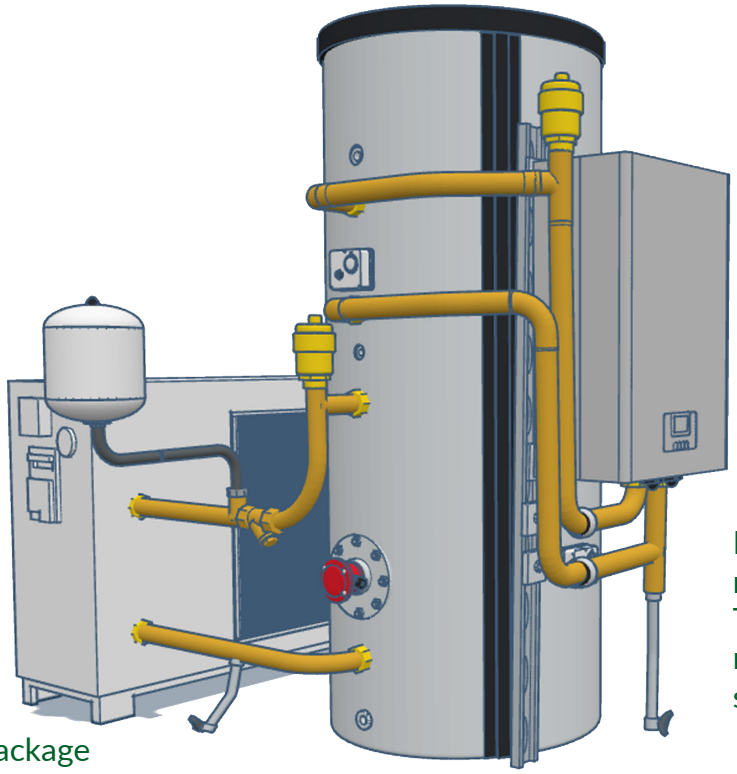
Installation Instructions: FUSION-Tplus

7. FUSION-Tplus System Description and Components



For full system schematics and wiring diagrams, please see Appendix *d*

Note: Example drawing for right-hand installations. This installation can be mirrored to the other side of the tank.

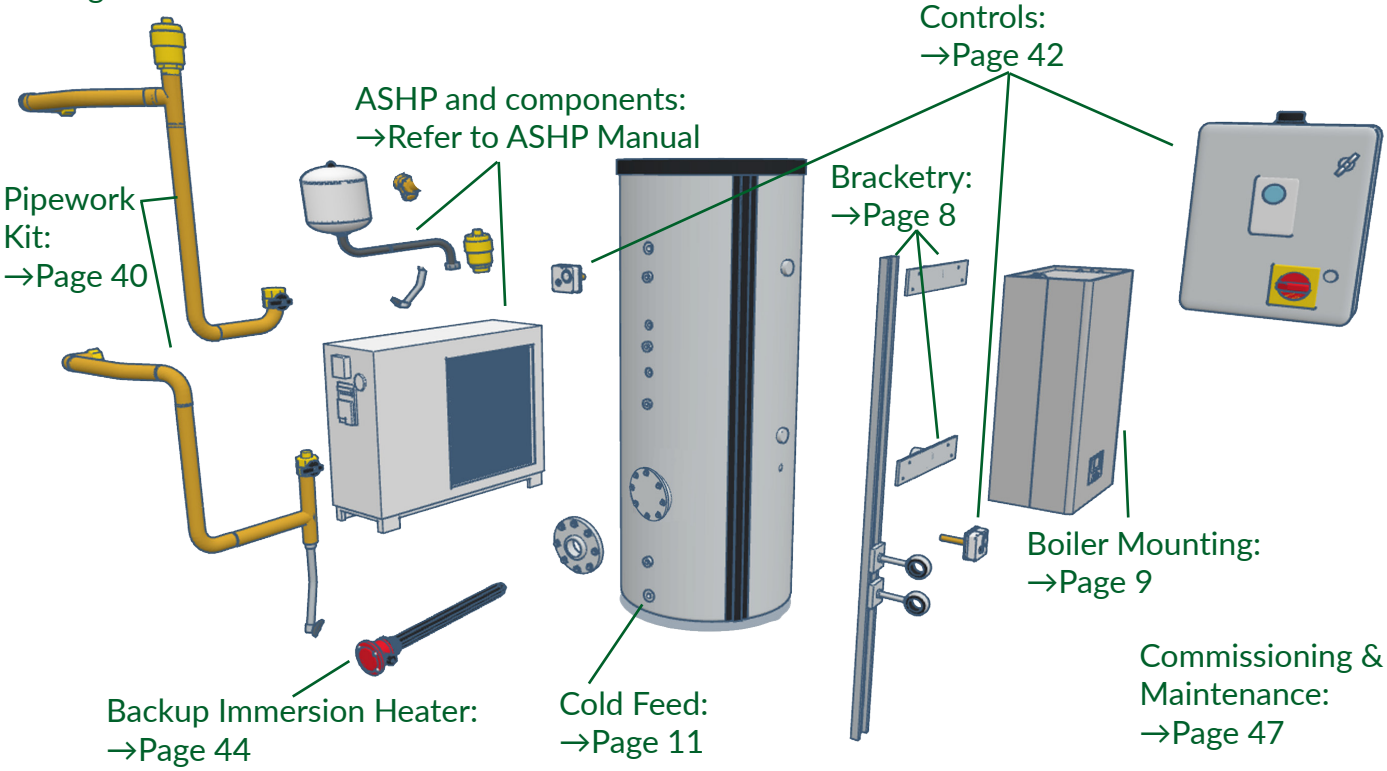
FUSION-Tplus Package Component List:
→Page 39

