UM-014

Invivo$_2$ Plus User Manual

Affix Serial Number Sticker Here

Product Summary

Baker Ruskinn's Invivo$_2$ hypoxia workstation allows you to isolate cells in a chamber that accurately maintains and controls temperature, humidity, oxygen and carbon dioxide. With the Invivo$_2$, you can study even the most complex cell interactions under perfect microaerophilic or anaerobic conditions.

Features and Benefits

- Quick and easy direct access with the gloveless, cuffed Ezeeyin Sleeve system.
- Single plate entry system (SPES) - standard on most models, this mailbox-like slot allows quick side entry or exit of individual plates, bypassing the interlock cycling process.
- Read plates easily without exposure to oxygen - energy-saving lighting provides perfect illumination.
- Up to 520 90mm plate capacity
- Interlock transfer 78 plates in 5 minutes.
- Utilised with the ICO_2N_2IC Advanced Gas mixing system to offer a microaerophilic environment in which to grow facultative anaerobes.
- 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 as an optional extra with anaerobic colour-indicator strips verifying anaerobic conditions.
    - Ezeeyin 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.
    - Minimal maintenance and downtime - with annual or biennial preventative maintenance kits available.

The ICO_2N_2IC provides accurate control over O_2 (0.1% - 20.9% in 0.1% increments, can reach 23.0% using separate 25% O_2 cylinder) and CO_2 (0.1% - 30% in 0.1% increments).

The ICO_2N_2IC is available in two options.

- Hypoxic (standard build)
- Anaerobic (optional accessory)

***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.

Table of Contents

1. Overview and Safety Instructions

Please read this manual carefully to familiarise yourself with the operation and maintenance of your Invivo$_2$ Plus workstation. **Note**: The workstation should be located in a well-ventilated area.

For your safety, 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 Invivo$_2$ Plus workstation is connected to, MUST not be obstructed by the Invivo$_2$ Plus workstation or any other equipment, and MUST be accessible in case of emergency. In case of emergency, disconnect the Invivo$_2$ Plus workstation from the AC Mains Outlet.**
- **In case of damage to the Invivo$_2$ Plus workstation, disconnect the Invivo$_2$ Plus workstation from the AC Mains Outlet and contact your local distributor for advice.**
- **The workstation 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 anaerobic 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 ratings of the internal sockets must not be exceeded.**
- **The exhaust valve outlet must not be covered or blocked.**
- **The cooling fan covers and vents must not be covered or blocked.**
- **The workstation must be disconnected from the mains supply before removing the front screen. The workstation must not be reconnected to the mains supply until the front screen has been reinstalled.**
- **The workstation should not be lifted by the glove ports, the interlock or the Single Plate Entry System.**
- **If an Uninterruptable Power Supply (UPS) system is used, both the Invivo$_2$ Plus workstation and the ICO_2N_2IC Advanced Gas mixing system must be connected to the Uninterruptable Power Supply (UPS) system.**
- **The weight limit for the interlock floor tray is 4kg.**
- **The weight limit for the rear shelf is 12.5kg, evenly distributed.**
- **The spot light should not be used continuously for a period of more than 10 minute. The spot light should be allowed to cool for a period of 10 minutes after each use.**
- **The use of Radioactive materials in the Invivo$_2$ 400 is strictly prohibited.**

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

1.1 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.

1.2 Symbols

Before using the Invivo$_2$ Plus, please ensure that you are familiar with the symbols on the Invivo$_2$ Plus. Figure 1 explains the symbols found on the Invivo$_2$ Plus;

Figure 1: Invivo2 Plus symbols

Symbol	Meaning
	Refer to user manual.
~	Alternating current
O	Off
I	On
	Primary earth connection
	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.
	Warning: Do not use toxic or Flammable substances inside the incubator.
	Invivo$_2$ Plus 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

1.3 Installation and relocation

Invivo$_2$ Plus should only be installed or relocated by a qualified engineer. To arrange installation or relocation, please contact your local distributor.

The mains socket that forms connection to the Invivo$_2$ Plus, is not to be obstructed by Invivo$_2$ Plus or any other equipment, and must be accessible in case of emergency. In case of emergency, disconnect the Invivo$_2$ Plus from the AC mains outlet.

1.4 Weight and dimensions

The Invivo$_2$ Plus workstations weigh approximately 130kg. Figure 2 lists the dimensions of the Invivo$_2$ Plus workstation;

Figure 2: Invivo2 Plus workstation dimensions

External width	1586 mm
External height	725 mm
External depth	714 mm
Workstation chamber internal width	1050 mm
Workstation chamber internal height	479 mm
Workstation chamber internal depth	575 mm
Interlock internal width	320 mm
Interlock internal height	300 mm
Interlock internal depth	314 mm
Interlock outer door clear opening width	300 mm
Interlock outer door clear opening height	250 mm
Interlock inner door clear opening width	230 mm
Interlock inner door clear opening height	255 mm

2. Gas and electrical supply requirements

2.1 Gas supply requirements

The Invivo$_2$ Plus workstation requires;

- Oxygen free nitrogen.
- In addition to this, the Invivo$_2$ Plus workstation should be connected to ICO$_2$N$_2$IC (supplied with the Invivo$_2$ Plus workstation). All other gas connections should be made to the ICO$_2$N$_2$IC.
  See UM-011 ICO$_2$N$_2$IC user manual for more details.

The maximum permissible concentration of hydrogen in the anaerobic mixed gas is 5.5%. The use of any other gas(ses) will invalidate the warranty and may cause serious injury. The Gas supplies must be securely fastened after installation.

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 (42psi) Bar Gauge. 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.

The gasses are connected to the ICO$_2$N$_2$IC Advanced Gas mixing system. See UM-011 ICO$_2$N$_2$IC user manual for more details.

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 obscured by the Invivo$_2$ Plus workstation. The workstation must be connected to a protective earth.

NOTE: If an Uninterruptable Power Supply (UPS) system is used, both the Invivo$_2$ Plus workstation and the ICO$_2$N$_2$IC Advanced Gas mixing system must be connected to the Uninterruptable Power Supply (UPS) system.

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 (Figure 8). The mains supply voltage fluctuations must not exceed +/- 10% of the nominal mains voltage.

2.5 Power consumption

Figure 3: Power consumption ratings

Supply voltage and frequency	Power consumption
240V AC, 50Hz	200W
120V AC, 60Hz	250W

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 6 in Figure 15).

To switch the workstation off, press the power switch (item 6 in Figure 15).

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 Invivo$_2$ Plus 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, the Single Plate Entry System (SPES) and the interlock. The interlock consists of the interlock chamber, with an inner and an outer door. The Invivo$_2$ Plus workstation is controlled via the control panel. The ICO$_2$N$_2$IC Advanced Gas mixing system controls the gaseous composition of the internal environment. See UM-011 for more information on the ICO$_2$N$_2$IC Advanced Gas mixing system.

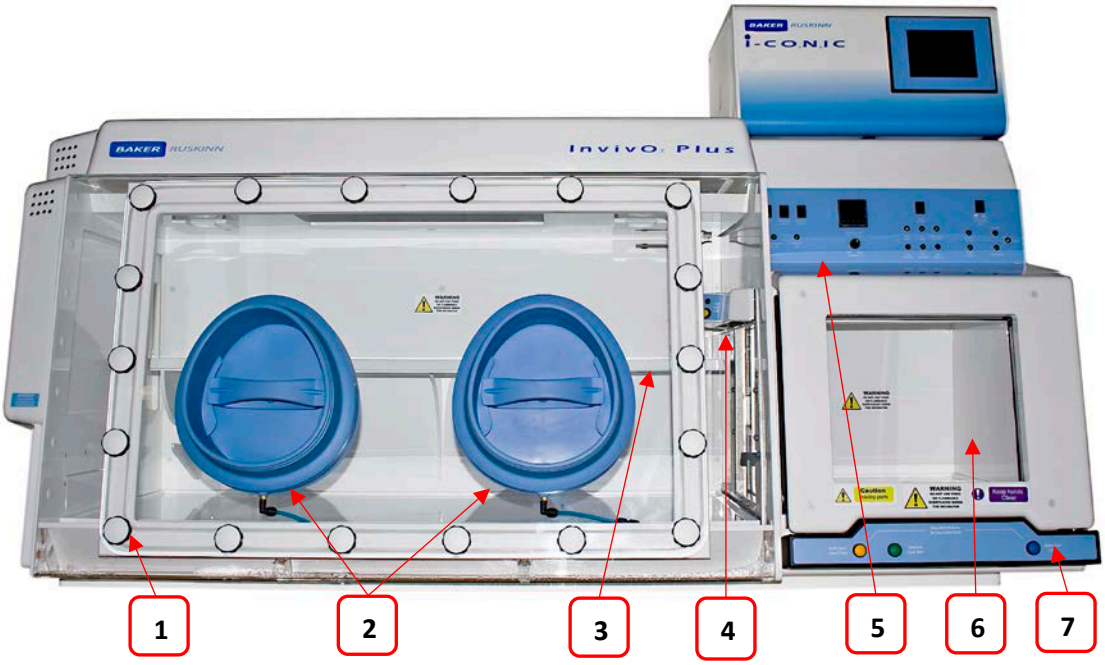
3.2 Component layout

Please familiarise yourself with the layout of your Invivo$_2$ Plus workstation.

