Bugbox

UM-016

Bugbox User Manual

Affix Serial Number Sticker Here

Product Summary

Baker Ruskinn's anaerobic workstations are designed specifically to help microbiologists cope with rising workloads and provide the best primary isolation rates.

Features and Benefits

- Compact size - Your personal workstation
- Quick and easy direct access with the gloveless, cuffed Ezee Sleeve system.
- Energy saving lighting. Read plates easily under perfect illumination without O_2 exposure.
- High- intensity inspection spot lamp for close sample analysis is foot-operated for ease of use.
- Petri dish holders for quick plate transfer included.
- Optimum cell environment
    - Accurate temperature control - from ambient + 5˚C to 45˚C.
    - Accurate and automated humidity control - no dry spots.
    - Palladium catalyst maintains anaerobic environment - plus anaerobic colour-indicator strips verify anoxic conditions.
    - Ezee Sleeve system allows access without disrupting atmosphere within the chamber.
- Economic and reliable long-term savings
- Standard dual gas operation - low gas consumption and running costs.
- Lower cost per plate compared to anaerobic jars.
- Minimal maintenance and downtime - with annual or biennial preventative maintenance kits available.

Note: The use of the word Interlock in this manual is medical terminology, and refers to the environmental working area between both chambers. It does not refer to the engineering safety interlock switch mechanism.

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1. Overview

Please read this manual carefully to familiarise yourself with the operation and maintenance of your Bugbox workstation. **Note:** The workstation should be located in a well-ventilated area.

1.1 Safety Instructions

For your safety, the safety of others using the workstation and those around you;

- **The covers on both ends and the top of the workstation must not be removed by anyone other than a qualified service engineer. There are no end user serviceable parts within these covers.**
- **The AC Mains outlet that the workstation is connected to, MUST not be obstructed by the workstation or any other equipment, and MUST be accessible in case of emergency. In case of emergency, disconnect the workstation from the AC Mains Outlet.**
- **In case of damage to the workstation disconnect the workstation from the AC Mains outlet and contact your Local Distributor for advice.**
- **The workstation and stand must be connected to a protective earth.**
- **Only the power cord supplied with the workstation should be used to connect the workstation to the mains supply.**
- **Only Ruskinn Technology Limited replacement parts should be used.**
- **Gas regulators must be used for each gas supply. A 2 stage regulator should be used for a bottled gas supply. The maximum supply pressure permissible is 4 bar gauge.**
- **The maximum permissible concentration of Hydrogen in the anoxic mixed gas is 5.5% Hydrogen.**
- **The mains supply voltage fluctuations must not exceed +/- 10% of the nominal mains voltage.**
- **Only the gasses specified in this manual may be used.**
- **The maximum power rating of the internal socket must not be exceeded, if fitted.**
- **The humidifier screw cap must not be covered or blocked.**
- **The humidifier/ pressure relief tank must not be overfilled.**
- **The spot light should not be used continuously for more than 10 minutes. The spot light should be allowed to cool for at least 10 minutes between uses.**
- **The cooling fan covers and vents must not be covered or blocked.**
- **The workstation should not be lifted by the glove ports, the interlock or the Single Plate Entry System (if fitted).**
- **The weight limit for the rear shelf is 5.5kg. The weight must be evenly distributed.**
- **The use of Radioactive materials in the workstation is strictly prohibited.**
- **The connection hose for the jar attachment option must not be connected or disconnected whilst the jar attachment option is switched on.**

FAILURE TO ADHERE TO THESE SAFETY INSTRUCTIONS COULD CAUSE SERIOUS INJURY AND WILL INVALIDATE THE WORKSTATION WARRANTY. RUSKINN TECHNOLOGY LIMITED ACCEPTS NO RESPONSIBILITY FOR ANY ACCIDENT, INJURY OR LOSS CAUSED BY UNSAFE OPERATION OF THE WORKSTATION

1.2 Regulatory compliance

This product complies with the essential EEA requirements for Electrical Safety and the Low Voltage Directive 2006/95/EC as well as Electromagnetic compatibility as set out in the EMC Directive 204/108/EC.

1.3 Symbols

Before using the Bugbox, please ensure that you are familiar with the symbols on the Bugbox. Figure 1 explains the symbols found on the Bugbox;

Figure 1: Bugbox symbols

Symbol	Meaning
	Refer to user manual.
~	Alternating current
O	Off
I	On
	Primary earth connection
CE	This product complies with the essential EEA requirements for Electrical Safety and Electromagnetic compatibility as set out in the EMC directive 2004/108/EC and the Low Voltage Directive 2006/95/EC
	Caution, do not remove covers. No end user serviceable parts behind covers. Please refer to this manual in all cases where this symbol appears, in order to find out the nature of the Potential Hazard and actions to be taken in order to avoid the Hazard.

Symbol	Meaning
	Warning, this equipment contains high voltage circuitry.
	Bugbox contains hazardous components and must not be disposed of at a household waste site. Instead it should be taken to the appropriate collection point for the recycling of electrical and electronic equipment.
	Date of manufacture in format **YYYY MM**

1.4 Installation and relocation

Bugbox should not be installed or relocated by anyone other than a qualified engineer. To arrange installation or relocation, please contact your local distributor.

1.5 Weight and dimensions

The Bugbox workstation weighs approximately 45kg. Figure 2 lists the dimensions of the Bugbox workstation;

Figure 2: Bugbox workstation dimensions

External width	758 mm
External height	640 mm
External depth	650 mm
Workstation chamber internal width	535 mm
Workstation chamber internal height	425 mm
Workstation chamber internal depth	510 mm
Interlock internal width	100 mm
Interlock internal height	200 mm
Interlock internal depth	100 mm
Interlock outer door clear opening diameter	105 mm
Interlock inner door clear opening width	130 mm
Interlock inner door clear opening height	190 mm

Note: The interlock is specifically designed for use with Ruskinn Technology Limited small Petri dish holders.

2. Gas and electrical supply requirement

2.1 Gas supply requirements

The Bugbox workstation requires 2 gas supplies;

- Anoxic mixed gas (up to 5.5% hydrogen, up to 10% carbon dioxide, remainder nitrogen)
- Oxygen free nitrogen.

The maximum permissible concentration of hydrogen in the anoxic mixed gas is 5.5%. The use of any other gas(ses) will invalidate the warranty and may cause serious injury.

2.2 Gas regulator requirements

Gas regulators must be used with all gas supplies to the workstation. A 2 stage regulator must be used for each bottled gas supply. Regulators should be available from your local gas supplier. Ruskinn Technology Limited does not supply gas regulators.

The gas regulator should provide a minimum supply pressure of 3 Bar Gauge (42psi). The maximum supply pressure permissible is 4 bar gauge. A supply pressure greater than this will damage internal components of the workstation and will invalidate the warranty.

2.3 Electrical supply requirements

The workstation must be connected to a mains power supply. A power cord is supplied to connect the workstation to the mains supply. Only the power cord supplied should be used to connect the workstation to the mains supply. It is advised that the workstation be located no greater than 1 metre from the plug socket. The plug socket should not be obstructed by the Bugbox workstation. The workstation must be connected to a protective earth.

2.4 Voltage and frequency requirements

To ensure safe operation of the workstation, it must be connected to a supply of the correct voltage and frequency as shown in the rating label (item 3 Figure 8). The mains supply voltage fluctuations must not exceed +/- 10% of the nominal mains voltage.

2.5 Power consumption

Figure 3 shows the power consumption ratings;

Figure 3: Power consumption ratings

Supply voltage and frequency	Power consumption
240V AC, 50Hz	150 W
110V AC, 60Hz	200 W

Note: The power consumption is for normal operating conditions with no equipment connected to the internal power supply. Power consumption will vary dependent upon the conditions inside the workstation chamber and the conditions inside the room the workstation is located in.

2.6 Powering the workstation

To switch the workstation on, press the power switch (item 2 in Figure 13). To switch the workstation off, press the power switch (item 2 in Figure 13). **Note:** A glove port should be left open when the workstation is switched off, as the pressure inside the workstation will decrease as the workstation cools. The open glove port will allow the pressure inside the workstation chamber to equalise with the external pressure.

3. Workstation overview

3.1 Workstation layout

The Bugbox workstation consists of 2 main areas; the workstation chamber and the interlock chamber. The workstation chamber is the main working area of the workstation. Access to the workstation chamber is provided by the glove ports and the interlock. The interlock consists of the interlock chamber, with an inner and an outer door. The Bugbox workstation is controlled via the control panel.