Controls:
→Page 42

ASHP and components:
→Refer to ASHP Manual

Pipework Kit:
→Page 40

Bracketry:
→Page 8



Boiler Mounting:
→Page 9

Commissioning & Maintenance:
→Page 47

Backup Immersion Heater:
→Page 44

Cold Feed:
→Page 11

Installation Instructions: FUSION-Tplus

7. FUSION-Tplus System Description and Components

The **FUSION-Tplus (FTplus)** prioritises use of an air source heat pump to maximise overall heating efficiency, with preheated water brought up to final storage and use temperature using an electric boiler for increased power, reliability, and system longevity. Additionally, the package features an automatically activated backup immersion heater and associated control functions to reduce the likelihood of a hot water system interruption in the event of a primary appliance fault.

The FTplus is available in the following component configurations. Each configuration is available with left- and right-handed pipework kits for boiler mounting, suffixed with 'L' and 'R' respectively. For further details of each component, please contact Adveco.

FUSION FTplus Variant	Hot Water Tank Model	Heat Pump Model	Electric Boiler Model	Ancillary Components
FTplus 300-14	ATST 300	FPi32-6 (4.72 kW)	Ardent P9 (9.00 kW)	
FTplus 300-17	ATST 300	FPi32-6 (4.72 kW)	Ardent P12 (12.00 kW)	
FTplus 300-18	ATST 300	FPi32-12 (8.62 kW)	Ardent P9 (9.00 kW)	
FTplus 300-19	ATST 300	FPi32-9 (6.85 kW)	Ardent P12 (12.00 kW)	
FTplus 300-22	ATST 300	FPi32-6 (4.72 kW)	Ardent P24 (16.81 kW)	All FTplus systems: Boiler pipework kit (left or right handed) including union fittings 2x Boiler mounting brackets and bolts Control panel Destratification pump Unvented components kit: valve set, expansion vessel, temperature and pressure relief valve 2x Dual control and overheat thermostats 2x Sensor pockets Temperature and pressure gauges 2x Boiler system filling loops 2x Automatic air vents Strainer Corrosion inhibitor ASHP expansion vessel 6kW Backup immersion heater with stainless steel adaptor plate Upgraded control panel with backup changeover and fault alert system
FTplus 300-24	ATST 300	FPi32-12 (8.62 kW)	Ardent P24 (15.41 kW)	
FTplus 400-17	ATST 400	FPi32-6 (4.72 kW)	Ardent P12 (12.00 kW)	
FTplus 400-18	ATST 400	FPi32-12 (8.62 kW)	Ardent P9 (9.00 kW)	
FTplus 400-19	ATST 400	FPi32-9 (6.85 kW)	Ardent P12 (12.00 kW)	
FTplus 400-21	ATST 400	FPi32-12 (8.62 kW)	Ardent P12 (12.00 kW)	
FTplus 400-24	ATST 400	FPi32-6 (4.72 kW)	Ardent P24 (19.12 kW)	
FTplus 400-26	ATST 400	FPi32-12 (8.62 kW)	Ardent P24 (17.67 kW)	
FTplus 500-17	ATST 500	FPi32-6 (4.72 kW)	Ardent P12 (12.00 kW)	
FTplus 500-18	ATST 500	FPi32-12 (8.62 kW)	Ardent P9 (9.00 kW)	
FTplus 500-21	ATST 500	FPi32-12 (8.62 kW)	Ardent P12 (12.00 kW)	
FTplus 500-24	ATST 500	FPi32-6 (4.72 kW)	Ardent P24 (19.12 kW)	
FTplus 500-26	ATST 500	FPi32-12 (8.62 kW)	Ardent P24 (17.67 kW)	
FTplus 750-17	ATST 750	FPi32-6 (4.72 kW)	Ardent P12 (12.00 kW)	
FTplus 750-18	ATST 750	FPi32-12 (8.62 kW)	Ardent P9 (9.00 kW)	
FTplus 750-21	ATST 750	FPi32-12 (8.62 kW)	Ardent P12 (12.00 kW)	
FTplus 750-29	ATST 750	FPi32-6 (4.72 kW)	Ardent P24 (24.30 kW)	
FTplus 750-33	ATST 750	FPi32-12 (8.62 kW)	Ardent P24 (24.30 kW)	