3.2.1 Front view

Figure 4 shows the front view of the Invivo$_2$ Plus workstation;

Figure 4: Invivo2 Plus workstation front view

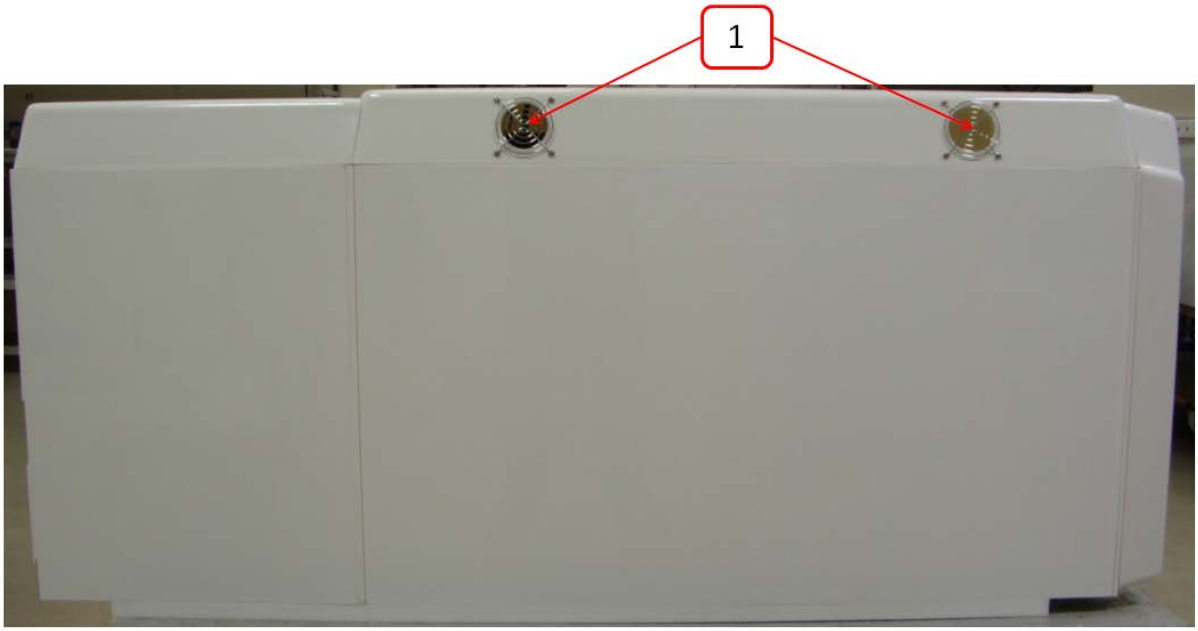


1. Front screen knobs.
2. Glove ports (shown without Ezee Sleeves).
3. Rear shelf.
4. Interlock internal door control panel.
5. Control panel.
6. Interlock outer door.
7. Interlock outer door control panel.

3.2.2 Rear view

Figure 5 shows the rear view of the Invivo$_2$ Plus workstation;

Figure 5: Invivo2 Plus workstation rear view

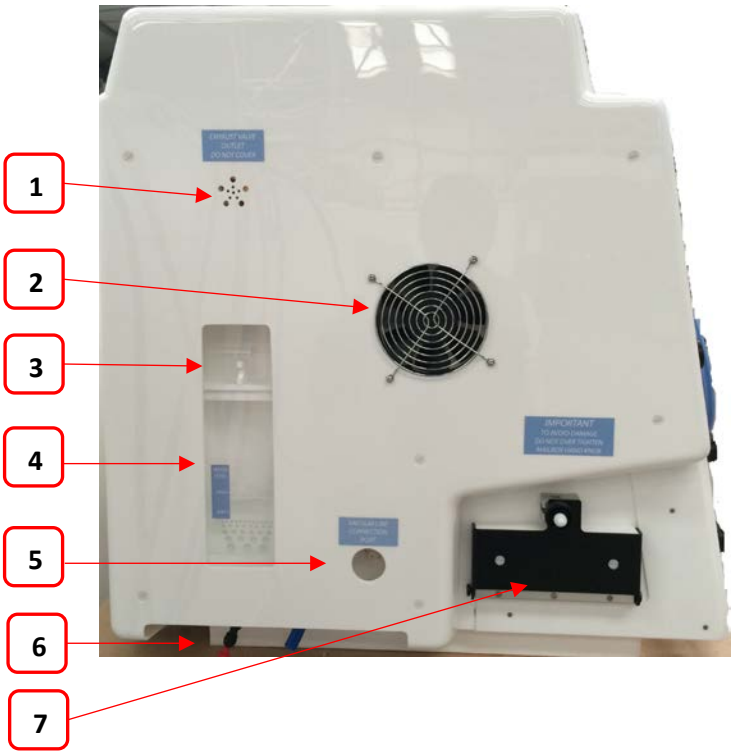


1. Cooling vent outlet.

3.2.3 Left side view – Standard humidifier

Figure 6 shows the left side view of the Invivo$_2$ Plus workstation with the standard humidifier;

Figure 6: Invivo2 Plus workstation left side view with standard humidifier

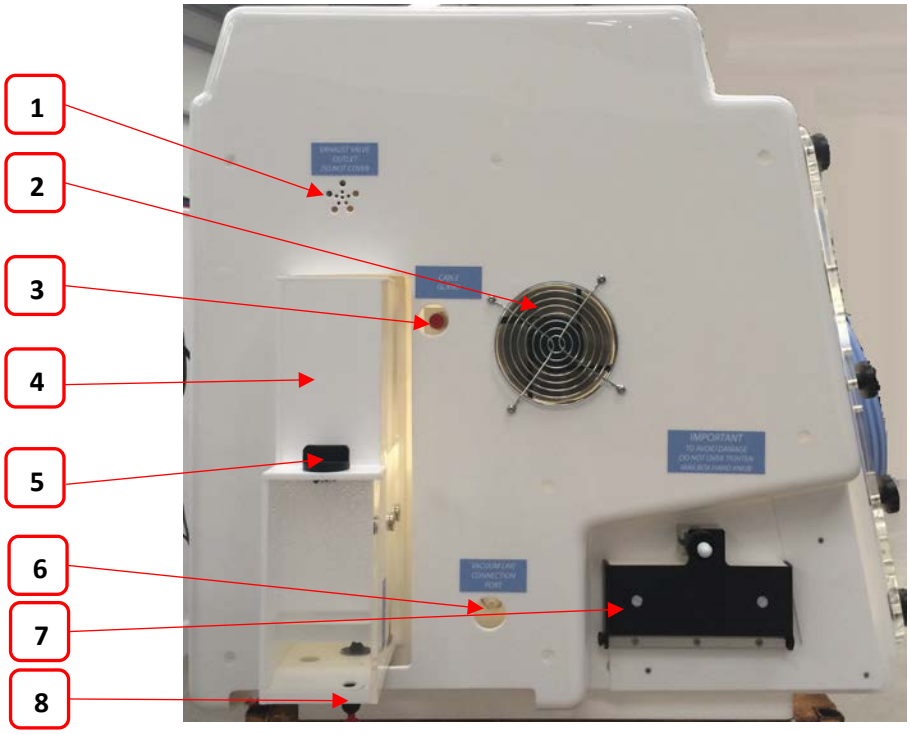


1. Exhaust valve outlet.
2. Condenser fan.
3. Pressure relief tank cover (pressure relief tank bung).
4. Pressure relief tank.
5. Vacuum line (optional accessory).
6. Pressure relief tank overflow tube.
7. Single Plate Entry System (SPES).

