

Just Add Gas



Preventative Maintenance Kit Instructions



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Preventative Maintenance Kit (PMK) Overview

Check the correct Preventative Maintenance Kit has been obtained for the instrument on which work is to be undertaken. If you are unsure, check with BWB prior to commencing maintenance.

Please check the following items are present before undertaking the procedures outlined in this document.

Note: Items may vary slightly depending on the serial number of your instrument. If you are unsure please contact BWB for advice.

Air Filter Assembly	Generation Specific
12V Air Compressor	Generation Specific
Ignitor Electrode Assembly	018-529
Gas Filter Assembly	019-674
Mixing Chamber Assembly (Side Entry)	Application Specific
Air Compressor Filter Kit	019-667
'O' Ring Replacement Kit	019-676
Aspiration Kit (including Clean out wire)	018-533
LCD and Ribbon Cable	Generation Specific

A comprehensive Service Guide is available to support the BWB range of instruments. The Service Guide contains detailed procedures for routine maintenance and service information. It is strongly recommended that the Service Guide is available and used as a reference whenever service activities are undertaken.

Recommended Tool Kit

Although not exhaustive, the following tools are recommended (as a minimum) in order to undertake the replacement of items included in the Preventative Maintenance Kit on the BWB range of Flame Photometers:

- 5.5mm AF Spanner/Socket
- 7mm AF Spanner
- 2.4mmAF Allen Key
- 2.1mmAF Allen Key
- Wire Cutters
- Tyraps®
- Flat Blade Screwdrivers (Small and Medium)
- Pozi-driv® Screwdrivers (1 & 2 pt)
- Scalpel or Precision Knife

A BWB Service and Repair Tool Kit is available: Order Code 019-985.

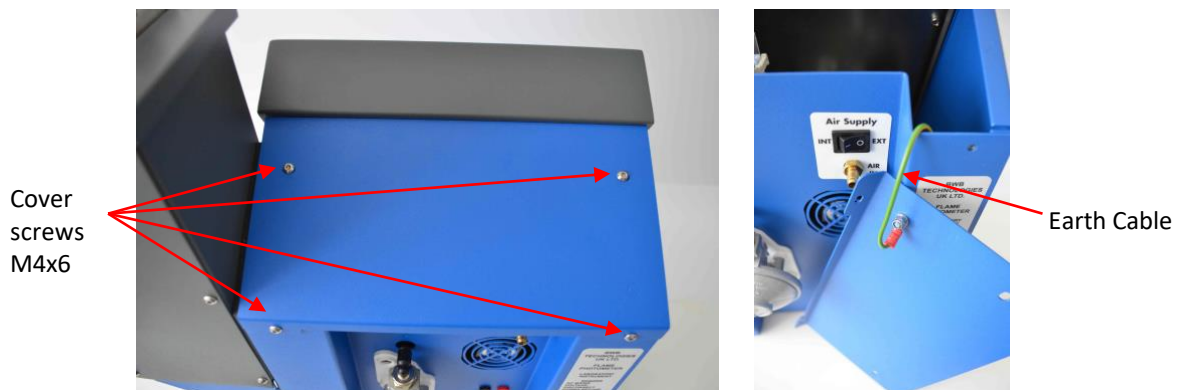
NOTE: The Aspiration Kit, including Clean out wire, (018-533) supplied as part of the Preventative Maintenance Kit (PMK), should be used in accordance with the BWB Flame Photometer Installation and Operation Manual .

Section 1 - Gaining Access to the Instrument Enclosure

To perform the following component or sub-assembly replacement or other servicing procedures, it will first be necessary to access the interior of the instrument enclosure. This should be carried out as follows:-

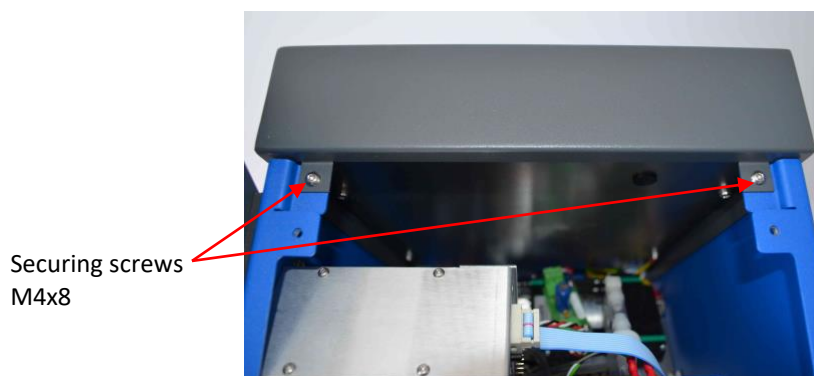
1. **Unplug the mains power cord.**
2. Turn off the gas supply at source and switch off the external air supply (if used).

Note: It will not normally be necessary to disconnect the gas supply and external air supply (if used) from the instrument rear panel unless the servicing is to be performed at another location or if sufficient access cannot be gained without doing so.
3. Remove the four screws which secure the instrument top cover and remove the cover.

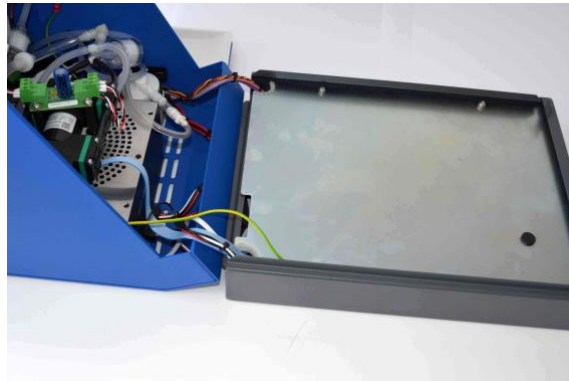


Note: Some units have a printer unit fitted to this cover (not shown above). In such cases care should be taken that the printer and its connection cables are not damaged when the cover is removed, particularly if it is left connected to the instrument during servicing activities. The cover will also always be attached to the instrument by an earth cable. If the cable is removed it is **essential** that the earth cable be replaced in the same position and the fixing is fully tightened when the cover is replaced.