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Installation Instructions: FUSION-Tplus

8. Primary Pipework Installation

General

The FUSION packaged hot water system is supplied with a pre-assembled primary pipework kit (figure 60) designed and shaped to precisely fit the supplied hot water tank. The ATST hot water tank supplied as part of FUSION-Tplus systems features two fixed internal heat exchange coils, one in the lower half of the tank and one in the upper half. The supplied primary pipework kit is sized to connect between the upper coil inlet/outlets and the electric boiler flow and return connections when mounted to the side of the tank, allowing the boiler to provide high-grade heat to the top of the tank.

The lower coil of the hot water tank should be connected to the air source heat pump to provide renewable low-grade heat to the lower half of the tank. The air source heat pump pipework is not supplied as part of the FUSION hot water kit, and should be built to suit the ASHP installation location and site layout and in accordance with the air source heat pump installation manual.

For detailed installation instructions for each appliance in the FUSION-Tplus system please consult the relevant product installation manual(s). For installation reference diagrams please refer to the system schematics included as appendix *d* at the rear of this manual.

Packaged Pipework Installation:

- Prepare tank connections and brackets: Remove any plastic dust caps or covers over the tank upper coil connections and loosen the screws of the rubber-lined clips on the unistrut frame (figure 61).
- Prepare boiler pipework: Each length of supplied pipework has been manufactured to the specific dimensions of the chosen tank for the corresponding boiler connection. Offer up the lengths of pipework to the mounted boiler and tank to identify the correct connections and orientations.
- For systems with hot water tanks of 580 litres or below, the hot water tank will have flat-faced connections on the coil inlet and outlets. For such systems, the pipework kit will be supplied with a pair of gaskets (figure 62). For hot water tanks over 580 litres, the coil connections are threaded and an appropriate thread sealant should be used instead of a gasket.

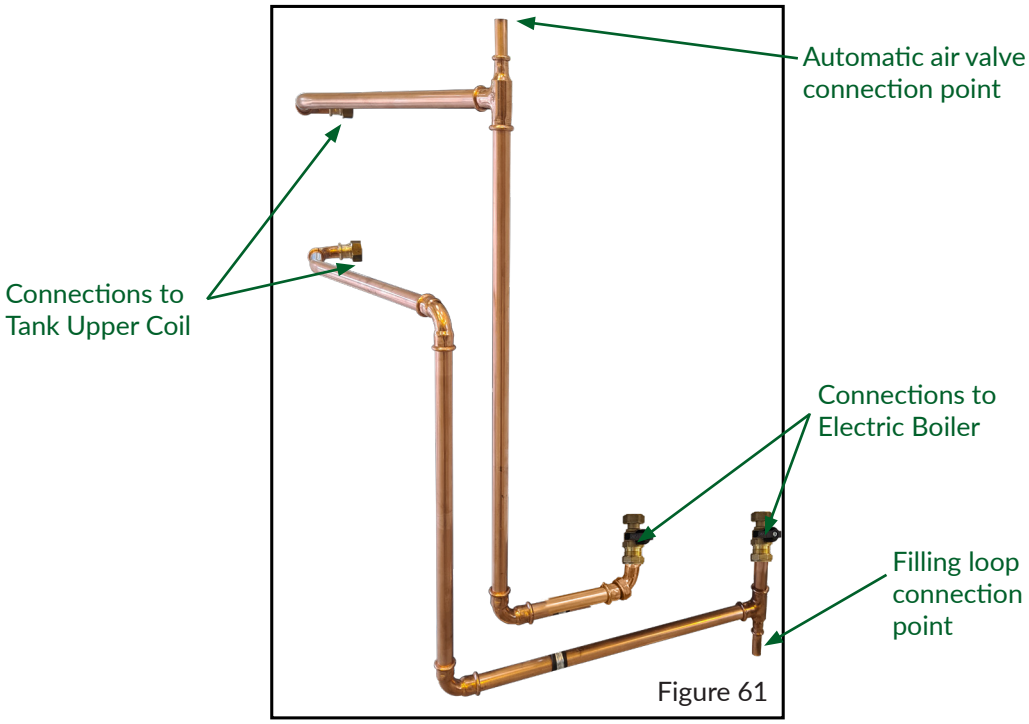

Figure 61

Installation Instructions: FUSION-Tplus

8. Primary Pipework Installation

- Fit boiler pipework: Loosely fit each length of the boiler pipework kit to the relevant coil inlet or outlet connection on the hot water tank (figure 63). Connect the included valved ends to the boiler flow and return connections (figure 64), and secure the pipework using the rubber-lined clips on the unistrut (figure 65). Once correctly aligned, tighten and secure all connections and repeat for both sections of pipework.