3.2.4 Left side view – Ultrasonic humidifier

Figure 7 shows the left side view of the Invivo$_2$ Plus workstation with the ultrasonic humidifier;

Figure 7: Invivo$_2$ Plus workstation left side view with ultrasonic humidifier



1. Exhaust valve outlet.
2. Condenser fan
3. Cable gland (optional accessory).
4. Humidifier tank.
5. Humidifier tank filler cap.
6. Vacuum line (optional accessory).
7. Single Plate Entry System (SPES).
8. Tank Plug

3.2.5 Right side view

Figure 8 shows the right side view of the Invivo$_2$ Plus workstation;

Figure 8: Invivo$_2$ Plus workstation right side view

1. Serial number /Rating label.
2. Portable appliance test (PAT test) label.
3. Mixed gas inlet.
4. Gas sample return.
5. Gas sample out.
6. Power entry panel.

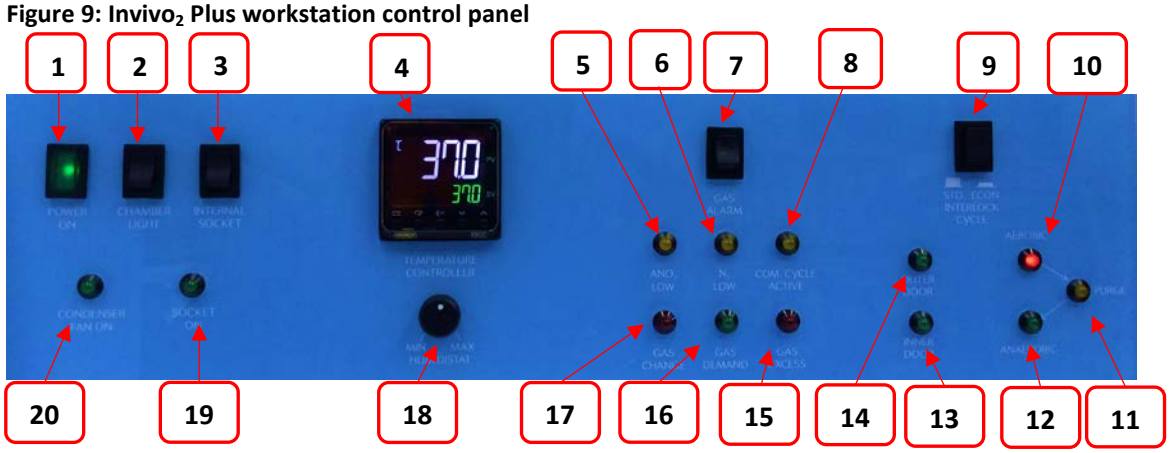
3.3 Control system layout

The control system layout varies by model. Please familiarise yourself with the control system layout of the Invivo$_2$ Plus workstation.

3.3.1 Control panel – Standard humidity control

Figure 9 shows the control panel of Invivo$_2$ Plus workstations equipped with standard humidity control;

Figure 9: Invivo$_2$ Plus workstation control panel



1. **Power indicator.** Illuminates to indicate the workstation is connected to the mains power supply and is switched on.
2. **Chamber light switch.** Press to switch the chamber light on / off. The chamber light switches off after 1 hour automatically.
3. **Internal socket.** Press to switch the internal socket on / off.
4. **Temperature controller**. See section 3.3.3, for more details.
5. **ANO$_2$ low.**
6. **N$_2$ low**.
7. **Gas alarm.** Press to switch the gas alarm on / off.
8. **Com. Cycle active.**
9. **Interlock purge cycle selector**. Press to switch between the standard (3mins) and economy (2minutes) interlock cycles. When the switch is depressed, the economy cycle is selected. Note that this feature is an optional accessory.
10. **Interlock cycle status aerobic indicator.** Illuminates to indicate that the interlock chamber is in an aerobic condition and requires purging
11. **Interlock cycle status purge indicator**. Illuminates to indicate that the interlock purge cycle is in progress.
12. **Interlock cycle status anaerobic indicator.** Illuminates to indicate that the interlock chamber is in an anaerobic condition.
13. **Inner door indicator**. Illuminates to indicate that the interlock inner door is open.
14. **Outer door indicator**. Illuminates to indicate that the interlock outer door is open.
15. **Gas Excess**.
16. **Gas Demand**. Illuminates to indicate a low pressure condition inside the workstation chamber.
17. **Gas change**
18. **Humidistat**. See Sector 4.2 for more details.

19. **Socket on indicator**. Illuminates to indicate that the internal socket is switched on.
20. **Condenser fan indicator**. Illuminates to indicate the condenser fan is running.

3.3.2 Control panel – Ultrasonic humidity control

Ultrasonic humidity control is available as an optional accessory on the Invivo$_2$ Plus. Ultrasonic humidity is only available at time of order and is not available as an aftermarket upgrade. Figure 10 shows the control panel for Invivo$_2$ Plus workstations equipped with ultrasonic humidity;

Figure 10: Control panel for Invivo$_2$ Plus workstations with ultrasonic humidity

1. **Power indicator**. Illuminates to indicate the workstation is connected to the mains power supply and is switched on.
2. **Chamber light switch**. Press to switch the chamber light on / off. The chamber light switches off after 1 hour automatically.
3. **Internal socket switch.** Press to switch the internal socket on / off.
4. **Temperature controller.** See section 3.3.3, for more details.
5. **ANO$_2$ low.**
6. **Gas alarm**. Press to switch the gas alarm on / off.
7. **N$_2$ low**.
8. **Com. Cycle active**.
9. **Interlock purge cycle selector**. Press to switch between the standard and economy interlock cycles. When the switch is depressed, the economy cycle is selected.
10. **Condenser fan on**. Illuminates to indicate the condenser fan is running.
11. **Socket on**. Illuminates to indicate that the internal socket is switched on.
12. **Humidity controller.** See section 3.3.3, for more details.
13. **Gas change.**
14. **Gas demand.** Illuminates to indicate that gas is being injected into the workstation from the ICO$_2$N$_2$IC Advanced gas mixer system.
15. **Gas Excess**.
16. **Inner door indicator**. Illuminates to indicate that the interlock inner door is open.
17. **Outer door indicator**. Illuminates to indicate that the interlock outer door is open.
18. **Interlock cycle status aerobic**. Illuminates to indicate that the interlock chamber is in an aerobic condition and requires purging.

19. **Interlock cycle status purge.** Illuminates to indicate that the interlock purge cycle is in progress.
20. **Interlock cycle status anaerobic.** Illuminates to indicate that the interlock chamber is in an anaerobic condition.

Note: For both control panels, the ANO_2, Com. Cycle active, gas change and gas excess indicators are not used by the $Invivo_2$ Plus workstation. The functions are used by the Concept Plus workstation, which shares the same control panel as the $Invivo_2$ Plus workstation. LEDs are provided to blank holes in the control panel.

3.3.3 Temperature controller / ultrasonic humidity controller

Figure 11 shows the temperature / ultrasonic humidity controller;

Figure 11: Temperature / ultrasonic humidity 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.

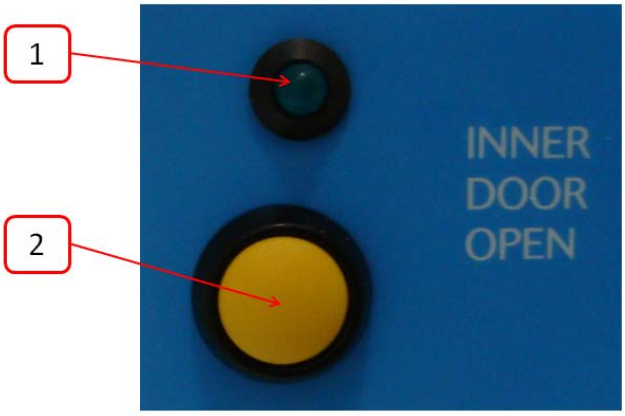
For temperature control, the white value (PV- Process Value) is the actual temperature. The green value (SV- Set Value) is the required value (the set point). All temperatures are in °C.