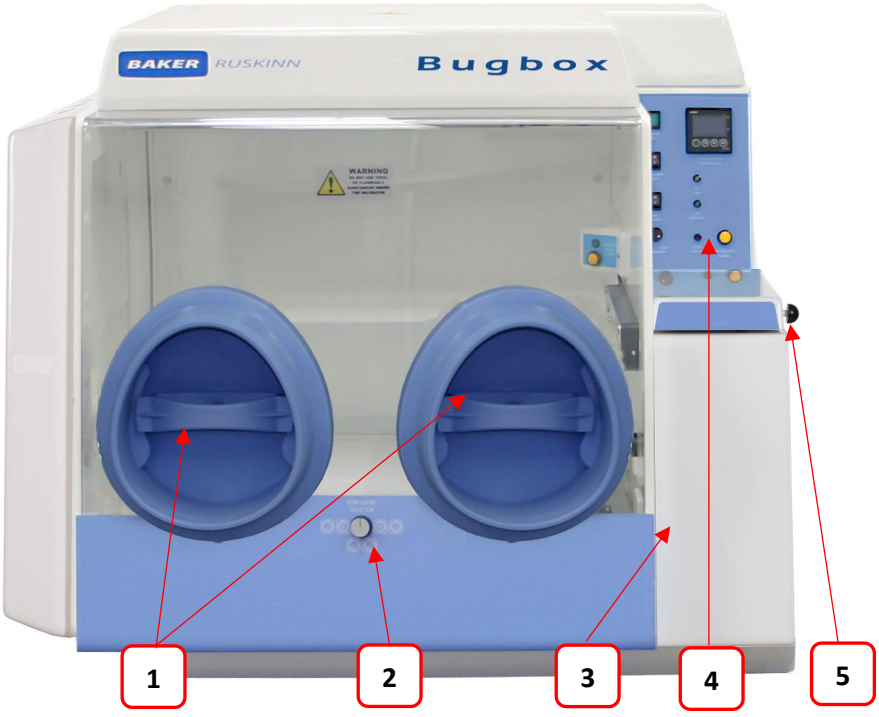
3.2 Component layout

Please familiarise yourself with the layout of your Bugbox workstation.

3.2.1 Front view

Figure 4 shows the front view of the Bugbox workstation;

Figure 4: Bugbox workstation front view



1. Glove ports (shown without Ezee Sleeves).
2. Port entry selector switch.
3. Interlock outer door.
4. Control panel.
5. Interlock outer door knob

3.2.2 Rear view

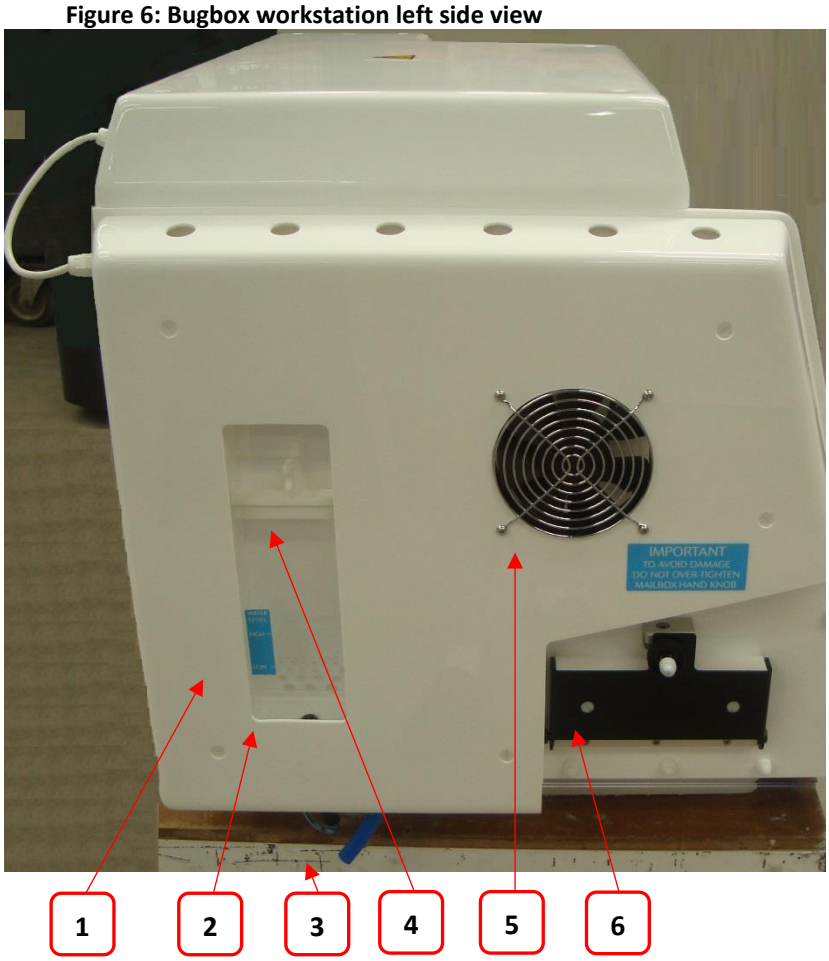
Figure 5 shows the rear view of the Bugbox workstation;

Figure 5: Bugbox workstation rear view

3.2.3 Left side view – Standard humidifier

Figure 6 shows the left side view of the Bugbox workstation with the standard humidifier;

Figure 6: Bugbox workstation left side view



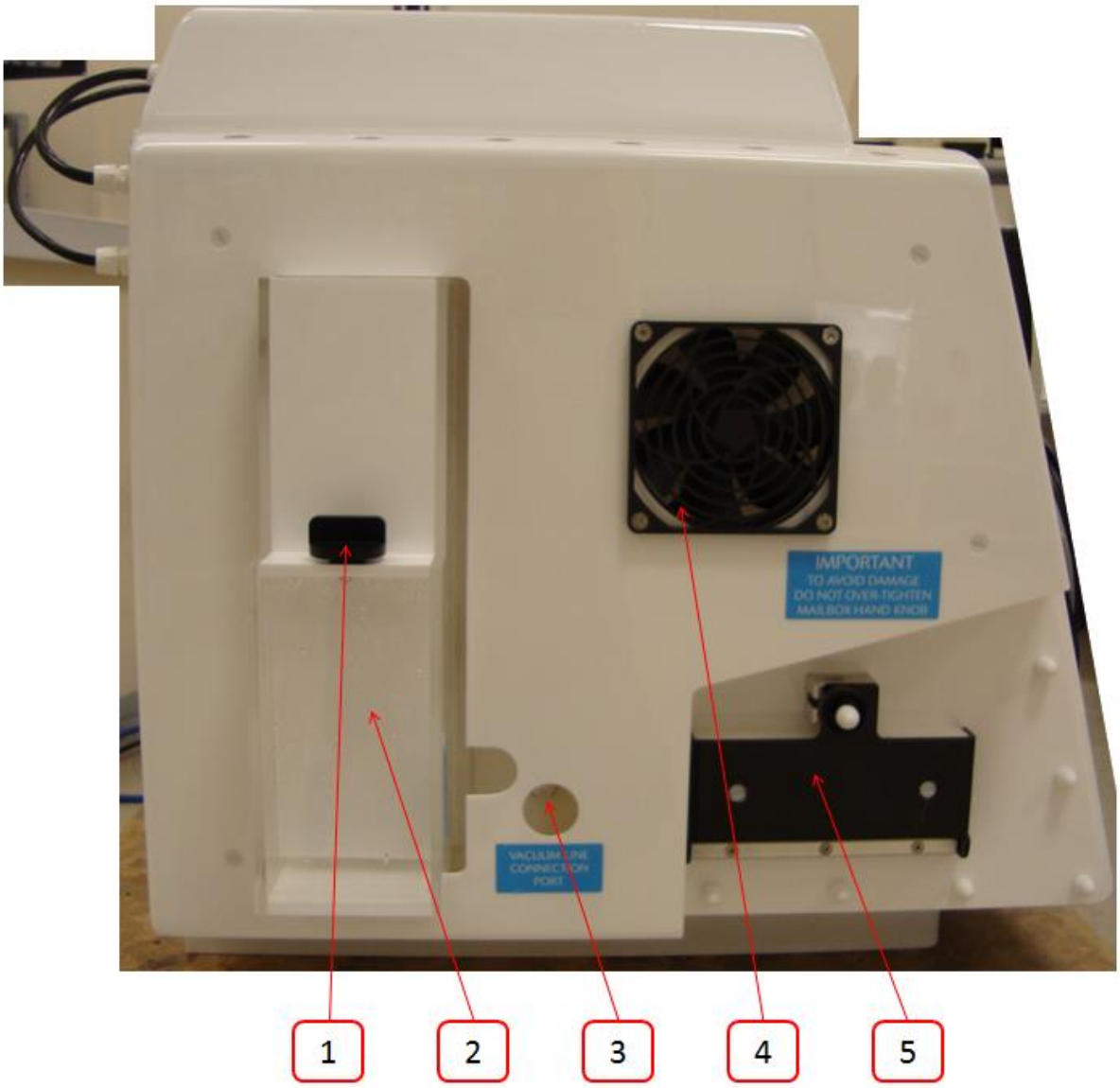
1. Pressure relief tank fill level indicator.
2. Pressure relief tank.
3. Pressure relief tank overflow pipe.
4. Pressure relief tank cover (pressure relief tank bung)
5. Condenser fan.
6. Single Plate Entry System (optional extra)

Note: Please locate a suitable container below the tubing to collect any excess water from the overflow tube. (A container is provided in the accessory kit).

3.2.4 Left side view – Ultrasonic humidifier

Figure 7 shows the left side view of the Bugbox workstation with the ultrasonic humidifier;

Figure 7: Bugbox workstation left side view with ultrasonic humidifier



1. Humidifier screw cap.
2. Humidifier tank.
3. Vacuum port (optional extra).
4. Condenser fan (Plastic covers shown, metal covers now standard).
5. Single Plate Entry System (SPES, optional extra).