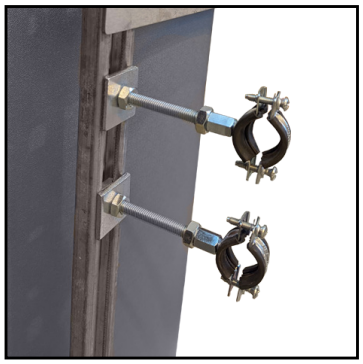

Figure 61

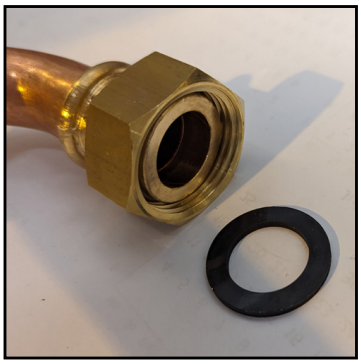

Figure 62

Figure 63

Figure 64

Figure 65

- Fit boiler air vent: The supplied automatic air vent and olive must be fitted to the available connection at the highest point of the pipework (figures 66, 67).
- Fit boiler filling loop: The supplied closed circuit filling loop must be fitted to the available connection at the lowest point of the pipework (figure 68).

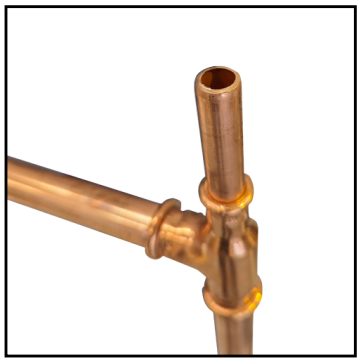

Figure 66

Figure 67

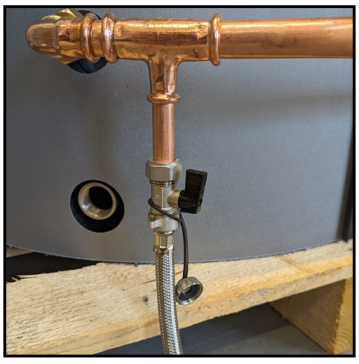

Figure 68

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Installation Instructions: FUSION-Tplus

9. Electrical Installation and Controls

General

Every hot water tank featuring a heat source must be fitted with a method of temperature control and overheat protection. Temperature control can be achieved either by a control thermostat in the tank, a sensor, or a differential control between the tank temperature and the heat source. This must be set to ensure a hot water storage temperature of at least 60°C throughout the tank. The temperature control setting should be subject to a risk assessment in accordance with local building regulations. In most cases, it is recommended to fit thermostatic mixing valves on all outlets for personal use.

The temperature control method and secondary return configuration should be designed to provide a water temperature at outlets of at least 50°C (55°C in healthcare premises) within one minute, and a minimum return temperature of 50°C.

Every tank that contains a heat source must be fitted with a non-self-resetting overheat thermostat capable of preventing heat entering the tank from all sources, by either stopping the primary flow or by turning off the heat source. Stopping the primary flow may be achieved by a spring-loaded zone valve, or by turning off the pump, providing that thermosiphoning cannot occur.

The Adveco FUSION-Tplus packaged hot water system is supplied with the required dual control and overheat thermostats for the safe and efficient operation of the system. This should be installed according to the instructions below and the system schematics and wiring diagram included as appendix *d* at the rear of this manual.