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.

3.3.4 Interlock internal door control panel

Figure 12 shows the interlock internal door control panel;

Figure 12: Interlock internal door control panel

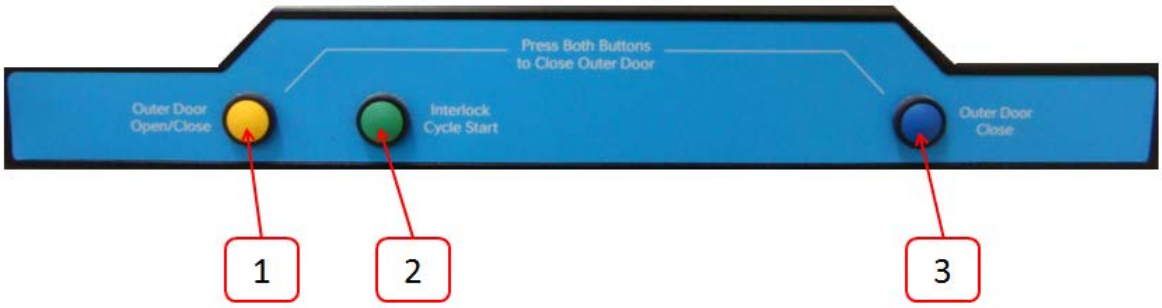


1. Inner door LED indicator. Illuminates to indicate when the interlock inner door is available.
2. Inner door button. Press to unlock the interlock inner door (when available).

3.3.5 Interlock outer door control panel

Figure 13 shows the interlock outer door control panel;

Figure 13: Interlock outer door control panel



1. Outer door open / close. Press individually to open the interlock outer door. Press and hold with outer door close (item 3) to close the interlock outer door.
2. Interlock cycle start. Press to start the interlock purge cycle.
3. Outer door close. Press and hold with outer door open / close (item 1) until the outer door indicator (item 14 Figure 9 or item 17 Figure 10) goes out to close the interlock outer door.

3.3.6 Foot switch control panel

Figure 14 shows the foot switch controller;

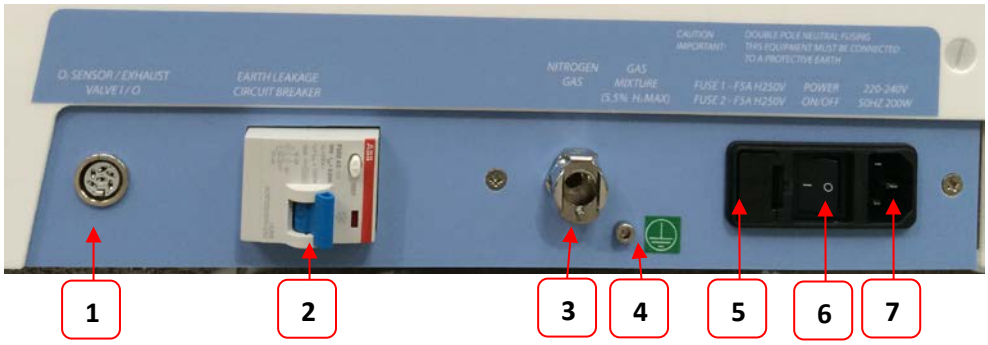
Figure 14: Foot switch controller

1. Left for Left hand side glove port
2. Right for Right hand side glove port
3. Spot for spotlight operation

3.3.7 Power entry panel

Figure 15 shows the power entry panel;

Figure 15: Power entry panel



1. Gas mixer umbilical connection.
2. Earth Leakage Circuit Breaker (ELCB).
3. Nitrogen inlet
4. Primary earth stud.
5. Mains fuse holder.
6. On / off switch.
7. Power cord inlet.

4. Temperature and humidity control

4.1 Temperature control

The Invivo$_2$ Plus 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 11,

- To decrease the temperature set point, press button 3.
- To increase the temperature set point, press button 4.

The temperature set point will increase or decrease in intervals of 0.1^{o}C.

4.2 Humidity control

The Invivo$_2$ Plus workstation controls the humidity of the workstation chamber from ambient to 85% relative humidity.

Note that 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 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 (item 18 in Figure 9);

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

For Invivo$_2$ Plus 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.

4.2.2 Ultrasonic humidity control

To control the humidity of the workstation chamber using the humidity controller (item 12 in Figure 10), referring to Figure 11:

- To decrease the humidity set point, press button 3.
- To increase the humidity set point, press button 4.

5. Environmental gas composition control

The environmental gas composition of the workstation chamber is controlled by the ICO_2N_2IC Advanced Gas mixing system. For more information, please see UM-011 ICO_2N_2IC user manual for more details.

6. Using the workstation chamber

6.1 Using the interlock

The Invivo$_2$ Plus workstation has a 28.8 litre interlock for transferring materials and samples into and out of the workstation chamber. Invivo$_2$ Plus workstations can enable a purge facility in the interlock when placing items into the workstation.

As an optional extra (HEPA protection option) the purge facility can be operated for both entering and exiting the workstation. When transferring samples out of the workstation the interlock purge cycle must be run before the interlock outer door can be opened.

6.1.1 Interlock overview

The interlock consists of 4 main components;

- Interlock outer door
- Interlock inner door
- Interlock chamber
- Interlock floor tray

The interlock is accessed by opening either the outer or inner door. Note that both doors cannot be open at the same time.

6.1.2 Opening the interlock outer door

Before opening the interlock outer door, check that the interlock inner door is closed. To open the interlock outer door, press button 1 in Figure 13. The interlock door will automatically slide up. To close the interlock outer door, press and hold buttons 1 and 3 in Figure 13, simultaneously. The door will automatically slide down. Once the door has located, the door seal will inflate and the buttons can be released.

6.1.3 Opening the interlock inner door

The interlock inner door can only be opened if the interlock has been purged, indicated by the interlock cycle status anaerobic (item 12 in Figure 9 or item 20 in Figure 10). To open the interlock inner door;

- Access the workstation chamber via the Ezee Sleeves.
- Press the interlock inner door button (item 2 in Figure 12).
- Slide the interlock inner door backwards to open.

To close the interlock inner door, slide the interlock inner door forwards.

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 can be opened and closed as often as required to transfer material, providing the outer door has not been opened.

6.1.4 Transferring material into the workstation chamber via the interlock

To transfer material into the workstation chamber via the interlock;

- Open the interlock outer door.

- Place the required items on the interlock tray. The weight limit for the interlock floor tray is 4kg.
- Close the interlock outer door.
- Start the interlock purge cycle by pressing the interlock cycle start button (item 2 in Figure 13)
- Access the workstation chamber via the Ezee Sleeves. See section 6.2 for details.
- When the interlock purge cycle has completed, indicated by the interlock cycle status anaerobic (item 12 in Figure 9 or item 20 in Figure 10) being illuminated, press the inner door button (item 2 in Figure 12).
- Slide the interlock inner door backwards to open the interlock door.
- Slide the interlock floor tray into the workstation chamber by pulling it to the left.
- Move the material from the interlock chamber into the workstation chamber.
- Slide the interlock floor tray into the interlock chamber by pushing it right.
- Close the interlock inner door by sliding the interlock inner door forward.

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 by pressing the inner door button (item 2 in Figure 12) and sliding the interlock inner door backwards.
- Slide the interlock floor tray into the workstation chamber by pulling it to the left.
- Move the material from the workstation chamber into the interlock chamber.
- Slide the interlock floor tray into the interlock chamber by pushing it right.
- Close the interlock inner door by sliding the interlock inner door forwards.
- Exit the workstation chamber via the Ezee Sleeves.
- Open the interlock outer door.
- Remove the material from the interlock chamber.
- Close the interlock outer door as described in section 6.1.2

6.2 Hand access to the main chamber

Direct hand access to the workstation chamber is provided via the glove ports and Ezee Sleeve system.