3.2.5 Right side view

Figure 8 shows the right side view of the Bugbox workstation;

Figure 8: Bugbox workstation right side view

1. Interlock outer door knob.
2. Interlock outer door.
3. Serial number label.
4. PAT test label.
5. Power entry panel.

3.3 Control system layout

Please familiarise yourself with the control system layout of your Bugbox workstation.

3.3.1 Control panel

Figure 9 shows the control panel of the Bugbox workstation;

Figure 9: Bugbox workstation control panel

1. **Power indicator.** Illuminates to indicate the workstation is connected to the mains and is switched on.
2. **Chamber light switch**. Press to switch the chamber light on/ off.
3. **Gas Alarm switch**. Press to switch the gas alarm on/ off.
4. **Humidistat.** Controls the level of humidity inside the workstation chamber.
5. **Interlock purge button**. Press to initiate the interlock purge cycle.
6. **Lock active indicator LED**. Flashes to indicate that the interlock purge cycle is in progress.
7. **Gas demand indicator**. Illuminates when there is a low pressure condition inside the workstation chamber.
8. **ANO_2 low indicator.** Illuminates to indicate that the anaerobic mixed gas supply has run out.
9. **N_2 low indicator**. Illuminates to indicate that the nitrogen supply has run out.
10. **Temperature controller**. See section 3.3.2 for more details.

3.3.2 Temperature controller

Figure 10 shows the temperature controller;

Figure 10: Temperature controller

1. Not user accessible (For service personnel only)
2. Not user accessible (For service personnel only)
3. Number scrolling button. Use to move across digits. Use with buttons 4 & 5 to increase and decrease the temperature.
4. Decrease temperature (0.1˚C increments) or humidity.
5. Increase temperature (0.1˚C increments) or humidity.

For temperature control, the white value (PV- Process Value) is the actual temperature. The green value (SV- Set Value) is the required value (the set point). All temperatures are in ºC.

For ultrasonic humidity control, the white value is the actual relative humidity and the green value the required relative humidity (the set point). All humidity's are percentage relative humidity.

3.3.3 Port selector knob controller

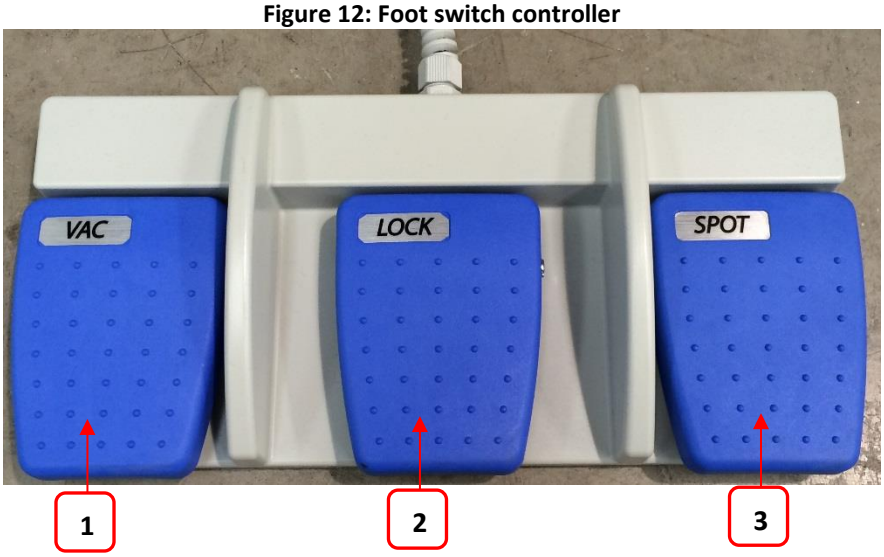
Figure 11 shows the port selector knob controller;

Figure 11: Port selector knob controller

3.3.4 Foot switch control panel

Figure 12 shows the foot switch controller which is used to operate the spot light, vacuum control and interlock purge control;

Figure 12: Foot switch controller

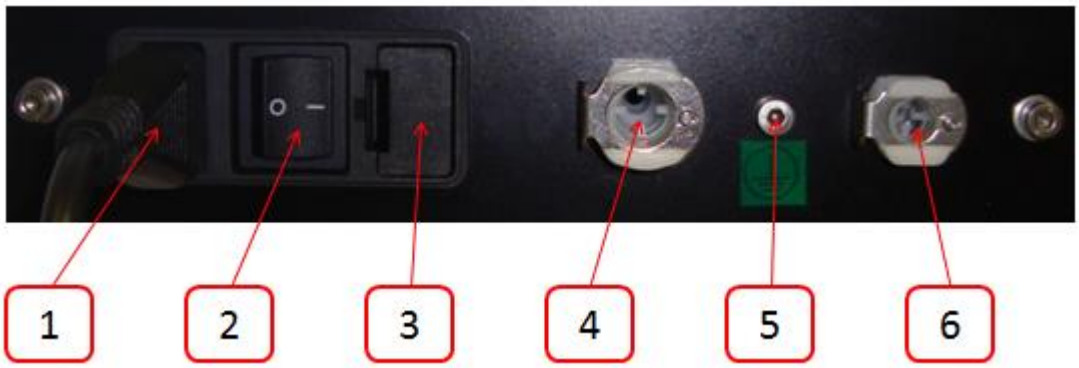


1. VAC for glove port vacuum control
2. LOCK for interlock purge control
3. SPOT for spotlight operation

3.3.5 Power entry panel

Figure 13 shows the power entry panel on the side of the workstation;

Figure 13: Power entry panel



1. Mains lead connection.
2. On/ off switch.
3. Mains fuse holder.
4. Nitrogen Gas inlet
5. Primary earth stud.
6. Anaerobic Mixed Gas Inlet (Max 5.5% Hydrogen in gas mixture)

4. Temperature and humidity control

4.1 Temperature control

The Bugbox workstation can control the workstation chamber temperature between ambient plus 5°C and 45°C.

The temperature in the main chamber can be set using the temperature controller on the control panel.

Setting the temperature;

Referring to Figure 10

- To decrease the temperature set point, press button 4.
- To increase the temperature set point, press button 5.

The temperature set point will increase or decrease in intervals of 0.1°C.

4.2 Humidity control

The Bugbox workstation can control the workstation chamber humidity between ambient and 85% relative humidity. There are 2 methods of humidity control on Bugbox workstations;

- Standard
- Ultrasonic

Humidistat is the standard method of humidity control on the Bugbox workstation. Ultrasonic is an optional extra.

Note: Ultrasonic humidity can only be fitted at time of order; it cannot be added after manufacture of the workstation.

Note: Any equipment installed in the workstation chamber must be suitable for the humidity level inside the workstation chamber. If in doubt, consult the owner's manual for any equipment that is installed in the workstation chamber. Ruskinn Technology Limited accepts no responsibility for damage to any equipment installed in the workstation chamber that is not suitable for the conditions inside the workstation chamber.

4.2.1 Standard humidity control

To control the humidity of the workstation chamber using the humidistat;

- To increase the humidity, rotate the humidistat clockwise.
- To decrease the humidity, rotate the humidistat anti-clockwise (counter-clockwise).

Note: For Bugbox workstations fitted with standard humidity, a Petri dish/ tray of distilled water should be placed in the workstation chamber to provide the humidity source for the workstation chamber.

5. Environmental gas composition control

The Bugbox workstation provides an anaerobic (oxygen free) environment for the incubation of samples and cultures.

5.1 Environmental control overview

To provide an anaerobic environment, anoxic mixed gas is injected into the workstation chamber. The hydrogen in the anaerobic mixed gas reacts with any oxygen in the workstation chamber in the presence of a catalyst to form water. The excess water is then removed by the humidity control system.

5.2 Using the anoxic indicator strips

Anaerobic indicator strips are provided with the Bugbox to verify that the conditions inside the workstation chamber are anaerobic. Additional anaerobic indicator strips can be ordered from your local supplier. See section 7.4.2 for more details. The anaerobic indicator strips should be stored sealed and at between 2°C and 8°C. To check the condition of the environment inside the workstation chamber using the anaerobic indicator strips;

- Open the interlock outer door (see section 6.1.2).
- Place the anaerobic indicator strips in the interlock.
- Close the interlock outer door (see section 6.1.2 for more details).
- Start the interlock purge cycle by either pressing the interlock purge button (item 5 in Figure 9,) or the lock pedal (item 2 in Figure 12).
- Access the workstation chamber via the Ezee Sleeves (see section 6.2 for more details).
- Open the interlock inner door (see section 6.1.3 for more details).
- Remove the anaerobic indicator strips from the interlock.
- Close the interlock inner door (see section 6.1.3 for more details).
- Open the packet of anaerobic indicator strips. Take care not to touch the anaerobic indicator strips.
- If the strip stays white, the environment is anoxic. If the strip turns pink, there is oxygen in the environment.

Note: The anaerobic indicator strips should not be opened outside of the workstation chamber. Take care not to touch the anaerobic indicator strips, as this will cause them to turn pink. It is recommended that gloves are worn when using the anaerobic indicator strips.

6. Using the workstation

6.1 Using the interlock

The Bugbox workstation has a specially designed interlock for transferring Petri dishes into and out of the workstation chamber.

6.1.1 Interlock overview

The interlock consists of 2 main components;

- Interlock outer door
- Interlock inner door

The interlock is accessed by opening either the outer or inner door. **Note** Both doors should not be opened at the same time.