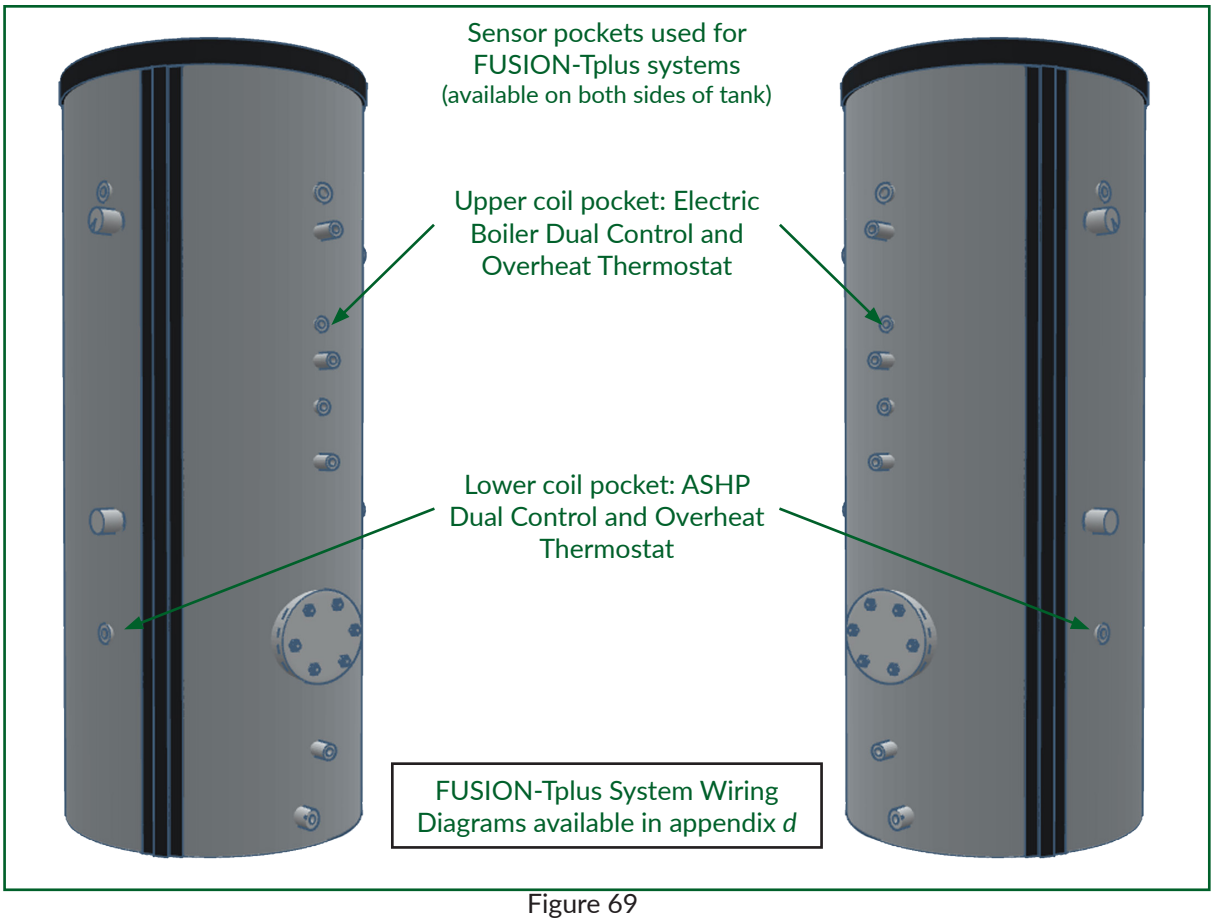

Figure 69

Installation Instructions: FUSION-Tplus

9. Electrical Installation and Controls

FUSION-Tplus Systems:

The Adveco Ardent electric boiler is packaged with a control sensor which should not be used with the FUSION-Tplus system arrangement. Instead, the system is supplied with a dual control and overheat thermostat contained within a single housing which should be installed into a sensor pocket level with the upper coil on the front of the hot water tank. The Adveco FPi air source heat pump should be controlled by a second dual control and overheat thermostat installed into a sensor pocket level with the lower coil of the hot water tank, available on either side of the tank as required by the installation siting. FUSION-Tplus systems are supplied with a control panel to accept wiring connections and provide power and switching to the installation.

- Fit sensor pockets: Fit one of the supplied chrome sensor pockets (figure 70), using an appropriate thread sealant as necessary, into the hot water tank upper coil sensor connection located on the front of the hot water tank. Fit the second supplied chrome sensor pocket to the lower coil sensor connection on the desired side of the hot water tank, with consideration to the eventual cable course between the sensor pockets and the nearby Adveco control panel.

- Install boiler control and overheat thermostat: The electric boiler should be controlled using the supplied combined control and overheat thermostat (figure 71) installed into the sensor pocket on the front of the tank at the level of the upper coil. The two phials of the thermostat should be pulled taut and inserted as far as possible into the tank thermostat pocket. The thermostat housing can be mounted over the end of the pocket (figure 72).

- Install air source heat pump control and overheat thermostat: The ASHP should be controlled using the supplied combined control and overheat thermostat (figure 71) installed into the sensor pocket at the level of the lower tank coil. The two phials of the thermostat should be similarly pulled taut and inserted as far as possible into the tank thermostat pocket and the thermostat housing can be mounted over the end of the pocket (figure 72).

Figure 70

Figure 71

Figure 72

- Check and complete control panel wiring: The control panel is supplied with all internal wiring complete and ready to accept the final connections to and from the plant equipment. All thermostat wiring should connect to the relevant terminals in the Adveco control panel according to the panel wiring diagram supplied with the system and included as appendix *h* at the rear of this manual. Refer to the control panel wiring diagram and appliance manuals to identify and complete any further required connections.