4. Remove the two screws holding the Front Panel Assembly in place.



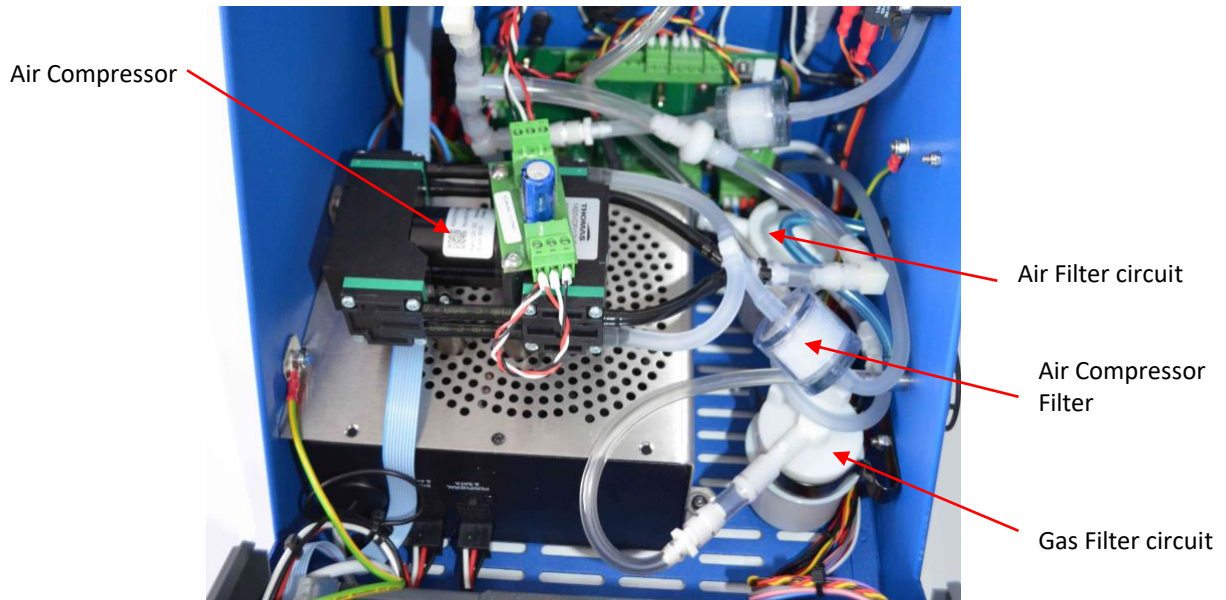
5. Place bubble wrap or a soft material on the table in front of the front panel to protect the keypad. Carefully lower the Front Panel Assembly down on the table being aware that it is retained to the instrument by cables at the bottom.



6. If wished the printer cables (if present) can now be disconnected and the earth wire removed to allow the top cover to be removed completely. Note however that these must be replaced during re-assembly of the instrument.

Instrument Main Chassis

Location of Air Compressor and Filters within instrument:



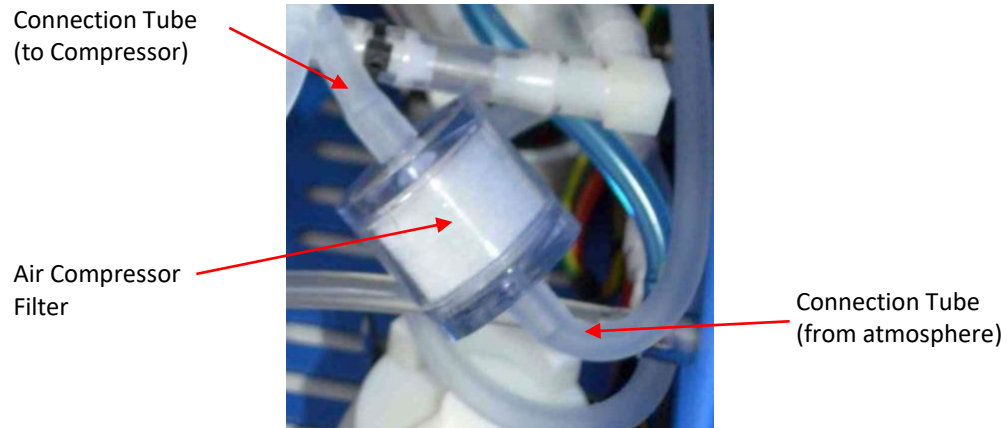
Instrument Front Panel Assembly

Location of LCD PCB and Ribbon Cable within instrument: (Cover Plate Removed - M4x10)



Section 2 - Replacing the Air Compressor (Inlet) Filter

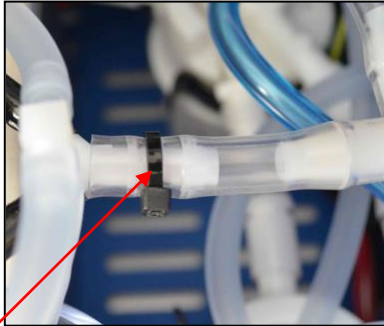
1. Gain access to the instrument enclosure as described in Section 1.
2. Identify the Air Compressor Inlet Filter and carefully ease the tubing off of the two connections, one at either end of the filter.



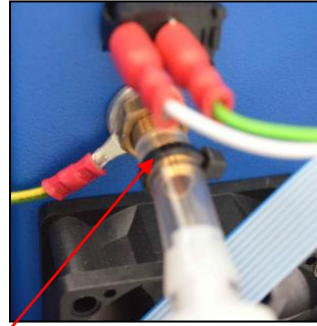
3. Remove the Air Compressor Filter and discard responsibly.
4. Ease the two tubes onto the new Air Compressor Inlet Filter ensuring that tubing is not pinched or damaged.
5. Check connections for leaks prior to reassembly.

Section 3 - Replacing the Air Circuit

1. Gain access to the instrument enclosure as described in Section 1.
2. Cut the Ty-Rap® and disconnect the air outlet tube at the 'T' connector.
3. Cut the Ty-rap® from external air inlet connector and remove the tube from the connector.

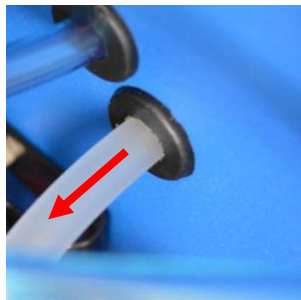


Cut Ty-Rap® and disconnect air tube



Cut Ty-Rap® and disconnect air tube

4. Disconnect the air tubing from the nebuliser and feed it back through the bulkhead.
5. Gently pull the tube off the air pressure switch.