6.1.2 Opening the interlock outer door

To open the interlock outer door, push the interlock outer door knob (item 5 in Figure 4) towards the workstation. The interlock outer door will release. The interlock outer door can then be lifted open.

To close the interlock outer door, push the interlock outer door down. The door latch will click to indicate that the door is closed.

Note: Do not open the interlock outer door if the interlock inner door is open. Do not place object(s) on the interlock outer door, as this may damage the workstation.

6.1.3 Opening the interlock inner door

To open the interlock inner door;

- Access the workstation chamber via the Ezee Sleeves See section 6.2 for details.
- Undo the inner door catch by turning the catch anti-clockwise (counter-clockwise).
- Pull the inner door backwards to open the inner door.

To close the interlock inner door;

- Push the interlock inner door closed.
- Tighten the inner door catch by turning it clockwise. Do not over tighten the inner door catch.

Note: The interlock inner door should only be open when transferring materials from the interlock chamber to the workstation chamber and vice versa. The interlock inner door should not be opened if the interlock outer door is open.

6.1.4 Transferring material into the workstation chamber via the interlock

To transfer material into the workstation chamber via the interlock;

- Place the Petri dishes in a small Petri dish holder.
- Open the interlock outer door (see section 6.1.2 for more details).
- Place the Petri dish holder inside the interlock.
- Close the interlock outer door (see section 6.1.2 for more details).
- Start the interlock purge cycle by either pressing the interlock purge button (item 5 in Figure 9) or the lock pedal (item 2 in Figure 12).
- Access the workstation chamber via the Ezee Sleeves (see section 6.2 for more details).
- Open the interlock inner door (see section 6.1.3 for more details).
- Remove the Petri dish holder from the interlock.
- Close the interlock inner door (see section 6.1.3 for more details).

6.1.5 Removing material from the workstation chamber via the interlock

To remove material from the workstation chamber via the interlock;

- Open the interlock inner door (see section 6.1.3 for more details).
- Place the Petri dish holder in the interlock.
- Close the interlock inner door (see section 6.1.3 for more details).
- Exit the workstation chamber via the Ezee Sleeves (see section 6.2.3 for more details).
- Open the interlock outer door (see section 6.1.2 for more details).
- Remove the Petri dish holder from the interlock.
- Close the interlock outer door (see section 6.1.2 for more details).

6.2 Hand access to the main chamber

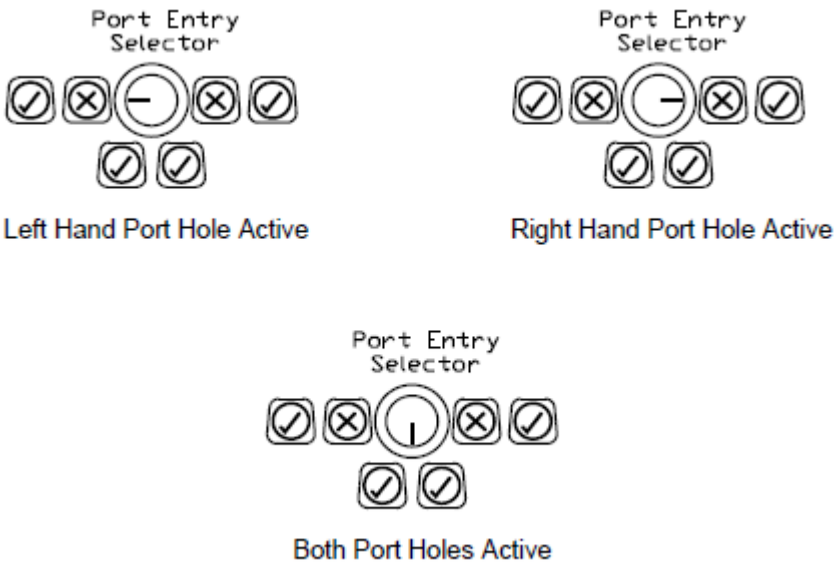
Direct hand access to the workstation chamber is provided via the glove ports and the Ezee Sleeve system. The Ezee Sleeves provide direct bare hand (or gloved) access to the workstation chamber.

The glove ports and Ezee Sleeves can be used in 3 ways;

- Left hand glove port only, for loading items into the workstation chamber via the Single Plate Entry System (SPES), if fitted.
- Both glove ports, for working inside the workstation chamber, loading items into the workstation chamber via the SPES and unloading the interlock.
- Right hand glove port only, for unloading the interlock.

For each method of entry, the glove port selector knob (Figure 11) must be set in the correct position. Figure 14 shows the positioning of the glove port selector knob for each mode of operation;

Figure 14: Glove port selector knob positioning



6.2.1 Ezee Sleeve overview

The Ezee Sleeves consists of a sleeve and a cuff. There are 3 sizes of Ezee Sleeve available; small, medium and large. See section 7.4.2 for ordering details.

The sleeve attaches to the glove port via 2 O-rings. The cuff is then attached to the sleeve via an O-ring. **Note**: The workstation should not be used without the Ezee Sleeves attached.

6.2.2 Entering the workstation chamber using the Ezee Sleeves

To enter the workstation via the Ezee Sleeves;

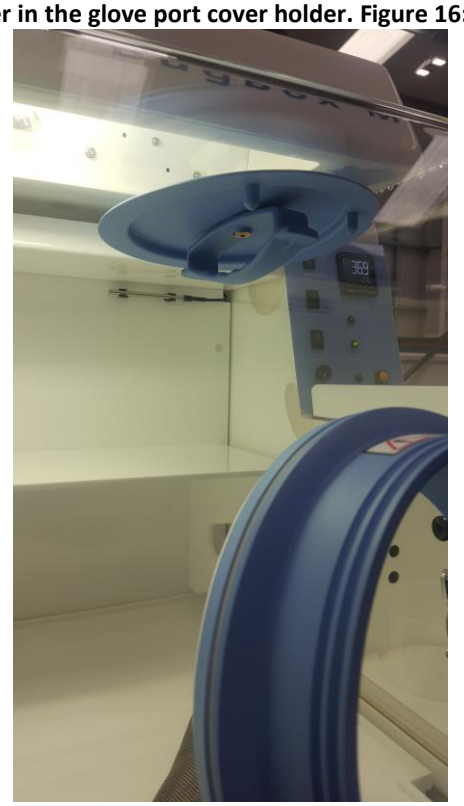
- Set the glove port selector switch (Figure 11) to the correct position for the desired hand entry (Figure 14).
- Hold the desired Ezee Sleeve cuff with the opposite hand.
- Supporting the Ezee Sleeve cuff, push the desired hand through the cuff of the Ezee Sleeve. Figure 15 shows this procedure;

Figure 15: Entering the cuffs of the Ezee Sleeves

- Repeat the procedure for the other hand (if both hands are to enter the workstation chamber).
- Press and hold the vacuum pedal with your foot (item 1 in Figure 12) until the internal gas volume in the sleeves has been evacuated (the sleeves will now be tight around your arms), then remove your foot from the vacuum pedal.
- Repeat the vacuum process to remove oxygen from the Ezee Sleeves.
- Unscrew the glove port cover knob by turning it anti-clockwise (counter-clockwise).

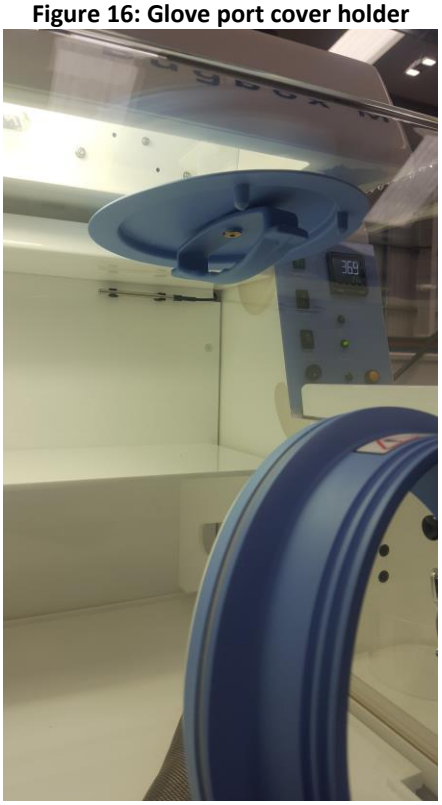
- Rotate the glove port bar until it is horizontal.
- Whilst holding the glove port cover knob, push the glove port cover and your hand into the workstation chamber slowly.

Place the glove port cover in the glove port cover holder. Figure 16: Glove port cover holder



- shows the glove port cover holder;

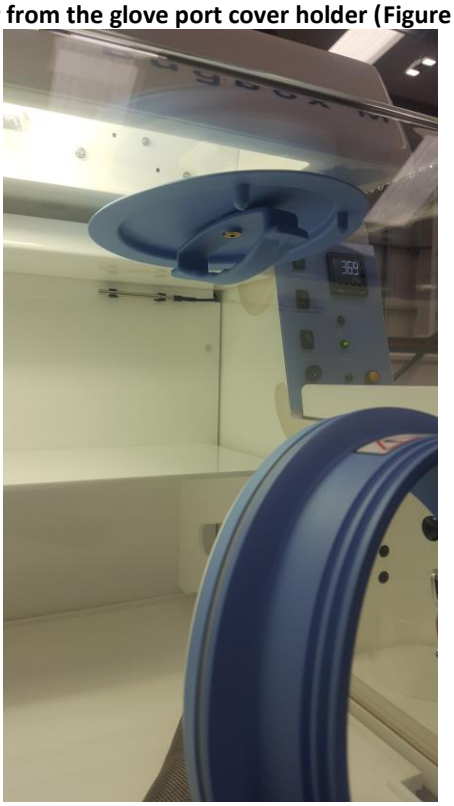
Figure 16: Glove port cover holder



6.2.3 Exiting the workstation chamber using the Ezee Sleeves

To exit the workstation chamber using the Ezee Sleeves;

Remove the glove port cover from the glove port cover holder (Figure 16: Glove port cover holder



-).