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Installation Instructions: FUSION-Tplus

9. Electrical Installation and Controls

- Fit backup immersion heater: Locate the clean-out inspection flange of the hot water tank and remove the insulation cover and flange blanking plate. Replace with the supplied immersion heater adaptor flange plate containing a central threaded connection, using the supplied gasket and the original bolts from the tank, tightened in a diametrically opposed sequence to ensure an even tension across the flange plate. The immersion heater element (figure 73) can be screwed in and sealed using an appropriate thread sealant.

- Connect immersion heater thermostats: The backup immersion heater is supplied with a single internal combined control and overheat thermostat (figure 74) pre-fitted within the element housing in a factory fitted pocket. This thermostat is acceptable to use for low power immersion heaters used for backup purposes, and should be connected to the Adveco control panel backup immersion heater control connections according to the panel wiring diagram. For further details please refer to the supplied Immersion Heater Criticial Installation Requirements document and control panel wiring diagram included with the panel or available online at www.adveco.co.

- Check and complete control panel wiring: The control panel is supplied with all internal wiring complete and ready to accept the final connections to and from the plant equipment. All thermostat wiring should connect to the relevant terminals in the Adveco control panel according to the panel wiring diagram supplied with the system and included as appendix *b* at the rear of this manual. Refer to the control panel wiring diagram and appliance manuals to identify and complete any further required connections.

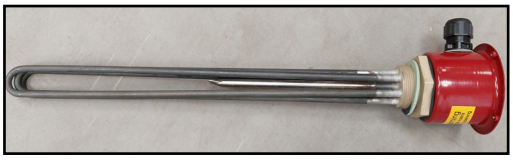

Figure 73

Figure 74

Installation Instructions: FUSION-Tplus

10. Secondary Return Pipework

A secondary return is the best way to ensure that there is hot water at the outlets in a short amount of time. In some cases this could be done with trace heating, but the amount of electricity necessary to do this must be considered. In some small systems it is not necessary to use either, and the hot water can flow directly to the taps. The water at the furthest outlet must be 50°C within one minute (55°C in healthcare premises), although this may not be acceptable to all users and a secondary return arrangement should be considered for waiting times of longer than 20 seconds. In all cases, site legionella protection policy takes precedence over this document.

The secondary return pump should be sized to give a suitable flow of hot water around the system to ensure the returning temperature is at least 50°C. The pipework must be insulated. The pump must have a check valve on the positive side of the return pump to prevent cold flow to the hot outlets.

For FUSION-Tplus systems featuring the twin-coil ATST hot water tank, the secondary return pipework should enter the hot water system in the middle of the tank, above the level of the ASHP-fed lower coil, and below the upper coil fed by the electirc boiler. For further details, refer to the FUSION-Tplus system schematic and wiring diagram included as appendix *d* at the rear of this manual.

11. Shunt / Destratification Pump

In installations where the secondary return is piped into the cold feed, it may be considered that all requirements for destratification or purging are met. This must be confirmed by site Legionella risk assessment.

In installations without secondary returns, or when it is piped into the centre of the tank, it is advised that the tank is entirely heated to 60°C for at least one hour per day. This should be done with a destratification pump piped from the outlet to the inlet. The Adveco FUSION-Tplus system is supplied with an ancillary destratification pump which can be controlled through a dedicated timeclock in the supplied control panel.

The destratification pump timeclock should be set to run at a low demand period of the day, while the heat source is on, for long enough that the bottom of the tank will achieve 60°C for one hour. In installations with multiple heat sources, a destratification pump should not run permanently.

