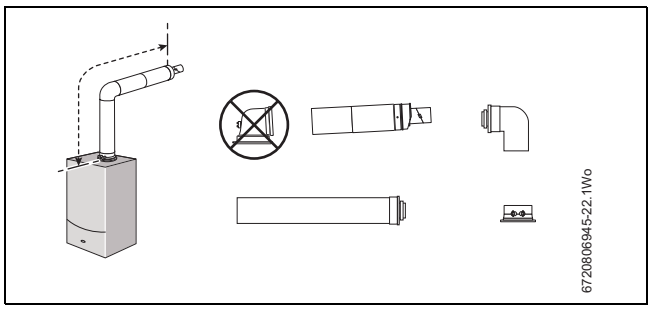
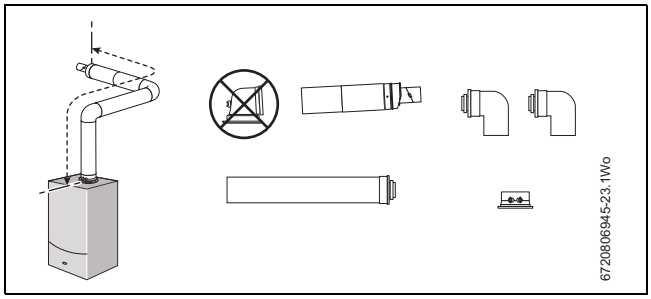
High level horizontal flue



	Maximum flue length (mm)	
	60/100	80/125
High level horizontal flue	6,000	15,000

Table 16

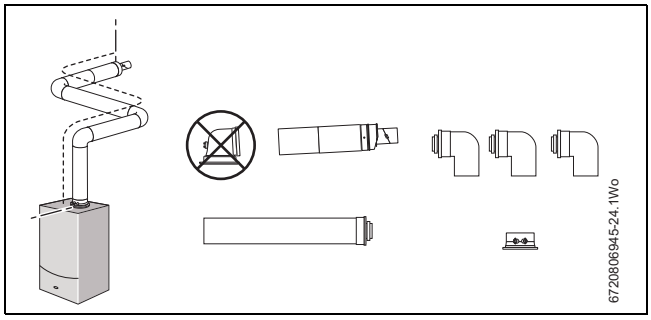
High level horizontal flue with additional elbows



	Maximum flue length (mm)	
	60/100	80/125
High level horizontal flue with 2 x 90° bends	4,000	13,000

Table 17

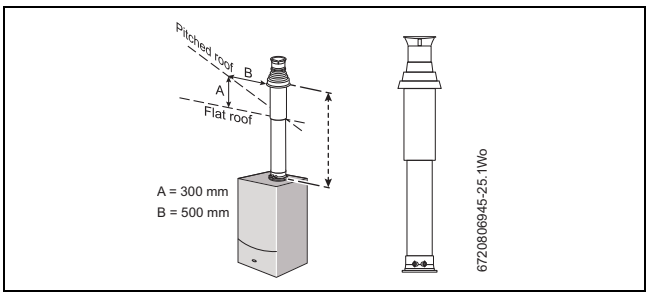
High level horizontal flue with additional elbows



	Maximum flue length (mm)	
	60/100	80/125
High level horizontal flue with 3 x 90° bends	2,000	11,000

Table 18

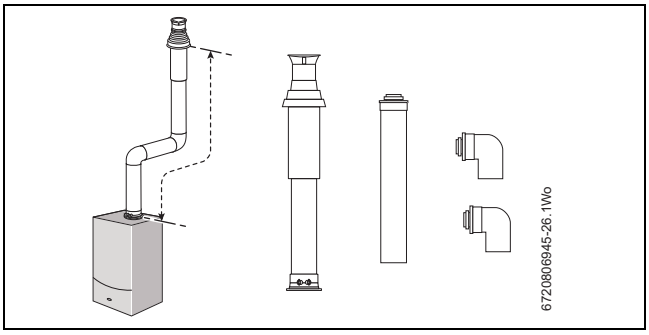
Vertical balanced flue assembly



	Maximum flue length (mm)	
	60/100	80/125
Vertical balanced flue assembly	6,000	15,000

Table 19

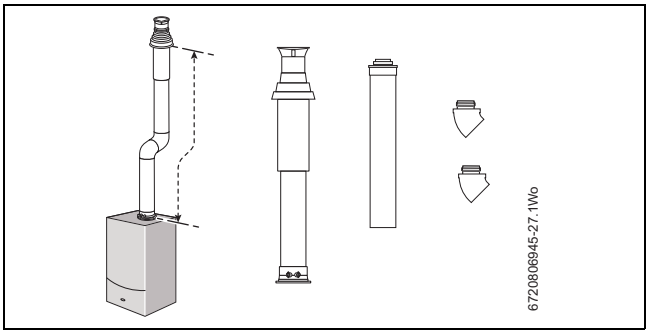
Vertical balanced flue with elbow offset (2 x 90 ° bends)



	Maximum flue length (mm)	
	60/100	80/125
Vertical balanced flue with 2 x 90° bends	2,000	11,000

Table 20

Vertical balanced flue with elbow offset (2 x 45 ° bends)



	Maximum flue length (mm)	
	60/100	80/125
Vertical balanced flue with 2 x 45° bends	4,000	13,000

Table 21

4.9 Flue terminal positions

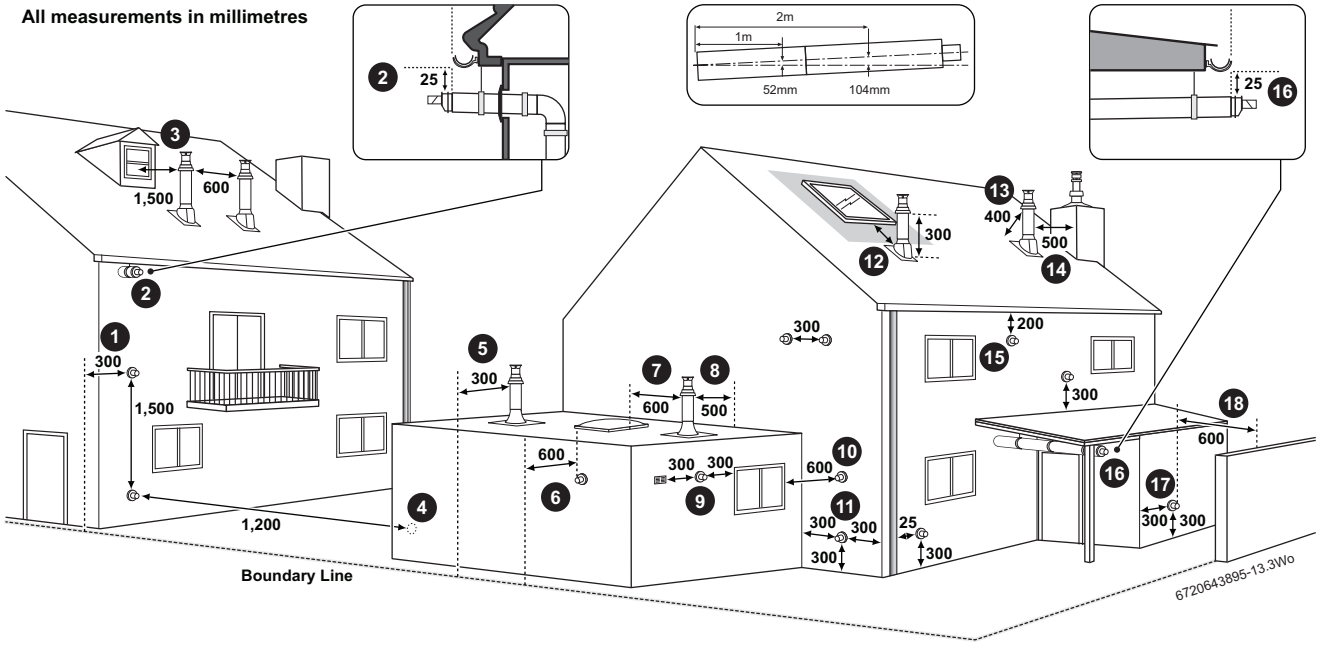


Fig. 17 Flue terminal positions

NOTICE:

- All measurements are the minimum clearances required.
- Terminals must be positioned so to avoid combustion products entering the building.
- Support the flue at approximately one metre intervals and at a change of direction, use suitable brackets and fittings. (flue bracket 100mm part number: 7 716 191 177, flue brackets 100mm x 6 part number: 7 716 191 178, flue bracket 125mm part number: 7 716 191 179).

Key to illustration

1. 300mm adjacent to a boundary line.
2. The dimension below eaves, gutters, pipes and drains can be reduced to 25mm, as long as the flue terminal is extended to clear any overhang. External flue joints must be sealed with suitable silicon sealant.
3. 1,500mm between a vertical flue terminal and a window or dormer window.
4. 1,200mm between terminals facing each other.
5. Vertical flue clearance, 300mm adjacent to a boundary line unless it will cause a nuisance. BS 5440:Part 1 recommends that care is taken when siting terminal in relation to boundary lines
6. 600m distance to a boundary line, unless it will cause a nuisance. BS 5440:Part 1 recommends that care is taken when siting terminal in relation to boundary lines.
7. 600mm minimum clearance from a skylight to a vertical flue.
8. Vertical flue clearance, 500mm to non-combustible building material, and 1,500mm clearance to combustible building material.
9. 300mm above, below and either side of an opening door, air vent or opening window.
10. 600mm diagonally to an opening door, air vent or opening window.
11. 300mm to an internal or external corner. This does not apply to building protrusions less than 450mm.
12. 2,000mm below a Velux window, 600mm above or to either side of the Velux window.
13. 400mm from a pitched roof or 500mm in regions with heavy snow fall.
14. 500mm clearance to any vertical structure on a roof, 600mm to room sealed flue or 1,500 to an open flue.
15. 200mm below eaves and 75mm below gutters, pipe and drains.
16. The dimension below eaves, balconies and car ports can be reduced to 25mm, as long as the flue terminal is extended to clear any overhang. External flue joints must be sealed with suitable silicon sealant.
17. Flue clearance must be at least 300mm from the ground. Terminal guards must be fitted if the flue is less than 2 metres from the ground or if a person could come into contact with the flue terminal.
18. 600mm distance to a surface facing a terminal, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminals in relation to surfaces facing a terminal.

Note:

- Installations in car ports are not recommended.
- The flue cannot be lower than 1,000mm from the top of a light well due to the build up of combustion products.
- Dimensions from a flue terminal to a fanned air inlet to be determined by the ventilation equipment manufacturer.
- A flue terminal guard should be fitted over a terminal, if persons could come into contact with the terminal, or it could be subject to damage and where the terminal is less than 2,000mm from the finished floor level.

