6.7 CO and combustion checks

The following combustion and flue integrity checks are mandatory from April 2014 and these values must be recorded on the Benchmark check list, at the back of this manual.

Once the gas rate and pressure have been confirmed as acceptable then the CO and combustion checks can be undertaken.

The flow chart is given for guidance, the details of the checks are given in the following sections:

- Checking flue integrity, refer to section 7.2, page 42
- Flue gas analysis, refer to section 7.6, page 44

NOTICE: BEFORE CO AND COMBUSTION CHECKS:

- Refer to section 6.5.1 and 6.5.2 to verify gas type, gas inlet pressure, and gas rate.
  Visually check the integrity of the whole flue system and confirm that all the components are correctly assembled, fixed and supported.
- The flue gas analyser must be the correct type as specified in BS 7967.
  Before use the analyser must have been calibrated as specified by the manufacturer.
  The installer must be competent in the use of the analyser.
  Check and zero the analyser in fresh air as specified by the manufacturer.
- The gas valve is factory set and must not be adjusted during commissioning if found to be out of tolerance, please contact the Worcester, Bosch Group help line 0330 123 3366.

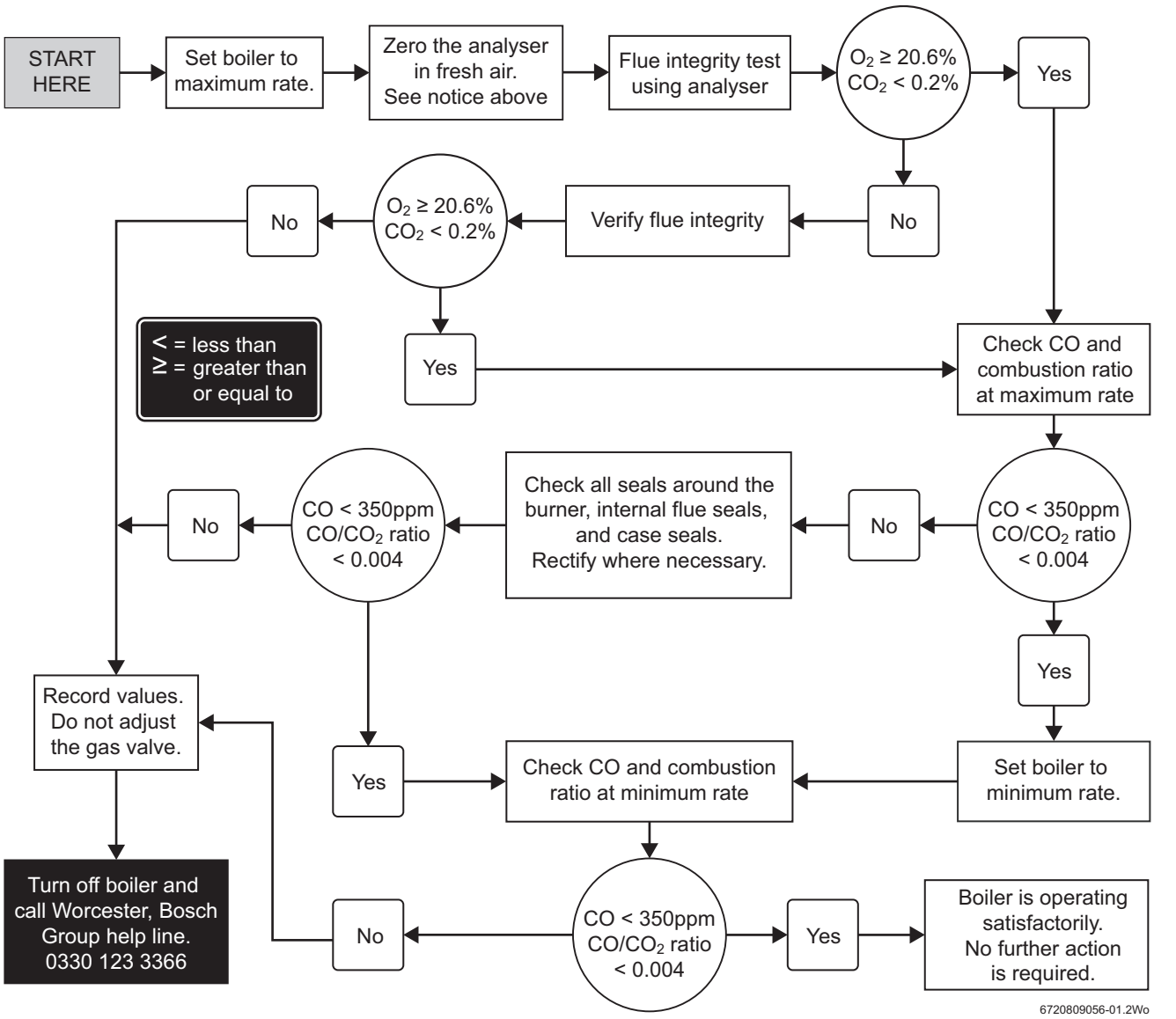

Fig. 61 Combustion check flow chart

6.8 Finishing commissioning

6.8.1 Replacing the boiler case:

1. Replace the boiler case.
2. Make sure that the securing points on top of the case are properly located.
3. Tighten the bottom two screws (2).

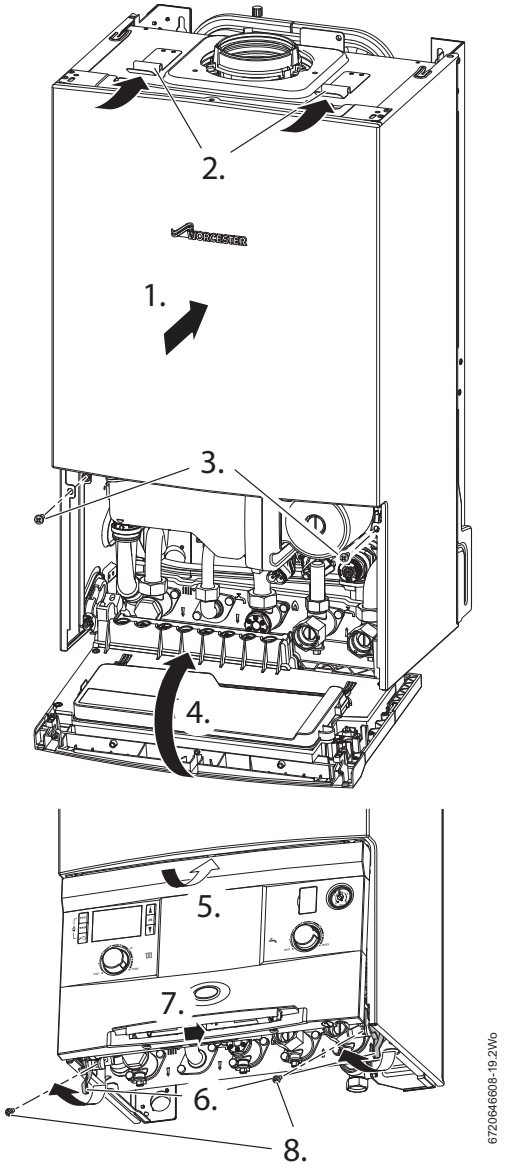

Fig. 62 Fitting case

6.8.2 Securing the control panel

4. Raise the control panel.
5. Push the control panel up to engage the top edge under the case.
6. Lift the catches with your fingers.
7. Press the bottom of the control panel back to engage with the catches
8. Secure the catch retaining screws underneath the boiler.

6.8.3 Fitting the fascia flap

1. Rotate the hinge to be in-line with the flap and present the flap assembly up to the fascia.
2. Push the pegs on the hinge into the three slots in the front of the fascia and close the flap.
3. Secure the flap to the fascia with the two screws provided.

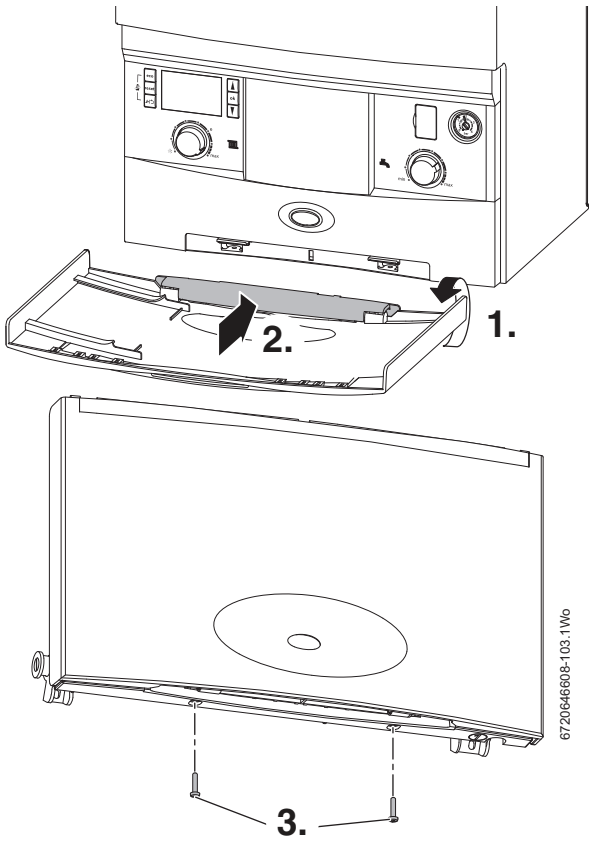

Fig. 63 Installing the fascia flap

6.8.4 Installing bottom panel

1. The bottom panel slides onto two ledges either side of the boiler frame.
2. Hold the panel up against the underside of the boiler. Please note the second plastic tab should be offered up to the boiler guides and not the rear tabs. Slide towards the rear, until there is no more movement.
3. Slide the panel forward until it is fully engaged.

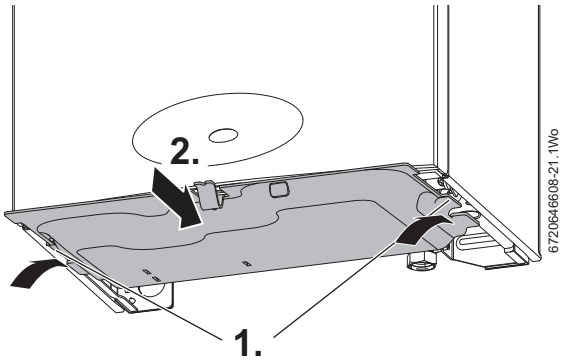

Fig. 64 Bottom panel installation

6.8.5 Hand over

- ▶ Complete the Benchmark Gas Boiler Commissioning Checklist at the back of this manual.
- ▶ Open the fascia flap by hinging the flap downwards using the curved hand hold in the centre of the flap.
- ▶ Set up the controls and show the customer how to operate all the controls shown in the User Guide plus any external controls.
- ▶ Instruct the customer on:
  - the need to repressurise the boiler occasionally and the pressure expected at the pressure gauge.
  - where to find and store the filling loop key.
  - location of the filling loop and system pressure gauge.
  - the use of the filling loop and how to repressurise the system.
  - how to use the TRVs.
  - how to reset the boiler.
- ▶ Show the customer the fault finding information in the User guide.
- ▶ Show the customer where the serial number/boiler information is when they call in with a problem (Benchmark checklist at the rear of the manual).
- ▶ Have you given the customer details of how to contact the installer/ gas emergency numbers.
- ▶ Have you shown the customer how to safely isolate the boiler
- ▶ Have you advised the customer where they can find information on the Worcester, Bosch Group website , www.worcester-bosch.co.uk.
- ▶ Advise the customer that the varying external temperatures will affect the output of the boiler, especially the DHW.
- ▶ Ensure that the User Guide and Installation, Commissioning and Service manual, with the Benchmark checklist and service record, is left with the boiler or homeowner.
- ▶ If the appliance is unused and exposed to freezing conditions, shut off all the mains supplies and drain the system and boiler, label accordingly.

6.8.6 Boiler guarantee

This boiler has a guarantee against faulty materials or workmanship for a period of two years from the date of installation subject to the following terms and conditions:

- During the period of this guarantee any components of the boiler which are proven to be faulty or defective in manufacture will be exchanged or repaired free of charge by Bosch Thermotechnology Ltd.
- The householder may be asked to prove the date of installation, that the boiler was correctly commissioned and, where appropriate, the first year's service has been carried out to the satisfaction of Bosch Thermotechnology Ltd., when requested. These should be documented as a part of the Benchmark Checklist.
- The boiler has been used only for the normal domestic purposes for which it was designed.

This guarantee does not affect your statutory rights.

Guarantee registration

Your Greenstar appliance carries a guarantee against faulty material or manufacture subject to Terms and Conditions.
Guarantee Registration can be completed:

- On-line
  - You can register on our website: www.worcester-bosch.co.uk/guarantee
- By phone
  - You can register by ringing 0330 123 2552
- By post
  - Please send your completed form to: Worcester, Bosch Group, Cotswold Way, Warndon, Worcester, WR4 9SW.