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).
- 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 loading / unloading the interlock.

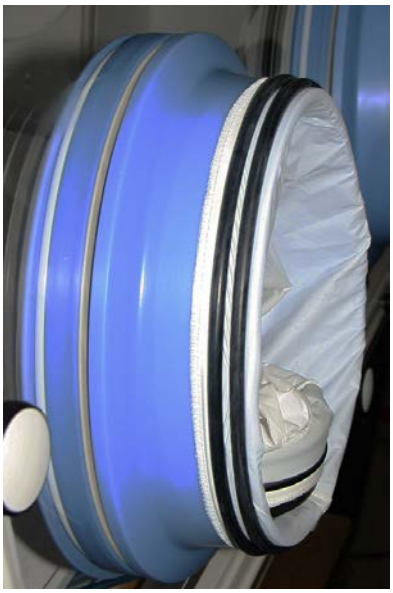
6.2.1 Ezeeyin Sleeve System Overview

The Ezeeyin system consists of Ezee Sleeve and a cuff.

- The sleeve attaches to the glove port via 2 O-rings.

Note: The workstation should not be used without the Ezee Sleeves attached.

Figure 16: Ezee glove port and sleeve



6.2.2 Vacuum Operation

To ensure that no external atmosphere contaminates the workstation, a single vacuum operation is required before Glove Port access. To minimise the time it is recommended to eliminate as much external atmosphere from the sleeve as possible prior to arm entry. This can be achieved by compressing the Sleeve before inserting the hand and arm as shown in Figure 17.

Figure 17: Removing atmosphere from sleeve

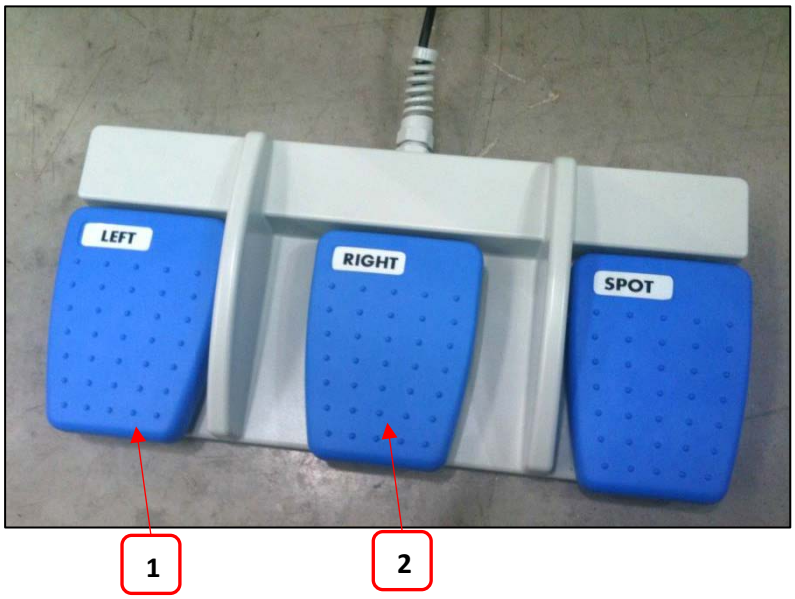
- Hold the desired Ezee cuff with the opposite hand.
- Support the Ezee Cuff, push the hand through the cuff of the Ezee Sleeve.
- Insert the arm and grasp the Glove Port handle in preparation for the vacuum stage, using the foot pedals.

Note: Failure to grasp the Handle at this stage will make grasping it after the vacuum operation much more difficult.

Figure 18: Arm inserted into sleeve (Shown with and without sleeve)

1. Glove port handle

Figure 19: Foot pedals for right and left glove ports



1. Left for Left hand side glove port
2. Right for Right hand side glove port

While the arm is grasping the handle, generate a vacuum by operating the foot pedal for the corresponding glove port.

The vacuum operation should be continued until the maximum amount of external atmosphere has been removed from the sleeve and the sleeve exerts pressure on the arm/hand. This take approx 15 to 20 seconds.

Figure 21: Sleeve before vacuum operation

Figure 20: Sleeve after vacuum operation

The Sleeve should pull forcefully against both the inner surface of the Glove Port interior and the users arm and hand when adequate vacuum has been achieved.

Figure 22: Glove port showing vacuum achieved

6.2.3 Workstation Entry

Once the vacuum has been achieved, the Glove Port Handle can now be rotated in either direction to unlock the Glove Port Cap.

As there is a strong vacuum within the Sleeve, removal of the Cap can require a reasonable amount of force. This can be made easier by pushing the uppermost part of the Handle to first break the vacuum at the upper edge of the Cap seal.

Figure 23: Glove port cap

The Glove port Cap can now be stored inside the workstation using the locator feature on the rear of the Cap. These slot into the storage brackets mounted within the workstation.

Figure 24: Glove port cap storage locator

Figure 25: Glove port cap storage location inside workstation

Repeat the procedure for the other hand (if both hands are entering the workstation chamber).

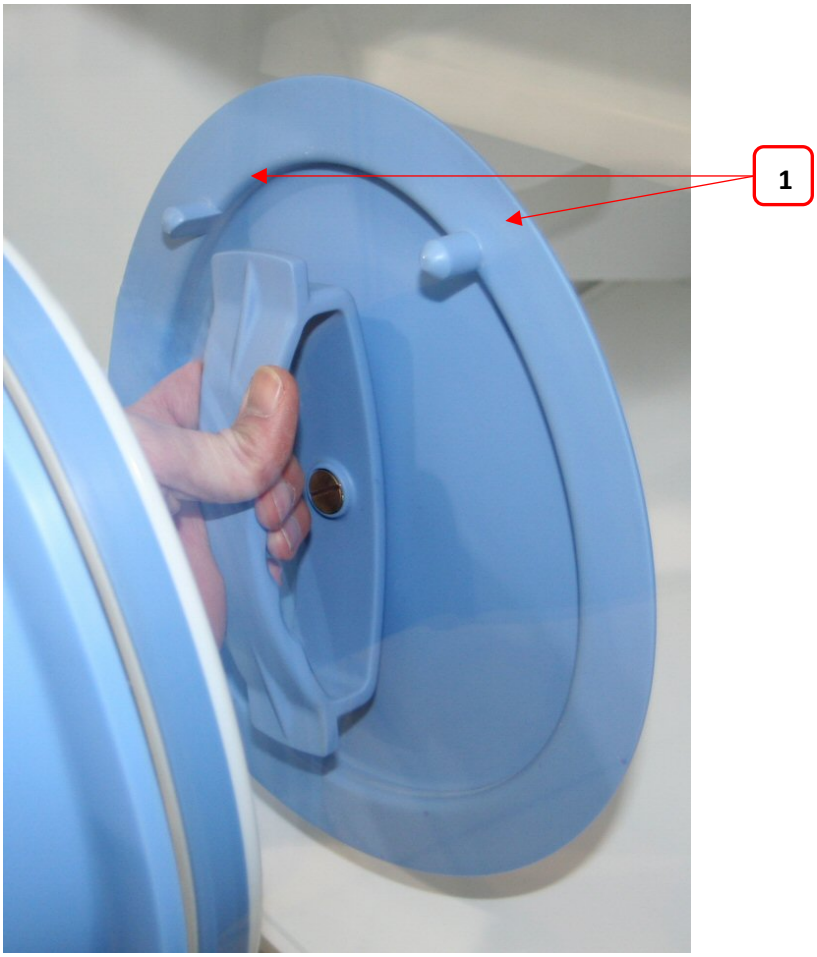
6.3 Workstation Exit

Remove Cap from storage brackets, and ensure the handle is oriented in a vertical position on the Cap. The Handle is designed with “indexing” detent features to help locate the Handle relative to the Cap.

Drawing the handle into the Glove Port, replace the cap, using the location posts to orient the Cap correctly on the Glove Port.

Note: Care should be taken to ensure that the sleeve material does not become caught between the Cap and the Glove Port seal.

