

Hypoxia/Cell Culture Workstations









01 Our Credentials

Don Whitley started his career in microbiology and haematology laboratories, before moving into the sale of laboratory products. This experience helped him to develop novel ideas for improving the working life of scientists through the use of labour-saving equipment and automated solutions, leading to the formation of Don Whitley Scientific Limited in 1976.

We continue to design, develop and manufacture our products in the UK and have been granted patents for many of our innovations. We now offer a range of controlled atmosphere workstations for cultivation of mammalian cells under physiologically appropriate conditions of normoxia or hypoxia. This product line has recently been enhanced by the introduction of our internal HEPA filtration system, which combines precise atmospheric control with cleanroom conditions for cell culture.

Our product range has been sold in over 50 countries through our worldwide network of distributors.

For more information on any of our additional services, please contact us: +44 (0)1274 595728 or sales@dwscientific.co.uk

Top right: Don Whitley Chairman & Founder receiving his honourary doctrate.









Our greatest assets are our satisfied customers...

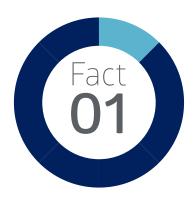
I bought a Whitley Workstation when I worked in London. I was so pleased with the product that when I moved to Denmark, I ordered another one. It is a beautifully well thought through and reliable product – it simply does what it says it does.

Janine Erler, Biotech Research and Innovation Centre, University of Cophenhagen, Denmark.

The precise control of oxygen tension by the H35 has improved the quality of our results considerably. Also, a previous instrument I used did not have the facility to programme cycling oxygen tensions, so the H35 has opened up a new avenue of research for us.

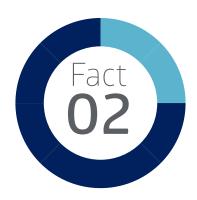
Dr Dan Tennant, Hypoxia and Metabolism Group, School of Cancer Sciences, University of Birmingham.

O3 Unique Innovations



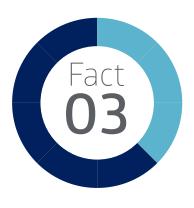
Oval Sleeved Ports

Patented oval, sleeved ports allow greater freedom of movement and operator comfort. This system allows you to work gloved or bare handed.



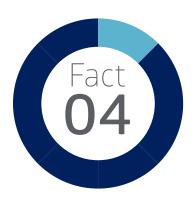
Colour Touchscreen

Intuitive full colour touchscreen that is ethernet-enabled for remote access. The touchscreen 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.



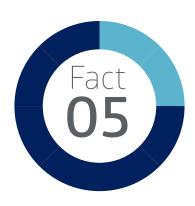
HEPA Filtration

In the Whitley HEPA Filtration System all the atmosphere in the chamber passes through the filter hundreds of times an hour, quickly creating and maintaining a particlefree environment. The HEPA system exceeds the requirements stipulated by ISO 14644 (Class 3), as referenced in the Cell Tissue Culture Directive. or Class 1 of US Federal Standard 209E. Unlike some other systems, DWS integrates the filter within the workstation. Because the warm. moist atmosphere isn't pumped to an external filter, the filter does not become saturated with condensate and thus rendered ineffective.



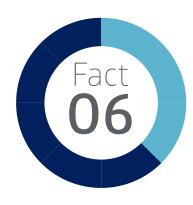
Automatic Humidification

The Automatic Humidification System provides a sterile source of humidity without the need for the user to increase the humidity by adding open trays/containers of water to the workstation. The automatic humidification system does not increase the maximum level of humidity that can be achieved but will increase the humidity very quickly and does so without contaminating the atmosphere.



Whitley Removable Front

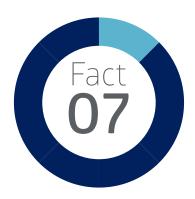
This feature allows for thorough cleaning and the transfer of bulk samples and equipment. With swing latches that are turned 90° - and don't need to be removed – it's very easy to attach and detach the Whitley Removable Front. There are no parts to store (or lose!) or that can be overtightened.



Data Download/Traceability

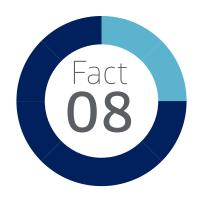
There is an option to purchase data logging software for all Whitley Hypoxystations. This feature allows the recording of temperature, humidity and chamber pressure conditions for traceability and reference. The information is displayed on the touch screen in graphical format. The recorded data can be downloaded in only 10 seconds via the USB interface to a memory stick and exported to our bespoke, pre-formatted spreadsheet software.