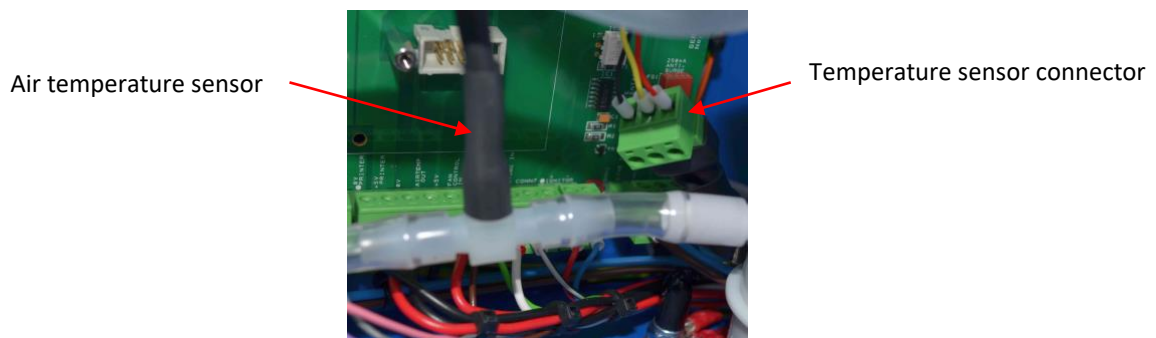


Disconnect tube from Nebuliser and feed through bulkhead



Pull tube off pressure switch

6. Identify the air temperature sensor and disconnect the electrical connection.

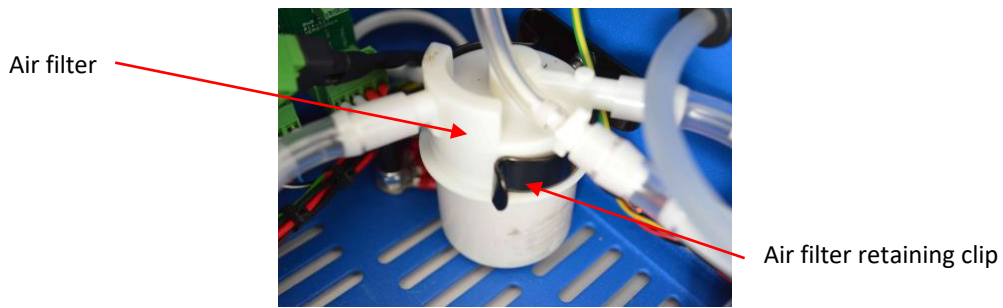


Air temperature sensor

Temperature sensor connector

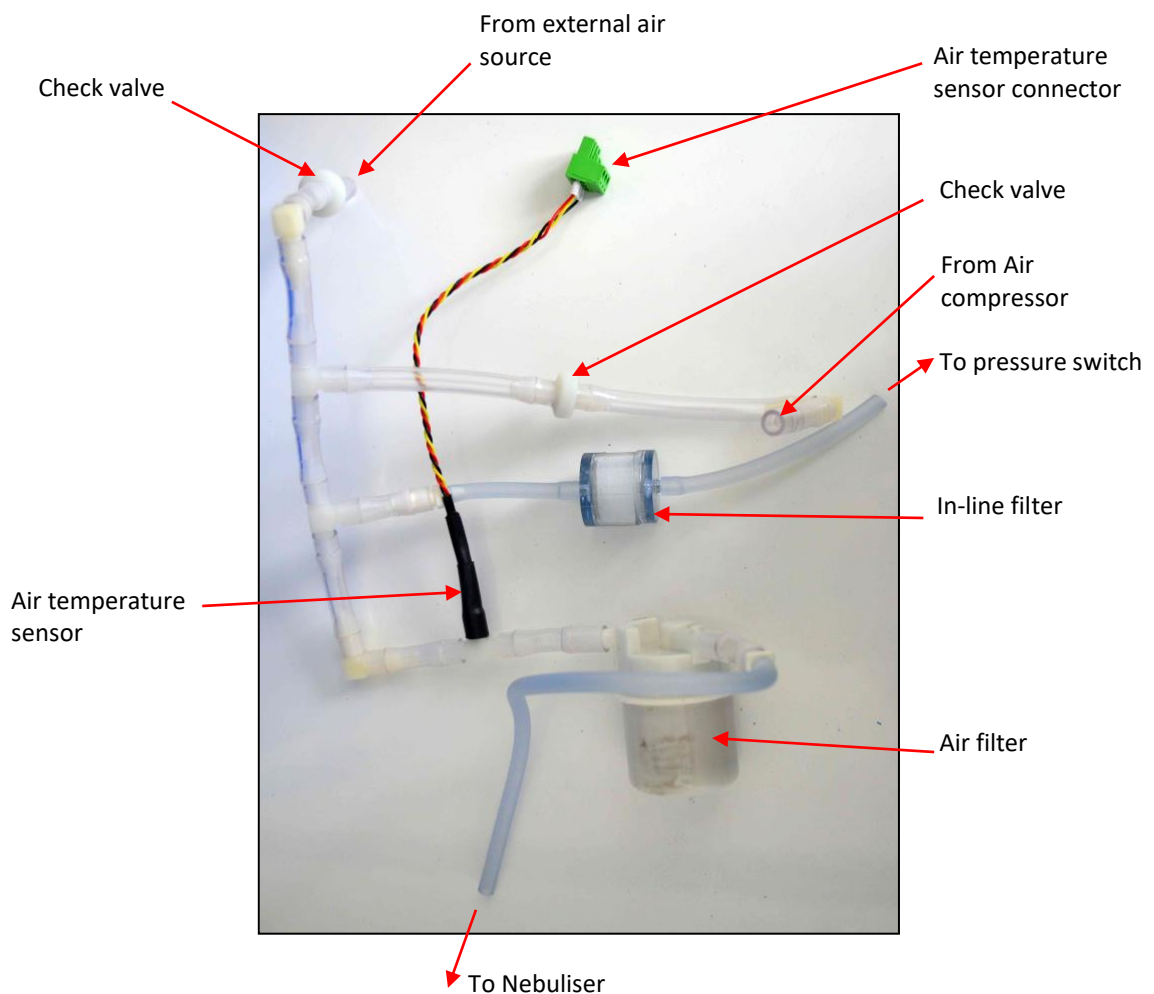
Disconnect air temperature sensor connector

7. Identify and release the air filter from the retaining clip and withdraw the complete Air Circuit. Use a screwdriver to assist in opening the spring clip for filter removal.

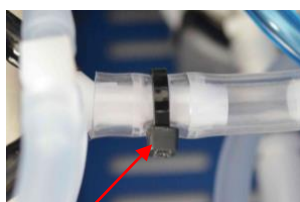


Release Air filter from retaining clip

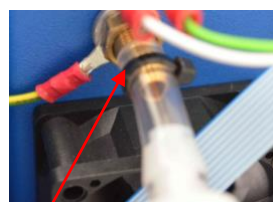
8. Replace and re-fit the Air Circuit by reversing the procedure ensuring all tubing connections are correctly identified and that tubing is not pinched or damaged.