4.10 Plume management terminal positions

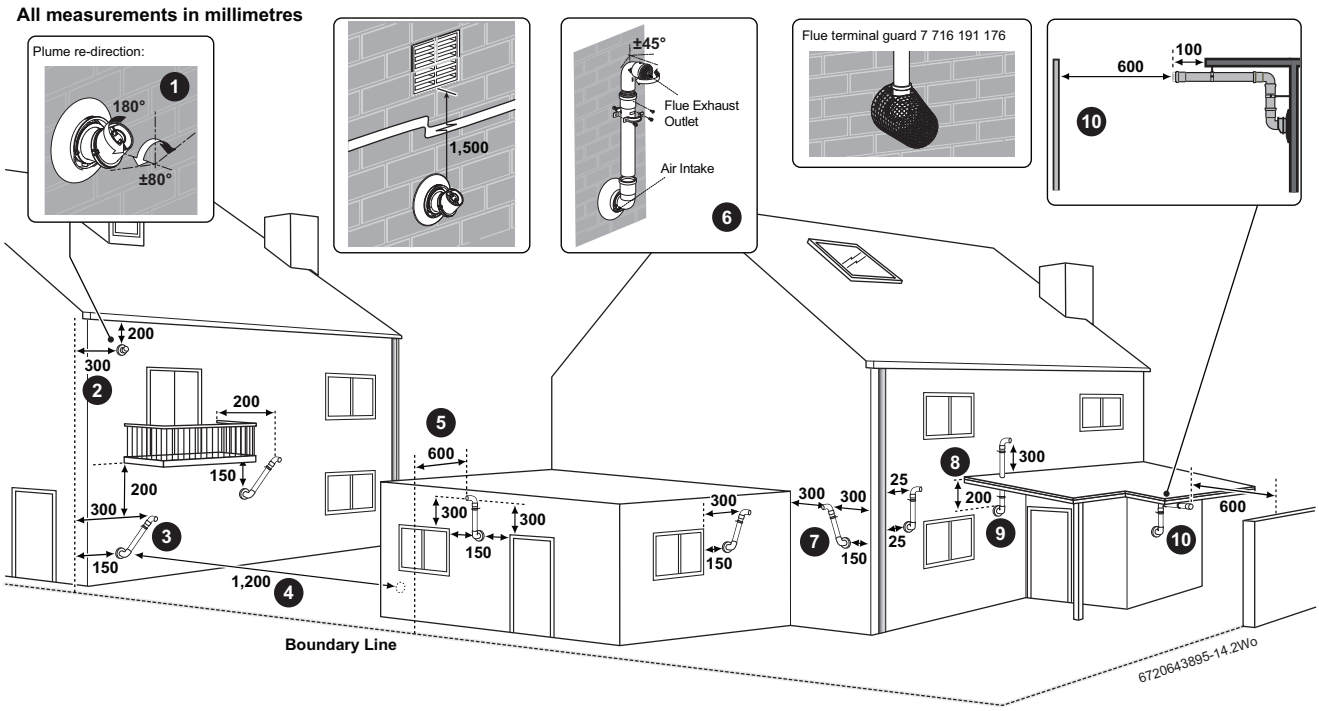


Fig. 18 Plume terminal positions

Maximum and minimum plume management lengths:

- A minimum distance of 500mm must be maintained between the plume management outlet and the flue air intake.
- The maximum plume management length is 4.5 metres for the appliances detailed on the front of this manual.
- The 45° bend is equivalent to 0.75 metres of straight plume management and the 90° bend is equivalent to 1.5 metres.

NOTICE:

- All measurements are the minimum clearances required.
- Refer to previous page for all concentric flue terminal positions unless the flue position is specified on the figure above “Plume terminal positions”.
- Terminals must be positioned so to avoid combustion products entering the building.
- Support the flue at approximately one metre intervals and at a change of direction, use suitable brackets and fittings.

Key to illustration

1. This feature allows some basic plume re-direction options on a standard telescopic horizontal flue terminal.
   300mm minimum clearances to a opening e.g. window.
   However the minimum clearances to an opening in the direction that the plume management is facing, must be increased to 1,500mm.
   Where the flue is less than 150mm to a drainpipe and plume re-direction is used the deflector should not be directed towards the drainpipe.
2. 300mm adjacent to a boundary line.
3. Plume Management kit air intake can be reduced to 150mm providing the flue exhaust outlet is no less than 300mm adjacent to a boundary line.
4. 1,200mm between terminals facing each other.
5. 600mm distance to a boundary line, unless it will cause a nuisance. BS 5440:Part 1 recommends that care is taken when siting terminal in relation to boundary lines.
6. Using a Plume Management kit the air intake measurement can be reduced to 150mm providing the flue exhaust outlet has a 300mm clearance. The initial horizontal run from the terminal elbow must have a minimum 10° fall back, (stop tabs in the elbow prevent less than 10°) to the appliance for proper disposal of condensate. Any further horizontal runs can be 3°.
   – For details on specific lengths see relevant appliance Technical & Specification information.
7. Internal/external corners. The air intake clearance can be reduced to 150mm providing the flue exhaust outlet has a 300mm clearance.
8. Clearances no less than 200mm from the lowest point of the balcony or overhang.
9. 1,200mm from an opening in a car port on the same wall e.g. door or window leading into the dwelling.
10. 600mm distance to a surface facing a terminal, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminals in relation to surfaces facing a terminal.

Note:

- Installations in car ports are not recommended.
- The flue cannot be lower than 1,000mm from the top of a light well due to the build up of combustion products.
- Dimensions from a flue terminal to a fanned air inlet to be determined by the ventilation equipment manufacturer.

4.10.1 Determine the plume management system length

Effective straight flue length for telescopic flue with plume management	
Minimum plume length 500mm (M)	**Maximum plume length 5,000mm (M)**
Maximum flue length 5,000mm (L)	Maximum flue length 2,200mm (L)

Note: Measurement M plume length

- Measurement M must be a minimum of 500mm and must not exceed 4,500mm for a 60mm plume management system used with the horizontal Ø 60/100mm flue.

Minimum plume management length

The minimum plume length should be calculated to ensure that the air inlet and exhaust have a minimum distance of 500mm between them (→ figure 19).

The plume management can be in any configuration, within the parameters of the plume management installation instructions, as long as it does not terminate inside the shaded area.

WARNING: Minimum plume management length.

The minimum distance of 500mm must be maintained between air inlet and exhaust.

- Do not terminate the plume management inside the shaded area shown in figure 19

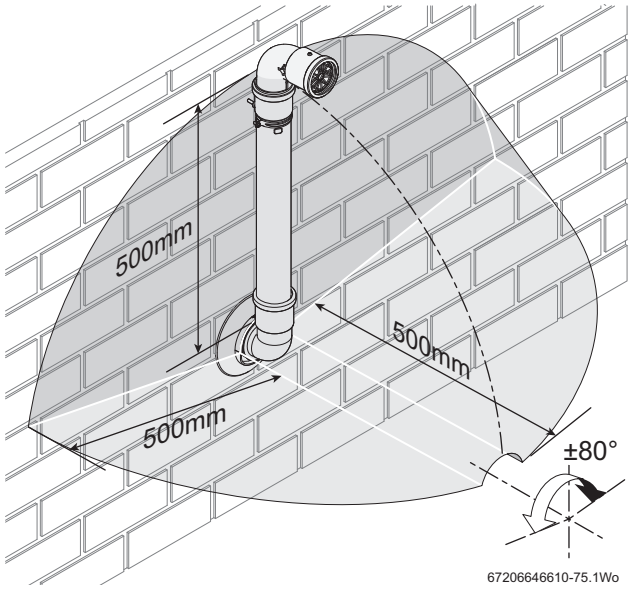


Fig. 19 Terminal exclusion zone

NOTICE: Cutting the 500mm pipe

If the 500mm plume management pipe kit is cut, an additional elbow will be required to join the pipe work.

- The Plume management extension kit contains the components required for such a configuration.

Flue length versus plume management length

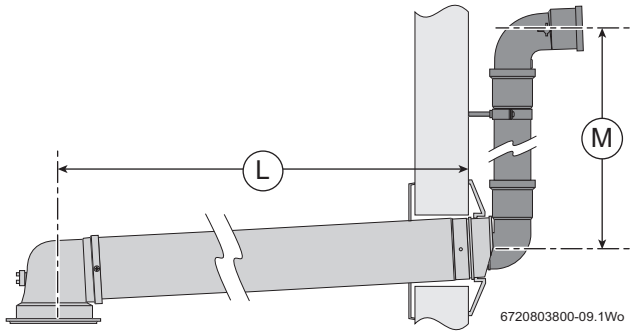


Fig. 20 Effective lengths L and M

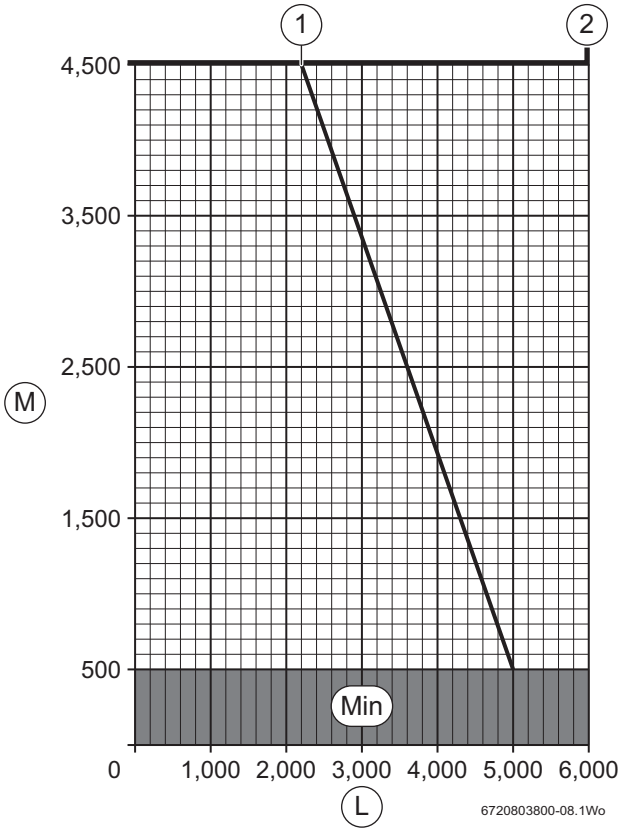


Fig. 21 Effective flue lengths versus plume management lengths

[Min] Minimum plume kit length 500mm
[M] Plume management length allowed (mm)
[L] Effective flue length (mm)
[1] 25 & 30Si Compact ErP data line
[2] Maximum plume length for all boilers

Refer to figure 21 to determine the appropriate plume length (M) versus the flue length (L).

The lengths for both plume and flue are the effective lengths, which includes the effective length of any bends plus the straight lengths.

The graph can be used to calculate:

- **Effective flue length** if a specific effective plume length is required.
- **Effective plume length** if a specific effective flue length is required.

5 INSTALLATION

WARNING: All the previous "Pre-Installation" sections must be read and the requirements met before starting boiler or flue installation.

5.1 Unpacking wall frame & ancillary items

CAUTION: LIFTING AND CARRYING
- ▶ Only lift a manageable weight, or ask for help.
- ▶ Bend your knees and keep your back straight with feet apart, when lifting or putting down heavy objects.
- ▶ DO NOT lift and twist at the same time.
- ▶ Lift and carry object close to the body.

▶ Remove the retaining straps from the carton.

▶ Open the four carton flaps and unpack as follows:

1. Remove items 1 to 7 from the cardboard tray.
2. Remove the wall mounting frame and cardboard tray together.

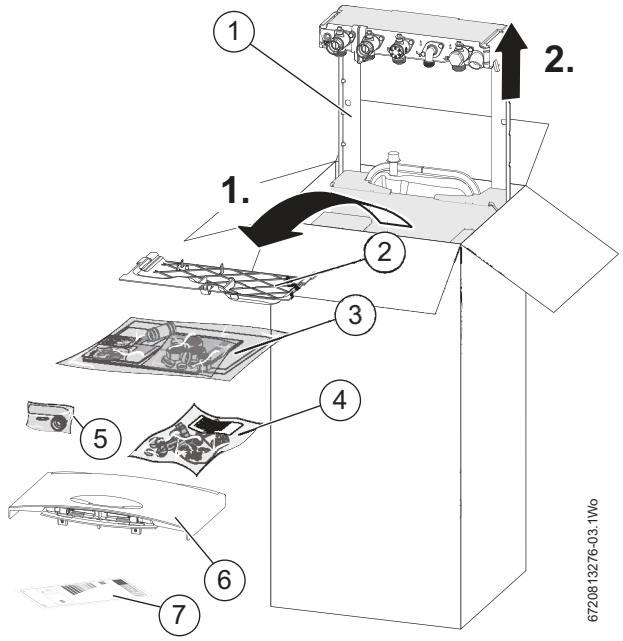


Fig. 22 Unpacking

[1] Wall mounting frame
[2] Bottom panel
[3] Literature pack with wall mounting template
[4] Integral Filling Loop kit
[5] PRV installer connection elbow
[6] Front fascia panel
[7] ErP label

IMPORTANT HANDLING INSTRUCTIONS:

- It is advised that two people are used to carry the carton from the van to the point of delivery.
- Once the carton has been delivered, the outer carton is removed first. Care should be taken when releasing the straps. If a sharp implement is used make sure the outer carton is not pierced and that the implement is used in such a way so that it may not cause personal injury.
- All sharp objects must be covered or the blade retracted after use and put away in a safe place.
  Care should be taken when lifting the boiler from the base and the proper technique for safe lifting of any heavy object should be strictly observed.