- Holding the glove port cover by the glove port cover knob, slowly pull the glove port cover into the glove port with the glove port bar horizontal.
- Rotate the glove port bar inside the glove port so that it is vertical.
- Tighten the glove port cover knob. Do not over tighten the glove port cover knob.
- Supporting the Ezee Sleeve cuff with your opposite hand, pull your hand through the cuff of the Ezee Sleeve.
- Repeat for the opposite hand if required.

6.2.4 Arm gas displacement volume and pressure changes

When entering or exiting the workstation chamber via the Ezee Sleeves, the internal volume of the workstation chamber changes due to the displacement of your arms. The change in volume changes the internal pressure. To minimise the effect of the pressure change, enter and exit the workstation chamber slowly.

6.3 Internal lights

2 internal lighting systems are provided for the workstation chamber;

- Main chamber light.
- Spot light.

To switch the main chamber light on, press the chamber light switch (item 2 in Figure 9).

To switch the main chamber light off, press the chamber light switch (item 2 in Figure 9).

To switch the spotlight on, press and hold the spot pedal on the foot switch control panel (item 3 in Figure 12). To switch the spotlight off, remove your foot from the spot pedal on the foot switch control panel (item 3 in Figure 12).

Note: The spot light should not be used continuously for a period of more than 10 minutes, as this will cause the spot light to overheat. The spot light should be allowed to cool for a period of 10 minutes after each use.

6.4 Rear shelf

The Bugbox workstation has a rear shelf for additional storage within the workstation chamber. The weight limit for the shelf is 5.5kg. The weight on the shelf must be evenly distributed.

6.5 Optional extras

Your Bugbox workstation may be fitted with optional extra parts to provide added functionality. The available optional extra parts for Bugbox workstations are;

- Single Plate Entry System (SPES).
- Internal socket.
- Cable gland port.
- Universal cable gland
- Gas sample port.
- Ultrasonic humidity control.
- Vacuum port.
- Jar attachment option.

Note: These parts are not available as aftermarket upgrades; they must be fitted during the manufacture of the workstation.

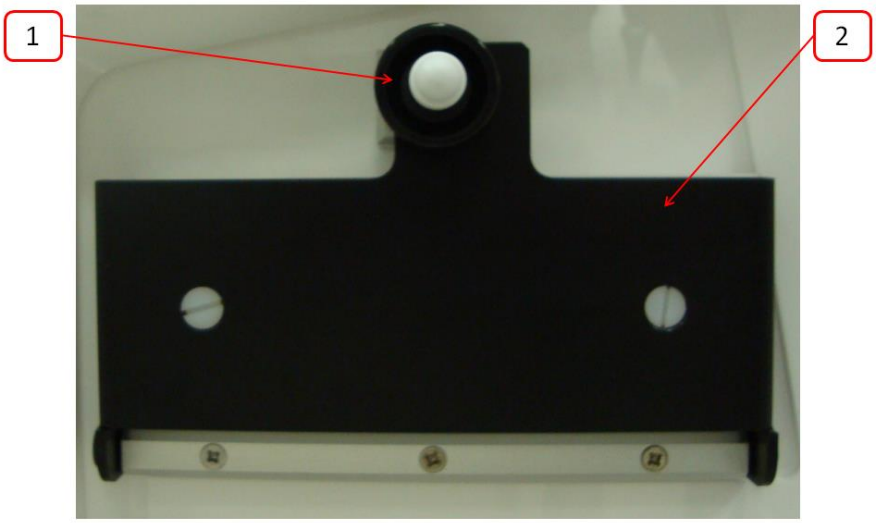
6.5.1 Single Plate Entry System (SPES)

A SPES is provided for quick and easy direct access to the workstation chamber, for loading materials. The SPES is also known as the mailbox.

6.5.1.1 SPES overview

The SPES consists of an external hinged flap and an internal hinged flap. The external flap is held in place by a thumb screw when not in use. The internal flap is self-closing. Figure 17 shows the external view of the SPES;

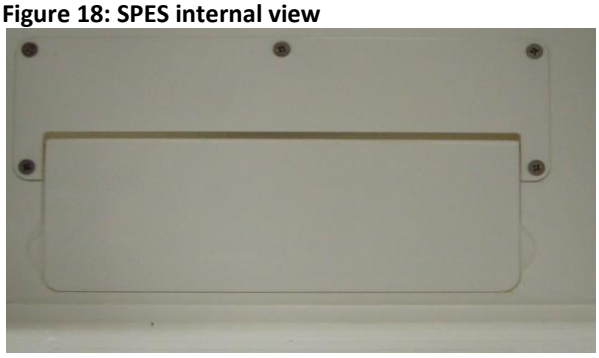
Figure 17: SPES external view



1. Thumb screw.
2. SPES external flap.

Figure 18 shows the internal view of the SPES;

Figure 18: SPES internal view



6.5.1.2 Using the SPES

To use the SPES;

- Undo the thumb screw on the external flap (item 1 in Figure 17).
- Whilst supporting the SPES external flap, swing the thumb screw to the left.
- Lower the SPES external flap.

Figure 19 shows the SPES when opened;

Figure 19: SPES with external hinged flap opened

- Push materials through the SPES internal flap into the workstation chamber. This should be done as quickly as possible to minimise gas loss from the workstation chamber.
- When all materials have been added, lift the SPES external flap back to its closed position.
- Whilst holding the SPES external flap, swing the thumb screw right to slot into the SPES external flap.
- Tighten the thumb screw.

Note: Do not over tighten the thumb screw. Note also that it may be easier to have your right hand in the left hand Ezee Sleeve if loading multiple items.

6.5.2 Internal power socket

An internal power socket is provided within the workstation chamber. The socket is located on the left hand side, underneath the rear shelf.

The maximum permissible power rating of equipment connected to the internal socket is shown in Figure 20.

Figure 20: Internal socket power ratings

Supply voltage	Power rating
120V AC, 60Hz	85W
240V AC, 50 Hz	190W

6.5.3 Cable gland

The cable gland is used to allow cables to enter the workstation chamber without affecting the internal environment of the workstation chamber. The cable gland is suitable for cables of diameter 3.5mm to 7mm. The cable gland port is located on the left hand side and is shown below.

Figure 21: Cable gland

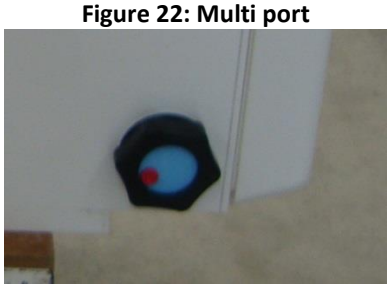
To use the cable gland;

- Turn the grey collar anti-clockwise (counter-clockwise) to loosen the cable gland.
- Remove the red plug.
- Push the cable through the cable gland.
- Tighten the grey collar by turning clockwise until tight. Do not over tighten the cable gland.

6.5.4 Universal cable gland

The Universal cable gland is used to allow cables to enter the workstation chamber without affecting the internal environment of the workstation chamber. The Universal cable gland provides a diameter of 50mm for passing through larger cables and connectors. The Universal cable gland is located on the rear of the workstation.

Figure 22: Multi port



6.5.5 Gas sample port

The gas sample port can be used to collect a gas sample from the workstation chamber. To use the gas sample port;

- Remove the outer cap.
- Push a needle connected to a syringe through the internal sponge of the gas sample port.
- Pull back the syringe to withdraw a sample of gas.
- Remove the needle from the internal sponge of the gas sample port.
- Replace the outer cap.

Figure 23: Gas Sample Port

6.5.6 Vacuum port

The vacuum port is used to remove liquids from the workstation chamber, for example excess media from Petri dishes. The vacuum port is located on the left hand side of the workstation (item 3 in Figure 7).

To use the vacuum port;

- Connect the vacuum source to the external part of the vacuum port by pushing a tube from the vacuum source onto the vacuum port hose connection.
- Insert the internal vacuum hose into the internal section of the vacuum port. Figure 24 shows the internal part of the vacuum port;

Figure 24: Internal part of vacuum port

- When the vacuum is no longer required, remove the internal vacuum hose from the vacuum port by pressing the top of the metal part of the internal section of the vacuum port and pulling the vacuum hose. The hose should release from the vacuum port, sealing the vacuum port.
- Remove the vacuum source from the outside of the vacuum port.

