Detailed Specification

Whitley H45 Hypoxystation

Statements in red in the Detailed Specification contain features and/or benefits which we believe are unique to Don Whitley Scientific.

1. Introduction

The Whitley range of modified atmosphere workstations combines advanced ergonomics, contemporary aesthetics and superb atmospheric control. The Hypoxystation has been developed for the study of cells under hypoxic and anoxic atmospheric conditions. Nitrogen, carbon dioxide and compressed air can be combined to provide a specific atmosphere when the unit is operated in hypoxic mode.

The component gases can be adjusted in the following ranges:
O_2 - 0-20% in increments of 0.1%;
CO_2 - 0-15% in increments of 0.1%;
N_2 - Balance.

2. Capacity

The workstation has a 12 litre airlock and a 439 litre main chamber.

3. Construction Material

All acrylic structures incorporated within Whitley Workstations are produced by specialised acrylic fabricators employing skilled craftsman with many years of relevant experience. The fabricated acrylic chamber at the heart of every Whitley Workstation is annealed (heat treated) at least twice during manufacture. The chamber is manufactured from a combination of 6mm and 10mm acrylic for structural stiffness and optical clarity. The annealing process relieves the stresses induced in the structure as a natural consequence of machining, forming and polishing acrylic. All annealing is carried out in strict accordance with procedures laid down by the suppler/manufacturer of the acrylic sheet in a UKAS-calibrated annealing oven which is temperature mapped annually. These tests are traceable to national standards. The individual temperature process profile for the final annealing cycle of every completed chamber is recorded, printed and supplied to us with the chamber by our acrylic fabricator. These results, together with other production records, are filed in our archives for a minimum of five years.

Whitley Workstations are provided with a lifetime guarantee against faulty design or workmanship.

Other workstation components are manufactured from a variety of materials including mild steel, aluminium, stainless steel, brass and polyurethane. Each material and industrial process has been carefully selected according to the function of the component.

4. Size

Physical dimensions: 1660mm x 710mm x 720mm (L x H x D). Incubation area: 1272mm x 430mm x 400mm (L x H x D). The internal shelf divides this space into two areas, both 215mm high.

5. Gas Requirements

Gas inlets for the following gases are located at the back of the workstation: compressed air, carbon dioxide from a vapour withdrawal cylinder and oxygen free nitrogen.

Input pressures for all gases are:
Minimum 4 bar (60psi);
Maximum 6 bar (90 psi).

The possible percentage concentration of carbon dioxide is a function of the percentage of oxygen selected. Carbon dioxide (0% - 15%) and oxygen (0% - 20%) can be selected. There must be a minimum of 80% nitrogen in the system and the balance can be split between O_2 and CO_2.

When there is a requirement to operate the Hypoxystation anoxically, connect an anaerobic gas mix cylinder (10% H_2, 5% CO_2 and 85% N_2) to the workstation via the supplied adaptor and install palladium catalyst. In the presence of the catalyst, any oxygen present in the workstation atmosphere will be removed by combining with hydrogen to produce water.

6. Gas Alarms and Control System

All alarms are displayed clearly on the touch screen panel.

7. System Operation:

7.1 Humidity Control

A fully automatic de-humidification system is fitted. It does not require any operator intervention. The level of humidity in the chamber is controlled using a humidity sensor in conjunction with a condenser plate. The condenser plate is chilled using a Peltier thermoelectric cooling device. A pump controlled by a timer runs periodically for a set duration and transfers any condensed water to an external reservoir for evaporation.

7.2 Temperature Control

The operating temperature of the workstation can be set between 5°C above ambient and 45°C by adjusting the set point value. Detailed instructions are contained within the User Manual, which is supplied to you at the time of installation. Both the working and storage areas of the chamber are temperature controlled with an impressively low temperature gradient throughout. This allows the full internal chamber volume to be used for incubation if desired. A separate, small internal incubator with a maximum operating temperature of 60°C is available as an optional extra.

7.3 Sample Manipulation

All Don Whitley Scientific workstations are designed to provide incubation areas and generous working spaces. The advanced ergonomic design ensures that good laboratory practice can be carried out with maximum user comfort.

8. Integral Airlock

This Hypoxystation is equipped with an integral 12 litre airlock. The airlock is used as the means of transferring up to 44 x 96 well plates or 84 x T25 culture flasks and other small objects quickly and efficiently to and from the chamber without any loss of internal chamber atmospheric conditions. An airlock cycle takes just 60 seconds to complete. A comprehensive system of interlocks prevents accidental loss of internal conditions in the chamber. There is no risk of compromising conditions.

The maximum cuboid that can be introduced into the chamber via the airlock is 197mm wide x 197mm deep x 190mm high. The front face of the airlock is inclined at an angle of 10° away from the user. This means that the front to back floor dimension is greater than the front to back ceiling dimension. The diagonal length at floor level is potentially of considerable interest to users who want to transfer pipettes and similar items. This dimension is 356mm. We apply a small tolerance to these figures so it could be that a particular item can be transferred even if it is slightly larger than the sizes quoted.

9. Humidification System

There is an option to purchase an automatic humidification system. This option will provide a responsive, accurate, sterile source of humidity without the need for open trays/containers of water in the workstation to increase humidity. The automatic humidification system does not increase the maximum level of humidity that can be achieved but will maintain the setpoint humidity level very accurately.

10. Removable Front

A removable front with conventional, oval sleeved ports can be specified on this Workstation. This facilitates thorough cleaning and the introduction and removal of bulk quantities of samples and larger pieces of equipment for use in the workstation. The front is removed without the use of tools and all small parts remain attached so there is nothing to misplace or lose.