9. Fit new Ty-Raps® to secure the air outlet tube to the 'T' Piece and to secure the inlet tube to the external air inlet. Check connections for leaks prior to re-assembly.



Replace Ty-Rap®

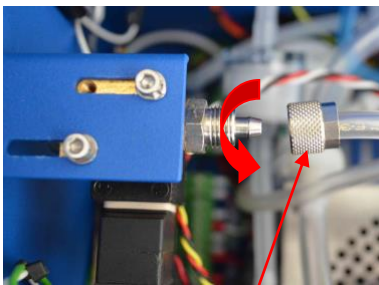


Replace Ty-Rap®

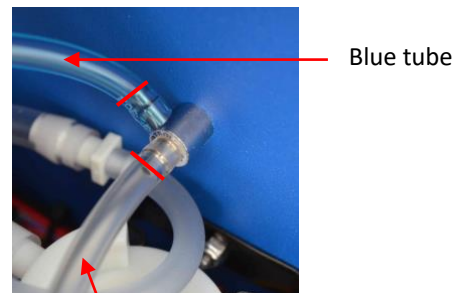
Section 4 - Replacing the Gas Circuit

1. Gain access to the instrument enclosure as described in Section 1.
2. Undo the knurled connector and disconnect gas tube from the solenoid assembly. Cut the transparent tube from the gas control valve. The blue tube that connects the gas control valve to the mixing chamber is also supplied as part of the gas kit and this should also be cut off and removed.

Note: The blue and clear tubes must be cut from the gas control valve rather than pulled off to prevent damage to the barb on the gas control valve - especially the one connected to the blue tube.

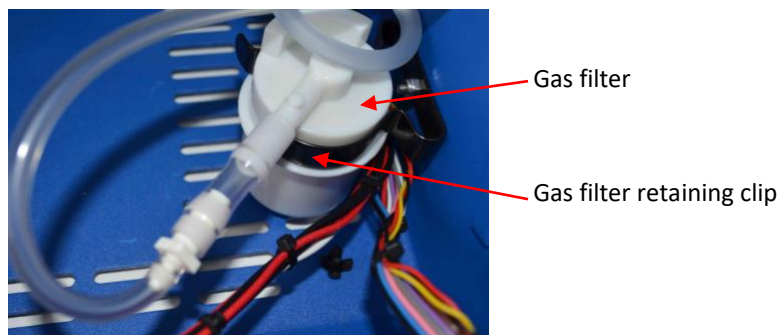


Knurled screw



Transparent tube

3. Identify and release the gas filter from the retaining clip and withdraw the complete Gas Circuit. Use a screwdriver to assist in opening the spring clip for filter removal.



Release Gas filter from retaining clip

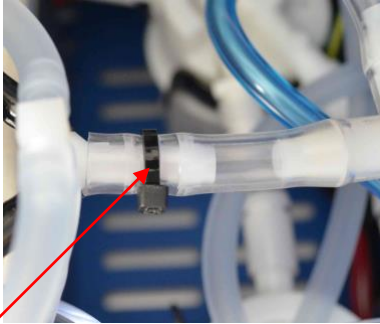
4. Replace and re-fit the Gas Circuit by reversing the procedure ensuring all tubing connections are correctly identified and that tubing is not pinched or damaged.

Note: It is essential that a leakage check is performed using a soap solution or a proprietary leak detection solution once the unit is put back to functional condition, but before replacing the Front Panel and Top Cover securing screws. Initiate a flame start sequence allowing the solenoid to pass gas, lower the Front Panel and check all gas connections for leaks whilst flame is alight. Once all connections have been confirmed as free from leaks, refit and secure the Front Panel and Top Cover.

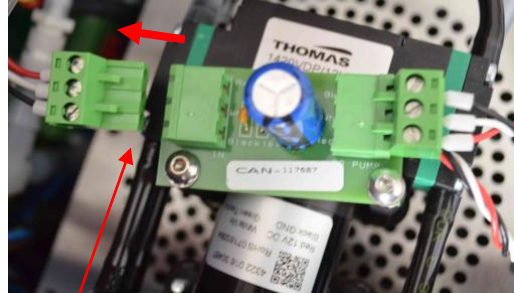
Section 5 - Replacing the Air Compressor

The Air Compressor assembly is mounted to the Power Supply Unit chassis. To replace the air compressor it is necessary to remove the Power Supply to gain access and dismount the Air Compressor.

1. Gain access to the instrument enclosure as described in Section 1.
2. Cut the Ty-Rap® and disconnect the air outlet tube at the 'T' connector.
3. Disconnect the Air Compressor electrical supply connection from the Compressor Control PCB connector CONN1.

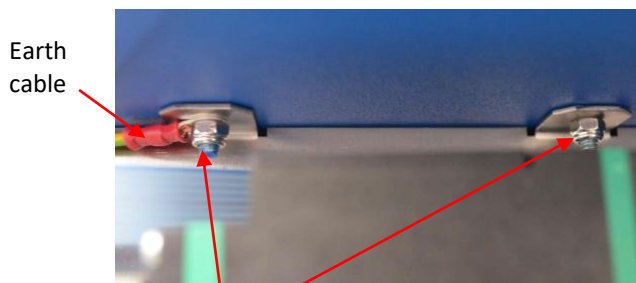


Cut Ty-Rap® and disconnect air tube



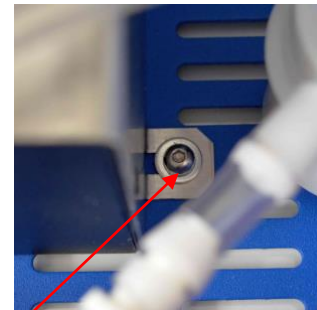
Disconnect electrical supply

4. Loosen and remove the Power Supply side fixing nuts using a 7mmAF spanner.
Note: The front nut has an earth cable attached. This must be replaced in the same position during re-assembly.
5. Remove the Power Supply lower securing screw using a 2.4mmAF Allen Key. This is located to the right of the Power Supply.



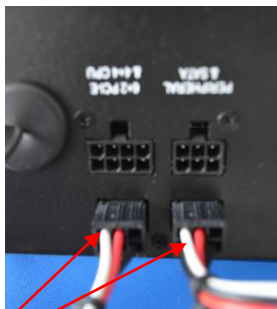
Earth cable

Remove PSU M4 side fixings



Remove PSU M4x6 lower fixing

6. Lift the Power Supply Unit sufficiently to gain access and note the position of the two, 6-way electrical connectors at the front of the Power Supply. Note that each connector has a release tab on the underside. Depress the tabs and remove both connectors.
7. Lift and rotate the Power Supply Unit to gain access and disconnect the 3-pin AC connection from the rear of the Power Supply.