To read the full Terms & Conditions please visit us on-line at www.worcester-bosch.co.uk/guarantee.
Your statutory rights are not affected by the manufacturer's guarantee.

7 SERVICE AND SPARES

CAUTION: Mains supplies:
- ▶ Turn off the gas supply and isolate the electrical mains supply before starting any work on the appliance and observe all relevant safety precautions.

CAUTION: Component replacement:
- ▶ After replacement of a gas related component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas sniffer/ analyser.
- ▶ Also after re-assembly, carry out the following checks:
  Fan pressure in section 7.5,
  Flue gas analysis in section 7.6.

NOTICE: Service work
- ▶ Service work must be carried out by a competent engineer, such as Gas Safe registered personnel!

NOTICE: FLUE GAS ANALYSER
- ▶ Service work must not be attempted if a flue gas analyser is not available.

- To ensure continued efficient operation the appliance must be checked at regular interval.
- The frequency of servicing will depend upon the particular installation conditions and usage, however, normally an annual service is recommended.
- The extent of the service work required by the appliance is determined by the operating condition of the appliance when tested by qualified engineers.
- After each service, the service interval record sheet at the rear of this manual, must be completed.

7.1 Inspection and service

1. Check that the terminal and terminal guard, if fitted, are unobstructed and undamaged.
2. If the appliance is in a compartment or cupboard, check that the specified service space around the appliance is clear.
3. Check all joints and connections in the system and remake any that show signs of leakage.
   Refill and re-pressurise if applicable as described in the commissioning section.
4. Operate the appliance and take note of any irregularities.
   Refer to the fault finding pages for rectification procedure.

7.2 Checking flue integrity

The integrity of the flue system and performance of the boiler can be checked via the flue turret sample points.

Flue gas sample point	1
Air inlet sample point	2

Table 26 Key to figure 65

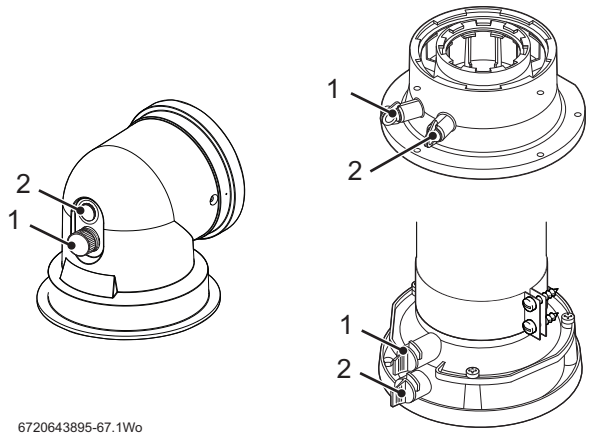

Fig. 65 Flue turret test points

With the boiler case on and the boiler running at maximum output (refer to section 7.5.1 “Setting the boiler maximum”).
- ▶ Insert the analyser probe into the air intake sample point.
- ▶ Ensure that the probe reaches the centre of the air intake, adjust the cone on the probe so that it seals the sample point and correctly positions the end of the probe.
- ▶ Allow the readings to stabilise and check that:
  - O_2 is equal to, or greater than 20.6%.
  - CO_2 is less than 0.2%
- ▶ If the readings are outside these limits then this indicates that there is a problem with the flue system or combustion circuit, e.g. missing or dislodged seals.

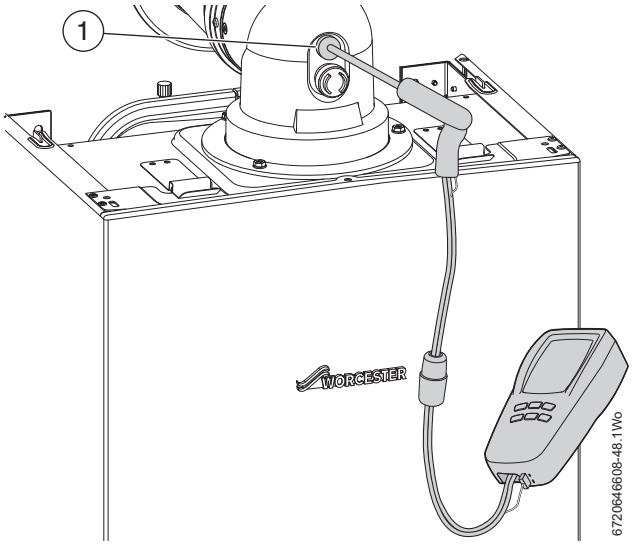

Fig. 66 Flue integrity test

7.3 Component access

To gain access to the components, remove the outer case:

1. Remove the two screws securing the control panel.
2. Release the two catches.
3. Pull the bottom of the control panel forward and down.
4. Lower the control panel into the service position
5. Undo and remove the two bottom retaining screws.
6. Lift the spring clips on top of the case.
7. Pull the case towards you to remove.

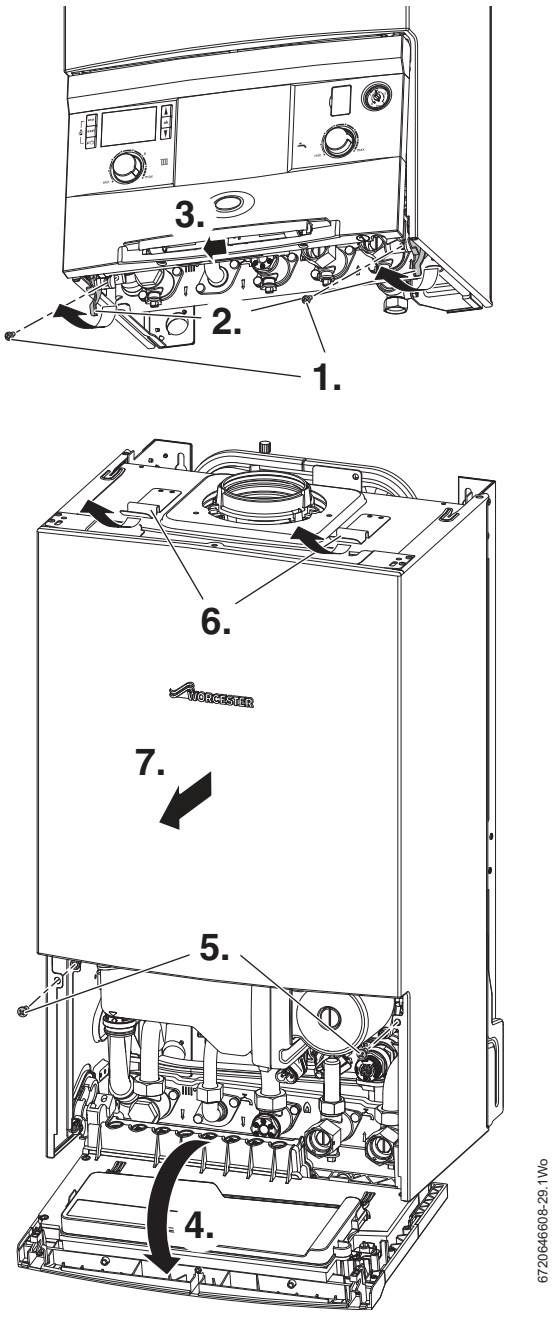

Fig. 67 Component access

7.4 Checking the gas inlet pressure

NOTICE: Gas inlet pressure

▶ Do not continue with the other checks if the correct gas pressure can not be achieved.

▶ Refer to section 6.5.1 and check that the gas working pressures in the system conform to the figures shown below:

	Allowed mbar pressure drop			
meter/ regulator	**across pipework**	**boiler inlet**	**across boiler**	**gas control valve**
Natural gas				
19 - 23	1	18 - 22	1.5	16.5 - 20.5
L.P.G.				
32 - 45	2.5	29.5 - 42.5	1.5	28 - 41
mbar range				

7.5 Fan pressure test

This test is to determine if the heat cell requires cleaning or attention.

Before setting the boiler to maximum output for the fan pressure test, refer to figure 69:

▶ Switch the boiler off.
▶ Remove the combustion air intake pipe (1).
▶ Remove the fan pressure test point cover (2).
▶ Connect the digital manometer pipe (3) to the fan pressure test point (4).
▶ Replace the combustion air intake pipe.
▶ Switch the boiler on.
▶ Set the boiler to maximum output.

7.5.1 Setting the boiler to maximum

To set the boiler to maximum output, refer to figure 68:

1. With the control panel in the operating position, press and hold the eco and buttons together for at least five seconds.
   - The chimney sweep symbol (1) will be displayed at the top of the screen.
   - The word Max will flash at the bottom of the screen.
   - The boiler will take approximately 30 to 35 seconds to ramp up to maximum output.
   - Allow the boiler to stabilise at maximum output.

▶ Ensure that the fan/gas valve do not modulate.

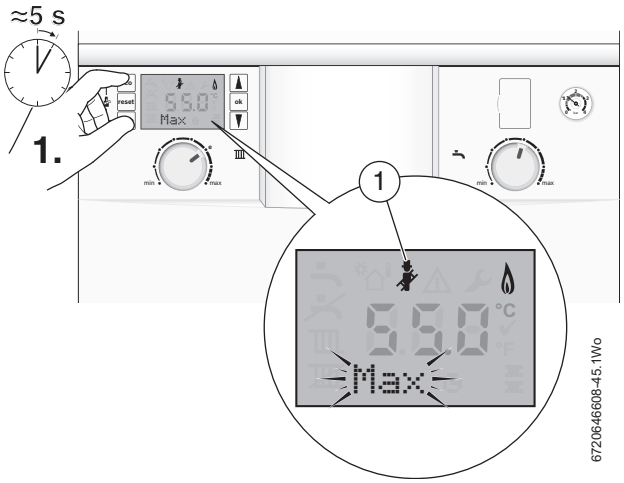

Fig. 68 Set boiler to maximum

When running at maximum output, and the water temperature is 65°C or less, the boiler will operate both the central heating and DHW circuits with the diverter valve in the mid position. It will be necessary to run sufficient water through the DHW circuit to ensure that the boiler will not cycle on low heating demands.
This is to allow sufficient time for the setting procedure. When the water temperature reaches 75°C the diverter valve will switch to CH only.

7.5.2 Fan pressure

- ▶ Remove the combustion air intake pipe [1]
- ▶ Remove the cover [2] from the fan pressure test point [4]
- ▶ Connect the pipe [3] from the digital manometer to the fan pressure test point [4]
- ▶ Refit the combustion air intake pipe

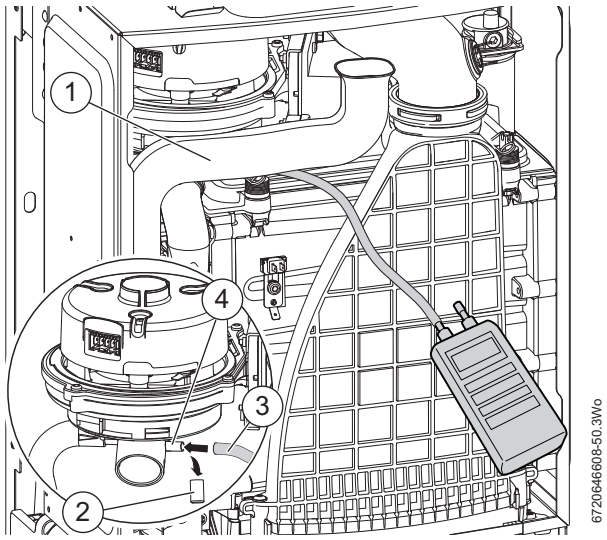

Fig. 69 Fan pressure test point

NOTICE: Fan pressure test
- ▶ The boiler must be run at maximum output for the fan pressure test and flue gas analysis.

With the combustion air intake pipe fitted and the boiler running at maximum output, measure the fan pressure:

- ▶ The pressure will read negative, refer to the chart in figure 70 below.

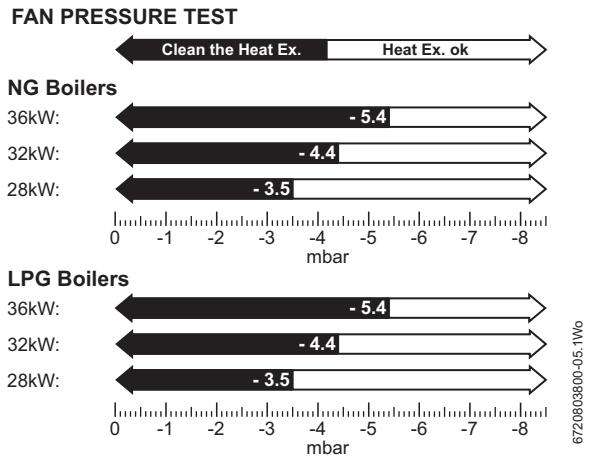

Fig. 70 Fan pressure readings

- ▶ If the manometer reading is in the white area of the chart the heat exchanger/exhaust path/siphon does not require attention.
- ▶ If the manometer reading is in the black area of the chart then carry out the following checks:
  - Check that the siphon is not blocked.
  - Check the exhaust paths for restrictions.
  - Clean the heat exchanger with a suitable cleaning tool, refer to section 7.7 - Cleaning the heat exchanger.
- ▶ Re-check the fan pressure readings.