Figure 26: Glove port cap



1. Cap location posts

Rotating the Handle by 90 degrees to the horizontal position will now lock the Cap to the Glove Port, allowing withdrawal of the users arm from the Sleeve.

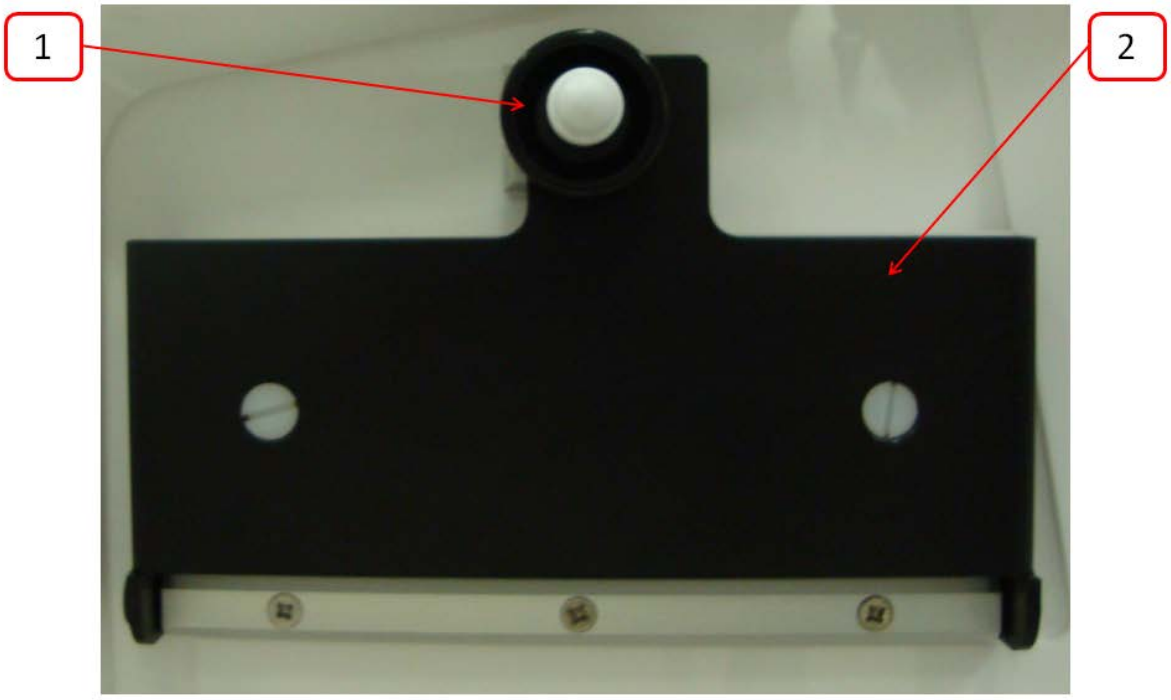
6.4 Single Plate Entry System (SPES)

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.

6.4.1 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 27 shows the external view of the SPES;

Figure 27: SPES external view



1. Thumb screw.
2. SPES external flap.

Figure 28 shows the internal view of the SPES;

Figure 28: SPES internal view

6.4.2 Using the SPES

To use the SPES;

- Undo the thumb screw on the external flap (item 1 in Figure 27).
- Whilst supporting the SPES external flap, swing the thumb screw to the left.
- Lower the SPES external flap.

Figure 29 shows the SPES when opened;

Figure 29: 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 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 30;

Figure 30: Internal socket power ratings

Supply voltage	Power rating
120V AC, 60Hz	88W
240V AC, 50 Hz	192W

6.6 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, or item 2 in Figure 10).

To switch the main chamber light off, press the chamber light switch (item 2 in Figure 9, or item 2 in Figure 10).

To switch the spotlight on, press and hold the spot pedal on the foot switch control panel (item 3 in Figure 14). To switch the spotlight off, remove your foot from the spot pedal on the foot switch control panel (item 3 in Figure 14).

Note that 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.

6.7 Rear shelf

The Invivo$_2$ Plus workstation has a sliding rear shelf for additional storage within the workstation chamber. To slide the shelf forwards, pull the shelf towards you with both hands. To slide the shelf backwards, push the shelf away from you with both hands. The weight limit for the shelf is 12.5kg. The weight on the shelf must be evenly distributed.

6.8 Optional accessories

Your Invivo$_2$ Plus workstation may be fitted with optional accessories to provide added functionality. The available optional accessories for Invivo$_2$ Plus workstations are;

- Cable gland.
- Universal cable gland.
- Gas sample port.
- Ultrasonic humidity control.
- Vacuum port.
- HEPA protection option (see section 6.2).

Note that these optional accessories are not available as aftermarket upgrades; they must be fitted during the manufacture of the workstation.

6.8.1 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 is located on the left hand side of the workstation

Figure 31 shows the cable gland;

Figure 31: 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.

6.8.2 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 32: Multi port

6.8.3 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 33: Gas sample port

To use the gas sample port;

- Connect the independent gas meter to the gas sample port.

6.8.4 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.

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 34 shows the internal part of the vacuum port;

Figure 34: 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.

6.9 Online video user guides

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

http://www.youtube.com/ruskinntechnology

Video demonstrations are available for;

- Entering and exiting the workstation chamber via the Ezee Sleeves.
- Setting oxygen and carbon dioxide values.
- Using the JuLI fluorescent cell image analyser.

7. Cleaning and maintenance

7.1 Cleaning the workstation

To ensure that your Invivo$_2$ Plus 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 7.6.2 for details.
- Ruskinn Technology Limited anti-static cleaner.
- Distilled water.

No other cleaning agents are permitted. The use of UV light is not permitted in the workstation, as it will damage the acrylic shell.

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
- Wipe the workstation chamber floor tray clean using paper towels to dry.
- Wipe the interlock floor tray using paper towels soaked in an appropriate cleaning agent.
- Wipe the interlock floor tray using paper towels to dry.

Note: It is easiest to clean the interlock from the outside.

7.2 Removing/ reinstalling the front screen

Invivo$_2$ Plus is fitted with a removable front screen, to facilitate easier cleaning and installation/ removal of equipment to and from the workstation chamber.

To remove the front screen;

- 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 7.4.2 for more details).
- Remove the front screen knobs by turning them anti-clockwise (counter-clockwise) to remove them.
- Disconnect the glove port selector knob using the quick release connector.
- Remove the front screen by lifting it towards you. Place the front screen on a suitable surface that will not scratch the front screen.

Take care not to lose any of the front cover knobs.

To reinstall the front screen;

- Check that the front screen seals are clean. Clean the front screen seals using an approved cleaning agent if required.
- Place the front screen onto the mounting studs.
- Reconnect the glove port selector knob using the quick release connector.
- Tighten the front screen knobs onto the mounting studs by turning the front screen knobs clockwise. Take care not to cross thread or over tighten the front screen knobs. The front screen knobs should be tight enough to compress the seals.
- Reinstall the Ezee Sleeves (see section 7.4.2, for more details).

7.3 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 front screen as described in section 7.2.
- 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 workstation floor.
    - The ceiling panel.
    - The rear shelf.
    - The inner rear wall.

    - The left hand wall.
    - The right hand wall.
    - The interlock inner door.
    - The inside of the SPES.
    - The glove port covers.
- 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 inner rear wall), plug socket and the interlock internal door control panel.
- Wipe dry using paper towels.

Cleaning the interlock chamber;

- The items inside the workstation chamber that require cleaning are;
    - The floor.
    - The floor tray.
    - The ceiling panel.
    - The rear wall.
    - The left hand wall.
    - The right hand wall.
    - The interlock inner door.
- For all workstation 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 front screen as described in section 7.2.
- Reinstall the Ezee Sleeves (see section 7.4.2 for more details).

7.4 Maintaining the workstation – End user maintenance

To ensure that your Invivo$_2$ Plus workstation remains at optimum working conditions, it must be maintained on a regular basis. Many basic tasks can be performed by the end user.