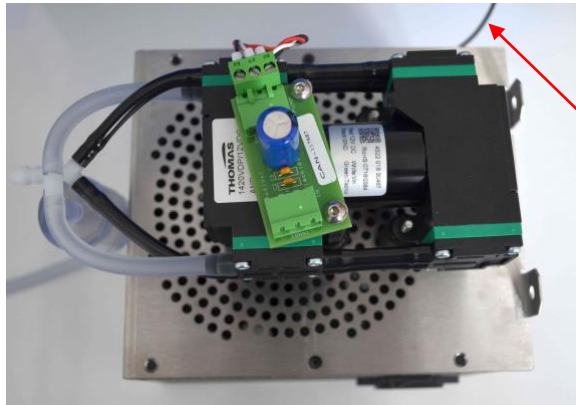
Disconnect 6-way connectors



Remove 3-pin AC connector

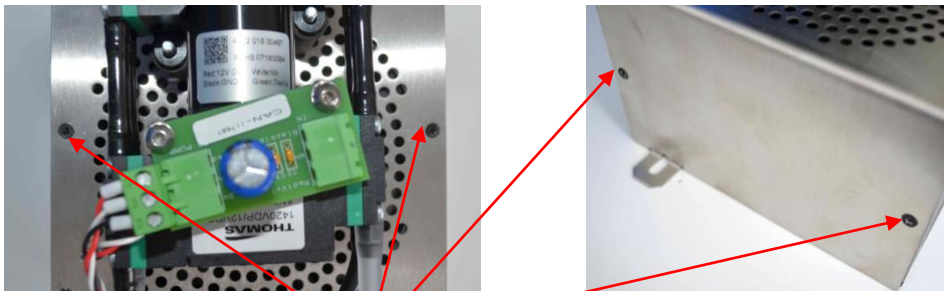
- Carefully lift out the Power Supply Unit (with Air Compressor) and place it alongside the instrument.

Note that the Power Supply is still connected to the Front Panel Assembly by a single black cable. It should not be necessary to disconnect this cable, however take care to avoid damaging the cable or subjecting it to excessive strain.



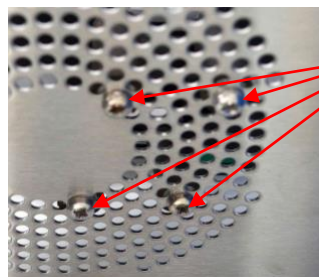
Cable retains Power Supply to the Front Panel Assembly. Take care to avoid damaging or straining the cable.

- Remove the four countersunk screws which retain the Power Supply cover. Two are located on the top and two are on the side, as shown.



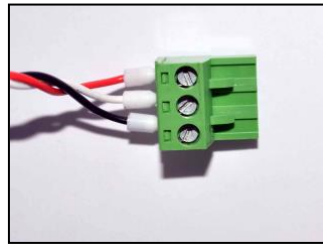
Remove four M3x6 cover screws

- Remove the power supply cover with the Air Compressor attached. Note the positioning of the four air compressor retaining screws on the inside of the perforated section of the cover. Undo the four screws to remove the Air Compressor from the cover.



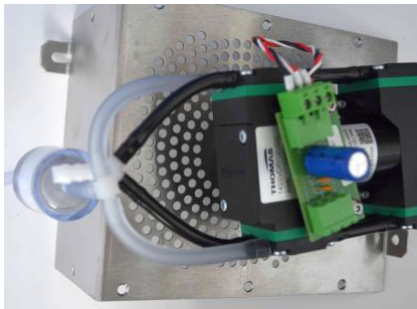
Remove Air Compressor retaining screws

11. Disconnect the two transparent air tubes from the Compressor inlet. If necessary, remove connector from Air Compressor Cable and fit to the cable of the replacement Air Compressor ensuring connections are as shown.

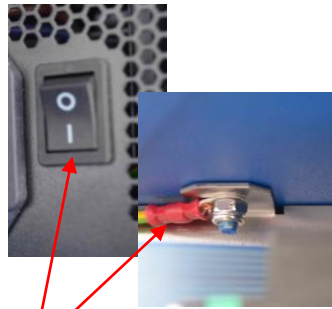


Air Compressor wiring

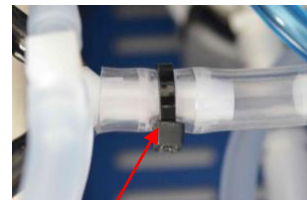
12. Re-assemble in reverse order ensuring the replacement Air Compressor is correctly orientated with the Power Supply Cover. Check that rear power switch on the Power Supply Unit is set to the ON position before it is fitted back into the instrument and ensure that the Earth cable is reconnected. Fit a new Ty-Rap® to secure the air outlet tube to the 'T' Piece.