If the boiler, after completing the above checks, fails the fan pressure test then contact Worcester, Bosch Group for advice.

- ▶ After the measurements are taken switch the boiler off.
- ▶ Remove the combustion air intake pipe.
- ▶ Disconnect the manometer and replace the test point cover.
- ▶ Replace the combustion air intake pipe.

7.6 Flue gas analysis

NOTICE: Combustion testing
- ▶ Combustion testing must be carried out by a competent person. Testing must not be attempted unless the person carrying out the combustion check is equipped with a calibrated Combustion Analyser conforming to BS 7927 and is competent in its use.

NOTICE: Gas inlet pressure
- ▶ Ensure that the gas inlet pressure has been checked and is satisfactory, refer to section 6.5.1

Combustion test

When running in maximum output, and the water temperature is 65°C or less, the boiler will operate both the central heating and DHW circuits with the diverter valve in the mid position. It will be necessary to run sufficient water through the DHW circuit to ensure that the boiler will not cycle on low heating demands.
This is to allow sufficient time for the setting procedure. When the water temperature reaches 75°C the diverter valve will switch to CH only.

- ▶ Connect the flue gas analyser to the flue gas sampling point (1) as shown in the figure below.
- ▶ Ensure that the probe reaches the centre of the flue gas exhaust, adjust the cone on the probe so that it seals the sample point and correctly positions the end of the probe.
- ▶ Press the eco and buttons together
  - The chimney sweep symbol will be displayed at the top of the screen.
  - "Max" will flash at the bottom of the screen.
  - The boiler will ramp up to maximum output in approximately 30 to 35 seconds.
- ▶ Run the boiler at maximum output for at least 10 minutes.
- ▶ Check the CO/CO_2 readings against the information in table 27.

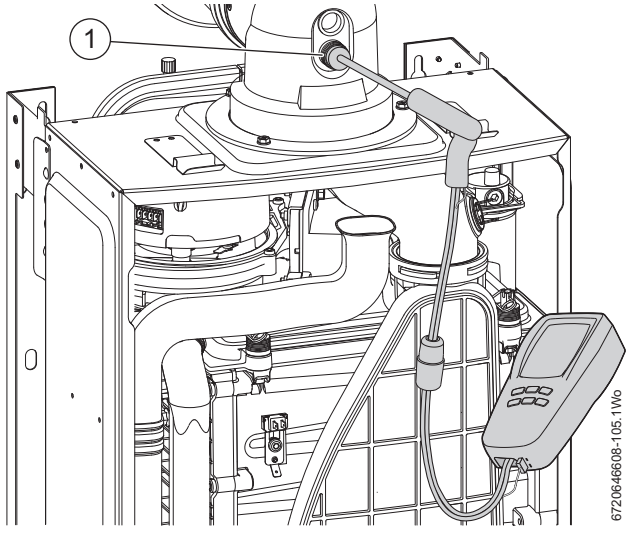

Fig. 71 Combustion test

- ▶ Set the boiler to minimum power by pressing the down arrow button.
  - – "Min" will flash at the bottom left of the screen.
  - – The boiler will take 30 to 35 seconds to ramp down to minimum output.
  - – Allow the boiler to stabilise at minimum output.
- ▶ Check the CO/CO_2 readings against those in tables 27 and 28
- ▶ Return the boiler to maximum, by pressing the UP arrow button, and re-check the CO/CO_2.
  - – "Max" will flash at the bottom left of the screen.
  - – The boiler will take approximately 30 to 35 seconds to ramp up to maximum output.
  - – Allow the boiler to stabilise at maximum output.
- ▶ If correct, press the ↩ button and the boiler will return to normal operation.
- ▶ Re-assemble and refit boiler case.

NOTICE: Minimum CO_2
▶ The minimum CO_2 reading must be at least 0.2 lower that the maximum CO_2 reading.

NG Appliances		
Output	**CO_2 Reading**	**CO Reading**
Maximum setting (measured after 10 minutes	Between 8.5 and 10.1.	Less than 200ppm
Minimum setting (measured after 10 minutes	A minimum 0.2 lower than the maximum reading taken but above 7.5%	Less than 50ppm

Table 27 NG CO/CO_2 settings

LPG Appliances		
Output	**CO_2 Reading**	**CO Reading**
Maximum setting (measured after 10 minutes	Between 9.8 and 11.1.	Less than 200ppm
Minimum setting (measured after 10 minutes	A minimum 0.2 lower than the maximum reading taken but above 8.5%	Less than 50ppm

Table 28 LPG CO/CO_2 settings

Example of a Natural Gas appliance reading:
- Maximum CO_2 reading taken = 9.5%
- The minimum CO_2 reading must be between 8.0% and 9.3% (a minimum 0.2 lower than the maximum reading of 9.5%)

If the CO_2 is out of tolerance then please check:
- ▶ the gas inlet pressure,
- ▶ the gas rate,
- ▶ the fan test pressure,
- ▶ the condition of burner,
- ▶ the flue and air intake, plus any possible blockages in the condensate disposal.
- ▶ for leaks or obstructions in the gas way,
- ▶ that the injector is clean.

After all checks have been and the CO_2 is still out of tolerance then the gas valve must be replaced.

7.7 Cleaning the heat exchanger

NOTICE: Gaskets and seals
▶ Replace the burner and electrode assembly gaskets and the Flueway sump seal after cleaning the heat exchanger.
Do not attempt the cleaning procedure unless new gaskets and seals are available.

There is an optional tool available to assist in cleaning the heat exchanger, part number 7 746 901 479

The following items will have to be removed to gain access to the heat exchanger for cleaning:
- ▶ Lower the control panel into the service position.
- ▶ Remove the case.
- ▶ Disconnect electrical wires to the fan, ignition transformer, spark electrodes, flue overheat thermostat, main heat exchanger temperature sensor and flow pipe temperature sensor.
- ▶ Flueway
- ▶ Fan assembly
- ▶ Ignition transformer
- ▶ Spark electrode assembly
- ▶ Burner housing, burner and gasket

Refer to sections 7.8.10 to 7.8.14 for instructions on how to remove the items to gain access to the heat exchanger channels so that the heat exchanger can be cleaned

7.7.1 Cleaning the siphon
1. Protect the controller from water ingress and disconnect the black discharge hose from the wall frame connector.
2. Rotate the siphon body clockwise to release the bayonet connection.
3. Pull the siphon body down and away from the boiler.

- ▶ Empty the water and debris into a suitable container.
- ▶ Visually inspect the siphon to ensure that it is clean and free from debris.

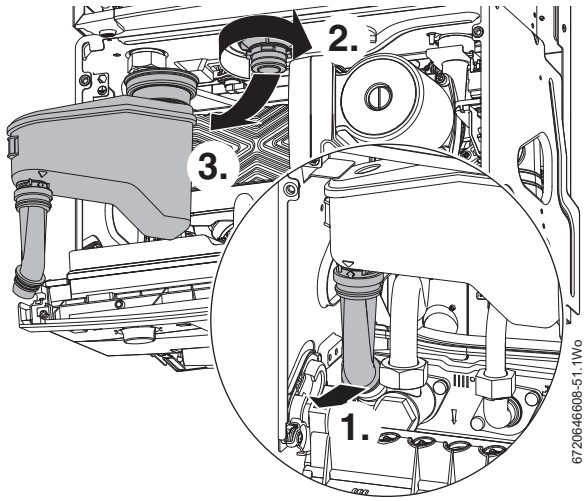

Fig. 72 Cleaning the siphon

Refitting the siphon
- ▶ Fill siphon with 200 to 250 millilitres of water.

1. Push the siphon up onto the sump assembly until it fully engages with the sump connection.

NOTICE: Do not use solvents, adhesive or lubricant when pushing the pipe onto the rubber connector.

2. Twist the siphon to the left to secure the bayonet connection.
3. Push the black discharge hose, onto the wall frame connector, until fully engaged.

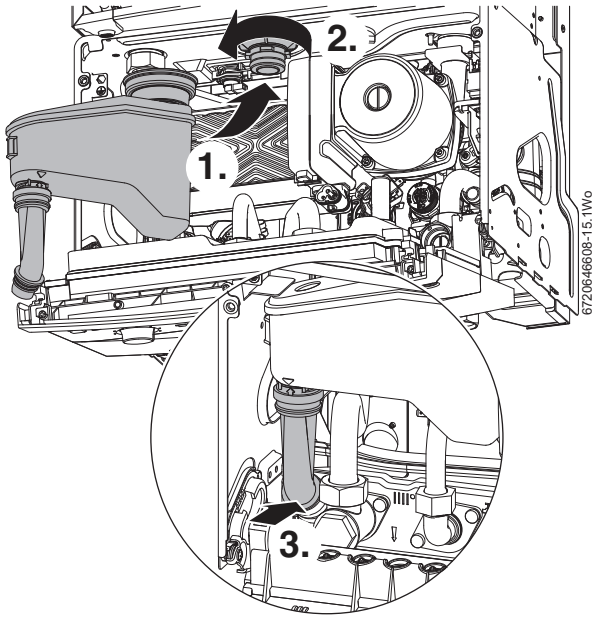

Fig. 73 Fitting siphon

7.7.2 Cleaning the primary heat exchanger

Single bladed tool and brush

Use a suitable blade to clean the heat exchanger channels.
There is an optional tool available to clean the heat exchanger, part number 7 746 901 479.

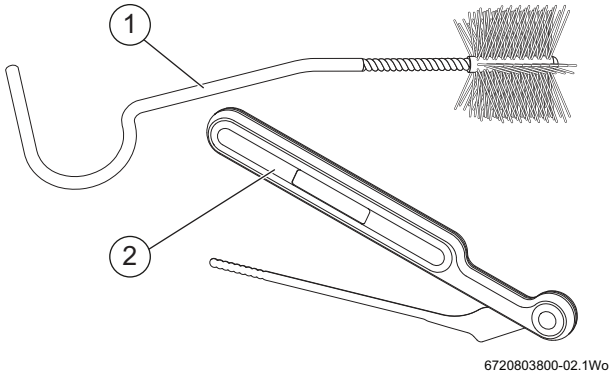

Fig. 74 Single-bladed cleaning tool and brush

- ▶ Visually inspect the inside of the heat exchanger by shining a torch from the top down into the sump area.
- ▶ When there is little or no light visible this would suggest that those channel(s) are restricted.
- ▶ It is recommended that all channels are cleaned.
- ▶ Remove the siphon and place a suitable container under the outlet to catch the water and debris.
- ▶ Protect the controller from water ingress.

To clean the rear and middle channel of the heat exchanger

1. Orient the cleaning tool (2) as shown in figure 75 and insert the tool into the rear or middle channels for cleaning.
2. Move the cleaning tool handle up and down motion, using the front edge of the heat exchanger as a pivot, to clean the channel.

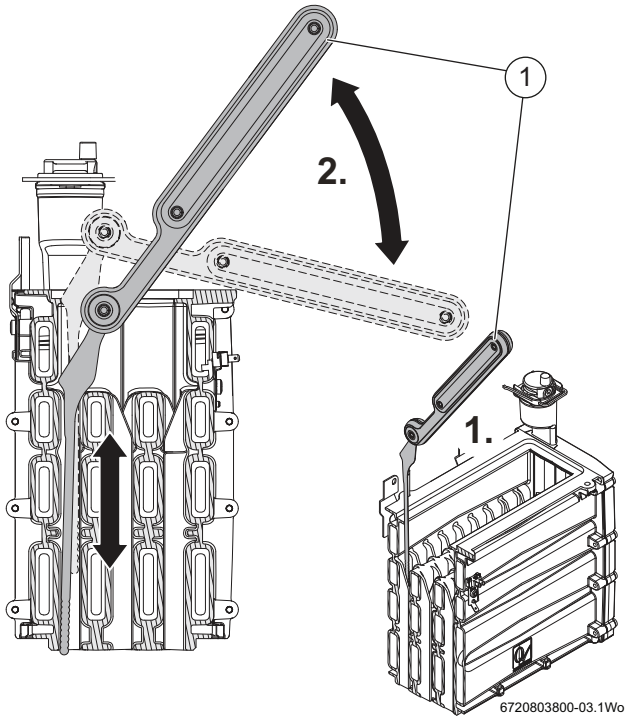

Fig. 75 Heat exchanger cleaning tool

To clean the front channel of the heat exchanger

3. Orient the cleaning tool (2) as shown in figure 76 and insert the tool into the front channel for cleaning.
4. Move the cleaning tool handle up and down motion, using the front edge of the heat exchanger as a pivot, to clean the channel.

- ▶ Use the brush to dislodge the debris and pour water down the channels to flush out the debris.