Additional requirements for roof space installation:

- The boiler should be first unpacked before ascending ladder to a loft space.
- Two sets of steps should be used.
- Two people should share the lifting of the boiler up to the loft hatch, where the boiler is entered into the loft space tilted and slid on its back into the loft.
- Once the appliance is removed from its packaging check the contents against the packing list.

NOTICE:
- ▶ **Before installing the appliance, ensure that the system has been cleaned as explained on page 12.**

5.2 Wall mounting template & flue opening

WARNING: BEFORE DRILLING ENSURE THAT THERE ARE NO PIPES, ELECTRICAL CABLES, DAMP PROOF COURSES OR OTHER HAZARDS.

SAFETY:

All relevant safety precautions must be undertaken. Protective clothing, footwear, gloves and safety goggles must be worn as appropriate.

FIXING THE WALL MOUNTING FRAME:

▶ The boiler wall mounting template shows the relative positions of the flue and the top and bottom fixing points of the wall mounting frame.

1. Fix the wall mounting template to the wall in the desired position.
2. Drill 4 holes for the wall mounting frame through the template, additional mounting holes can be utilised if required.

The wall mounting template has been sized to allow for minimum clearances of 5mm sides, 200mm base and 170mm above boiler case (which is 30mm above a 100mm diameter flue elbow).

REAR FLUE OUTLET

▶ The drawing opposite shows the boiler wall mounting template with the flue centre lines of both the 100mm and 125mm flue systems.

3. Mark the centre line of the flue to be used (3); the external diameter of the hole can also be marked if required.

▶ If a 100mm diameter flue is to be used, a 125mm diameter hole is required. However, if using the weather sealing collar by pushing it through from inside the property, then a 150mm diameter hole is required to accommodate this.

▶ The flue turret of the 100mm flue has an in-built 3° angle.

▶ If extensions are to be added then the complete flue must rise at an angle of 3°.

▶ Drill the hole, preferably using a core drill.

SIDE OUTLET:

4. Mark from the centre line of the wall mounting template to the wall that the flue will pass through (4).

▶ Allow for a rise of 52mm per metre length of flue, to give a 3° angle.

▶ Clear any debris from the site.

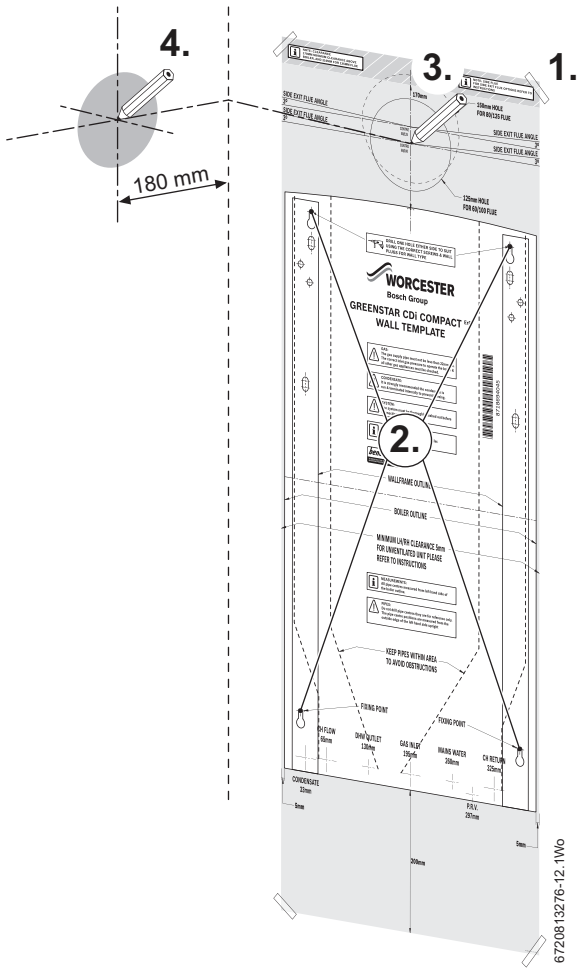


Fig. 23 Marking the flue position

- ▶ Remove wall mounting template.
- ▶ Secure the wall mounting frame to the wall with the appropriate fittings for the boiler weight and wall type.
- ▶ Remove and discard the red plastic dust cap from the expansion vessel pipe before hanging the boiler.

5.3 Unpacking the appliance

1. Remove outer carton (1) and place safely away from the working area.
2. Remove the inner sleeve (3) leaving all other cardboard inserts and base (4) in place.
3. Remove the protective wrapping (5) from the boiler.

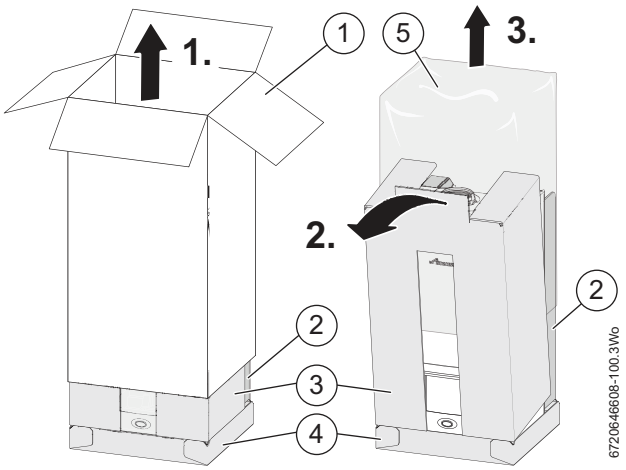


Fig. 24 Remove the carton

4. Remove the protective cardboard (5) from over the isolating valves.
5. Remove the protective cardboard (6) from around the expansion vessel.
6. Remove the inner packing (2) from the back of the boiler.
7. Lie the boiler on the floor ensuring that the V shaped cardboard insert (8) is in place.

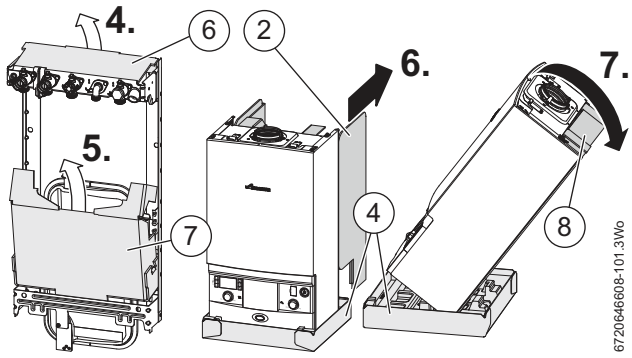


Fig. 25 Finish unpacking

Removing the outer case

- ▶ Before the case can be removed the control panel must be moved into the service position, i.e. hinged open.

1. Remove the two screws underneath the fascia securing the control panel.
2. Pull the catches forward to release.
3. Pull the bottom of the fascia forward and out to release the top of the control panel.
4. Hinge open the control panel into the service position
5. Refer to figure 26 and release the two screws securing the lower part of the case.
6. Release the spring clips at the top of the boiler.
7. Slide the case off the frame and store safely out of the way.

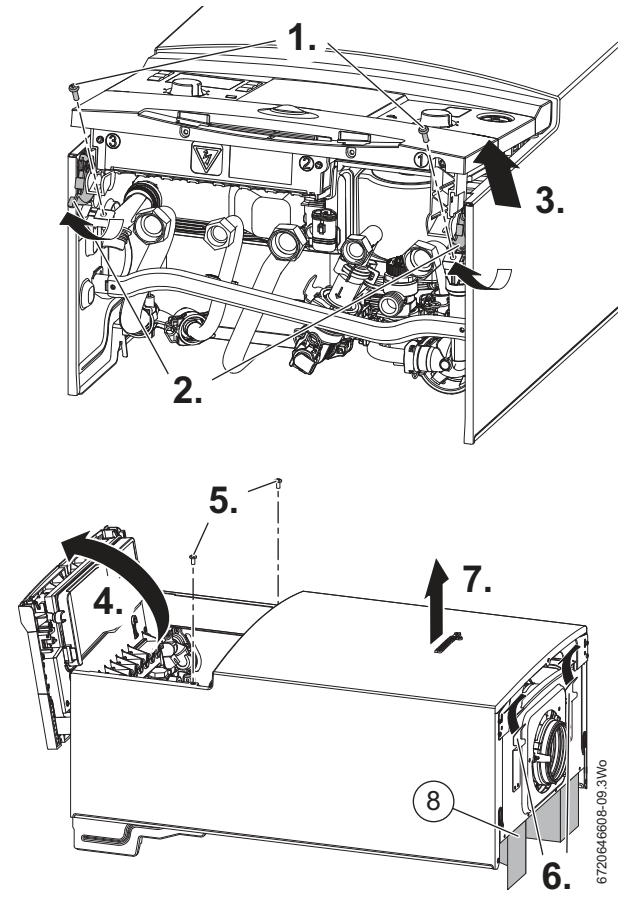


Fig. 26 Releasing the control panel

Refer to Figure 27. The connector (1) in the wiring harness is provided for the installation of the Domestic Hot Water Pre-Heat accessory - 7 716 192 735

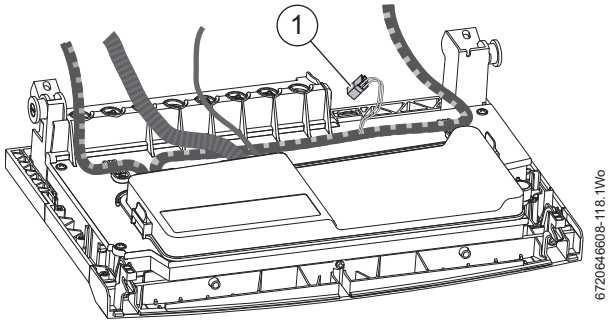


Fig. 27 Unused connector

- ▶ Remove any packaging within the boiler and the packaging base (3).
- ▶ Leave the V shaped support (5) in place until the boiler is ready to be hung on the wall frame, then remove.

5.4 Pre-plumbing boiler connections

CAUTION:
- ▶ Isolate the mains gas supply before starting any work and observe all relevant safety precautions.
- ▶ Be aware of plastic components when using a naked flame on pipe work.

Plumbing the condensate drain pipe

- ▶ Fit the condensate discharge pipe as close to the wall as possible to ensure easy fitting of the boiler bottom panel.
- ▶ Route the condensate pipe to an appropriate discharge point, refer to section 4.4.
- ▶ Plumb up to the wall frame with 22mm pipe.
- ▶ Ensure that there is enough pipe to insert 25mm into the rubber hose connector.
- ▶ Attach the connector to the condensate drain pipe.

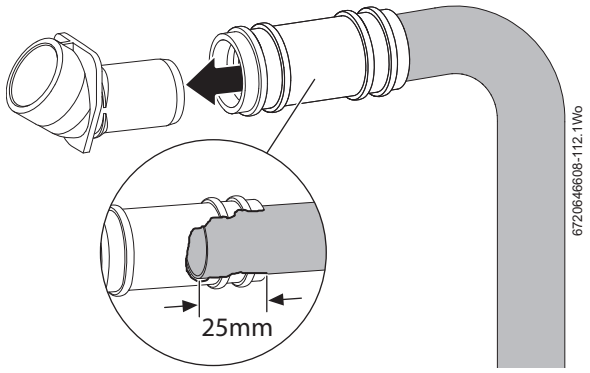


Fig. 28 Condensate connection

PRV Pre-plumbing connection

1. Fit the PRV pre-plumbing connector to the PRV locator bracket as shown in the figure below.

The elbow is supplied in the Hardware/Literature pack.