6.5.7 Jar attachment option

The jar attachment option is used to condition anaerobic jars. To use the jar attachment option using the manual gas purge;

- Attach the anaerobic jar to the anaerobic jar gas connector using the supplied connection hose, located on the power entry panel.
- Switch the jar attachment option on by pressing the jar attachment option on/ off switch, located on the front of the interlock.
- Press and hold the vacuum button to remove air from the jar. Release the vacuum button, located on the front of the interlock, when the jar is evacuated.
- Press and hold the manual gas purge button, located on the front of the interlock, to inject nitrogen into the anaerobic jar. Release the manual gas purge when the jar has been filled.
- Switch the jar attachment option off by pressing the jar attachment option on/ off switch, located on the front of the interlock.
- Disconnect the anaerobic jar from the anaerobic jar gas connector using the supplied connection hose.

To use the jar attachment option using the timed gas purge;

- Attach the anaerobic jar to the anaerobic jar gas connector using the supplied connection hose, located on the power entry panel.
- Switch the jar attachment option on by pressing the jar attachment option on/ off switch, located on the front of the interlock.
- Press and hold the vacuum button, located on the front of the interlock, to remove air from the jar. Release the vacuum button, located on the front of the interlock, when the jar is evacuated.
- Using the gas purge timer, located on the right had side of the workstation, set the required nitrogen injection time.
- Press the timed gas purge button, located on the front of the interlock, to start the timed gas purge.
- When the timed gas purge has completed, switch the jar attachment option off by pressing the jar attachment option on/ off switch, located on the front of the interlock.
- Disconnect the anaerobic jar from the anaerobic jar gas connector using the supplied connection hose.

6.6 Online video user guides

Further information and demonstrations can be found at Ruskinn Technology Limited's YouTube channel;

http://www.youtube.com/ruskinntechnology

7. Cleaning and maintenance

7.1 Cleaning the workstation

To ensure that the Bugbox workstation remains at optimum working conditions, it must be cleaned on a regular basis. A basic clean is required after each use. Deep cleaning is required at regular intervals, dependent upon the nature of the materials used in the workstation. As a guide, a deep clean should be performed at between 3-6 month intervals.

7.1.1 Cleaning agents

The correct cleaning agents must be used to clean the workstation. The use of incorrect cleaning agents will damage the workstation and invalidate the warranty. The following cleaning agents are permitted;

- Ethanol, laboratory grade at a maximum concentration of 70% by volume ethanol in distilled water.
- Propanol, laboratory grade at a maximum concentration of 70% by volume propanol in distilled water.
- Tristel Fuse Sachet, 1 sachet diluted in 3 litres of distilled water, or Tristel Duo Foamer. Tristel Fuse Sachets and Duo Foamer are available from Ruskinn Technology Limited, see section 7.4.2 for details.
- Ruskinn Technology Limited anti-static cleaner.
- Distilled water.

No other cleaning agents are permitted. Cleaning agents should be applied to a clean paper towel and then to the workstation, then removed using a clean paper towel. Cleaning agents should not be sprayed directly onto the workstation, as this may damage the shell of the workstation. The use of UV light is not permitted in the workstation, as it will damage the acrylic shell.

Note: Where 3rd party instruments or apparatus are used within the workstation, please refer to the applicable manufacturers for guidance on approved cleaning agents. If these cleaning agents are not listed above, please remove the instrument or apparatus from the workstation to undertake cleaning to prevent damage to the workstation or 3rd party instrument / apparatus

7.1.2 Cleaning procedure – during and after each use

During use, clean any spills immediately using paper towels soaked in an appropriate cleaning agent. Wipe dry using a dry paper towel.

After each use;

- Remove all waste materials from the workstation chamber.
- Wipe the workstation chamber floor tray using paper towels soaked an appropriate cleaning agent.
- Wipe the workstation chamber floor tray clean using paper towels to dry.
- Wipe the interlock inner door using paper towels soaked in an appropriate cleaning agent.
- Wipe the interlock inner door using paper towels to dry.

7.1.3 Cleaning procedure – deep clean

To deep clean the workstation;

Preparing the workstation

- Remove all cells/ samples to an alternative storage facility.
- Switch the workstation off at the mains and remove the plug from the mains.
- Remove the Ezee Sleeves (see section 7.2 more details).
- Remove any other equipment installed in the workstation chamber.

Cleaning the workstation chamber

- The items inside the workstation chamber that require cleaning are;
    - The floor tray.
    - The ceiling panel.
    - The shelf panel.
    - The left hand wall.
    - The right hand wall.
    - The interlock inner door.
    - The glove port covers.
    - If fitted, the inside of the SPES.
- For all workstation components, wipe with a paper towel soaked in an appropriate cleaning agent. Take care not to get cleaning agents on the fans (below the shelf panel) and if fitted, the plug socket
- Wipe dry using paper towels.

Cleaning the interlock chamber;

- The items inside the interlock chamber that require cleaning are;
    - The floor.
    - The interlock outer door
    - The Petri tube holder
    - The inside wall
    - The interlock inner door.
- For all interlock components, wipe with a paper towel soaked in an appropriate cleaning agent.
- Wipe dry using paper towels.

Reinstalling workstation components

- Reinstall any equipment removed from the workstation chamber.
- Reinstall the Ezee Sleeves (see section 7.2.2 for more details).

7.2 Maintaining the workstation – End user maintenance

To ensure that your Bugbox workstation remains at optimum working conditions, it must be maintained on a regular basis. Many basic tasks can be performed by the end user.

7.2.1 Filling the pressure relief/ humidifier tank

The pressure relief/ humidifier tank requires refilling if the water level is on or below the low level indication. Figure 25 shows the pressure relief/ humidifier tank level indicator;

Figure 25: Pressure relief/ humidifier tank level indicator

To refill the pressure relief/ humidifier tank;

- Open one of the glove port covers (see section 6.2 to equalise the pressure between the workstation chamber and the external environment.
- Remove the pressure relief tank cover/ humidifier screw cap.
- Top up the pressure relief/ humidifier tank until the water level is between the low and high level indicators.
- Replace the pressure relief tank cover/ humidifier screw cap.
- Close the glove port cover.

Note: Only distilled or deionised laboratory grade water should be used. Gloves should be worn during refilling to avoid contaminating the pressure relief/ humidifier tank. The pressure relief/ humidifier tank should be refilled slowly and only up to the high level indicator. Do not overfill the pressure relief/ humidifier tank. If fitted, the SPES can be opened instead of a glove port cover. If the humidifier is not filled to the correct level, the workstation may leak.

7.2.2 Replacing an Ezee Sleeve

To remove an Ezee Sleeve;

- Ensure that the glove port covers are closed.
- Remove the O-rings that hold the Ezee Sleeve to the glove port.

Note: The O-rings will be tight. Figure 26 shows the O-ring removal;

Figure 26: O-ring removal

- Remove the Ezee Sleeve.

To install an Ezee Sleeve;

- Place the new Ezee Sleeve onto the glove port, ensuring that the O-ring grooves are completely covered and that the Ezee Sleeve is not kinked or overlapping.
- Reinstall the O-rings over the Ezee Sleeve.
  Note: The O-rings will be a tight fit. This is intentional, to provide a gas tight seal.
  Note: The O-rings must completely cover the Ezee Sleeve to provide a gas tight seal.

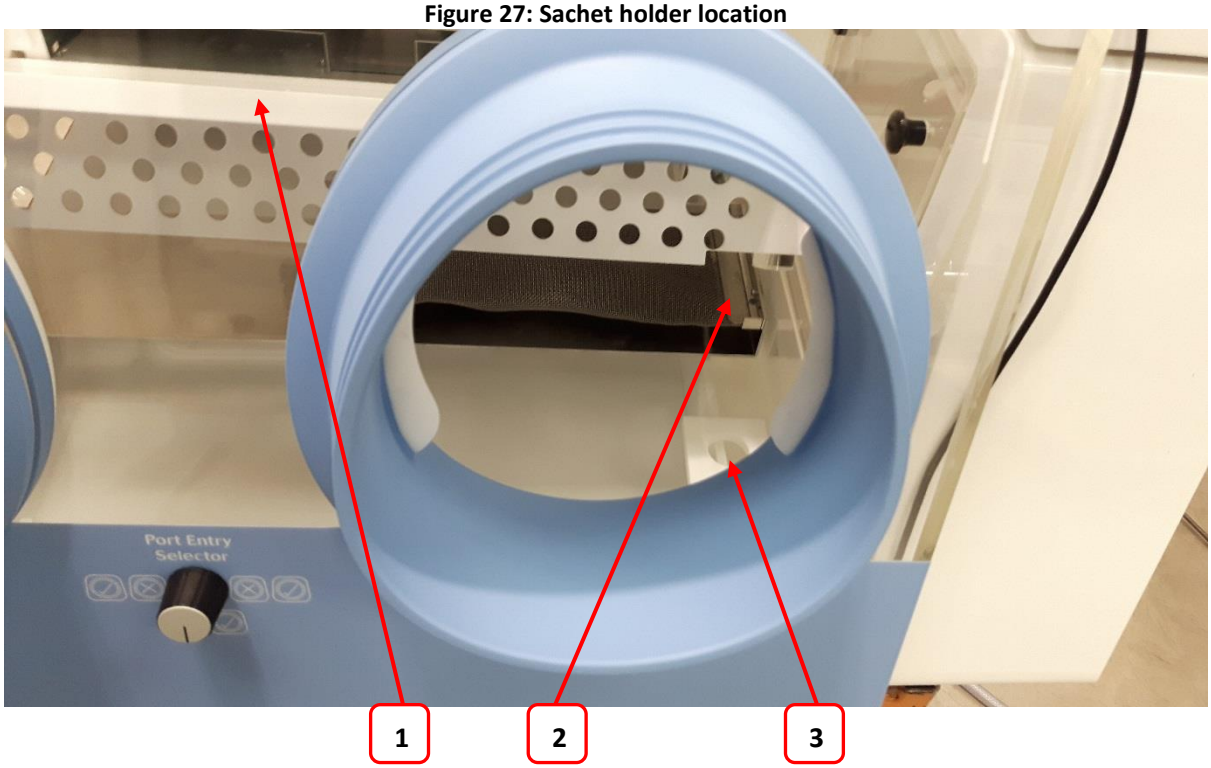
7.2.3 Replacing the detox and catalyst sachets

A detox and a catalyst sachet are supplied with the Bugbox workstation. The detox sachet adsorbs volatile organic compounds, improving the air quality within the workstation chamber. The catalyst sachet contains the catalyst required for the hydrogen to react with any oxygen in the workstation, to produce an anoxic environment. The detox sachet and the catalyst sachet need to be replaced annually. See section 7.4.2 for ordering details. It is recommended to replace both sachets at the same time. **Note**: Both sachets are replaced as part of an annual service.