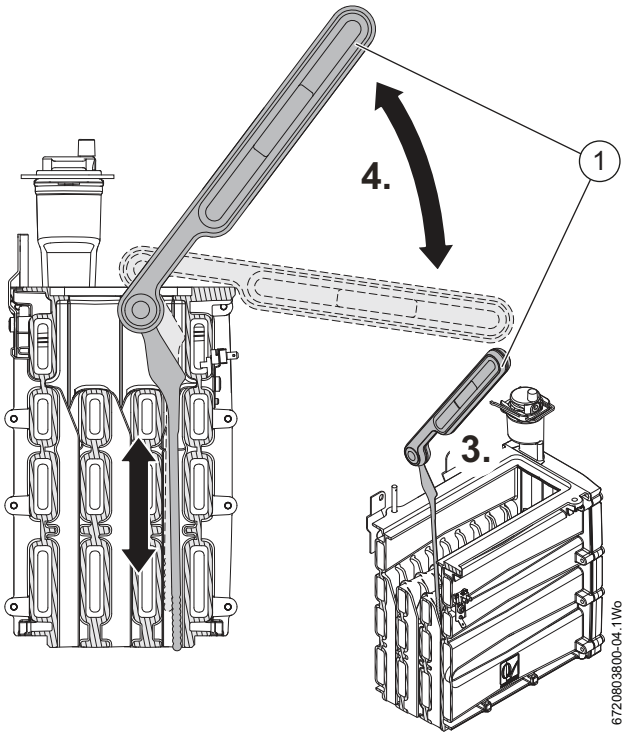

Fig. 76 Cleaning the front channels

On completion of the heat exchanger cleaning and re-assembly, perform the fan pressure test as described in section 7.5.2

7.8 Replacement of parts

CAUTION: Mains supplies:
- Turn off the gas supply and isolate the mains supplies before starting any work on the boiler and observe all relevant safety precautions.

CAUTION: Component replacement:
- Replace the burner housing gasket and the Flueway sump seal when re-assembling the heat exchanger. Do not reassembly the heat exchanger and Flueway until new gaskets and seals are available.
- After replacement of a gas related component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas sniffer/ analyser.
- On re-assembly check all affected seals for cracks, hardness and deterioration. If damaged or in any doubt the seal must be replaced.
- Also after re-assembly, carry out the following checks: Fan pressure in section 7.5, Flue gas analysis in section 7.6.

7.8.1 Removing the outer case

Removing the bottom panel:

1. Pull the catch down.
2. Slide the panel forward and down to remove

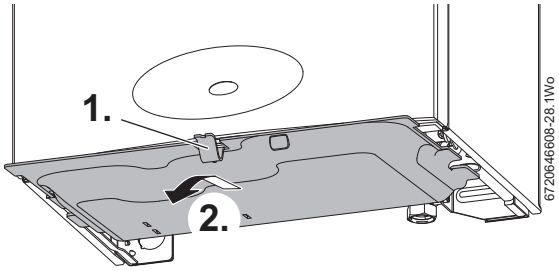

Fig. 77 Bottom panel

Removing the outer case:

1. Locate and remove the two screws under the front of the boiler.
2. Pull the two catches, located under the front of the boiler, down to release the control panel
3. Pull the bottom of the control panel forward slightly and down.
4. Allow the control panel to rotate down on the hinges.
5. Remove the two screws securing the bottom of the case.
6. Release the two catches on top of the boiler.
7. Pull the case towards you and remove.

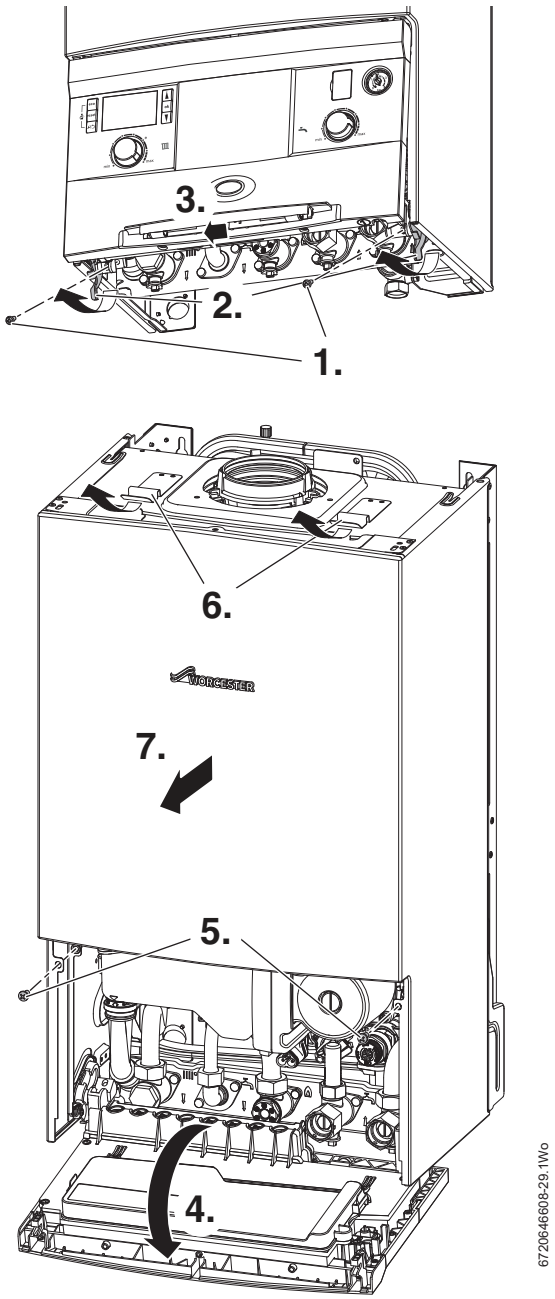

Fig. 78 Removing outer case

7.8.2 Draining the boiler

Many of the tasks in this section require that the boiler be isolated and drained.

1. Connect a suitable hose firmly to the drain point and run the hose outside to a suitable point or container.
2. Turn the drain valve a ¼ turn anticlockwise to open the drain. Turn the valve firmly clockwise to close.

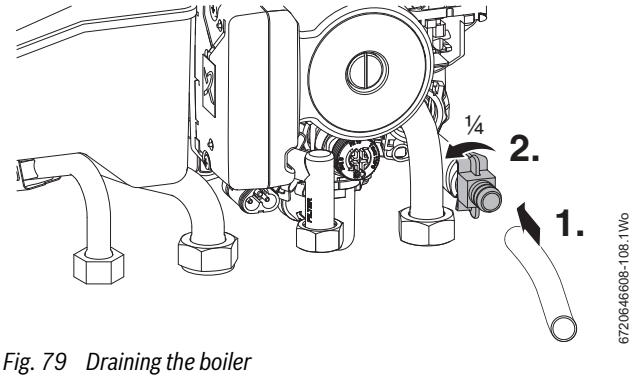

Fig. 79 Draining the boiler

7.8.3 Syphon removal

1. Disconnect the discharge hose from the wall frame connector.
2. Rotate the siphon body clockwise to release the bayonet connection.
3. Pull the siphon body down and away from the boiler.

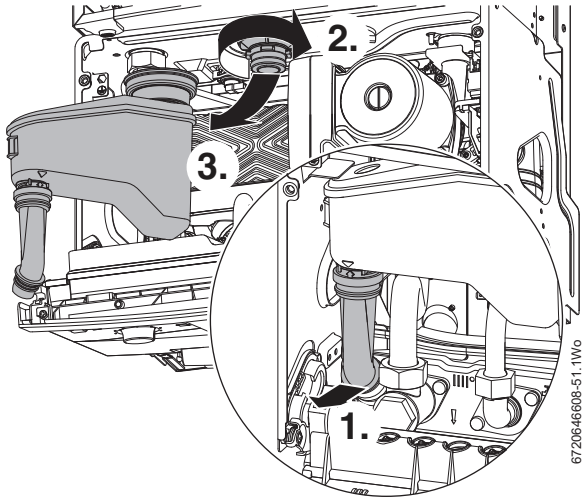

Fig. 80 Syphon removal

7.8.4 Primary sensor (CH NTC)

- ▶ Remove the combustion air inlet pipe from the pre-mix unit, rotate anti-clockwise and pull away from the fan assembly.
- ▶ Ease the gas pipe to the left.
- ▶ Disconnect the lead to the sensor.
- ▶ Remove the sensor by pulling forward.
- ▶ Replace the sensor onto the flow pipe.
- ▶ Connect the lead to the sensor.
- ▶ Re-fit the combustion air inlet pipe to the pre-mix unit.

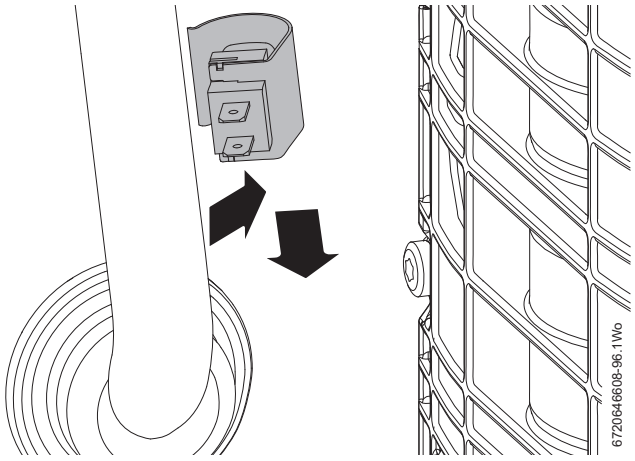

Fig. 81 Primary sensor

7.8.5 Maximum safety sensor (NTC)

- ▶ Disconnect the lead to the Maximum safety sensor.

1. Remove the screw securing the sensor.
2. Remove the sensor from the heat exchanger.

- ▶ When replacing the sensor, ensure that the assembly is properly located on the orientation pin.

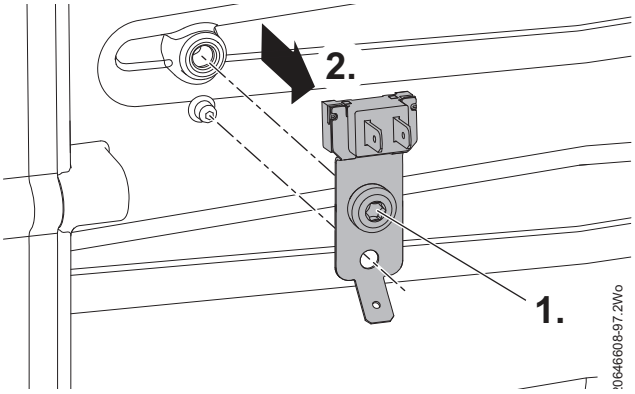

Fig. 82 Max safety sensor

7.8.6 Flue overheat thermostat

- ▶ Disconnect the lead to the flue overheat thermostat.

Take care not to damage the housing when removing the thermostat.

- ▶ Using a small screwdriver, gently prise the thermostat from the housing taking care not to damage the housing or grommet.

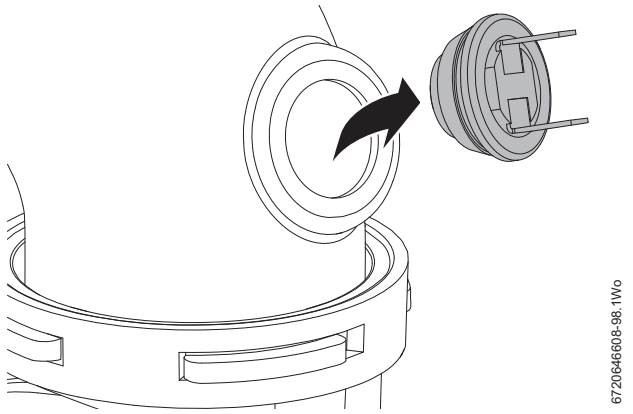

Fig. 83 Flue overheat thermostat

- ▶ To replace, push the thermostat and new grommet gently back into the opening until contact with the locating ridge is felt.
- ▶ The Flueway will have to be removed if the thermostat falls into the housing, refer to section 7.8.10.