Air Compressor orientation



Check PSU is ON and earth is reconnected



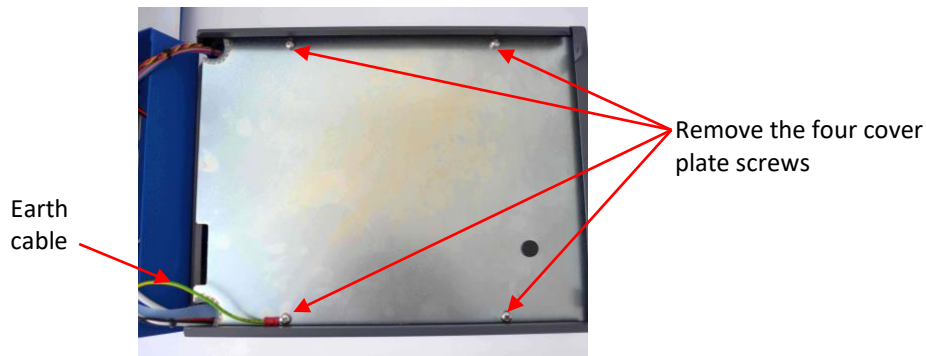
Replace Ty-Rap®

Section 6 - Replacing the LCD and Ribbon Cable

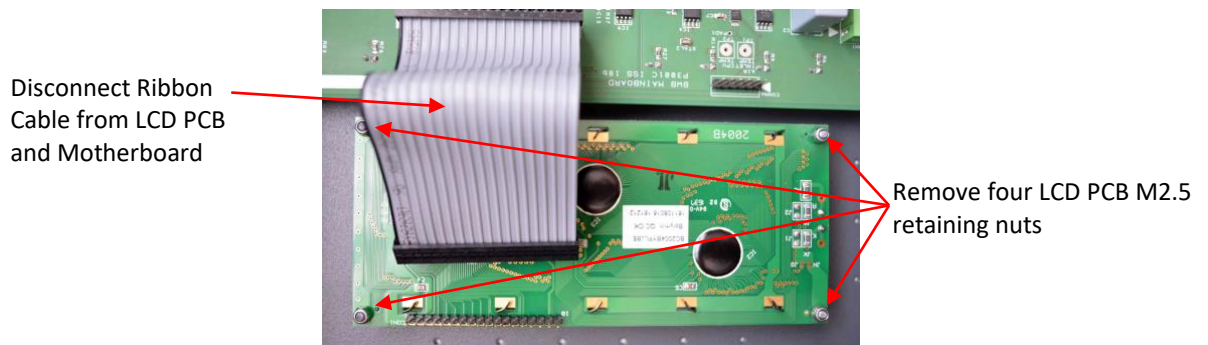
Note: Static Safe Handling Procedures and Working Practices must be observed during this procedure.

1. Gain access to the instrument enclosure as described in Section 1.
2. Remove the four screws which secure the cover plate to the Front Panel Assembly and remove the plate.

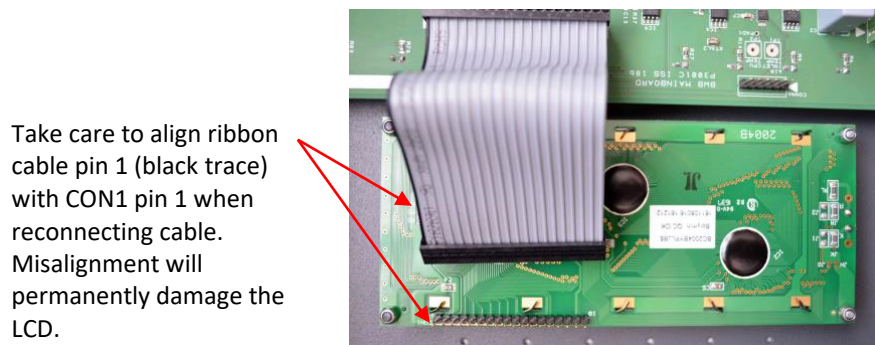
Note: One of the screws has an earth cable attached. This must be replaced in the same position during re-assembly



3. Disconnect the Ribbon Cable from both the LCD PCB and the Motherboard (CON1). Remove the four LCD PCB retaining nuts using a 5mm AF Spanner or Socket.



4. Locate replacement LCD PCB in position and retain using the four fixing nuts. Connect new Ribbon Cable between Motherboard and LCD PCB CON1 ensuring it is correctly located in the sockets and fully inserted.



Note: It is possible to offset the Ribbon Cable when reconnecting to CON1. Ensure pin 1 of the cable (black trace) is aligned with pin 1 of CON1. Misalignment will permanently damage the LCD.

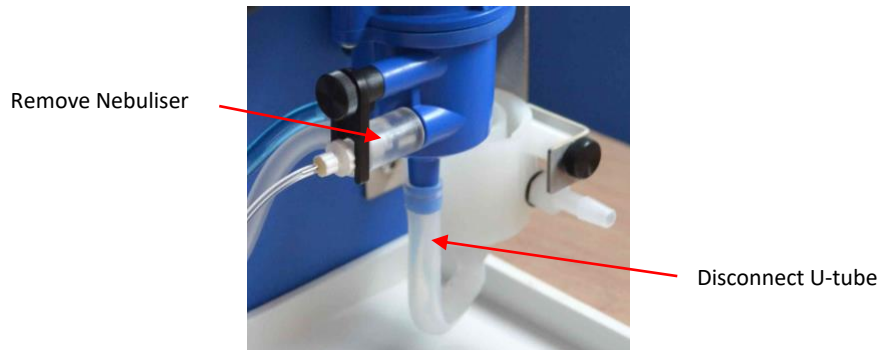
5. Re-assemble in reverse order ensuring the cover plate earth cable is replaced.

Section 7 - Replacing the Mixing Chamber

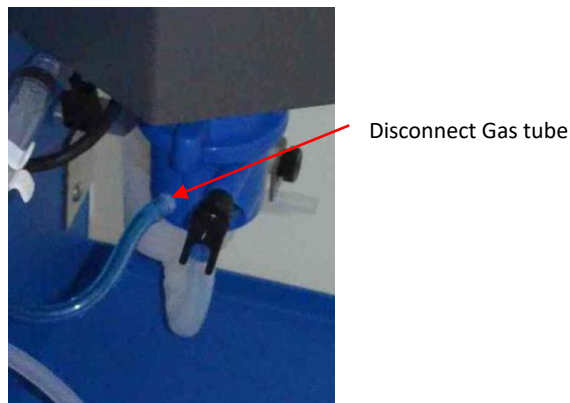
The Mixing Chamber should be replaced if contamination is suspected and which the cleaning procedure has failed to resolve, or if the Mixing Chamber has suffered physical or chemical damage. Note that the Mixing Chamber colour may differ from that shown depending on the BWB Flame Photometer model.

The Mixing Chamber and Burner must be completely cool before proceeding further.

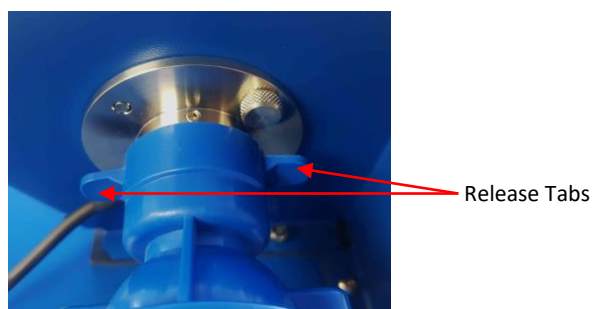
1. Remove the Nebuliser and disconnect the U-tube from the Mixing Chamber.



2. Disconnect the blue Gas tube. The tube can most easily be removed by first warming in hot water and then carefully easing off the connector. (It may be preferred to remove the tube after the Mixing Chamber is dismantled from the instrument in paragraph 4 below.)