11. Touchscreen Control

Operating conditions are configured and maintained by an intelligent, programmable logic controller in conjunction with an intuitive touch screen interface. The touch screen interface displays the status conditions of all controlled parameters and also allows the user to change operating parameters to suit specific test conditions. Alarm conditions are clearly displayed and PIN code controlled user access levels protect user adjustable parameters.

12. Porthole System

This workstation features one Whitley Instant Access Porthole and two patented, oval ports fitted with sleeves and cuffs, which provide considerable freedom of movement and operator comfort. The atmosphere in each sleeve is removed and replaced with nitrogen.

13. PLC

Incorporating such an advanced and intelligent programmable logic controller enables reliable control and accurate, fast monitoring of the workstation conditions.

14. **Oxygen Profiling with Data Logging**
    This option allows the user to record the data from the environmental parameters inside the workstation AND allows the user to pre-programme different oxygen levels. The user can determine how long the workstation atmosphere remains at a particular oxygen level and when to adjust to higher or lower oxygen concentrations.

15. **Automatic Sleeve Gassing**
    This optional feature ensures cost-effective gas usage and that internal conditions are maintained throughout the entry and exit process.

16. **Cable Glands**
    Cable glands allow cables and probes to be introduced into the chamber without compromising internal conditions. A spare, small cable gland is fitted as standard with a clamping range between 3 - 7mm in diameter. A larger cable gland (with a clamping range of 18 - 25mm in diameter with reducer) is also available. Within reason, any number of small or large cable glands can be incorporated. If additional cable glands are required, they must be discussed and specified at the time of order.

17. **Single Sample Entry System**
    This workstation has the option of two types of single sample entry system, ideal for quickly introducing culture flasks, Petri dishes and other small items. The 15cm 'Letterbox' is positioned on the left hand side of the chamber. Allow an additional 200mm working clearance if this option is fitted. A 9cm front loading letterbox can also be specified, which is retrofittable if the unit has a removable front.

18. **Remote Access/Ethernet Enabled**
    This workstation is Ethernet-enabled for remote access to the touchscreen control panel. This allows you to log into your workstation when you are away from the lab and manipulate the parameters, ie temperature, humidity, oxygen and carbon dioxide levels. This feature also allows DWS engineers to log into your workstation remotely to assess the situation should a fault occur. They will then be able to provide instant feedback and avoid any unnecessary downtime.

19. **Single Point Temperature Calibration**
    This is essential when a laboratory must demonstrate that temperature performance could directly or indirectly affect results. It provides independent, UKAS-accredited testing and supporting certification. It also confirms, through measurements taken from a single position within the workstation incubation area, using a calibrated temperature probe traceable to national standards, that the workstation temperature is controlled and displayed within specified tolerances. Factory-based or on-site test.

20. **Multi-Point Temperature Mapping**
    This is essential when a laboratory must demonstrate that temperature performance could directly or indirectly affect results. It provides independent, UKAS-accredited testing and supporting certification. The process comprises calibration of the workstation temperature sensor and a comprehensive temperature profile of the entire working and incubation area. Data is collected from up to 12 sensors, traceable to national standards, positioned throughout the workstation chamber. This is preferably a factory-based test but it can be performed on-site if necessary.

21. Oxygen Sensor Calibration

The oxygen sensor is positioned in accordance with the manufacturer's recommendations and is not removed for calibration. Keeping the sensor within a stable environment and not subjecting it to frequent changes in humidity and temperature prevents the risk of condensation forming on the sensor, which could affect system sensitivity and accuracy.

The calibration routine takes only seven minutes to complete. DWS recommends calibration is conducted every two weeks, however, users may calibrate the oxygen cell as often as they wish.

Readings are taken at two points – 0% oxygen and 20.9% oxygen levels. Full training, confirming how easy the calibration routine is to perform, is provided as part of the workstation installation procedure.

Don Whitley Scientific guarantees oxygen sensors for two years.

22. Spotlight Option

The Whitley LED Spotlight option provides directional lighting to assist specimen examination. It is mounted on a small pod on the left hand side of the chamber. The on/off switch is also located on this pod.

23. Chilled Incubation Compartment

If you need to store small quantities of media and samples in low oxygen conditions at lower than ambient temperatures, you can now specify an optional Chilled Incubation Compartment for this workstation. This insulated compartment is located on the left hand side of the workstation and is accessed from the main chamber. When you open the comparment door, the plate carrier basket swings outwards to allow easy access. It has a capacity of 10 x 90mm Petri dishes or items of a similar size.

The temperature in the Chilled Incubation Compartment can be easily adjusted, in 0.1°C increments, via the workstation's colour touchscreen. The operating temperature range is between +12°C and +25°C and the temperature distribution within the compartment is within 2°C*. This option must be specified at time of order as it is a factory-fitted modification. Please note that the location of the Chilled Incubation Compartment means that this product cannot be fitted to a Hypoxystation fitted with the optional Humidification System.

*Laboratory and main chamber temperatures may influence the upper and lower temperature levels that can be achieved.

24. Customer Specific

Whatever your application, we can tailor your workstation to your requirements. For example, if you want to be able to use electrical equipment inside the chamber, you could include the option of an internal double electrical socket. If you require under shelf storage trays, we can supply 1 or 2 units and if you want to be able to quickly introduce individual Petri dishes, tissue culture flasks or multi-well plates, you could specify a 'Letterbox'. We are always pleased to discuss your requirements.