7.8.7 Air Pressure Switch

NOTICE: Air Pressure Switch
- ▶ Ensure that the tube is reconnected to the Air Pressure Switch

To remove the Air pressure switch assembly:
- ▶ Slacken the two screws [1] but do not remove
- ▶ Remove the connector from the terminals [2]
- ▶ Disconnect the tube from the flue pipe
- ▶ Slide the assemble to left to release the retaining bracket
- ▶ Remove the assembly

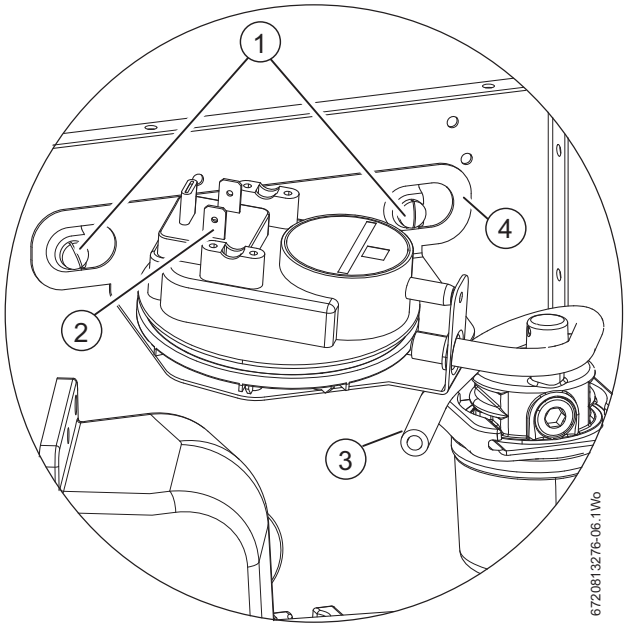

Fig. 84

To remove and replace the Air pressure switch:
- ▶ Remove the two screws [5] retaining the switch to the bracket [4].
- ▶ Disconnect the tube [3] from the switch.
- ▶ Fit the new switch to the bracket and secure with the two screws [5].
- ▶ Re-connect the tube [3] to the switch, ensuring routing is looped as in figure 84.
- ▶ Re-connect the connectors to the terminals [2].
- ▶ Align the Air pressure switch bracket [4] over the two screws [1] and slide the assembly to the right, tighten the screws to secure.

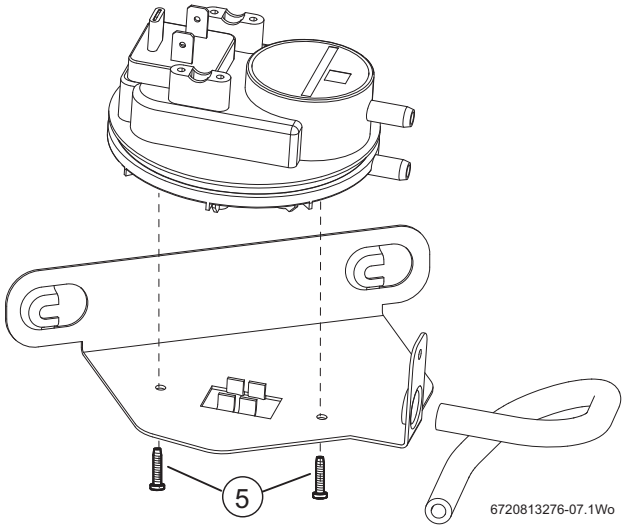

Fig. 85

7.8.8 Auto air vent

Ensure that the boiler has been fully drained.

1. Remove the spring clip completely.
2. Lift the air vent out of the housing and remove.

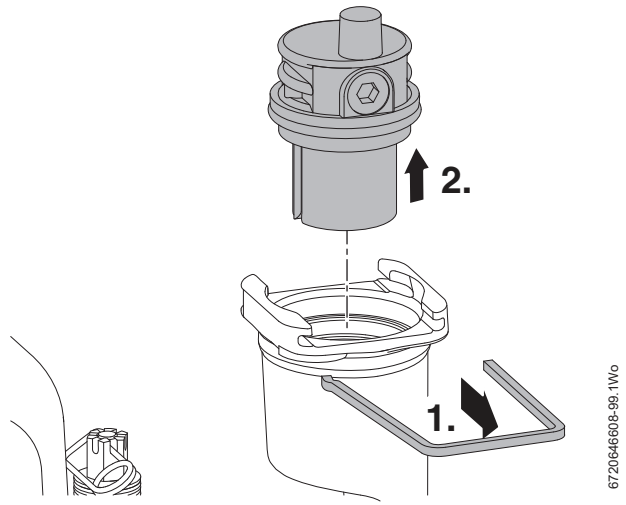

Fig. 86 Auto air vent

When re-assembling ensure that the “O” ring is fitted to the Auto air vent and NOT the heat exchanger, otherwise the Air vent will be difficult to fit.

Apply silicone grease to the “O” ring to ease assembly.

7.8.9 Gas valve

- ▶ Isolate the mains electrical supply and the gas supply at the boiler gas cock.
- ▶ Remove the combustion air inlet pipe.
- ▶ Disconnect the electrical connector from the valve

1. Remove the gas pipe from the top of the valve.
2. Undo the bottom gas pipe connection.
3. Remove the screw securing the gas valve.
4. Lift the gas valve to clear the bottom gas connection.
5. Pull the gas valve forward out of the boiler.

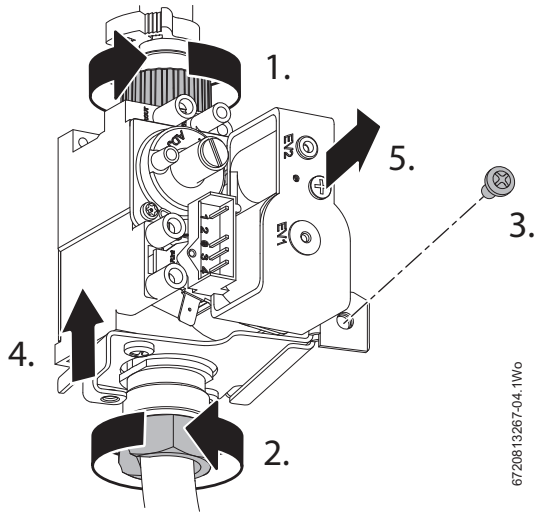

Fig. 87 Gas valve

- ▶ When fitting the new valve, start with the bottom gas connection and tighten by hand before making any other connections to the valve.
- ▶ Secure the valve with the screw.
- ▶ Tighten the bottom connection firmly with a suitable spanner.
- ▶ Connect the top gas pipe.
- ▶ Reconnect the electrical connector.
- ▶ Open the boiler gas isolator.
- ▶ Check all the gas connections for gas tightness.

7.8.10 Fan assembly

CAUTION: Component replacement:
- ▶ After replacement of a gas related component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas sniffer/ analyser.
- ▶ On re-assembly check all affected seals for cracks, hardness and deterioration. If damaged or in any doubt the seal must be replaced.
- ▶ Also after re-assembly, carry out the following checks: Fan pressure in section 7.5, Flue gas analysis in section 7.6.

To remove the fan, disconnect the electrical mains and gas supplies, and remove the following components:

- Flueway
- Combustion air inlet pipe and gas pipe

Flueway removal

CAUTION: Flueway sump seal.
- ▶ Replace the sump seal every time that the Flueway to sump connection is disturbed.

1. Release the two screws securing the Flueway to the sump.
2. Using a screwdriver under the tabs (1) next to the screws, lever the Flueway up and pull the Flueway forward.
3. Rotate the exhaust pipe to the left and pull the Flueway down to separate from the exhaust pipe.

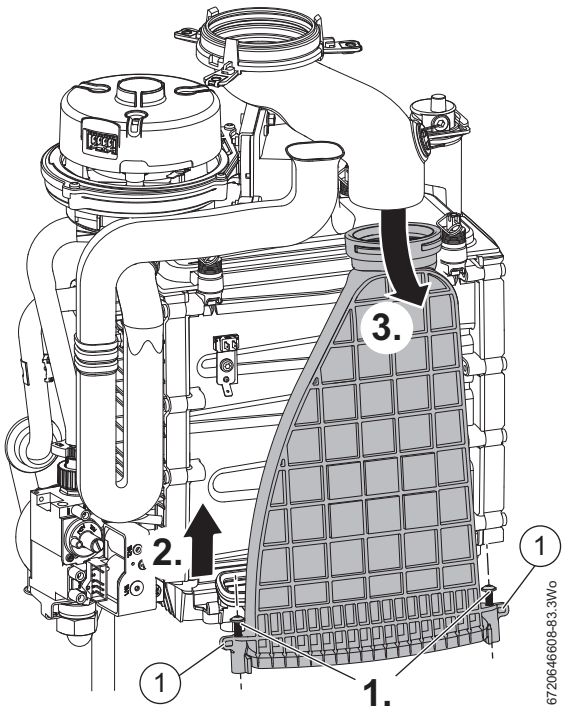

Fig. 88 Flueway removal

Remove the used seal

4. Discard the “tubular” seal [2] or the “moulded” seal [3], depending on which type is fitted and replace with the seal that is provided.

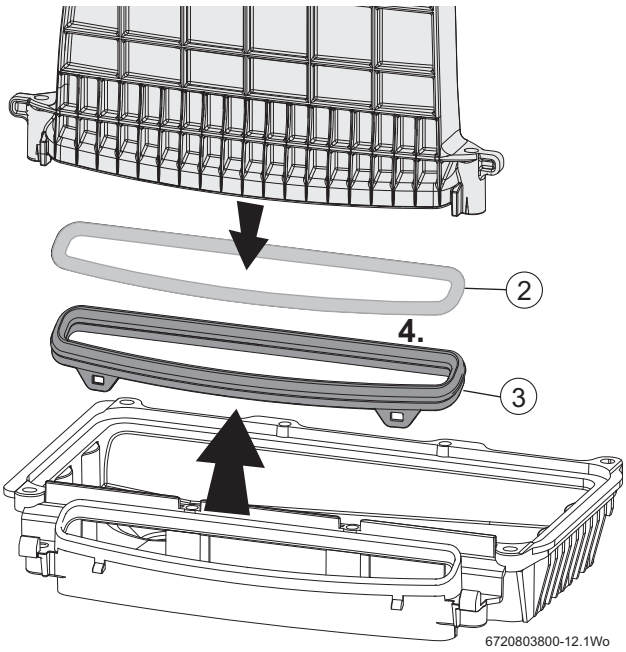

Fig. 89 Remove the existing seal

Fitting the “moulded” sump seal

1. Place the seal [3] on the sump interface.
2. Ensure that the lug flaps are mounted onto the sump lugs.

Before fitting the Flueway:

▶ Ensure that the seal is clean and free from debris.

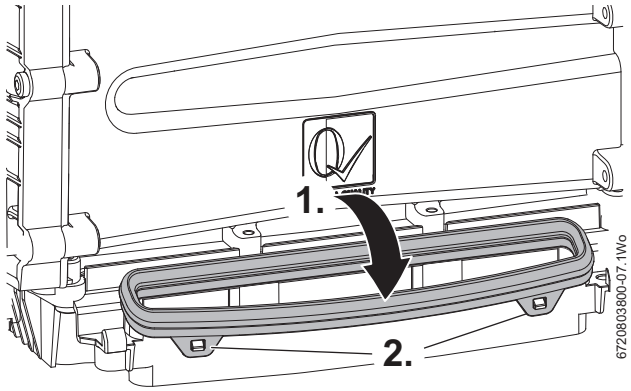

Fig. 90 Moulded style seal

Fitting the “tubular” sump seal

3. Fit the Flueway sump seal [2] into the Flueway. Ensure the seal is fitted fully into the recess in the underside of the Flueway.

Before fitting the Flueaway:

▶ Ensure that the seal is clean and free of debris.

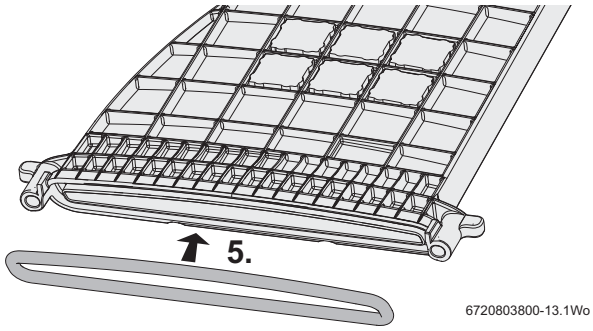

Fig. 91 Tubular style sump seal

Combustion air inlet and gas pipe disconnection

1. Rotate the combustion air inlet pipe anti-clockwise to release from the fan assembly and pull away from the fan.
2. Undo the top gas pipe connector at the gas valve.

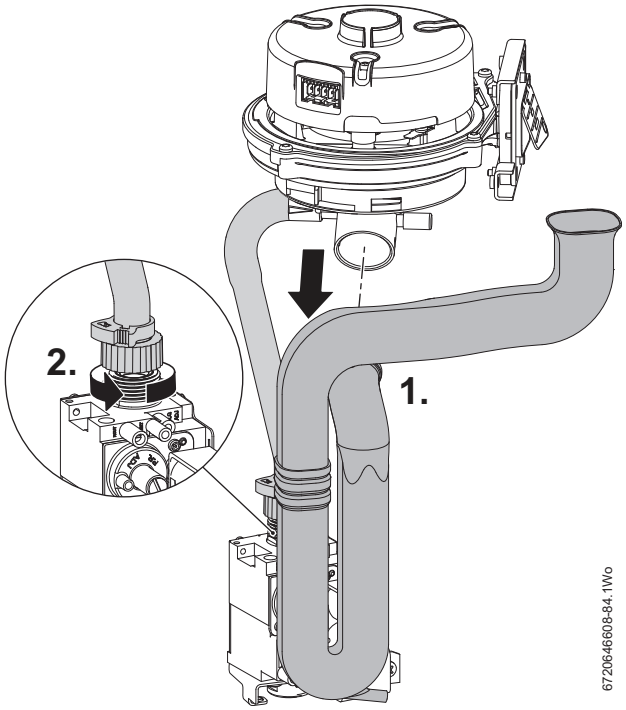

Fig. 92 Combustion air inlet pipe removal

Fan removal

The boiler case is shown removed to aid clarity.