7.4.1 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 35 shows the pressure relief/ humidifier tank level indicator;

Figure 35: Pressure relief/ humidifier tank level indicator

To refill the pressure relief/ humidifier tank;

- Either open the SPES (see section 6.4) or open one of the glove port covers (see section 6.2), to equalise the pressure between the workstation chamber and the external environment.
- For standard humidity, remove the pressure relief tank bung. For ultrasonic humidity, remove the humidifier filler cap.
- Top up the pressure relief tank/ humidifier tank until the water level is between the low and high level indicators.
- Replace the pressure relief tank bung or humidifier filler cap.
- Either close the SPES or close the glove port cover.
- Set the ICO_2N$_2$IC the desired mode of operation (see UM-0011 for more information).

Note: Only distilled or deionised laboratory grade water should be used. Gloves should be worn during refilling to avoid contaminating the 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.

7.4.2 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 that the O-rings will be tight. Figure 36 shows the O-ring removal;

Figure 36: 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 that the O-rings will be a tight fit. This is intentional, to provide a gas tight seal. Note that the O-rings must completely cover the Ezee Sleeve to provide a gas tight seal.

7.4.3 Replacing detox sachets

Detox sachets are supplied with the Invivo$_2$ Plus workstation. The detox sachets adsorb volatile organic compounds, improving the air quality within the workstation chamber. Detox sachets need to be replaced annually. See section 7.4.2 for part details. There are 2 methods for replacing the detox sachets;

- Via the interlock, to maintain the atmospheric condition in the workstation chamber.
- With the front screen removed, as part of a deep clean.

To replace the detox sachets via the interlock;

- Remove the new detox sachets from their packaging.
- Open the interlock outer door (see section 6.1.2, for more details).
- Place the new detox sachets in the interlock chamber.
- Close the interlock outer door (see section 6.1.2, for more details).
- Start the interlock purge cycle by pressing the interlock cycle start button (item 2 in Figure 13).
- Enter the workstation chamber via the Ezee Sleeves (see section 6.2 for more details).
- Move any samples/ equipment onto the rear shelf. Do not exceed the weight limit for the rear shelf.
- Lift the front of the floor tray to expose the old detox sachets and sachet holders.
- Whilst holding the floor tray up, slide the old detox sachets forwards and remove from sachet holders.
- When the interlock purge cycle has completed, open the interlock inner door (see section 6.1.3 for more details).
- Place the old detox sachets in the interlock chamber and bring the new detox sachets into the workstation chamber.
- Close the interlock inner door (see section 6.1.3 for more details).
- Whilst lifting the front of the floor tray, slide the new detox sachets into the detox sachet holders.
- Lower the front of the floor tray back to its original position.
- Move any samples/ equipment back to the floor tray.
- Exit the workstation chamber via the Ezee Sleeves (see section 6.2 for more details).
- Open the interlock outer door (see section 6.1.2 for more details).
- Remove the old detox sachets.
- Close the interlock outer door (see section 6.1.2 for more details).

To remove the detox sachets with the front screen removed;

- 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 7.4.2 for more details).
- Remove any other equipment installed in the workstation chamber.
- Lift the front of the floor tray to expose the detox sachets.
- Whilst holding the floor tray up, slide the detox sachets forwards and remove from the workstation.

To reinstall the detox sachets with the front screen removed;

- Remove the new detox sachets from their packaging.
- Whilst lifting the front of the floor tray, slide the detox sachets into the detox sachet holders.
- Lower the front of the floor tray back to its original position.
- Reinstall any equipment previously installed in the workstation.
- Reinstall the Ezee Sleeves (see section 7.4.2 for more details).
- Cells can be reintroduced to the workstation from the alternative storage facility.

Note: It is recommended to perform a deep clean (see section 7.3 for more details) when replacing the detox sachets with the front screen removed.

7.4.4 Installing/ replacing a catalyst sachet

Catalyst sachets are available as an accessory for the Invivo$_2$ Plus workstation. See section 7.6 for ordering details. The catalyst sachets are required for anaerobic operation of the workstation. There are 2 methods for replacing the detox sachets;

- Via the interlock, to maintain the atmospheric condition in the workstation chamber.
- With the front screen removed, as part of a deep clean.

To install a catalyst sachet via the interlock;

- Remove the catalyst sachet from its packaging.
- Open the interlock outer door (see section 6.1.2 for more details).
- Place the catalyst sachet in the interlock chamber.
- Close the interlock outer door (see section 6.1.2, for more details).
- Start the interlock purge cycle by pressing the interlock cycle start button (item 2 in Figure 13: Interlock outer door control panel).
- Enter the workstation chamber via the Ezee Sleeves (see section 6.2 for more details).
- Move any samples/ equipment onto the rear shelf. Do not exceed the weight limit for the rear shelf.
- Lift the front of the floor tray to expose the detox sachets and sachet holders.
- Whilst holding the floor tray up, slide one detox sachet forward and remove from sachet holder.
- When the interlock purge cycle has completed, open the interlock inner door (see section 6.1.3 for more details).
- Place the detox sachet in the interlock chamber and bring the catalyst sachet into the workstation chamber.
- Close the interlock inner door (see section 6.1.3, for more details).
- Whilst lifting the front of the floor tray, slide the catalyst sachet into the detox sachet holder.
- Lower the front of the floor tray back to its original position.
- Move any samples/ equipment back to the floor tray.
- Exit the workstation chamber via the Ezee Sleeves (see section 6.2 for more details).
- Open the interlock outer door (see section 6.1.2 for more details).

- Remove the old detox sachets.
- Close the interlock outer door (see section 6.1.2, for more details).

To install a catalyst sachet with the front screen removed;

- 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 7.4.2 for more details).
- Remove any other equipment installed in the workstation chamber.
- Lift the front of the floor tray to expose the detox sachets.
- Whilst holding the floor tray up, slide one detox sachets forwards and remove.
- Remove the new catalyst sachet from its packaging.
- Whilst lifting the front of the floor tray, slide the catalyst sachet into the available detox sachet holder.
- Lower the front of the floor tray back to its original position.
- Reinstall any equipment previously installed in the workstation.
- Reinstall the Ezee Sleeves (see section 7.4.2 for more details).
- Cells can be reintroduced to the workstation from the alternative storage facility.

Note: it is recommended to perform a deep clean (see section 7.3 for more details) when installing a catalyst sachet with the front screen removed.

7.4.5 Replacing the mains plug fuse – UK users only

To replace the mains plug fuse;

- Switch off Invivo$_2$ Plus 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 37 shows the fuse removal;

Figure 37: Mains plug fuse removal

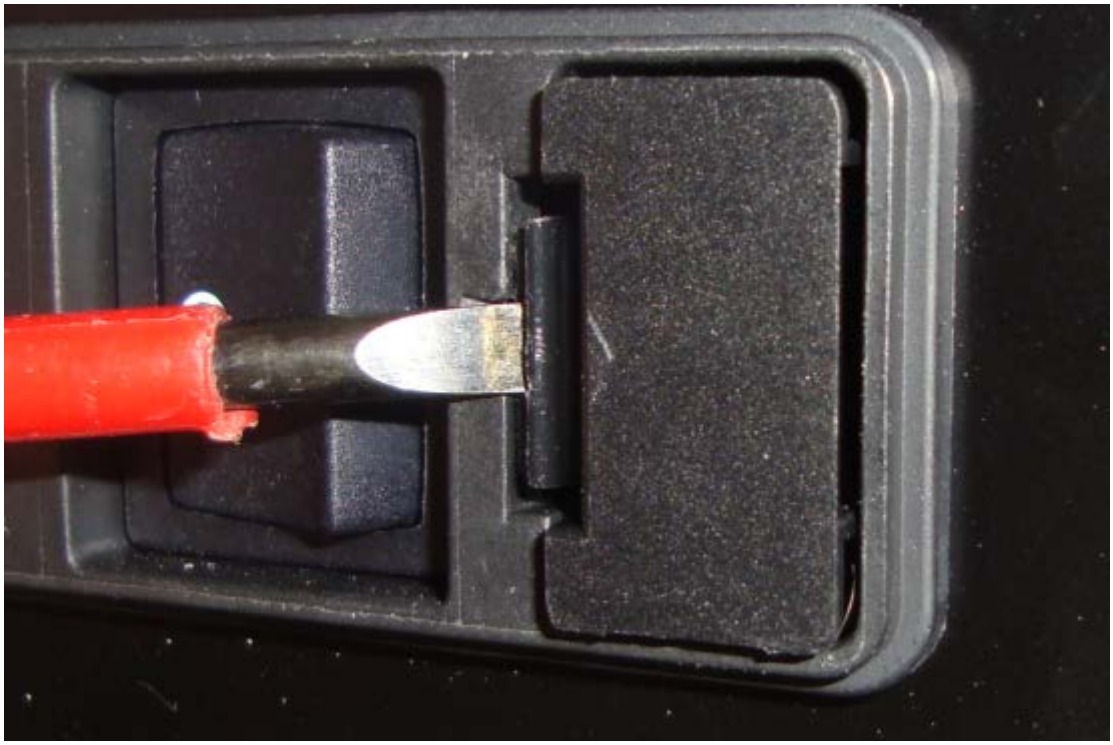
- Replace the fuse with a BS 1362 13A fuse.
- Replace the plug in the mains socket.
- Reconnect Invivo$_2$ Plus to the mains power supply and switch the Invivo$_2$ Plus on.