To replace the detox sachet and the catalyst sachet;

- Remove any samples to an alternative storage facility.
- Switch off Bugbox and disconnect from the mains power supply.
- Remove the Ezee Sleeves (see section 7.2.2 for more information).
- Undo the glove port covers and place on the rear shelf.
- Lift the floor tray at the front to expose the detox and catalyst sachets. Figure 27 shows the location of the sachet holders;

Figure 27: Sachet holder location



1. Floor tray.
2. Sachet holder. The second sachet holder is located behind and to the left of the first sachet holder.
3. Floor tray locator.

- Slide the sachets forwards to remove them from their holders.
- Remove the sachets via the glove ports.
- Lower the floor tray, ensuring that the floor tray leg has located in the floor tray locator (item 3 in Figure 27).

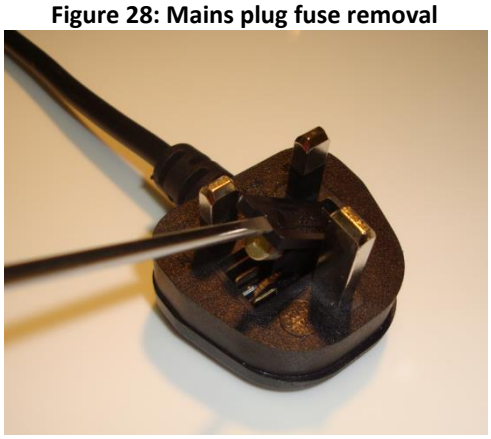
- Remove the new sachets from their packaging.
- Whilst lifting the floor tray at the front, slide the sachets into the sachet holder.
- Lower the floor tray, ensuring that the floor tray leg has located in the floor tray locator (item 3 in Figure 27).
- Close the glove ports using the glove port covers.
- Reinstall the Ezee Sleeves (see section 7.2.2 for more details).
- Reconnect the Bugbox to the mains power supply and switch the Bugbox on.
- Allow the Bugbox to reach an anaerobic environment in the workstation chamber by leaving the Bugbox for a period of approximately 1 hour.
- Check that the environment in the workstation is anoxic using the anaerobic indicator strips (see section 5.2 for more details).
- If the environment in the workstation chamber is anaerobic, samples/ cultures may be reintroduced to the workstation chamber via the interlock. See section 6.1.4 for more details.

7.2.4 Replacing the mains plug fuse – UK users only

To replace the mains plug fuse;

- Switch off Bugbox and disconnect from the mains power supply.
- Remove the plug from the mains socket.
- Using a small flat bladed screw driver, remove the fuse cover from the mains plug. Figure 28 shows the fuse removal;

Figure 28: Mains plug fuse removal



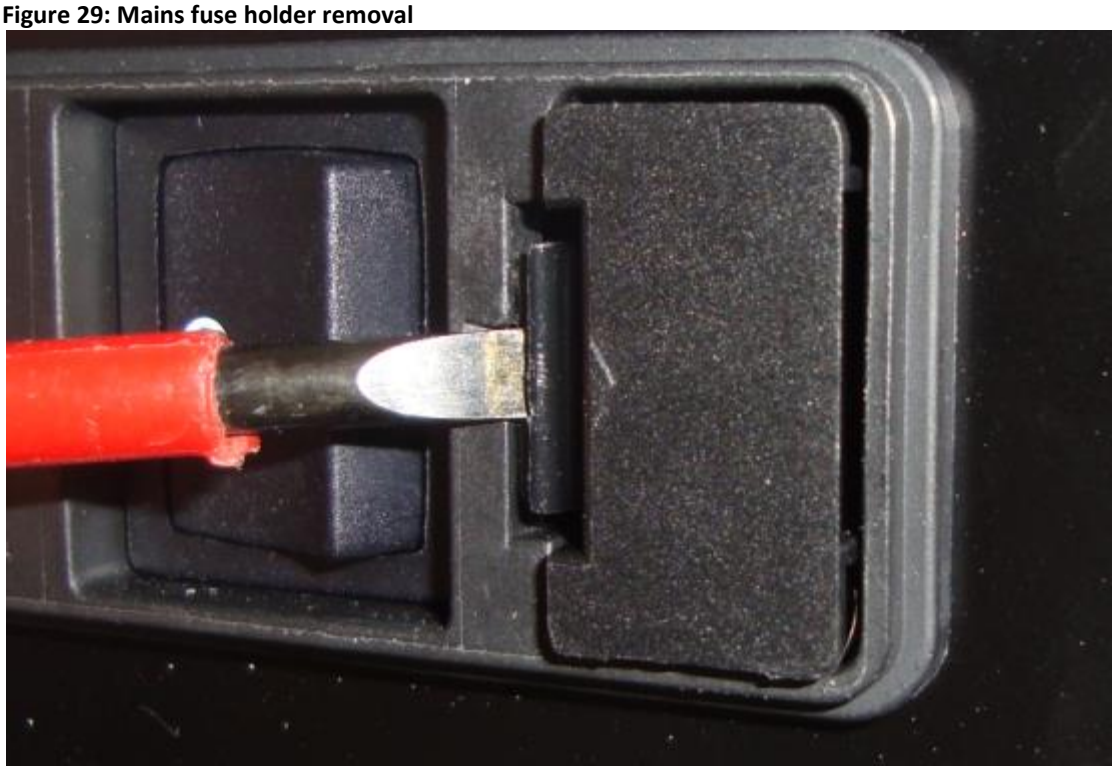
- Replace the fuse with a BS 1362 13A fuse.
- Replace the plug in the mains socket.
- Reconnect Bugbox to the mains power supply and switch on the Bugbox.

7.2.5 Replacing the mains fuses

To replace the mains fuses;

- Switch off the Bugbox.
- Remove the plug from the mains socket.
- Remove the mains fuse drawer using a small flat bladed screwdriver. Figure 29 shows the removal of the mains fuse holder;

Figure 29: Mains fuse holder removal



- Replace the mains fuses. The fuse ratings are;
    - 240V 50Hz – F3.15A H250V
    - 220V 60Hz - F3.15A H250V
    - 110V 60Hz – F5A H250V
    - 100V 50/60Hz – F5A H250V

Fuses should be fast blow, for example Cooper Bussmann S501. For more information, contact your local distributor.

- Replace the mains fuse holder. The fuse holder will click when it is fully inserted.
- Replace the plug in the mains socket.
- Switch the Bugbox on.

7.3 Service requirements

To maintain the best performance from your Bugbox workstation, it must be serviced at regular intervals. Figure 30 lists the servicing requirements, intervals and persons capable of performing the service;

Figure 30: Bugbox servicing requirements

Action	Frequency	By
Clean workstation	After each use	End User
Fill humidifier tank	Weekly	End User
Deep clean workstation	3-6 months depending on usage	End User
Replace detox sachet	Annually	End User
Replace catalyst sachet	Annually	End User
Annual service	Annually	Qualified service engineer
Biennial service	Biennially (every 2 years)	Qualified service engineer

To arrange an annual or biennial service, contact your local distributor.

Note: The biennial service includes an annual service.
Note: The annual service includes the replacement of the detox and the catalyst sachet.
Service contracts are available for all Ruskinn Technology Limited workstations. Please contact your local distributor for more information.

7.4 Spare parts and accessories

A range of spare parts and accessories are available for your Bugbox workstation.

Note: Only Ruskinn Technology Limited spare parts should be used. The use of unapproved spare parts will invalidate the warranty of your workstation and may cause damage to your workstation.

7.4.1 Overview

To order spare parts and accessories, please contact your local distributor for the latest pricing and availability.

7.4.2 Spare parts and cleaning agents

Figure 31 lists the spare parts and cleaning agents available for your Bugbox workstation. To order spare parts, please contact your local distributor for the latest pricing and availability. All items are sold individually except where stated.