3. Rotate the exhaust pipe anti-clockwise to gain access to the fan assembly securing screws.
4. Support the weight of the fan and remove the two screws securing the fan.

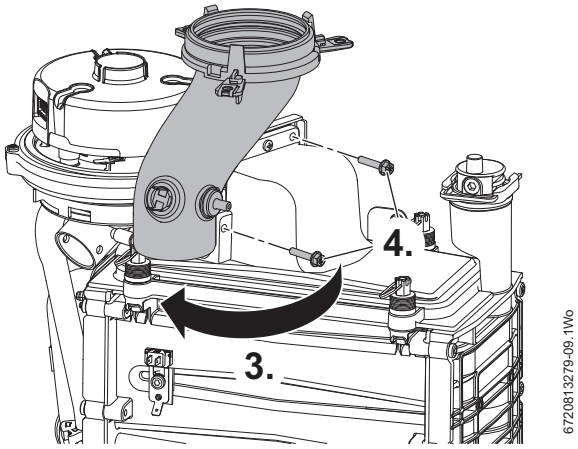

Fig. 93 Fan removal 1

5. Rotate the exhaust pipe clockwise.
6. Pull the fan assembly away from the mount, lift and rotate the fan towards you. Ensure that the front of the fan clears the left hand front castellated nut securing the burner housing.
7. Pull the gas pipe off the fan body connection, the pipe is secured by the interference fit between the pipe and connector.
8. Remove the electrical connector and earth from the fan.

When refitting the rubber gas pipe, ensure that the pipe is correctly oriented by aligning the notch in the pipe with the lug on the fan connector. Do not kink the pipe. There is a raised arrow on the pipe indicating the location of the notch.

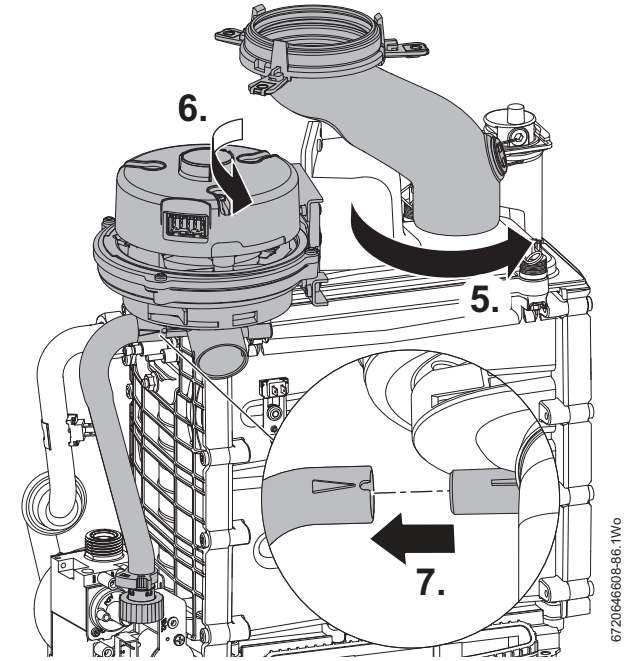

Fig. 94 Fan removal 2

7.8.11 Air/gas flap valve assembly

1. Remove the single screw securing the air/gas flap valve assembly.
2. Pull the flap assembly away from the housing.

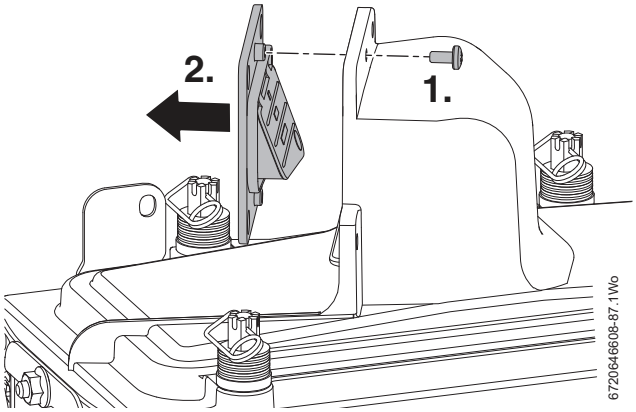

Fig. 95 Air/gas flap valve

7.8.12 Ignition transformer

To remove the ignition transformer

- ▶ Isolate the boiler electrically.
- ▶ Remove the combustion air inlet pipe.
- ▶ Ensure that the harness wires are disconnected from the transformer.
- ▶ Remove the electrode cables.
- ▶ Lift the transformer from the retaining clip.

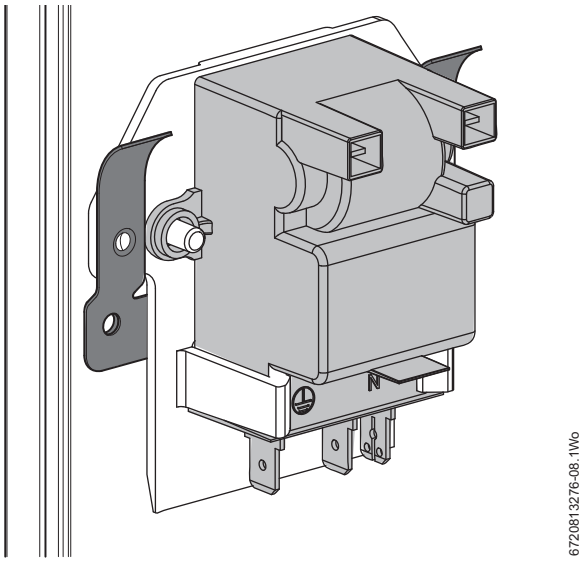

Fig. 96 Ignition transformer

7.8.13 Electrode assembly

CAUTION: Component replacement:

- ▶ After replacement of a gas related component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas sniffer/ analyser.
- ▶ Also after re-assembly, carry out the following checks:
  Fan pressure in section 7.5,
  Flue gas analysis in section 7.6.

To remove the spark electrode assembly:

1. Undo and remove the two nuts securing the electrode assembly
2. Rotate the electrode assembly down and forward to remove from the Heat exchanger.

- ▶ Inspect the spark electrodes (2), ionisation probe (3) and ceramics for signs of contamination or damage, replace as necessary.
- ▶ If necessary, clean the spark electrodes and ionisation probe with a plastic scouring pad.
- ▶ Re-assemble with a new electrode gasket (1),

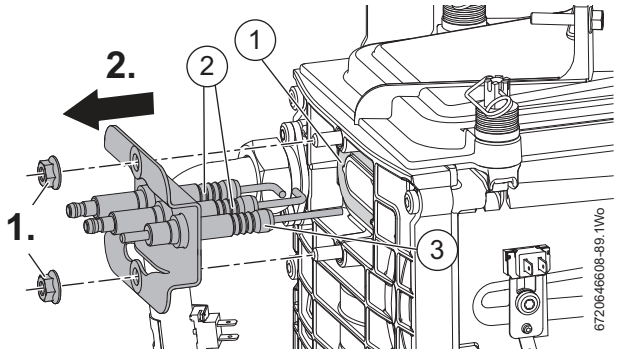

Fig. 97 Electrode assembly

7.8.14 Burner housing, burner/ gasket

The front two bolts retaining the burner housing are NOT captive and will drop out when the nuts are removed.

To remove the burner housing.

1. Release and remove the four spring pins from the castellated nuts.
2. Undo the front two castellated nuts/springs and remove and retain along with the front two bolts (1).
   Slacken the two rear castellated nuts/springs, but do not remove.

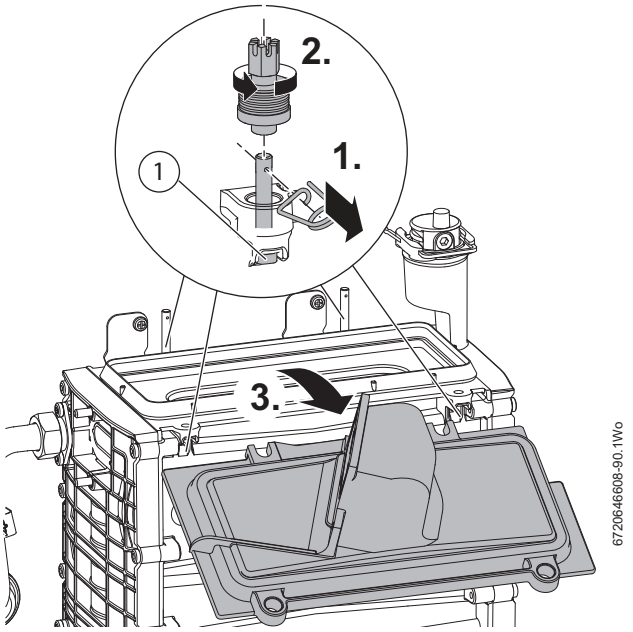

Fig. 98 Burner housing

3. Pull the burner housing up and forward to remove.

To remove the burner and gasket.

1. Lift the gasket (1) and burner mesh (2) from the heat exchanger body.

- ▶ When fitting the burner, ensure that the convex side of the burner faces down into the heat exchanger.
- ▶ Always fit a new gasket (1) when re-assembling the heat exchanger.

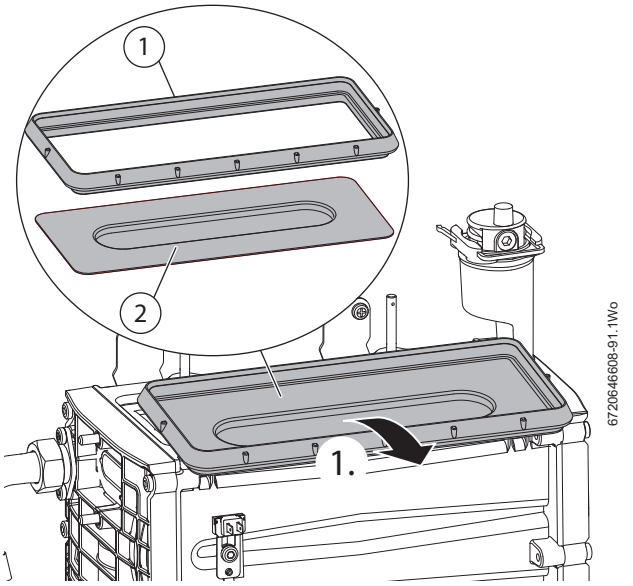

Fig. 99 Burner and gasket

7.8.15 Heat exchanger

Before removal:
- ▶ Isolate the electrical power to the boiler.
- ▶ Drain the boiler.

Heat exchanger disconnection

1. Undo the flow and return connections.
2. Pull both the flow and return pipes away from the heat exchanger.

▶ Replace the fibre washers (1) when replacing the heat exchanger.

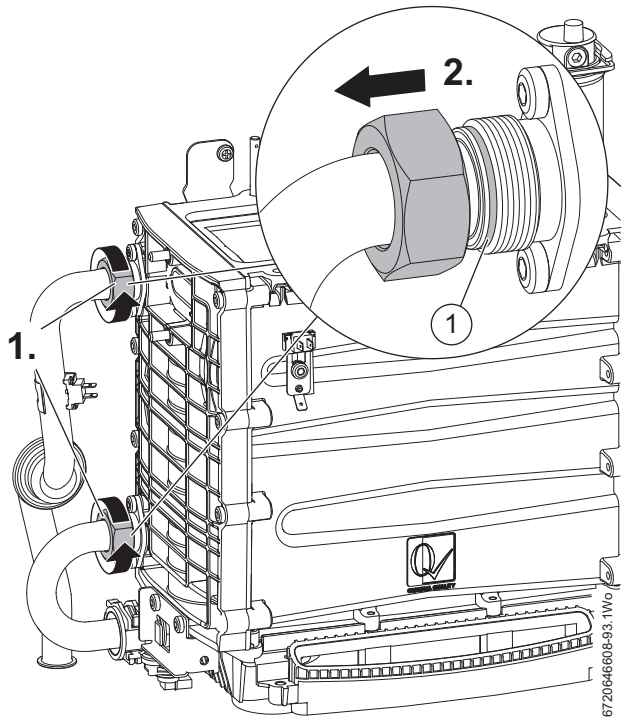

Fig. 100 Heat exchanger disconnection

Heat exchanger removal

- ▶ Ensure any electrical wires or connectors are removed.
- ▶ Remove the Auto air vent (refer to section 7.8.8) to ease removal of the heat exchanger

1. Unscrew the heat exchanger retaining nut.
2. Remove the heat exchanger retaining nut.
3. Remove the two screws securing the heat exchanger to the air box.
4. Lift the heat exchanger until the lower connection clears the hole in the air box.
5. Pull the heat exchanger towards you to remove.