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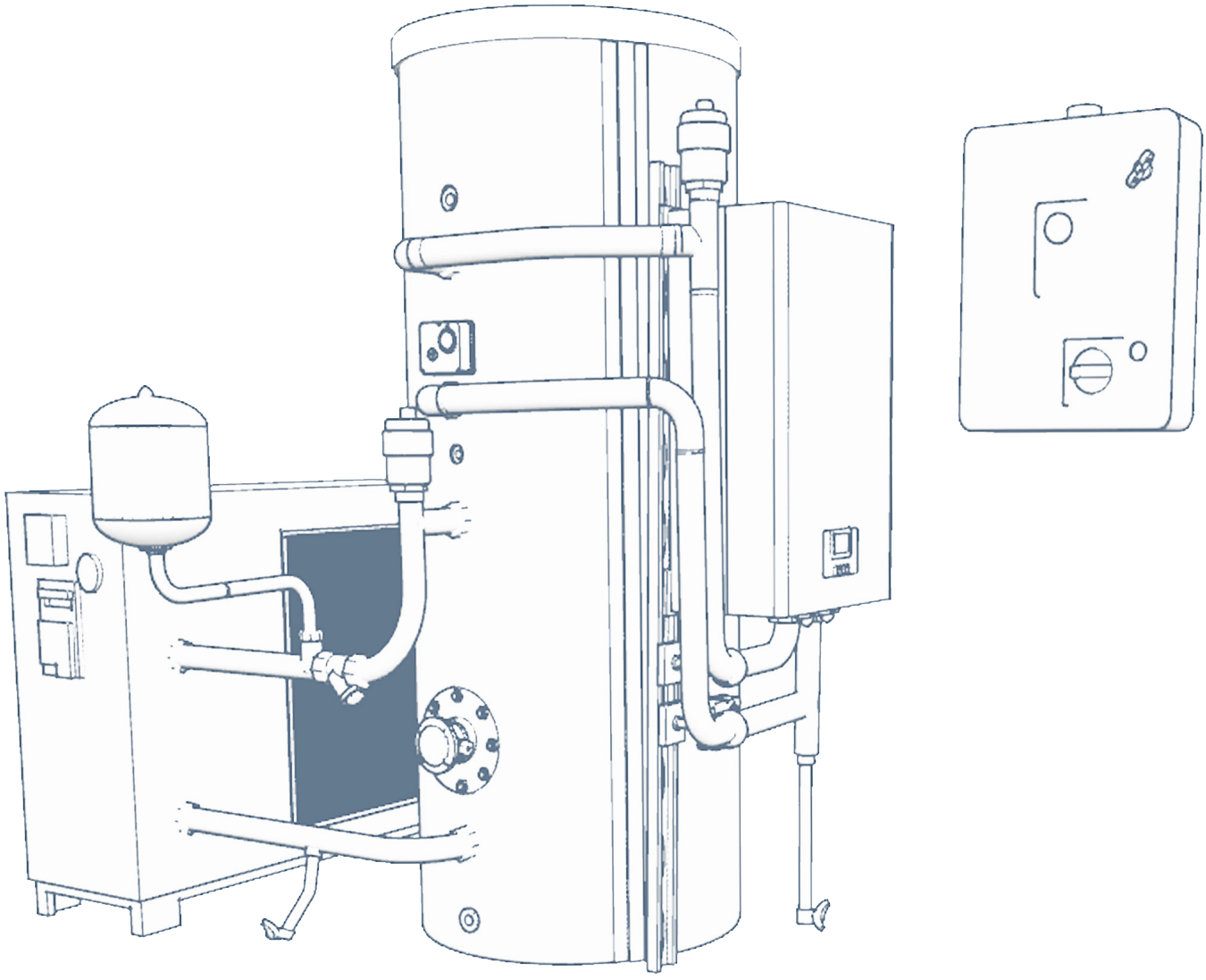
End of FUSION-Tplus Installation Instructions

For FUSION system operation and maintenance instructions,
please turn to page 47.



Commissioning Instructions

Hot water system commissioning should be carried out by a qualified engineer and suitably documented with a report made available to the customer and kept in a service log book for the system. The following page describes a non-exhaustive list of checks and procedures to serve as a guide only. For further commissioning details please contact Adveco using the contact details at the rear of this manual.

For decommissioning or temporary shutdown, please refer to the draindown procedure on page 48.

Commissioning Procedure:

- Check that all expansion vessels are suitably charged. Ensure that the pressure of any expansion vessel on the cold feed pipework is equal to the cold feed pressure (checked when there is no pressure on the water side of the diaphragm).
- Fill the hot water system according to the operation and maintenance instructions in the appliance manuals. Ensure that the drain connections are closed and that an open path remains for air egress out of the system during filling, and that all lengths of pipework and outlets are suitably filled. Once filled, bleed all air from the system and confirm there are no leaks.
- Fill the sealed primary circuits connected to the electric boiler and/or air source heat pump, depending on your specific FUSION system. For filling details of each appliance please refer to the relevant installation manual included with the appliance or available at www.adveco.co. Once filled, bleed all air from each primary system and confirm there are no leaks.
- Check all system pressures are correct and within the operational limits of the system equipment. Ensure that the pressure of the primary water loop(s) is/are correct and lower than the pressure of the domestic water side of the system.
- Confirm that all valves have free travel and operate and discharge correctly. Ensure all pumps are correctly installed and operable.
- Ensure that all thermostats and sensors are calibrated and correctly control their connected heat source. Ensure overheat thermostats correctly stop all heat input into the hot water tank when activated.
- Configure the appliance temperature set points, referring to the relevant appliance installation manuals for further details. Overheat thermostats are all factory set. Control thermostats in a typical system may be configured as follows:

  Electric boiler: Boiler display setpoint set to 70°C. Set tank-mounted control thermostat, if present, to 65°C.

  ASHP: ASHP display setpoint set to 55°C. Set tank-mounted control thermostat to 50°C.

  Backup immersion heater: Set control thermostat to 60-65°C.