7.4.6 Replacing the mains fuses

To replace the mains fuses;

- Remove the plug from the mains socket.
- Remove the mains fuse drawer using a small flat bladed screwdriver. Figure 38 shows the removal of the mains fuse holder;

Figure 38: mains fuse holder removal



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

Fuses should be fast blow, for example Cooper Bussmann S50 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 Invivo$_2$ Plus on.

7.5 Service requirements

To maintain the best performance from your Invivo$_2$ Plus workstation, it must be serviced at regular intervals. Figure 39 lists the servicing requirements, intervals and persons capable of performing the service;

Figure 39: Invivo2 Plus servicing requirements

Action	Frequency	By
Clean workstation	After each use	End User
Deep clean workstation	3-6 months depending on usage	End User
Replace detox sachets	Annually	End User
Replace catalyst sachet (if used)	Annually	End User
Annual service	Annually	Qualified service engineer
Biennial service	Biennially (2 yearly)	Qualified service engineer

To arrange an annual or biennial service, contact your local distributor. Note that the biennial service includes an annual service. Note that the annual service includes the replacement of detox sachets.

Service contracts are available for all Ruskinn Technology Limited workstations. Please contact your local distributor for more information.

7.6 Spare parts and accessories

A range of spare parts and accessories are available for your Invivo$_2$ Plus workstation. Note that 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.

7.6.1 Overview

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

7.6.2 Spare parts and cleaning agents

Figure 40 lists the spare parts and cleaning agents available for your Invivo$_2$ Plus 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 40: Invivo2 Plus 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 (2)	Mains lead
Anti-static cleaner (600ml)	Cleaning
Tristel Duo Foamer	Cleaning
Tristel Fuse Sachet	Cleaning
Large Detox Sachet	VOC filtration
Large Catalyst Sachet	Anaerobic operation
Anaerobic Indicator Strips	Anaerobic operation
Front screen knob	Front screen

7.6.3 Accessories

A range of accessories are available to enhance the functionality of your Invivo$_2$ Plus workstation. Figure 41 is the list of accessories for the Invivo$_2$ Plus workstation. Please contact your local distributor for the latest pricing and availability.

Figure 41: Invivo2 Plus 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
Large Petri dish holder	Holds up to 14 9cm Petri dishes for easier storage inside the workstation chamber. 7 Colours available; **Black** **Blue** **Green** **Purple** **Red** **Yellow** **White**
Large 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**
Anti-vibration table for multi well plates	Holds 4 multi well plates (6 well to 96 well), protecting the plates from vibration
Adjustable incubation tray	Holds 4 multi well plates (6 well to 96 well), adjustable feet and built in level indicator. Ideal for experiments with low media volumes
JuLI fluorescent cell analyser	Inverted optical microscope with touch screen control. Bright field and Blue track fluorescent imaging. Time lapse imaging function. Includes SD card.

7.7 Workstation malfunction

In the event of a workstation malfunction, please check section 7.8, 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. If the problem is related to the ICO_2N_2IC Advanced Gas Mixer, please download the event log to a USB device (see UM-011 ICO_2N_2IC user manual for more details) as it will be required by your local distributor. Until your problem is resolved, both the Invivo$_2$ Plus workstation and the ICO_2N_2IC should be switched off and disconnected from the mains supply.

7.8 Common problems and solutions

7.8.1 Workstation general problems

Figure 42: Common problems and solutions Figure 42 gives a list of common problems and solutions. Please consult this list as a first reference in the event of a malfunction of your workstation.

Figure 42: Common problems and solutions

Problem	Cause	Solution
The workstation will not switch on	The workstation is not plugged in	Plug the workstation into the mains
	The mains socket is not switched on	Switch the mains power on
	The mains fuse has blown	Contact your local distributor
	The mains plug fuse has blown (UK users only)	Replace the mains plug fuse (UK users only).
	The ELCB has tripped	Reset the ELCB. If the ELCB continues to trip, contact your local distributor.
The workstation temperature will not go above ambient plus 5°C	The heater mat thermal protection switch has activated	Wait for the workstation chamber to cool and the heater mat thermal protection switch will reset itself.
	The heater mat fuse has blown	Contact your local distributor
The LED indicators are not illuminated	24V power supply fuse has blown	Contact your local distributor
Devices plugged into the internal socket are not powering up	The power switch on the device is not switched on	Turn the power switch on the device on
	The plug for the device is not fully inserted into the socket	Check that the plug is correctly inserted into the socket
	The fuse in the device has blown and/ or the device has failed	Plug the device into another socket. If the device does not power up, there is a fault with the device. Plug another device into the internal socket to check the operation of the internal socket.
	The internal socket fuse has blown	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

7.8.2 Interlock problems

Figure 43 gives a list of common interlock problems and solutions;

Figure 43: Interlock problems and solutions

Problem	Cause	Solution
The interlock inner door will not open	The interlock outer door is open The interlock has not been purged The interlock is purging There is an obstruction behind the interlock inner door	Close the interlock outer door and run the purge cycle Run the interlock purge cycle The interlock purge cycle takes 3 minutes to run. Wait for the interlock purge cycle to finish Remove the obstruction from behind the interlock inner door
The interlock inner door will not close	The interlock inner door is blocked The interlock inner door is stuck	Check for obstructions to closing the interlock inner door and remove them. Spillages can cause the interlock inner door to stick. Clean the interlock inner door. See section 7.1.2 or section 7.3 for more details. 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 outer door will not open	The interlock inner door is open The nitrogen cylinder is empty	Close the interlock inner door Replace the nitrogen cylinder
The interlock outer door will not close	The interlock outer door is obstructed	Check for obstructions to closing the interlock outer door and remove them
The interlock outer door will not open (for workstations with HEPA filer option)	The interlock has not been purged	Run the interlock purge cycle

8. Warranty information

Ruskinn Technology Limited warrants for the applicable time period that the Invivo$_2$ Plus 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 Invivo$_2$ otherwise than in the normal course of a business.

THIS WARRANTY DOES NOT APPLY IN THE FOLLOWING CIRCUMSTANCES:

(A) IF THE Ruskinn Technology Limited Invivo$_2$ Plus HAS BEEN REPAIRED BY PERSONS NOT AUTHORIZED BY Ruskinn Technology Limited; OR

(B) THE Ruskinn Technology Limited Invivo$_2$ Plus and associated accessories/peripherals HAVE BEEN ALTERED, MODIFIED, OR MISUSED; OR

(C) THE Ruskinn Technology Limited Invivo$_2$ Plus IS USED WITH NON- Ruskinn Technology Limited COMPONENTS; OR

(D) THE Ruskinn Technology Limited Invivo$_2$ Plus OR A COMPONENT IS USED FOR OTHER

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

(E) THE Ruskinn Technology Limited Invivo$_2$ Plus 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 Invivo$_2$ Plus 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 Users sole remedy shall be, at Ruskinn Technology Limited's option: 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, INVESTMENTS, 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 Invivo$_2$ Plus, 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

Invivo$_2$ Plus 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.

Invivo$_2$ Plus contains recyclable parts. Please contact your local distributor for more advice.

10. Contact details

Ruskinn Technology Limited

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