3. Gently spread the Release Tabs just enough to clear the groove they are in and pull the Mixing Chamber down.

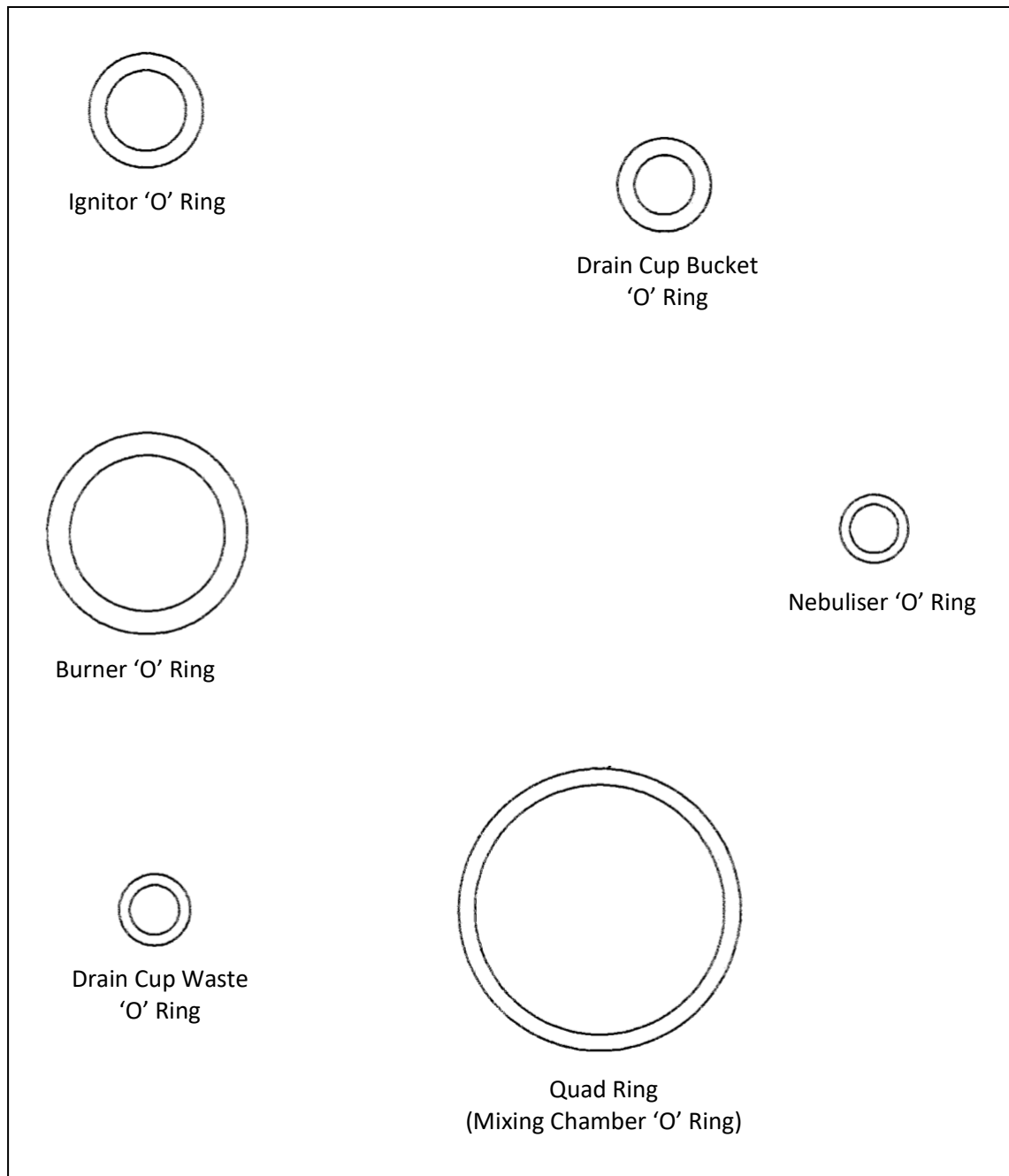


4. Remove the Mixing Chamber and discard responsibly.
5. Fit the new Mixing Chamber into position on the Burner Tube, ensuring the tabs locate securely into the retaining groove.
6. Refit the Gas tube, U-tube and Nebuliser assembly.

Section 8 - Replacement 'O' Ring Kit (019-676)

The 'O' Rings should be replaced if any damage is identified whilst performing scheduled maintenance, if a poor seal is suspected giving unstable or drifting readings, or as directed during component replacement.

Care should be taken to correctly identify each 'O' ring. Line up the 'O' rings in the kit with the following guide to identify their locations within the Flame Photometer:



Section 9 - Replacing the Mixing Chamber, Burner and Nebuliser 'O' Rings

The Mixing Chamber and Burner must be completely cool before proceeding further.

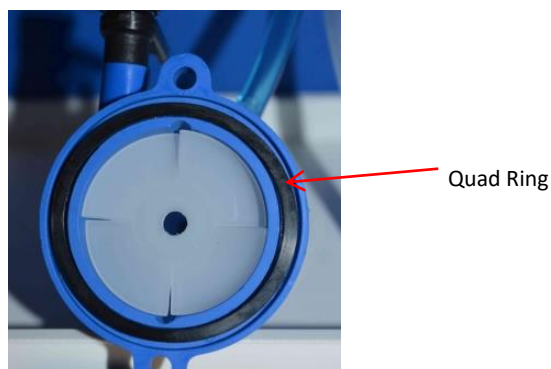
1. Remove the Nebuliser and disconnect the U-tube from the Mixing Chamber.



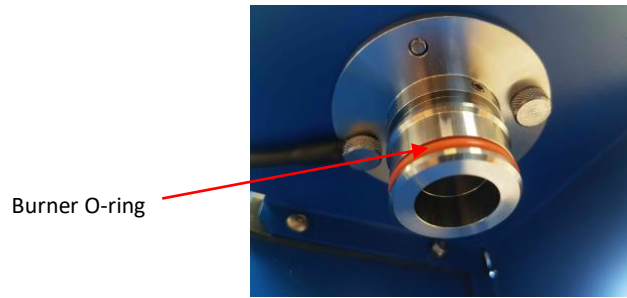
2. Gently spread the Release Tabs just enough to clear the groove they are in and pull the Mixing Chamber down.