- For FUSION-Eplus, FUSION-T, and FUSION-Tplus systems with a control panel, configure the internal timeclocks:

  TC1: Thermal Disinfection Control: Configure the legionella purge pump operating schedule in accordance with the site legionella risk assessment. The schedule should be set to a low-demand period of the day while the heat source is on, and run for long enough to heat the bottom of the tank to 60°C for one hour.

  TC2: Time Control of Hot Water System: Configure the hot water system operating hours in line with the building hot water demand and usage.

- For FUSION-Eplus and FUSION-Tplus systems, configure the fault notifications. The control panels supplied for systems featuring backup immersion heaters include a GSM module which can connect to any local cellular network to provide remote fault alerts by SMS or email for system monitoring, maintenance, or repair purposes. Ensure that a minimum of mobile connectivity is available in the vicinity of the control panel. The alert recipients must be remotely configured by Adveco Ltd. Please contact the Adveco service department using the details at the rear of this manual to provide the alert contact details (email addresses and/or phone numbers as desired) of agreed maintenance personnel or service providers to complete the set up of the remote fault alert system.

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Maintenance Operations

Hot water system maintenance should be determined by the building's risk assessment and legionella protection policy. While full maintenance and cleaning of tanks should be carried out by a trained operative, there are regular hot water system maintenance checks that must be carried out more frequently and can be done by the building controller's nominated person. These include monthly checks of the hot water temperature and regular flushing of low use outlets.
The more involved maintenance regime of a system will vary from site to site depending on water conditions, periodicity, and the intensity of operation. Maintenance must take place at least yearly, but more frequent visits may be required depending on the condition of the unit after one year. The main reason for frequent waterside maintenance is due to scale formation in the tank. Consideration should be given to scale control in hard water areas to reduce descale frequency.

For specific maintenance requirements of each component of the FUSION packaged hot water system, please refer to the specific maintenance manuals supplied with each appliance.

System Checks:

Hot water storage temperature is correct and above 60°C.
Hot water return temperature is above 50°C and in line with relevant local regulations.
The hot water temperature at the furthest outlet achieves 50°C (55°C for healthcare premises) in 60 seconds.
All control thermostats are calibrated and correctly shut off the connected heat source(s).
All overheat thermostats are functional and stop all heat input into the hot water tank.
All relief valves operate and discharge correctly.
All valves have free travel.
The system has no leaks.
The pressure of any expansion vessel on the cold feed pipework is equal to the cold feed pressure (checked when there is no pressure on the water side of the diaphragm).
The sealed primary water loop contains no air, is suitably filled, and all expansion vessels are appropriately charged.
The pressure of the primary water loop is correct and lower than the pressure of the domestic water side of the system.
Ensure all pumps are in good condition and operable.
For systems with air source heat pumps, additionally:

Check the physical condition of the heat pump and ensure all surfaces are free from obstruction and damage. Air must be able to flow freely around the appliance.
Examine and clear the evaporating fins in the event of obstruction, soiling, or deformation. Rinse with detergent and clean water only. A fine toothed comb is suitable for cleaning and straightening evaporator fins.

Cleaning Checks:

All filters and strainers should be cleaned.
The hot water tank should be drained down, cleaned and descaled.
Any immersion heaters in the system should be examined for wear and descaled.

Draindown Procedure:

Turn off all heat sources connected to the hot water tank.
Turn off any system pumps and isolate all connections to and from the hot water tank and related system equipment.
Ensure that the tank drain connection is connected to, or positioned over, a drain or gulley. For pressurised systems, open the drain valve connection to release the pressure within the tank.
Open a safety valve on the tank to allow air into the unit and prevent negative pressure build-up during drainage. Alternatively, ensure there is no isolation between the DHW outlet of the tank and a draw-off point, and open the tap.
Allow the water in the pipework to drain, and leave the tap open to allow ingress of air to the hot water tank.
Allow the tank to fully drain via the drain valve connection.
Repeat the above procedure to drain the coils of the hot water tank via a drainage point included on the pipework. Ensure that a vacuum cannot form within the primary pipework while draining.

Shutdown:

It is acceptable to shut off the hot water system if the building is unoccupied for a short period over night or on the weekends. Following a short shutdown, the hot water system must come on long enough before occupation so that it has been up to temperature for at least one hour. Longer shutdowns must be risk assessed and may require complete flushing and disinfection of the system before startup.

Contact Details & Warranty Information

The Adveco FUSION range, this manual, and all information contained within, are supplied by Adveco Ltd.

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Each component part of the Adveco FUSION assembly is provided with a its own component warranty as detailed in the relevant appliance manual. For further information and for warranty claims, please contact Adveco using the details provided on this page.

Adveco Sales Department
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E: Sales@adveco.co

Adveco Spares Department
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Adveco Technical Support Department
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Adveco Application Design Department
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Adveco Service & Commissioning Department
T: 01252 551 540 Option 6
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