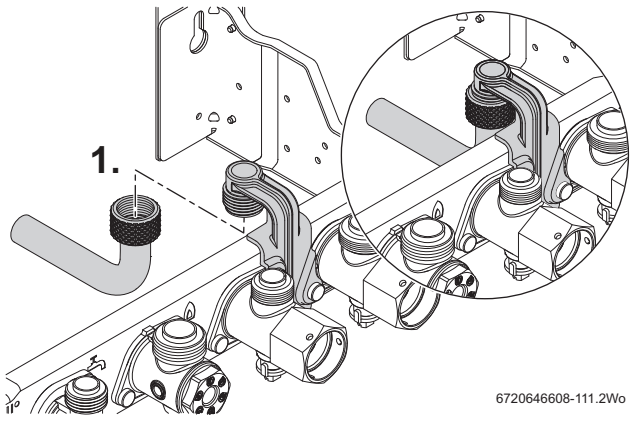


Fig. 29 PRV pipe connection

Once the wall frame has been mounted the PRV discharge pipe can be fitted.

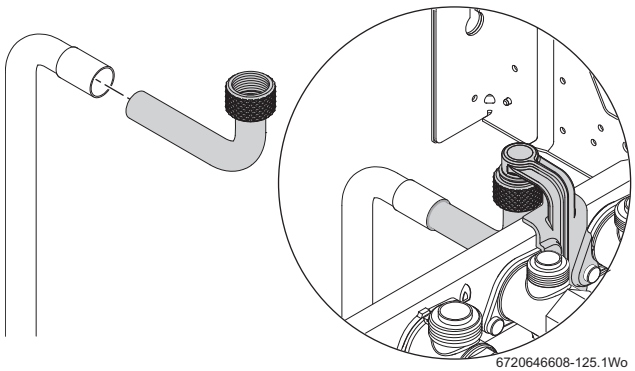


Fig. 30 PRV elbow fitting

- ▶ Connect the PRV discharge pipe to the pre-plumbing connector.
- ▶ The discharge pipe can be routed as required.
- ▶ The pre-plumbing connector must be removed before the boiler is hung on the wall frame.

Integral filling link

Fit the Integral Filling Link, supplied with the boiler, before hanging the boiler on the frame.

Fitting the Filling Link assembly at this stage will be easier than when the boiler is hung on the wall frame.

- Close the isolating valves on the DHW inlet and CH return connections.

There may be mains and system water pressure behind the blanking plugs.

- Unscrew the blanking plugs from the DHW inlet and CH return connections.
- Place the filter inside the inlet of the Filling link, ensuring that the mesh is inside the Filling link assembly.
- Fit the Filling link assembly onto the DHW inlet and CH return connections, refer to figure 31

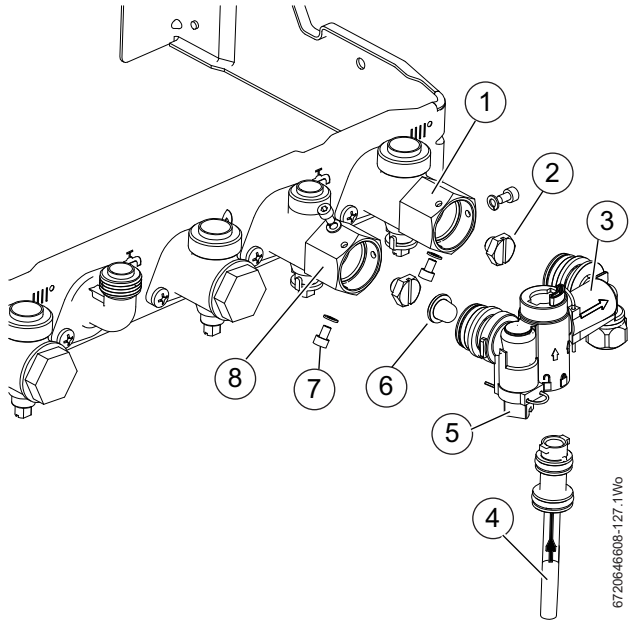


Fig. 31 Fitting the Filling link

[1] CH return connection
[2] Blanking plugs x 2
[3] Filling link assembly
[4] Filling key
[5] White control screw
[6] Filter
[7] M4 screws and washers x 4
[8] DHW inlet connection

- Ensure that the Filling link is pushed in fully to the locating tabs on both sides of the assembly.
- Fit an M4 screw and washer in at least two places on each connections.
- Ensure that the white plastic Control Screw [5] is turned clockwise into the fully closed position.

Do not insert Filling key [4] at this stage.

- Open the isolating valves on the DHW inlet and CH return connections.

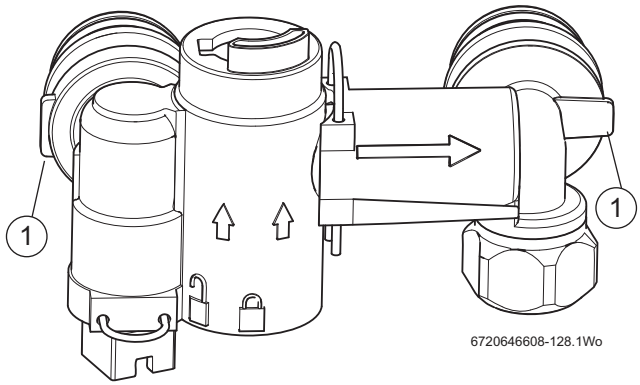


Fig. 32 Location tabs

[1] Locating tabs

Gas and water connections

WARNING: Bonded washer for gas (3)
- The bonded washer must be used on the gas pipe isolating valve connection.

- Connect the system pipes using the compression nuts and olives supplied in the Literature/Hardware pack.

1. CH flow (22mm),
2. DHW outlet (15mm),
3. Gas inlet (22mm bonded washer),
4. Domestic Cold Water inlet (15mm),
5. CH return (22mm),

- Fit sealing washers to service valves before hanging boiler.

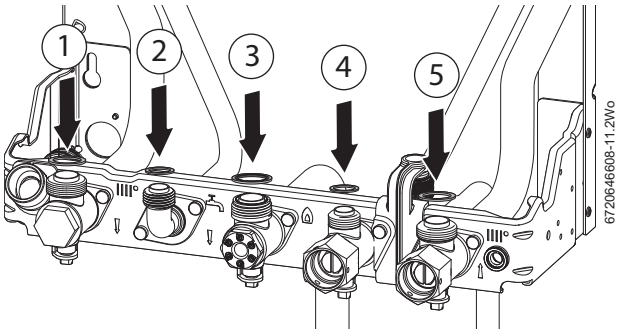


Fig. 33 Sealing washers

5.5 Hanging the boiler

CAUTION: Lifting the boiler
- ▶ Do not lift the boiler using the control panel as a hand hold.
- ▶ There are two handling holes incorporated into the inner casing left and right in the lower section of the appliance.

NOTICE: Before hanging the boiler remove:
- ▶ the plastic strip fitted to pipes.
- ▶ the red cap from the expansion vessel.
- ▶ the red plug in the expansion vessel connection in the hydraulic manifold.

Protect the floor from residual water.

The expansion vessel is secured to a bracket on the wall frame in a “Pre-Installation” position.

Ensure that the control panel is in the closed position before hanging the boiler.
There is no requirement to re-fit the bottom screws at this time.

- ▶ Stand the boiler upright to gain access to the rear of the hydraulic manifold.
- ▶ Release the wire retaining clip securing the red plastic blanking plug.

1. Before hanging the boiler:

- ▶ Remove the blanking plug from the expansion vessel connection at the hydraulic manifold.
- ▶ Lubricate the expansion vessel “O” ring with silicone grease.
- ▶ Ensure that the wire retaining clip is still fully released so that the expansion vessel pipe connection can be made into the hydraulic manifold.

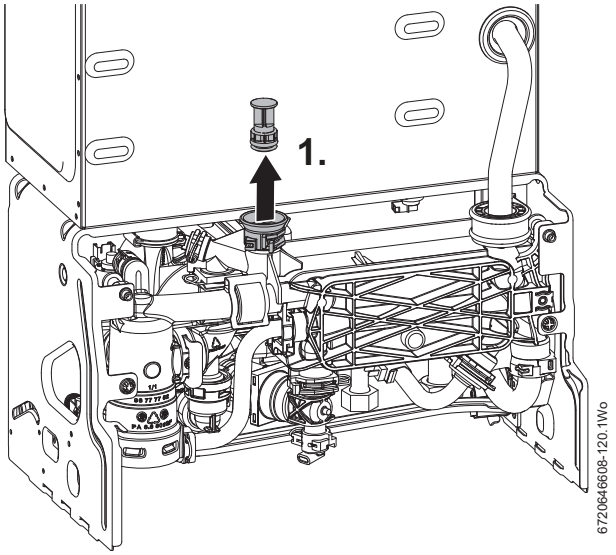


Fig. 34 Removing the blanking plug

1. Refer to figure 35 and ensure that the plastic protection cap is removed from the expansion vessel connection pipe.
2. Remove the pre-plumbing connector:

- ▶ Unscrew the PRV outlet pipe from the pre-plumbing connector.
- ▶ Remove the two screws (1) holding the pre-plumbing connector in place.
- ▶ Remove the temporary PRV pre-plumbing connector, and discard.
- ▶ Replace the two screws (1) removed earlier and tighten firmly.
- ▶ The boiler is mounted on the wall frame utilising the two mounting points, indicated on figure 35, left and right at the top of the wall frame.

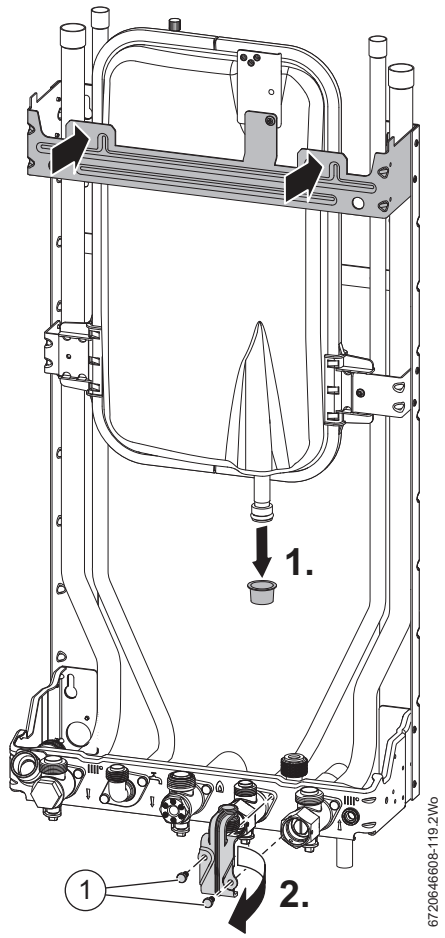


Fig. 35 Mounting points

- ▶ Hang the boiler on to the wall mounting frame utilising the two mounting points positioned left and right at the top rear of the appliance.
  The expansion vessel is shown removed for clarity.

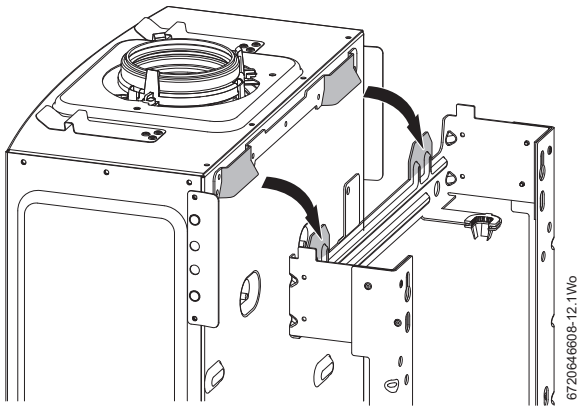


Fig. 36 Hanging the boiler

WARNING: Bonded washer (gas)
- ▶ The bonded washer must be used on the gas pipe isolating valve connection.

- ▶ Connect the PRV discharge pipe on the hydraulic unit onto the PRV outlet pipe work, and tighten firmly.
- ▶ Ensure that the gas and water connections to the isolating valves are made using the fibre washers supplied in the Literature/Hardware pack. Tighten the gas and water connections firmly.