CAUTION: Component replacement:
- ▶ After replacement of a gas related component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas sniffer/ analyser.
- ▶ Also after re-assembly, carry out the following checks:
  Fan pressure in section 7.5,
  Flue gas analysis in section 7.6.

▶ Re-assemble in the reverse order.

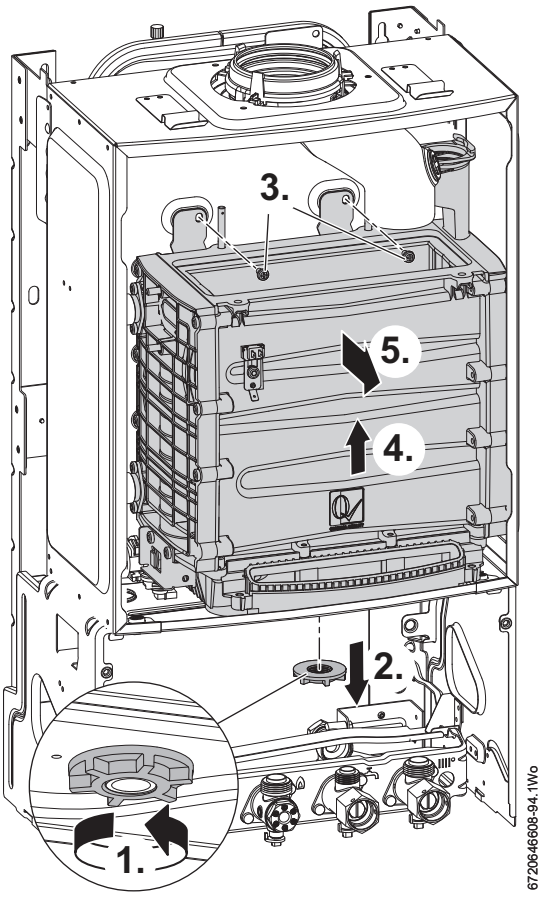

Fig. 101 Heat exchanger removal

7.8.16 Diverter valve motor and diverter valve removal

▶ Disconnect the lead from the diverter valve motor.

1. Pull the diverter valve motor from the housing.
2. Undo and remove the two screws from the diverter valve motor housing.
3. Pull the diverter valve motor housing from the diverter valve assembly.

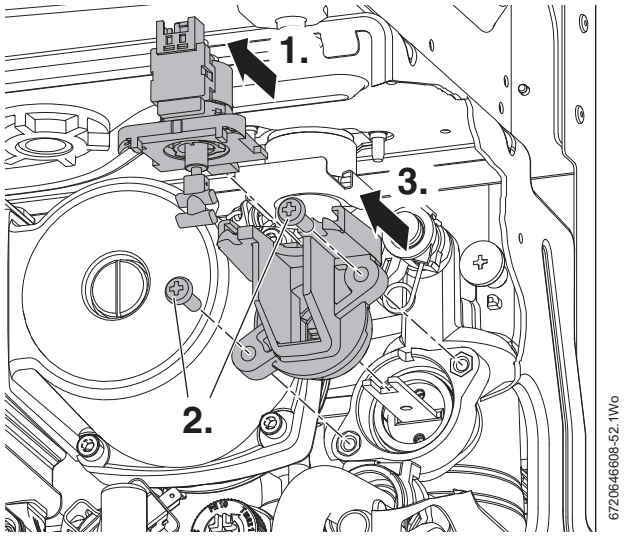

Fig. 102 Diverter valve

7.8.17 DHW Temperature sensor (NTC)

- ▶ Disconnect the electrical connector from the sensor.
- ▶ Unclip the sensor from the pipe.

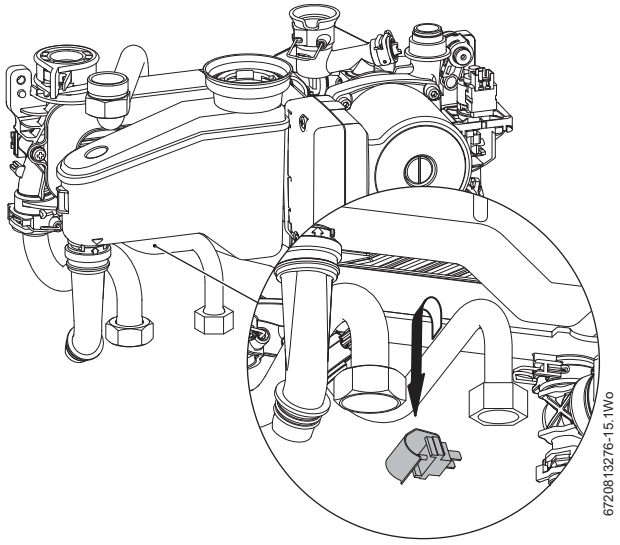

Fig. 103 DHW temperature sensor

7.8.18 Pump head

Before removal:

- ▶ Isolate the electrical power to the boiler.
- ▶ Drain the boiler.
- ▶ There may be water inside the pump. Protect any electrical items from water ingress.

1. Disconnect the main electrical connector from the bottom of the pump.
2. Remove the four screws securing the pump head.
3. Pull the pump free from the housing.

- ▶ Use a screwdriver to gently disconnect the three wire connector from the bottom of the pump.
- ▶ Ensure that the pump body is completely dry before fitting the new pump head, failure to do so may result in damage to the pump.

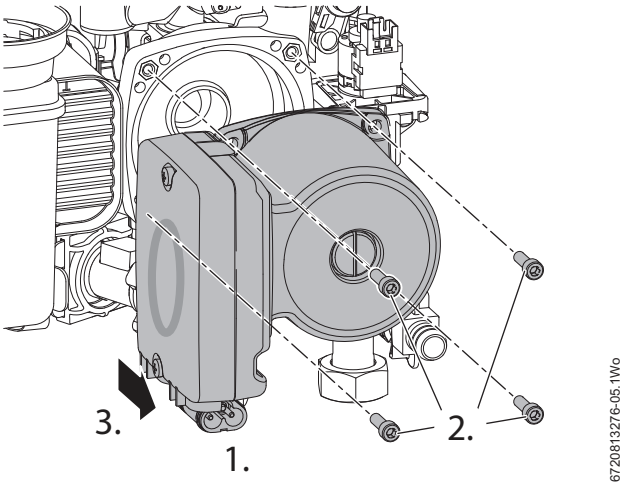

Fig. 104 Pump head removal

7.8.19 Flow sensor, flow restrictor and filter removal

- ▶ Isolate the cold mains and ensure that the DHW circuit is fully drained.
- ▶ Disconnect the electrical connection to the turbine.
- ▶ Undo the nut connecting the flow sensor assembly elbow to the Cold Mains isolating valve.

1. Remove the clip from the housing.
2. Pull the flow sensor assembly out.
3. Remove the flow regulator (1) from the turbine assembly (2).
4. Remove the clip from the flow sensor assembly.
5. Separate the elbow (3) from the turbine assembly (2).
6. Remove the filter (4).

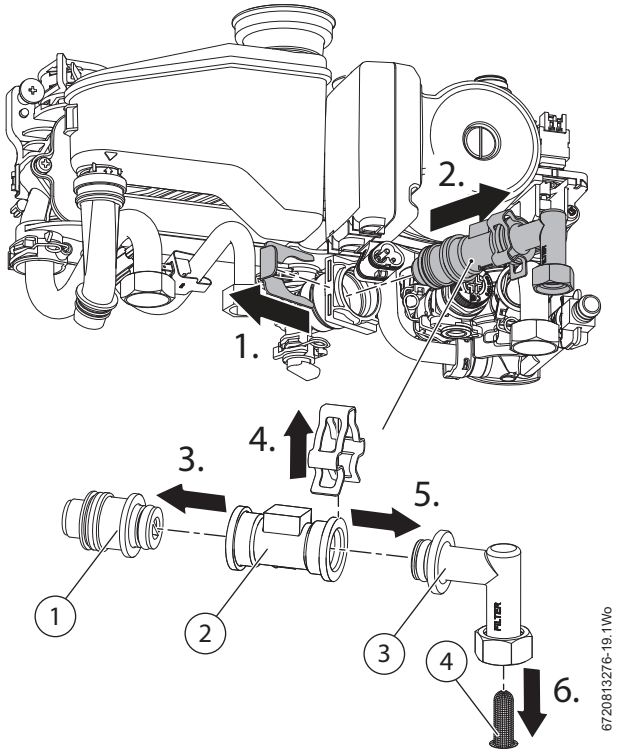

Fig. 105 Flow sensor assembly

7.8.20 Flow regulator

The flow regulator can be further broken down into:

1 - Spacer

2 - Flow regulator

3 - Flow regulator housing

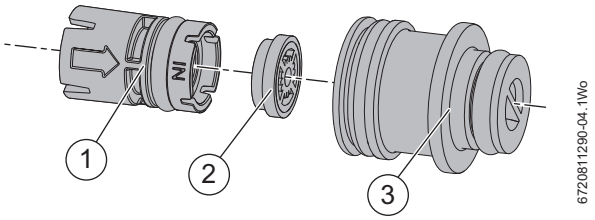

Fig. 106 Flow regulator assembly

7.8.21 Pressure gauge

▶ Ensure that the boiler is fully drained.

1. Carefully prise the lugs apart.
2. Remove the pressure gauge.
3. Withdraw the spring clip from the pressure sensing head housing.
4. Remove the pressure sensing head and pressure gauge capillary from the housing.

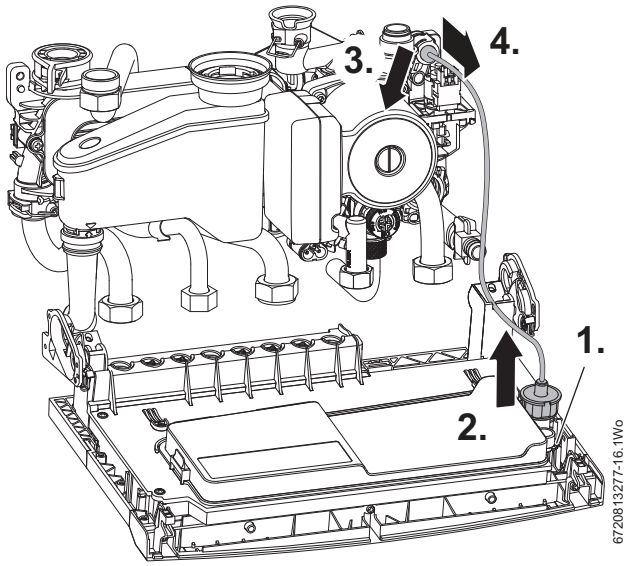

Fig. 107 Pressure gauge removal

7.8.22 Boiler return sensor (NTC)

▶ Isolate the boiler and ensure that the boiler is fully drained.

1. Withdraw the spring clip to release the sensor.
2. Pull the sensor down to remove from the housing.

▶ To refit follow the above actions in reverse.

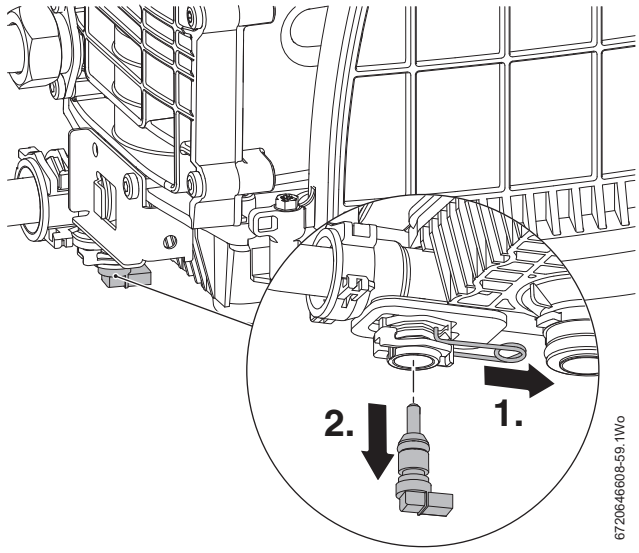

Fig. 108 Boiler return sensor

7.8.23 Drain tap

▶ Ensure that the boiler is full drained down.

▶ The drain tap rotates anti-clockwise for a ¼ turn to open.

1. Rotate the drain tap fully anti-clockwise passed the ¼ turn stop point to release.
2. Push in and withdraw from the housing.

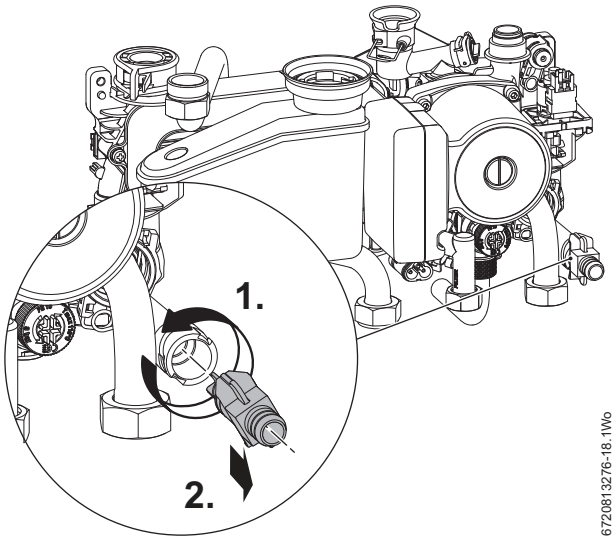

Fig. 109 Drain tap

7.8.24 CH pressure relief valve

▶ Isolate the boiler and ensure that the boiler is fully drained.