Figure 31: Bugbox end user spare parts and cleaning agents list

Part	Where used
Small Ezee Sleeve (Pair)	Ezee Sleeve
Medium Ezee Sleeve (Pair)	Ezee Sleeve
Large Ezee Sleeve (Pair)	Ezee Sleeve
Glove port seal plate assembly	Glove ports
Sleeve to port O-ring	Ezee Sleeve
Port Lube Talc	Ezee Sleeve
Mains lead	Mains lead
Anti-static cleaner (600ml)	Cleaning
Tristel Duo Foamer	Cleaning
Tristel Fuse Sachet	Cleaning
Small Detox Sachet	VOC filtration
Small Catalyst Sachet	Anaerobic operation
Anaerobic Indicator Strips	Anaerobic operation

7.4.3 Accessories

A range of accessories are available to enhance the functionality of your Bugbox workstation. Figure 32 is the list of accessories for the Bugbox workstation. Please contact your local distributor for the latest pricing and availability.

Figure 32: Bugbox accessories

Item	Description
G100/1 G100 Geotech CO_2 Analyser	Independent meter for measuring the Carbon Dioxide concentration in the workstation chamber
G100/2 G100 Geotech CO_2 and O_2 Analyser	Independent meter for measuring the Carbon Dioxide and Oxygen concentration in the workstation chamber
Small Petri dish holder	Holds up to 7 9cm Petri dishes for easier storage inside the workstation chamber. 3 colours available; **White** **Yellow** **Blue**
Small stand	The workstation can be located on the stand where bench space is not available. 2 models are available, either with fixed feet or mounted on castors. Stand height approximately 800mm **Stand with fixed feet** **Stand with castors**

7.5 Workstation malfunction

In the event of a workstation malfunction, please check section 7.6 for a list of common problems and solutions. If you cannot find a solution to your problem, please contact your local distributor, quoting the serial number of your workstation.

7.6 Common problems and solutions

7.6.1 Workstation general problems

Please consult the list shown below as a reference in the event of a malfunction of your workstation.

Figure 33: Common problems and solutions

Problem	Cause	Solution
The workstation will not switch on	The workstation is not plugged in The mains socket is not switched on The mains plug fuse has blown The mains fuse has blown	Plug the workstation into the mains Switch the mains power on UK users: Replace the mains plug fuse (see section 7.2.4, for more details) Replace the mains fuses. See section 7.2.5 for more details.
The workstation temperature will not go above ambient plus 5°C	The heater mat thermal protection switch has activated The heater mat fuse has blown	Wait for the heater mat thermal protection switch to reset. Contact your local distributor
The LED indicators are not illuminating	24V power supply fuse has blown	Contact your local distributor
Devices plugged into the internal socket (if fitted) are not powering up	The power switch on the device is not switched on The plug for the device is not fully inserted into the socket The fuse in the device has blown and/ or the device has failed The internal socket fuse has blown	Turn the power switch on the device on Check that the plug is correctly inserted into the socket Plug the device into another socket. If the device fails to power up, the fuse has blown and/ or the device has failed. Refer to the owner's manual for the device. Contact your local distributor
The internal light does not illuminate when switched on	The bulb has blown The fuse has blown	Contact your local distributor to arrange replacement
The spot light does not illuminate when switched on	The bulb has blown The fuse has blown	Contact your local distributor to arrange replacement
Plates are drying out	Too little humidity inside workstation	Place a tray of water inside the workstation as a water source.

7.6.2 Interlock problems

Figure 34 gives a list of common interlock problems and solutions;

Figure 34: Interlock problems and solutions

Problem	Cause	Solution
The interlock inner door will not open	The interlock outer door is open The interlock is purging The inner door has stuck to the seal	Check the interlock outer door and wait for the interlock purge cycle to run Wait for the interlock purge cycle to finish Press the inner interlock door release button and pull the inner interlock door handle to release the door from the seal. Apply a small amount of port Lube Talc to the inner Interlock door seal.
The interlock inner door will not close	The interlock inner door is blocked	Check for obstructions to closing the interlock inner door and remove them
The interlock outer door will not close	The interlock outer door is obstructed The interlock outer door catch has broken	Check for obstructions to closing the interlock outer door and remove them Contact your local distributor

7.6.3 Gas consumption/ environmental control problems

Bugbox is fitted with a gas demand indicator (item 7 in Figure 9). The indicator illuminates when gas is injected into the workstation chamber. When the workstation is at rest, the gas demand indicator should illuminate once every 20 minutes. At rest is defined as the workstation chamber is in an anaerobic condition with no access to the interlock chamber, i.e. the glove ports are closed, the interlock is closed and, if fitted, the SPES is closed. Figure 35 gives some common gas consumption and environmental control problems and solutions;

Figure 35: Gas consumption/ environmental control problems and solutions

Problem	Cause	Solution
The workstation is failing to reach an anaerobic condition.	The catalyst sachet has not been installed. The catalyst sachet needs replacing. The anoxic mixed gas supply has run out.	Install a catalyst sachet. See section 7.2.3 for more details. Replace the catalyst sachet. See section 7.2.3 for more details. Replace the anoxic mixed gas cylinder.
High gas consumption when at rest.	The glove port cover has been left open. The SPES has been left open. The interlock inner and outer doors are both open.	Close the glove port cover. Close the SPES. See section 6.5.1 for more details. Close the interlock inner and/ or outer door.
High gas consumption when in use.	The Ezee Sleeves have not been correctly fitted. The Ezee Sleeves are not sealing around the users wrists.	Refit the Ezee Sleeves. See section 7.2.2 for more details. Ensure that the Ezee Sleeves are the correct size for the user. Ensure that any clothing and/ or jewellery that may foul the Ezee Sleeves is removed/ rolled back. Ensure that the Ezee Sleeves are pulled tight around the user's wrists.
The N_2 low indicator is illuminated.	Low pressure in the nitrogen supply caused by an empty nitrogen cylinder.	Replace the nitrogen cylinder, check connections between canister and canister head for leaks.
The ANO_2 low indicator is illuminated.	Low pressure in the anoxic mixed gas supply caused by an empty nitrogen cylinder.	Replace the nitrogen cylinder.
An audible alarm can be heard.	Low pressure in the gas supply, caused by an empty gas cylinder.	Replace the empty gas cylinder. The alarm can be muted by pressing the gas alarm switch (item 3 in Figure 9)

8. Warranty information

Ruskinn Technology Limited warrants for the applicable time period that the Bugbox will substantially perform in accordance with the user documentation. The terms of this Agreement do not affect or prejudice the statutory rights of a consumer acquiring the Ruskinn Technology Limited Bugbox otherwise than in the normal course of a business.

THIS WARRANTY DOES NOT APPLY IN THE FOLLOWING CIRCUMSTANCES:

(A) IF THE Ruskinn Technology Limited Bugbox HAS BEEN REPAIRED BY PERSONS NOT AUTHORIZED BY Ruskinn Technology Limited; OR

(B) THE Ruskinn Technology Limited Bugbox and associated accessories/peripherals HAVE BEEN ALTERED, MODIFIED, OR MISUSED; OR

(C) THE Ruskinn Technology Limited Bugbox IS USED WITH NON- Ruskinn Technology Limited COMPONENTS; OR

(D) THE Ruskinn Technology Limited Bugbox OR A COMPONENT IS USED FOR OTHER

USES (FOR EXAMPLE USE WITH OTHER CIRCUIT BOARDS OR SOFTWARE) OR

(E) THE Ruskinn Technology Limited Bugbox HAS NOT BEEN MAINTAINED OR USED IN ACCORDANCE WITH THE INSTALLATION AND USER GUIDE. UNLESS PROHIBITED BY LAW, THIS WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, THE IMPLIED WARRANTY OF MERCHANTABILITY, OR ANY IMPLIED WARRANTY ARISING OUT OF A COURSE OF DEALING OR OF PERFORMANCE, CUSTOM OR USAGE OF TRADE. Ruskinn Technology Limited DOES NOT WARRANT THAT THE Ruskinn Technology Limited Bugbox WILL FUNCTION ERROR FREE.

If within the Warranty Period, the Ruskinn Technology Limited Gas Mixing Station does not conform to the express warranty set forth above, Ruskinn Technology Limited's sole obligation and User‘s sole remedy shall be, at Ruskinn Technology Limited's option: 1. to repair or replace the non-conforming component; or, 2. refund the purchase price.

LIMITATION OF LIABLITY.

UNLESS PROHIBITED BY LAW, Ruskinn Technology Limited WILL NOT BE LIABLE TO USER OR OTHERS

FOR ANY OTHER DIRECT, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES INCLUDING, FOR EXAMPLE, LOST PROFITS, BUSINESS, INVESENTS, OR OPPORTUNITIES EVEN IF Ruskinn Technology Limited HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

The parties agree that Ruskinn Technology Limited total cumulative liability to User for direct damages for all causes under this Agreement shall not exceed £5,000,000 (FIVE MILLION UK STERLING POUNDS), or the price paid for the Ruskinn Technology Limited Bugbox, whichever is higher. Some states or countries may have laws which require liability rights different from those stated above. In such states or countries, the minimum required liability terms shall apply.

9. Disposal information

Bugbox contains hazardous components and must not be disposed of at a household waste site. Instead it should be taken to the appropriate collection point for the recycling of electrical and electronic equipment. Alternatively please contact your local distributor for disposal instructions.

Bugbox contains recyclable parts. Please contact your local distributor for more advice.

10. Contact details

Ruskinn Technology Limited

Address:		8 York Park,
		Bridgend Industrial Estate
		Bridgend CF31 3TB
		United Kingdom
Phone:		+44 (0)1656 645988
Fax:		+44 (0)1656 667966
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