Connecting the expansion vessel

To connect the expansion vessel to the hydraulic pump manifold situated to the left of the pump:

1. Release the expansion tank from the retaining bracket, see fig 37.
2. Ensure that the wire retaining clip on the pump manifold is fully withdrawn, but not removed, before inserting the expansion vessel pipe into pump manifold, see fig. 37.
3. Secure in place with the wire retaining clip.

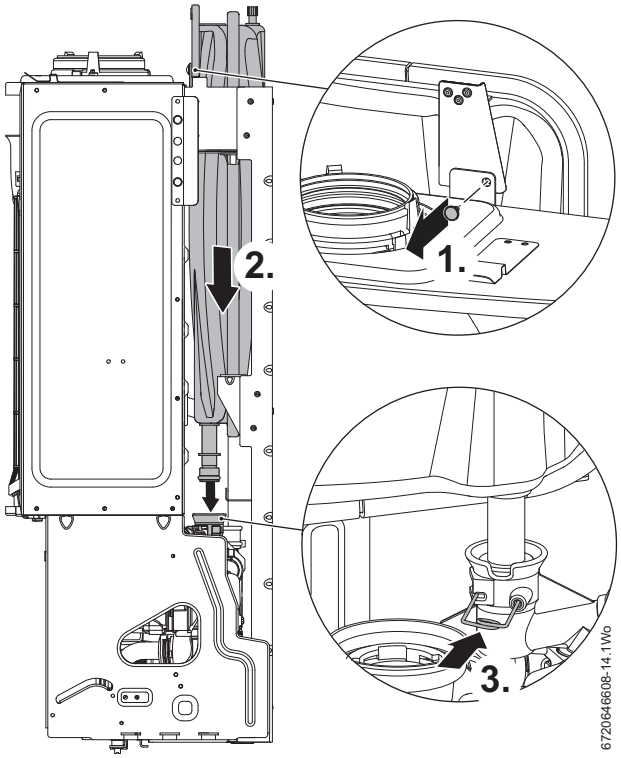


Fig. 37 Expansion vessel connection

Connecting the siphon outlet

1. Push the black rubber siphon discharge hose, onto the wall frame connector, until fully engaged.

Filling the siphon

2. Pour 200 to 250 millilitres of clean water through the inner flue opening to fill the siphon before running the boiler.

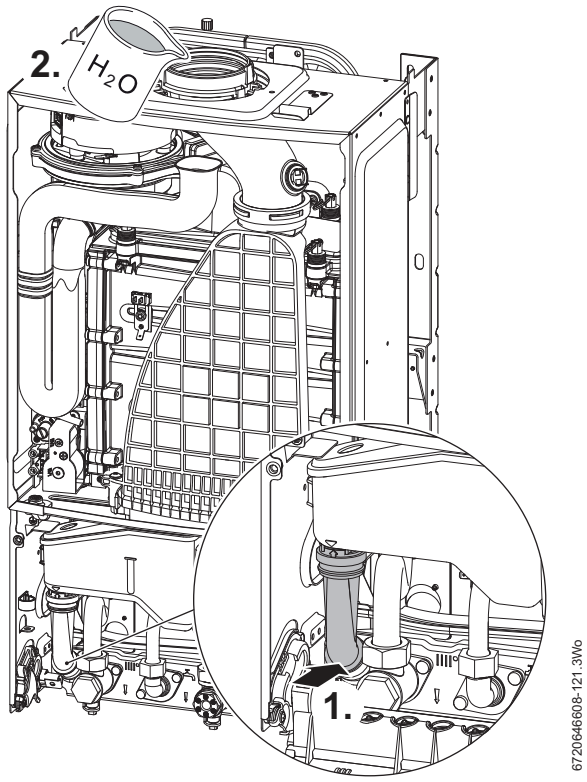


Fig. 38 Siphon fill

5.6 Flue turret/adapter installation

The flue turret/adaptor for the appliance is secured using three retaining screws (figure 39, item [1]) which come in position on the appliance.

To ease assembly of flue components, apply silicone lubricant to sealing surfaces.
Refer to the manual supplied with the flue kit for complete installation instructions.
For plume management effective lengths and the effective flue lengths, refer to details in section 4.8.

Refer to figures 39 & 40.

- ▶ Remove the three inner flue tube retaining screws [1]. The inner tube will be held in place in the appliance.
- ▶ Check the appliance flue seal [2] is correctly seated and apply silicone grease.

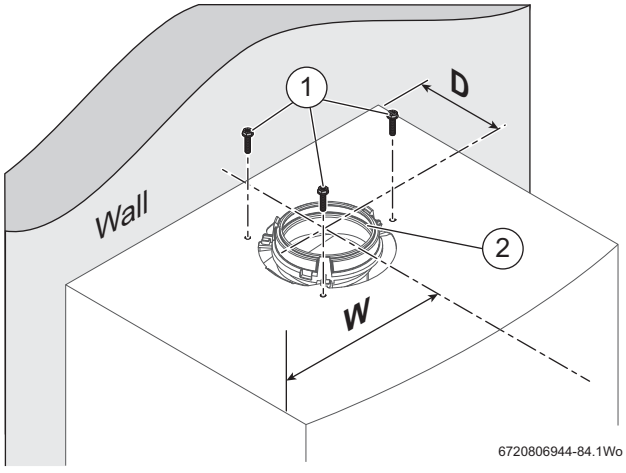


Fig. 39 Flue turret centre

[D] 180mm
[W] 195mm

- ▶ Align the flue turret/vertical adaptor to the appliance flue outlet with flat facing [3] to the rear of the appliance.
  The flue turret/adaptor should be pushed straight down, on to the appliance.
- ▶ The three inner flue tube retaining screws [1] are, re-used for the flue turret and replacement retaining screws [4] supplied with the adaptor kit are used to secure turret/adaptor to the appliance.

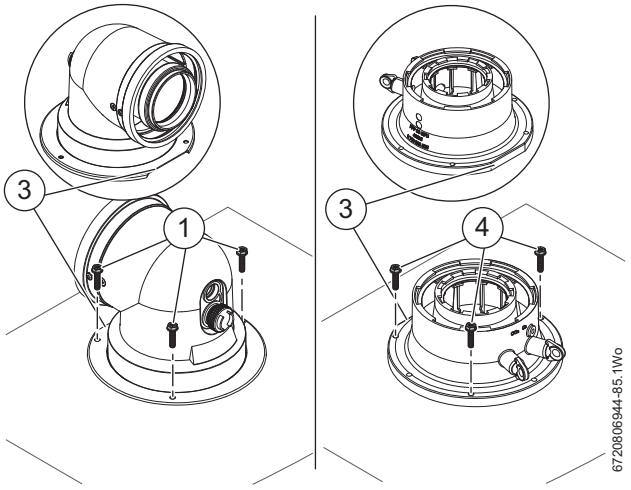


Fig. 40 Flue turret/adaptor connection

Additional notes and reminders:

- Ensure that all cut lengths are square and free from burrs.
- Ensure that the flue and seals are not damaged.
- The flue is sealed when assembled correctly, the components are pushed fully home and secured.
- The flue is set at an angle of 3° or 52mm per metre length.
- Support the flue at approximately one metre intervals and at a change of direction, use suitable brackets and fittings (flue bracket 100mm part number: 7 716 191 177, flue brackets 100mm x 6 part number: 7 716 191 178, flue bracket 125mm part number: 7 716 191 179)

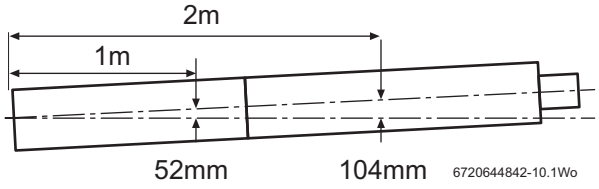


Fig. 41 Slope for condensate disposal

5.7 Electrical

CAUTION: Isolate the mains electrical supply before starting any work and observe all relevant safety precautions.

The boiler is pre-fitted with a mains supply cable. Route the cable through the right hand side of the wall mounting frame.

- The mains electrical supply to the boiler must be through either a fused double pole isolator or a fused three pin plug and unswitched socket situated, where practicable, adjacent to the boiler.
- The isolator must have a contact separation of 3mm minimum in both poles.
- Any additional equipment connected to the boiler must not have a separate electrical supply.
- External fuse rating 3A.

Access to electrical connections:

- ▶ Access to all wiring connections are via the Installer access cover at the bottom front of the control panel. No access is required to other parts of the control board.

1. Refer to figure 42 and release the three captive screws securing the Installer access cover.
2. Remove the Installer access cover.

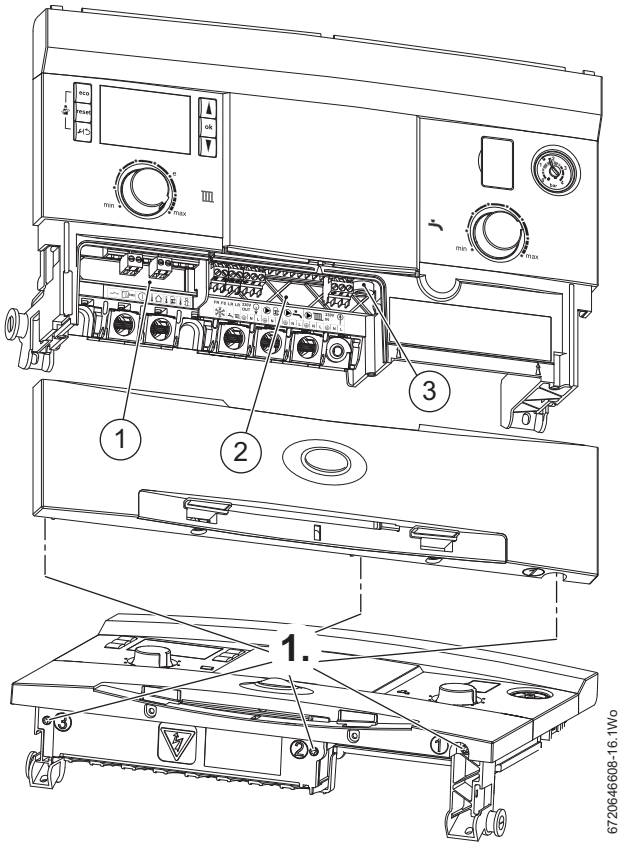


Fig. 42 Removing the installer access cover

[1] Low voltage connections
[2] Mains voltage connections
[3] Fuse carrier - 5A

Low voltage connections

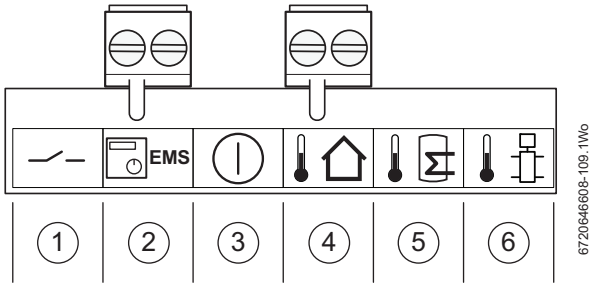


Fig. 43 Low voltage connectors

Low voltage terminal strip	
1	Low voltage room thermostat input (NOT USED)
2	EMS bus connections
3	External cut off switch (NOT USED)
4	Outdoor compensation sensor
5	Cylinder sensor (NOT USED on Combi)
6	Low Loss Header sensor (NOT USED)

Table 22 Key to figure 43

Mains voltage connections

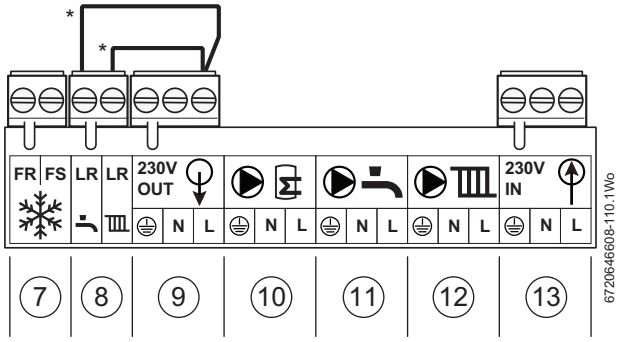


Fig. 44 Mains voltage connectors

Mains voltage terminal strip	
7	External frost thermostat
8	230 V A.C. switched live inputs • CH - Remove link when connecting external CH control • DHW - Remove link when connecting external DHW control
9	230 V A.C. mains output to wiring centre
10	DHW charge pump (NOT USED on Combi)
11	DHW circulation pump (NOT USED on Combi)
12	CH circulation pump (NOT USED on Combi)
13	Boiler 230 V A.C. mains supply
*	Pre-wired links

Table 23 Key to figure 44

NOTICE: DHW LR (Live Return) switched live

▶ This input provides connection for a proprietary external twin channel control to time the preheat function on the DHW (link must be removed). All Worcester twin channel digital controls provide this functionality.