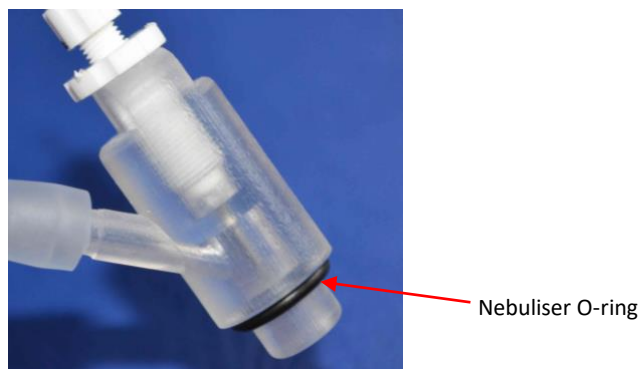
3. Separate the Mixing Chamber halves by undoing the two screws that hold them together using a 2.4mm AF Allen Key.
4. **NOTE:** The lower half of the mixing chamber will still be retained by the blue gas tube. It is not necessary to remove the tube to replace the Quad Ring.
5. Remove the Quad-ring (Mixing Chamber 'O' ring) from the groove in the lower half of the mixing chamber and discard.



6. Carefully fit the new Quad ring into the groove on the lower half of the mixing chamber.
7. Locate the top and bottom of the mixing chamber sections together and secure with the two screws removed earlier. Do not overtighten.
8. Identify the Burner O-ring and gently prise it out the groove in the Burner Tube using a small screwdriver or other blunt tool, taking care not to scratch the Tube.



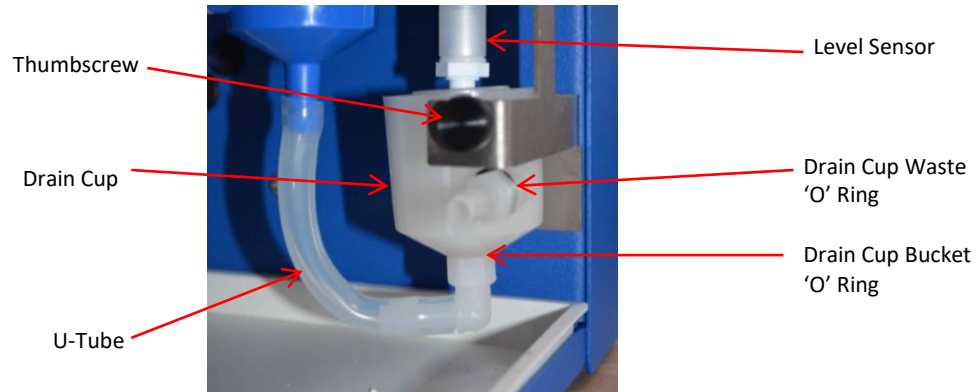
9. Fit the new Burner O-ring into the groove in the Burner Tube.
10. Refit the Mixing Chamber into position on the Burner Tube, ensuring the tabs locate securely into the retaining groove.
11. Identify the Nebuliser 'O' ring and gently slide it off the Nebuliser Body. Fit the new Nebuliser 'O' ring ensuring it fits flush to the Nebuliser body and is not twisted or distorted.



12. Refit the U-tube and Nebuliser assembly.

Section 10 - Replacing the Drain Cup 'O' Rings

1. Two 'O' rings are used to prevent leakage from the Drain Cup connectors, these are located as shown below:



2. The 'O' rings should be replaced if they are split or if leakage is occurring where the connectors meet the body of the Drain Cup. If it is necessary to replace one or both 'O' rings, disconnect the Waste tube and U-tube from the Drain Cup, remove the Thumbscrew and carefully withdraw the Drain Cup taking care not to damage the Level Sensor.
3. Unscrew the Connector(s), remove and discard the old 'O' ring. If necessary clean the threaded portion of the connector and the Drain Cup female thread to remove any salt deposits or other contamination. Taking care to correctly identify the replacement 'O' ring, slide it onto the threaded part of the connector. Screw the connector into the Drain Cup body and tighten taking care not to apply excessive force.
4. Replace the Drain Cup checking that the Level Sensor ring is free to move and retain with Thumbscrew. Reconnect Waste tube and U-tube to the Drain Cup.

Section 11 - Replacing the Ignitor 'O' Ring

1. The Ignitor 'O' ring should be replaced at the same time as the Ignitor Electrode Assembly. Refer to 'Replacing the Ignitor Electrode Assembly' in Section 12.

Section 12 - Replacing the Ignitor Electrode Assembly

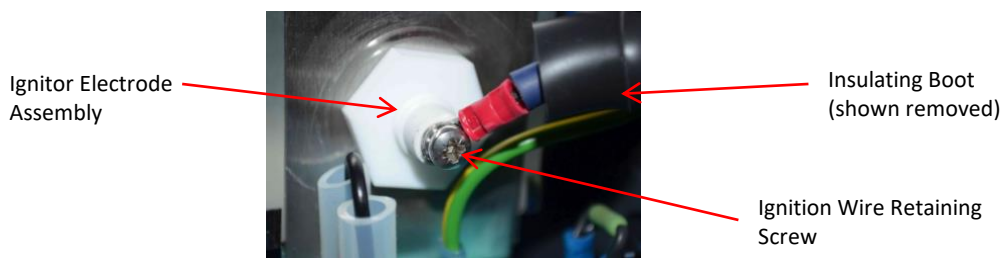
The Ignitor Electrode Assembly should be replaced if ignition is unreliable or the signal becomes erratic.

It is advised to ensure the optical glass is kept clean and free from finger grease and other such contaminants.

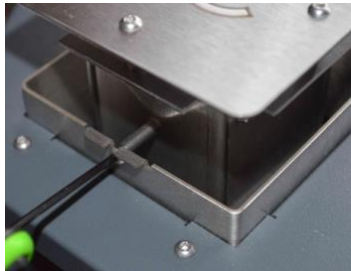


The Chimney Assembly and Burner must be completely cool before proceeding further.

1. **Unplug the mains power cord.**
2. Remove the six Chimney Back Piece retaining screws using a 2.4mm AF Allen Key. Carefully place Chimney Back Piece and screws to one side.
3. Identify the Ignitor Electrode Assembly connection. Slide back the insulating boot and disconnect the wire using a cross head screwdriver.



4. Remove the two screws holding the Inner Chimney to the Top Piece using a 2.1mm AF Allen Key.



5. Lift the Inner Chimney Assembly up and out of the Outer Chimney.
6. Undo the 25.4 (1") AF hexagonal Retaining Nut and remove complete with Ignition Electrode.
7. Fit a new Ignitor 'O' ring and screw the new Ignitor Electrode Assembly in place, taking care not to overtighten.
8. Re-assemble in reverse order, taking care not to damage or place finger grease on the windows.
9. Replace the Inner Chimney into the Outer Chimney. Reconnect the wire to the Ignitor Electrode Assembly and replace the Rubber Boot.
10. Refit the Chimney Back Piece and all six retaining screws.