1. Release the knurled connector from the bottom of the PRV.
2. Pull the captive clip to the left to release the PRV.
3. Pull the Central Heating pressure relief valve out of the housing.

▶ Replace in reverse order, secure with the clip and mounting screws.

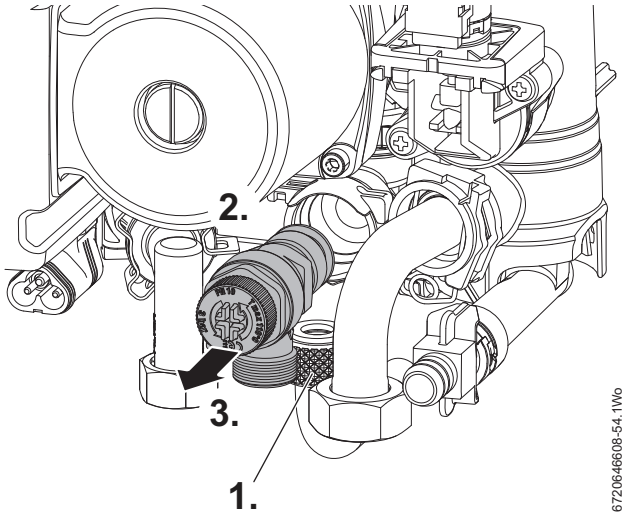

Fig. 110 PRV

7.8.25 DHW pressure relief valve

Before removal:
- ▶ Isolate the electrical power to the boiler.
- ▶ Drain the boiler.
- ▶ Isolate the cold water mains.

1. Release the retaining clip
2. Pull the pressure relief valve (1) with the deflector (2) from the housing.

▶ When replacing the DHW pressure relief valve, re-use the deflector from the old PRV.

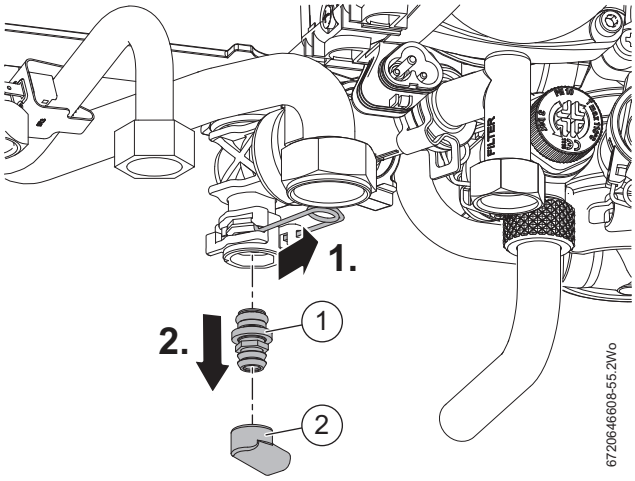

Fig. 111 DHW PRV

7.8.26 DHW plate heat exchanger

Before removal:
- ▶ Isolate the electrical power to the boiler.
- ▶ Isolate the cold water mains and drain DHW circuit within the boiler.
- ▶ Drain the boiler.

1. Undo and remove the retaining screw.
2. Rotate the left hand side of the heat exchanger towards you and slide out to the left.

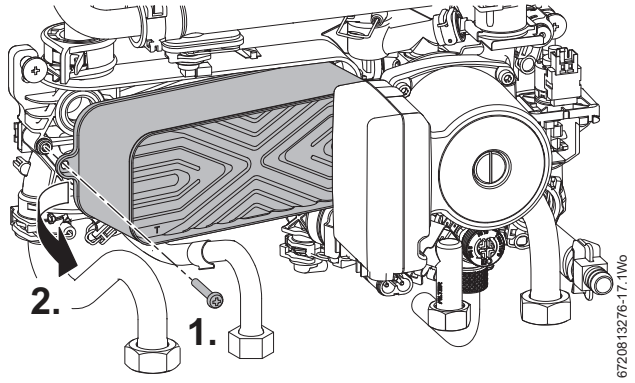

Fig. 112 Remove plate heat exchanger.

▶ When replacing the heat exchanger, ensure that any seals that have been disturbed are replaced.

7.8.27 Hydraulic block removal

Do not remove the hydraulic block assembly unless absolutely necessary.
Before removal:
- ▶ Isolate the electrical power to the boiler.
- ▶ Drain the boiler.
- ▶ Isolate the cold water mains and drain the DHW circuit within the boiler.

1. Squeeze the ratchet connector and rotate clockwise to release.
2. Release the pin on the expansion vessel connector at the pump assembly.
3. Pull the expansion vessel up and secure in raised position.
4. Remove the clip securing the pump return to the heat exchanger.
5. Remove the two screws securing the CH pressure relief valve mounting.
6. Remove the screws securing the hydraulic block assembly.

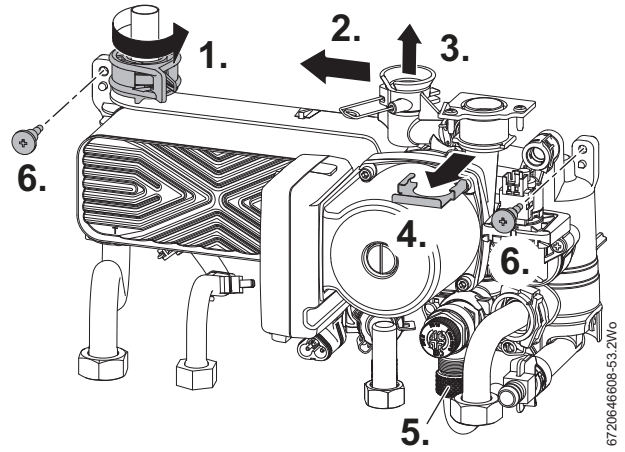

Fig. 113 Hydraulic block

7.8.28 Bypass valve

Remove the hydraulic block from the boiler.

1. Remove the clip on the return connection.
2. Remove the clip on the pump connection.
3. Remove the spring clip retaining the by-pass pipe.
4. Separate the return unit from the flow manifold.
5. Using a pair of pliers remove the by-pass valve.

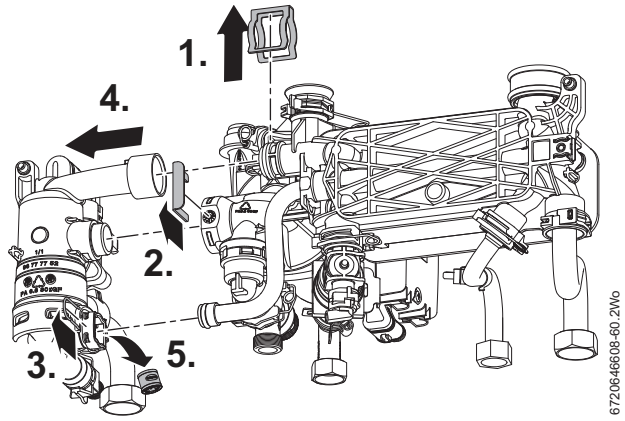

Fig. 114 Bypass valve

▶ When re-assembling, in reverse order, ensure that any seals that have been disturbed are replaced.

7.8.29 Access to boiler control components

1. Release the three captive screws retaining the installer access cover.
2. The access cover can now be removed with the flap.

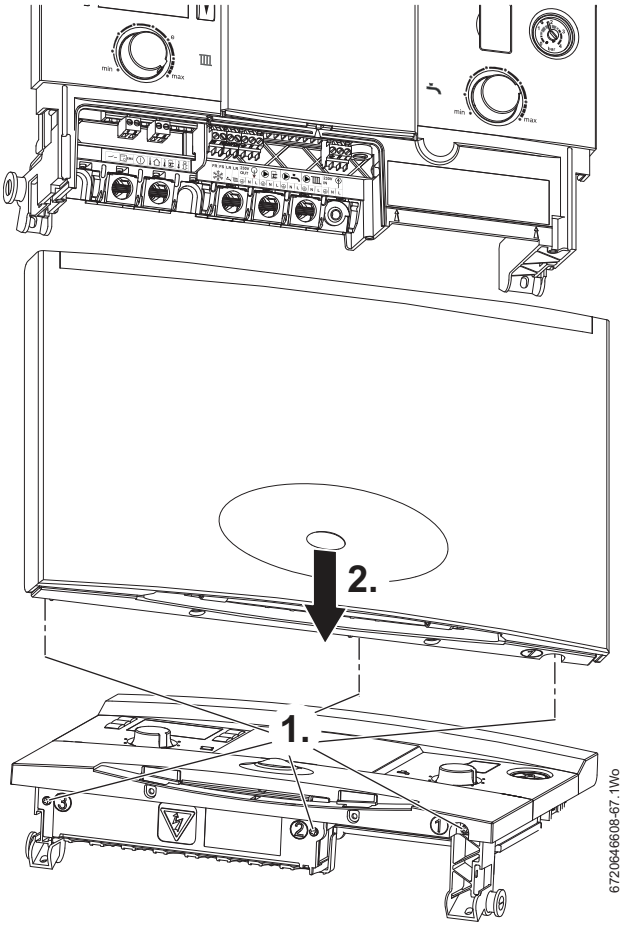

Fig. 115 Installer access cover

PCB fuse

The fuse is located next to the high voltage connectors and the spare fuse (1) is located on the back of the access cover.
To remove the fuse:

1. Push the top of the fuse holder up.
2. Rotate the top of the fuse holder anti-clockwise and remove.

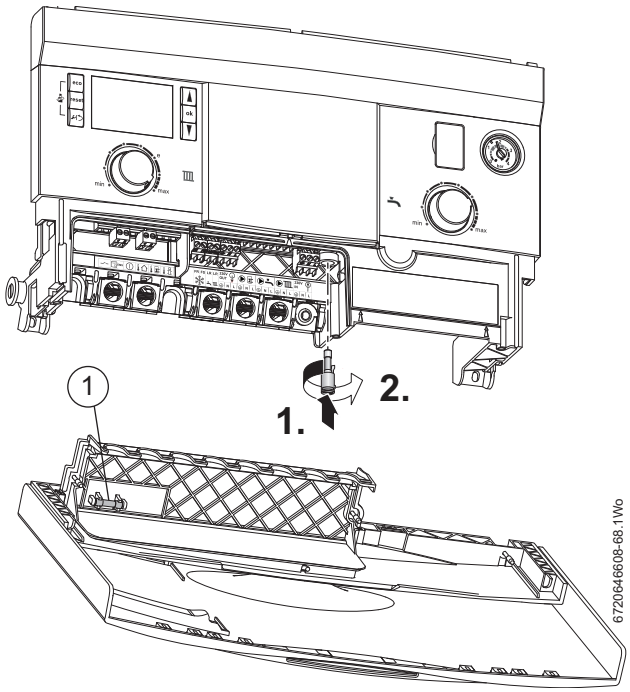

Fig. 116 Fuse holder

7.8.30 Replacing the control unit

The control unit is supplied in a plastic housing. The complete unit must be replaced.
The HCM must be exchanged from the old to the new control unit.

With the installer access cover removed:

1. Remove all the connectors
2. Slide out all the cable strain relief clamps

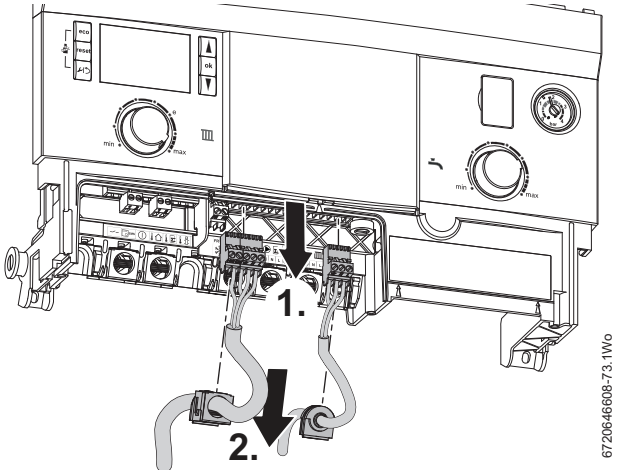

Fig. 117 Disconnect external connections

With the control unit in the service position:

1. Remove the single cover retaining screw.
2. Release the catches and remove the access cover.

- ▶ Lift the HCM (3) from the retainer and disconnect the cable, keep the HCM to fit into the new control unit.
- ▶ Disconnect and remove all cables and connectors from the control unit.
- ▶ Remove the pressure gauge, refer to section 7.8.21.