5.7.1 Mounting optional plug-in controls

CAUTION:

▶ Isolate the mains electrical supply before starting any work and observe all relevant safety precautions.

Refer the to Programmer/Timer manual for set up and operation of the unit.

▶ When connecting Worcester plug-in or EMS intelligent controls, the links (→ items 8 & 9 in figure 44) must be left in the connection points.

Removing the blanking plate

The control panel must be released and swung forward slightly to gain access to the top cover panel, refer to section 7.3 for access to the control panel.

1. Release the captive screws securing the top cover panel.
2. Remove the cover panel to enable the blanking plate to be removed.
3. Release the three captive screws enough to allow the Installer access cover to be lowered by 10mm.
4. Lower the Installer access cover to allow the blanking panel to be removed.
5. Use the tab (1) to lift and also press up on the bottom edge of the blanking plate to release the clips from the slots in the control panel.
6. Pull the blanking plate forward to remove.

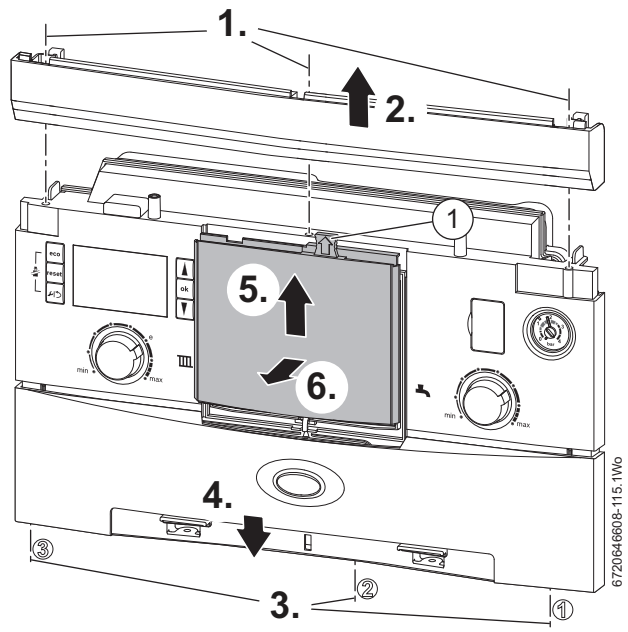


Fig. 45 Removing the blanking plate

Fitting the programmer/timer

When fitting EMS intelligent programmers, step 1 can be ignored.

1. Connect the ribbon cable to the socket (2) in the control panel, ensuring that the cable will fit into the recess (3) in the control panel.
2. Align the clips on the back of the Programmer/Timer with the slots in the control panel.

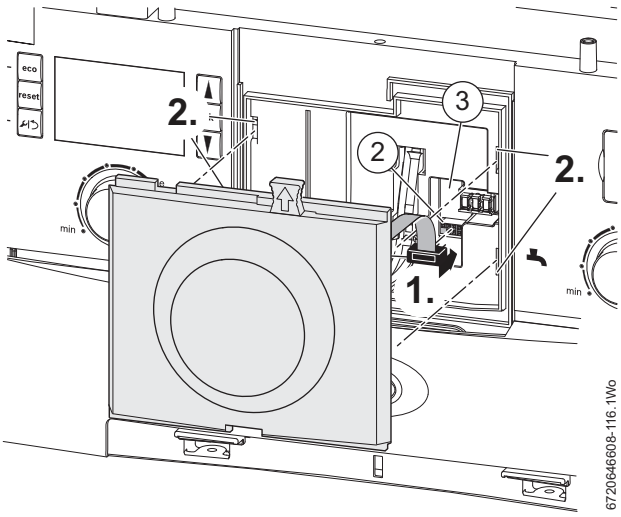


Fig. 46 Connecting the Programmer/Timer

3. Push the Programmer/Timer in to engage with the slots in the control panel.
4. Pull the Programmer/Timer down to secure with the clips.
5. Slide the Installer access cover up into position.
6. Secure with the three captive screws.
7. Replace the top cover panel.
8. Secure in position with the captive screws.

▶ Re-secure the control panel.

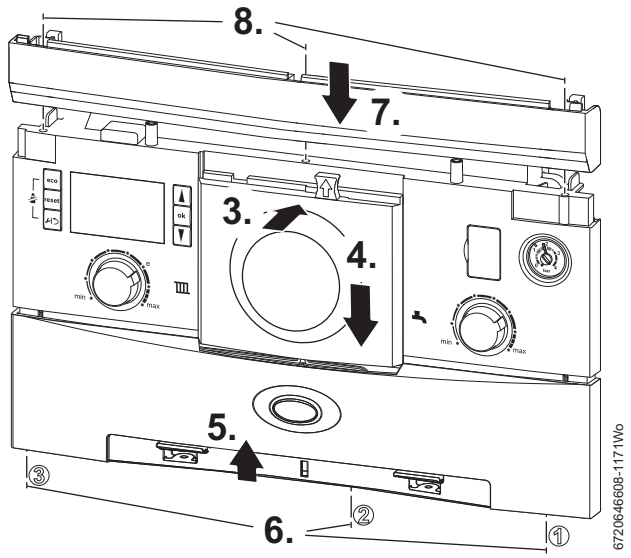


Fig. 47 Fitting the Programmer

Part number	Description
7 716 192 036	MT10 mechanical timer
7 716 192 037	MT10RF mechanical thermostat
7 716 192 038	DT20 twin channel digital timer (preheat time control available)
7 716 192 054	DT20RF digital RF thermostat with twin channel programmer (preheat time control available)
7 716 192 052	DT10RF digistat (preheat time control available)
7 716 192 053	DT10RF optimiser (preheat time control available)
7 716 192 065	FR10 intelligent room thermostat
7 716 192 066	FR110 programmable room thermostat (preheat time control available)
7 716 192 067	FW100 weather compensation controller (preheat time control available)
7 733 600 001	Comfort I RF (RF thermostat with twin channel programmer, preheat time control available)
7 733 600 002	Comfort II RF (programmable room thermostat, preheat time control available)
7 733 600 003	Comfort (twin channel programmer)
7 733 600 039	Comfort wall plate kit
7 738 110 058	Sense I intelligent room thermostat
7 738 111 064	Sense II weather compensation controller (preheat time control available)
7 716 192 072	Worcester Wave (thermostat)

Table 24 Control accessories

5.7.2 New complete system installations

If a new complete heating system is installed in a new build property or it is a first time installation in an existing property, the heating systems must conform to current building regulations Part L1a.

The exception to this are single storey, open plan dwellings where the living area is more than 70% of the total usable floor area. Then this type of dwelling can be controlled as one zone.

An alternative would be individual electronically controlled TRVs.

For dwellings with a floor area over 150m^2, separate time and temperature control for each zone is required. All radiators must have TRVs fitted in all rooms except bathrooms and rooms with thermostats.

THIRD PARTY EXTERNAL TIMER AND TWO ZONES

Pre-wired CH & DHW links
- ▶ Remove link when connecting external CH control
- ▶ Remove link when connecting external DHW control

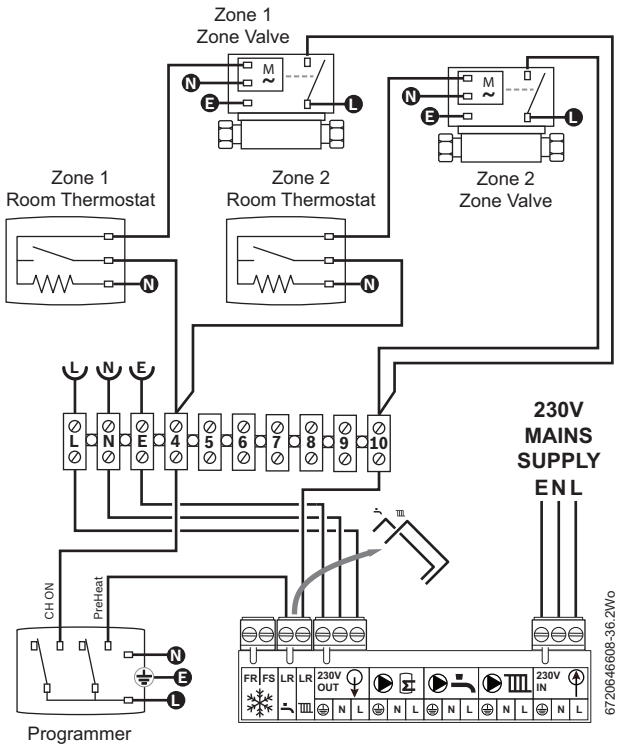


Fig. 48 Two room thermostats, one external timer

INTEGRATED TIMER AND TWO ZONES

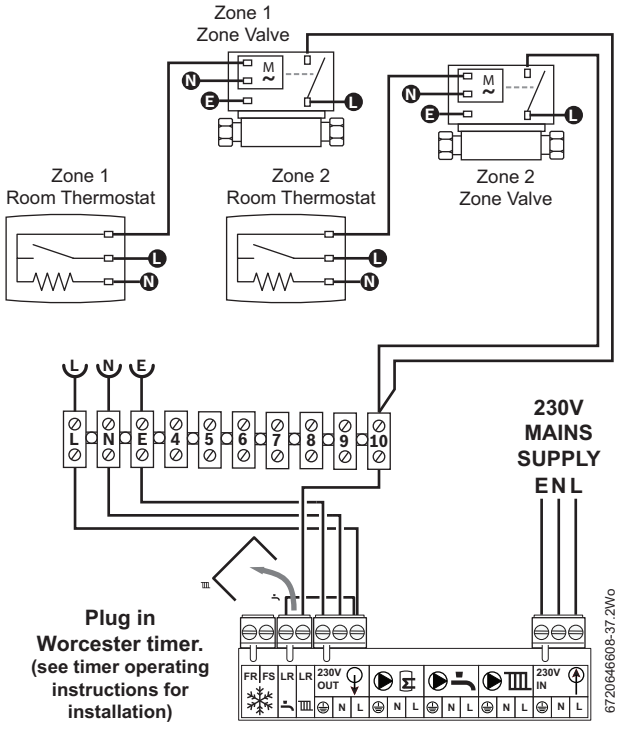


Fig. 49 Two room thermostats, one integrated timer

5.7.3 Existing installations

For boiler replacements on an existing system, it is not necessary to zone the upstairs and downstairs separately, compliance with the zone requirements can be achieved by a single room thermostat or programmable room thermostat.

While the system is drained down, TRVs must be fitted to all rooms except the bathrooms and the room with the room thermostat.

The following figures show the options of room thermostat with programmer, room thermostat only or programmable room thermostat.

EXTERNAL 230V PROGRAMMER AND ROOM THERMOSTAT

Pre-wired CH & DHW links
- ▶ Remove link when connecting external CH control
- ▶ Remove link when connecting external DHW control

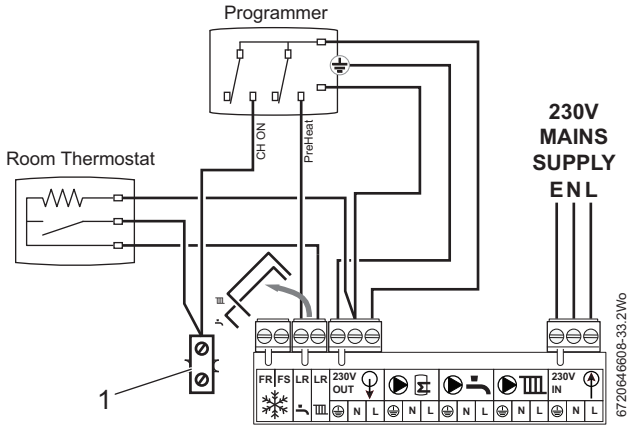


Fig. 50 Room thermostat with programmer

[1] Series connector, not supplied. Connector to be made safe.

ROOM THERMOSTAT ONLY

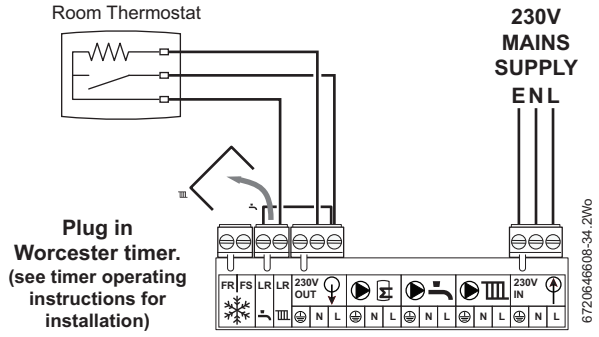


Fig. 51 Room thermostat with plug in timer

PROGRAMMABLE THERMOSTAT

The programmable room thermostat may be a hard wired or RF type.
This diagram is applicable for a hard wired unit or the receiver section of the RF pack.

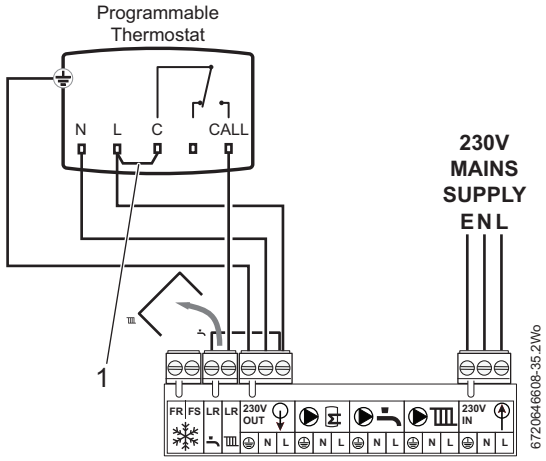


Fig. 52 Programmable thermostat

1	The link between the Live (L) and Common (C) may already be fitted as part of the Programmable thermostat, if not then a link must be wired in.

- ▶ Remove the link between L_R (CH) and L at the 230V OUT terminal block connection.
- ▶ Connect external controls LIVE supply to terminal L at the 230V OUT terminal block connection.
- ▶ Connect external controls LIVE return to terminal L_R (CH)

Live Return (L_R) is sometimes referred to as 'Call for Heat' or 'Switched Live'.

- ▶ Connect external controls NEUTRAL to terminal N at the 230V OUT terminal block connection.

Some devices do not require connection of a neutral i.e. battery powered devices.

OPTIONAL EXTERNAL FROST STAT CONNECTION FOR PROTECTION OF SYSTEM PIPEWORK IN UNHEATED AIR SPACE

- ▶ Connect frost thermostat cables to terminals F_S & F_R.
- ▶ These connections are not polarity sensitive.
- ▶ The external frost thermostat only operates the pump.

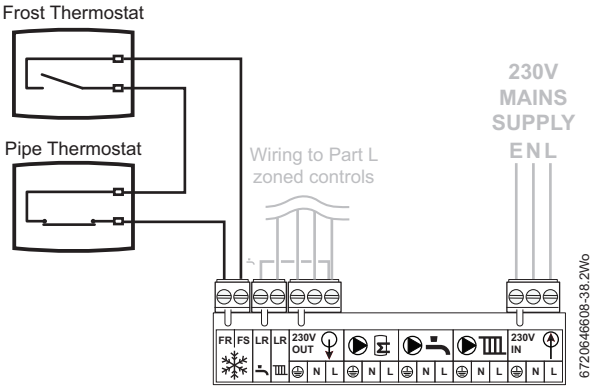


Fig. 53 Frost Thermostat

6 COMMISSIONING

6.1 Pre-Commissioning checks

CAUTION: ISOLATE THE MAINS ELECTRICITY SUPPLY BEFORE STARTING ANY WORK AND OBSERVE ALL RELEVANT SAFETY PRECAUTIONS.

Check that the service and water pipes are connected to the correct positions on the manifold.

Ensure that the washers have been fitted to the water connections and the bonded washer to the gas connection on the manifold, refer to Fig. 33.

1. - CH Flow (22mm)
2. - DHW (15mm)
3. - Gas inlet - bonded washer (22mm)
4. - Domestic cold mains water in (15mm)
5. - CH Return (22mm)

- ▶ Check the gas type specified on the data label, on the right hand side of the combustion chamber, matches that of the gas supply.
- ▶ Turn on the main gas supply, carry out a tightness test on the gas pipe work with the boiler gas pipe isolating valve open, and connections. Rectify any leaks.
- ▶ Check that the condensate pipe has been connected and correctly fitted to the siphon.
- ▶ Check pressure relief drain pipe is correctly fitted and securely tightened.

NOTICE: If the boiler is not to be commissioned immediately then, after successfully completing all of the checks and any rectification work:

- ▶ Close the gas valve
- ▶ Close the water shut off valve
- ▶ Isolate the gas supply
- ▶ Isolate the electricity supply
- ▶ Label appropriately

6.2 Filling the system

1. Turn on the water main and open the system valves.
2. Open all radiator valves.
3. Fill the system via a WRAS approved filling loop or the optional Worcester Integral Filling Link accessory to 1 bar then close the filling loop valve(s).
4. The Automatic Air Vent will release any air trapped in the boiler.
5. Manually vent all radiators, tighten when completed and check the system and correct any leaks.

- ▶ The boiler integral expansion vessel is pre-charged to 0.75 bar (equal to a static head of 7.5m (24.6ft)). A Schraeder type valve is fitted to the expansion vessel to allow for pressure adjustment if required.
- ▶ If an extra expansion vessel is fitted to the central heating return, adjust this to the same pressure as the appliance internal expansion vessel, refer to separate instructions with the extra expansion vessel.

6. If required increase system pressure back to 1 bar.
7. Isolate and remove filling loop connection to system or if using the optional integral filling connection (not supplied with the boiler) remove the key and place in its storage position on the bottom cover of the boiler.

If the Worcester “Keyless” filling link is fitted, the link does not have to be removed.

6.3 Water treatment

NOTICE:

- ▶ Artificially softened water must not be used to fill the central heating system.

ENSURE THAT THE SYSTEM HAS BEEN CLEANED. REFER TO SECTION 4.1 OF THESE INSTRUCTIONS.

FLUSHING (Central Heating):

- ▶ Ensure the boiler is switched off.
- ▶ Open all drain cocks and drain the system while the boiler is hot.
- ▶ Close drain cocks and add a suitable flushing agent at the correct strength for the system condition in accordance with the manufacturer's instructions.
- ▶ Run the boiler/system at normal operating temperature for the time stated by the manufacturer of the flushing agent.
- ▶ Drain and thoroughly flush the system to remove the flushing agent and debris.

INHIBITOR (Central Heating):

- ▶ Check drain cocks are closed and all radiator valves are open before adding a suitable inhibitor compatible with aluminium (or combined inhibitor/anti-freeze if the system is exposed to freezing conditions) to the heating system water in accordance with the manufacturers instructions.

The pH value of the system water must be less than 8 or the appliance guarantee will be invalidated.

- ▶ Fill system via a WRAS approved filling loop to between 1 and 1.5 bar.
- ▶ Vent all radiators; tighten vents when complete.
- ▶ Re-pressurise if necessary to 1bar.
- ▶ Set all controls to maximum.
- ▶ Record the date when the inhibitor was added to the system on the guarantee card and Benchmark checklist.

NOTICE:

- ▶ The concentration of inhibitor in the system should be checked every 12 months or sooner if system content is lost.
- ▶ The addition of sealing agents to the system water is not recommended as this can cause problems with deposits left in the heat exchanger.
- ▶ In cases where all attempts to find a micro leak have failed, Worcester, Bosch Group supports the use of Fernox F4 leak sealer.

Water treatment

Suitable water treatment products can be obtained from the following manufacturers:

FERNOX	01799 550811 or www.fernox.com
SENTINEL	0800 389 4670 or www.sentinel-solutions.net

6.4 Starting the appliance

CAUTION: RUNNING THE APPLIANCE
- Never run the appliance when the appliance/system is empty or partially filled.

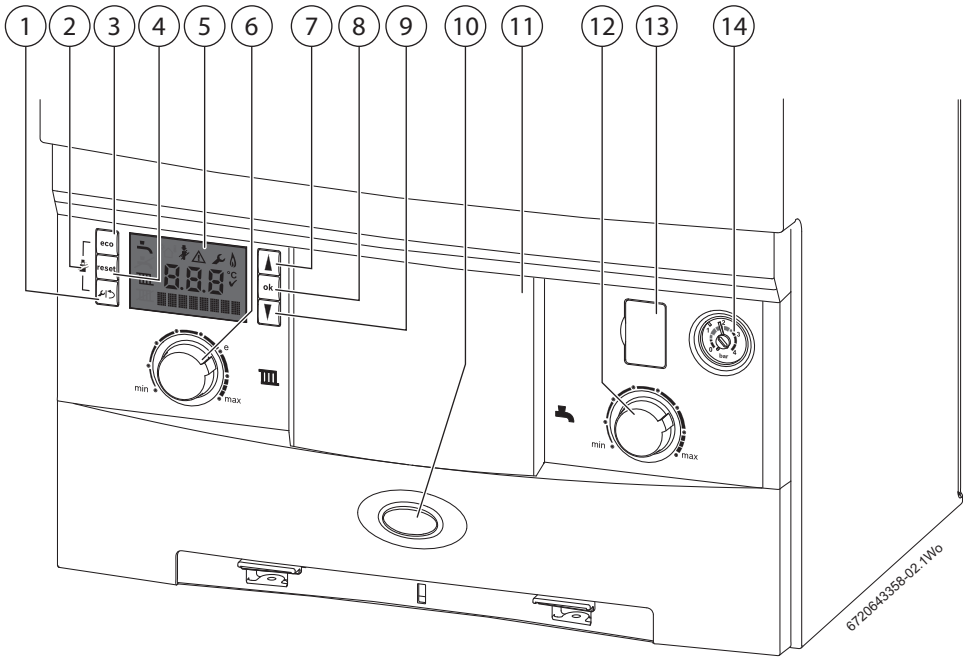


Fig. 54 Control panel

	Key to figure 54
1	Spanner/return button
2	Service engineer symbol
3	Eco button
4	Reset button
5	Boiler display
6	Central heating temperature control
7	Scroll up button
8	OK - Select/confirmation button
9	Scroll down button
10	Operation and fault indicator (blue)
11	Position for optional programmer
12	Hot water temperature control
13	Diagnostic port
14	System pressure gauge

Switching the appliance on/off:
- Turn on the mains power supply, initially the “Boiler start up screens” will be displayed (refer to figure 55).
- Turn on any external controls
- Set the thermostatic radiator controls to maximum temperature
- Set the clock/programmer to continuously ON and the room thermostat to maximum temperature

The blue Operation and fault indicator light will be illuminated when there is a demand for heat or hot water.

Turn the boiler CH temperature control (6) to maximum.

The “burner on” flame symbol will be shown on the boiler display after a successful ignition sequence.

If the boiler fails to light, a flashing fault code will be displayed.

NOTICE: RESET
- Do not press the blue operation/fault diagnostic indicator (10) to reset the boiler.

To reset the boiler, press the reset button (4), the tick symbol will be displayed briefly for a successful reset.

6.4.1 Boiler start up screens

On initial start up, the following screens are displayed:

1. All the symbols are displayed for approximately two seconds.
2. The control will run an internal test for approximately 30 seconds.
3. When the internal test has been successfully performed, this screen is displayed:
   - The boiler is in stand-by.
   - The flow temperature sensor indicates the primary temperature from the heat exchanger (not the target set point).

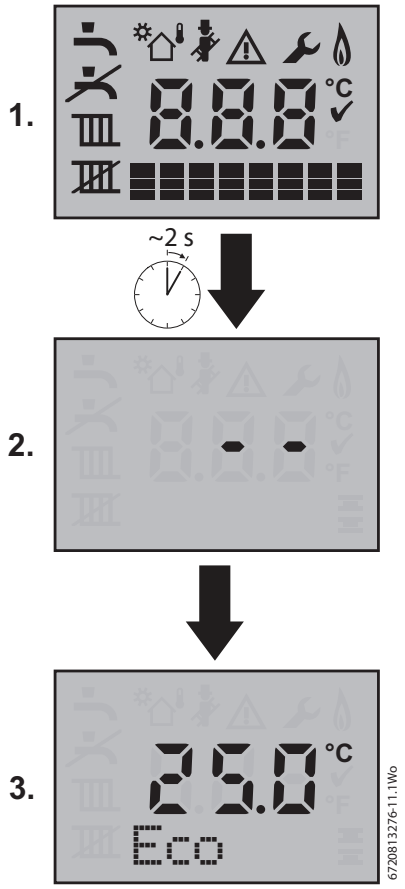


Fig. 55 Boiler start up screen

- If no adjustments are made for 30 seconds the back light is turned off.
- As soon as an adjustment is made, the screen will light up and the relevant information will be displayed.

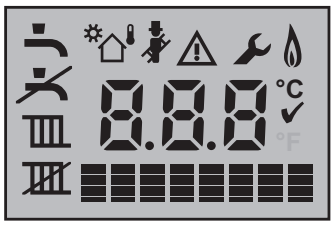
SCREEN DISPLAY	DESCRIPTION
All possible screen symbols 	This screen is displayed briefly during boiler start up and shows all the symbols that could be displayed.
Alpha/Numerical display 	Displays a temperature or boiler status code.
Text display 	Displays PreHeat or Eco, or diagnostic code
Hot water 	Displays this symbol during a DHW demand.
Central Heating 	Displays this symbol during a CH demand.
Chimney sweep mode 	Displays during service when the boiler is set to maximum or minimum output.
Alert 	Displays with the boiler status code and diagnostic code during a fault condition.
Service mode 	Displays when a qualified service engineer is in the service menus.
Burner on 	The boiler is in operation and the flame is alight.
Centigrade °C	Displays next to the temperature reading.
Confirmation ✔	This symbol confirms a manual change.

Table 25 Symbol description

Status codes

Refer to section 8.5 for Status codes and Service menus.

These are not faults, but provide information concerning the current status of the boiler.

During normal boiler operation various Status codes can be displayed by pressing the button.

The first screen of the Information menu displays the current Status code, this will change as the boiler runs through the various modes and sequences.

6.5 Commissioning

When running in the service mode, the boiler will operate both the central heating and the domestic hot water circuits. This is to allow sufficient time for this part of the commissioning procedure. It will be necessary to run water through the domestic hot water circuit to ensure that the boiler will not cycle on low heating demands.

Having checked:

- That the boiler has been installed in accordance with the installation instructions.
- The integrity of the flue system and flue seals.

6.5.1 Checking the gas inlet pressure

The inlet pressure to the appliance must be checked using the following procedure:

MEASURING THE INLET PRESSURE

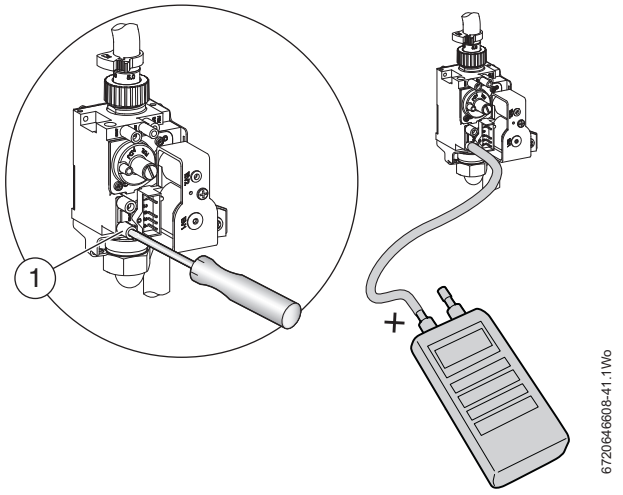


Fig. 56 Inlet pressure test point

- Close gas isolation valve.
- At the inlet test point (1), slacken the screw for a maximum of half a turn and connect a manometer.
  It is important to use a screwdriver of the correct size, too small a blade will damage the screw.
- Open the gas isolation valve.
- Measure the pressure with the boiler running at maximum.
  - Press the eco and button for at least 5 seconds and the boiler will ramp up to maximum output in approx. 30 to 35 seconds.
  - The display will show the chimney sweep symbol and the word MAX will flash.

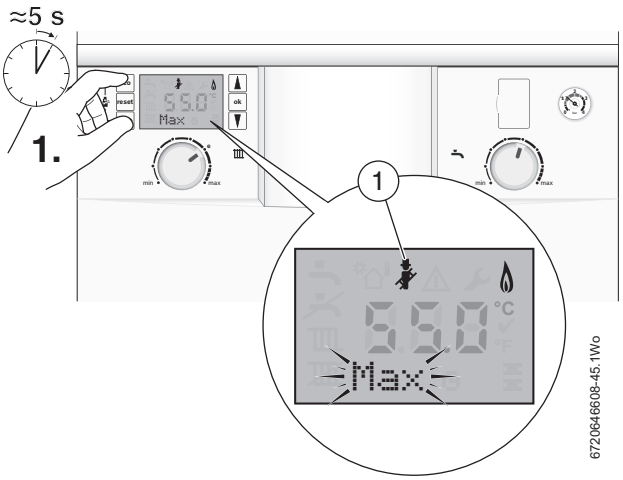


Fig. 57 Setting boiler to maximum

- Check the gas supply working pressure at the gas valve conforms to values shown in Fig. 58 or Fig. 59 .
- Press the ok button to return to normal operation.
- The boiler will run for 15 minutes in service mode and return to normal if no other inputs are made.

After the tests are completed:

- Disconnect the manometer.
- Retighten, but do not overtighten the inlet pressure test point screw.

GAS PRESSURE WITHIN THE SYSTEM

Refer to the figures below for natural gas or L.P.G gas pressures.

The working pressure at the boiler must not be less than the working pressure read at the meter minus 1mbar for natural gas or minus 2.5mbar for L.P.G.

The pressure drop from the meter to the gas valve must not be more than 2.5mbar for natural gas or 4mbar for L.P.G.

If the pressure drop is greater than shown below, then this would indicate a problem with the supply pipe work which must be rectified.

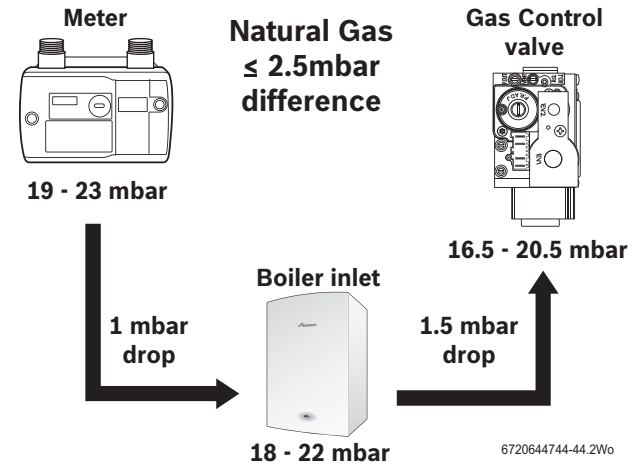


Fig. 58 Natural gas pressures

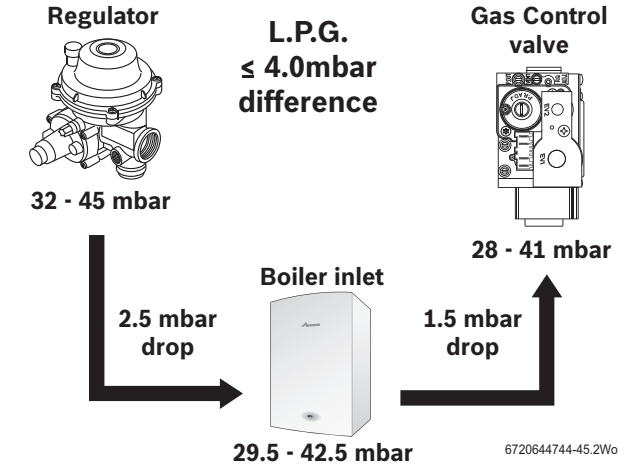


Fig. 59 L.P.G. pressures

NOTICE: Gas pressure
Do not continue commissioning until the correct gas pressure is achieved.

6.5.2 Checking the gas rate

- ▶ The gas rate should be measured at the gas meter after the boiler has been operating for a minimum of 10 minutes at maximum output.
- ▶ See Technical data section on page 9 of this manual for gas rates and CO/CO_2 ratios.
- ▶ Where a gas meter is not available (e.g. L.P.G.) the CO/CO_2 must be checked.

6.5.3 Gas rating test

- ▶ Ensure all other gas appliances are isolated.

1. Set the boiler to maximum output by pressing eco and the button together for at least 5 seconds.
   The chimney sweep symbol (1) will be displayed at the top of the screen and the word "Max" will flash at the bottom of the screen. The boiler will ramp up to maximum output in 30 to 35 seconds.

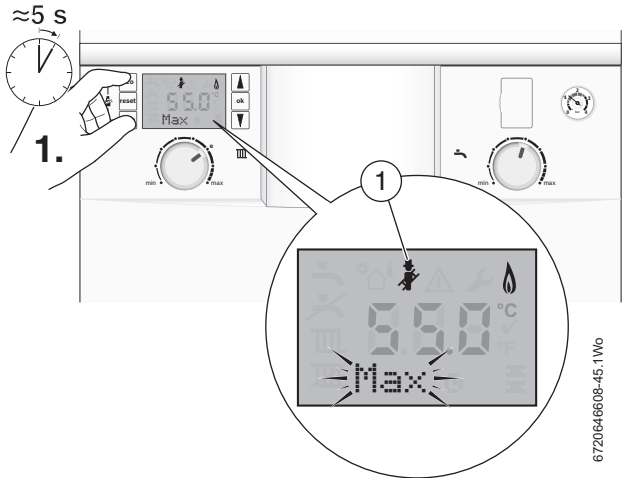


Fig. 60 Setting boiler to maximum

- ▶ Ensure that the boiler has stabilised at maximum output.
- ▶ Carry out Gas rating procedures as described in "Essential Gas Safety" third edition.
- ▶ If pressure and gas rate are satisfactory press the ok button and the boiler will return to normal operation.
  - – If left in the service mode the control will return to normal operation after 15 minutes.

6.5.4 Checking for leaks during operation

- ▶ Use an approved leak detector to check all connections for possible leaks. The product must be certified as a gas leak testing agent.
- ▶ Do not allow the product to come into contact with the electrical wiring.

6.6 Domestic hot water

Controlling the hot water temperature:

The hot water temperature can be set to between approximately 40°C and 60°C using the DHW temperature control.

6.6.1 Domestic hot water eco and preheat modes

- Eco mode is an energy saving feature which disables the Preheat function. Eco is enabled by default, during the initial appliance start up and Eco is displayed.
- Preheat mode, the hot water heat exchanger is kept pre-heated to reduce the time taken to deliver hot water at the tap.

In the Preheat mode, if there has been no demand for hot water for 24 hours the appliance will save energy by suspending Preheat until there is a demand for hot water. At this time Preheat mode is re-activated. It is advised to use a twin channel programmer to time the Preheat function and switch it off when it is not needed.