05 Unique Innovations



Oxygen Profiling

This option allows the user to preprogramme different oxygen levels. The user can determine how long the Hypoxystation atmosphere remains at a particular oxygen level before being automatically adjusted to higher or lower concentrations. Oxygen sensing is in real time with no delay as the sensor is inside the chamber.



Internal Oxygen Sensor

O2 sensing, monitoring and control are key components of accurate atmosphere control in a hypoxic workstation. The Hypoxystation has an integrated O2 sensor located in the incubation chamber, under the same environmental conditions as your cell cultures and other samples. This allows for a precise, real-time feedback system that constantly monitors the internal atmosphere. Hypoxystations can quickly respond to any changes to ensure user settings are accurate and reproducible. Having an integrated O2 sensor eliminates the need to extract a gas sample and pump it to an external or remote monitoring system for evaluation.





H25 Touchscreen

H25 Airlock



integrated gas mixing.

With a main chamber capacity of 180 litres but a small

FEATURES

- A 6 litre airlock: a cycle takes just 20 seconds
- Control oxygen in 0.1% increments up to 20%; carbon dioxide in 0.1% increments up to 15%; and relative humidity up to 80%.
- New style oval ports where the door folds flat into the chamber floor, taking up no extra space in the workstation itself
- Data logging option allows the downloading of data to a memory stick in seconds
- A side loading single sample entry system is available
- A variety of options and accessories are available to tailor your Hypoxystation to your specific needs.
- Ethernet enabled for remote access to touchscreen.

O5 Whitley **H35** Hypoxystation

The H35 Hypoxystation creates hypoxic and anoxic conditions within a controlled and sustained workstation environment. It is ideal for cell and tissue culture researchers wanting to accurately control oxygen, carbon dioxide, temperature and humidity.

This Hypoxystation has a generous 300 litre capacity and a colour touchscreen control panel for ease of use and for the visual display of parameters.

FEATURES

- Control $\rm O_2$ in 0.1% increments up to 20%; $\rm CO_2$ in 0.1% increments up to 15%; and RH up to 80% for flexibility in your research and confidence in your results.
- Colour touchscreen control panel for ease of use and for visual display of parameters including airlock cycle status.
- Integral 12 litre airlock accommodates up to 44 x 96 well plates or 7 x 500ml Duran bottles and completes a cycle in only 60 seconds.
- The optional HEPA model is fitted with the unique Whitley Internal HEPA Filtration System where all the atmosphere passes through the filter hundreds of times an hour, cleaning the chamber environment quickly. Exceeds the level of atmosphere cleanliness stipulated by Class 3 of ISO14644.
- Gas mixing achieved instantly via a unique, fully integrated control system – rapidly create your selected environmental conditions and minimise bench space required.
- Easy, accurate, 2-point oxygen sensor calibration.







Data download









Room to work and incubate



eliminates cellular stress linked to variations in temperature, pH levels and oxidation – resulting in better cell lines. The Whitley Instant Access Port and has a 450 litre capacity. The 12 litre airlock will accommodate a variety of pipettes, culture

FEATURES

- Control O₂ in 0.1% increments up to 20%; CO₂ in 0.1% increments up to 15%; and RH up to 80% for flexibility in your research and confidence in your results.
- The H45 is also available as an H45 HEPA, equipped with the Whitley Internal HEPA Filtration System. All the atmosphere inside the chamber passes through the filter hundreds of times an hour, which ensures the chamber environment is cleaned quickly.
- Additional HEPA filters can be fitted to reduce the possibility of bacteria contained inside workstations being released via the main chamber exhaust valve and the airlock exhaust valve.
- With three ports you have convenient access to the entire incubation and working areas.
- Fitted with a removable front to allow for thorough cleaning and the transfer of bulk samples and equipment for use in the Hypoxystation.
- Available with a fully automatic humidification system so you can add moisture while maintaining a sterile environment.

07 Whitley H85 Hypoxystation

Used for a variety of cell culture applications, the H85 Hypoxystation accurately controls O_2 , CO_2 , temperature and humidity to create hypoxic and anoxic conditions. It has a large 295 litre capacity and a very generous airlock. This workstation is available with an optional refrigeration unit designed to operate at 8°C (although other set temperatures are available if required). The H85 is ideal for use in university laboratories, hospitals and cancer research facilities

FEATURES

- Control O₂ in 0.1% increments up to 20%; CO₂ in 0.1% increments up to 15%; and RH up to 80% for flexibility in your research and confidence in your results.
- Fitted with patented, oval ports that act as mini airlocks so you can transfer flasks at the same time as you enter or withdraw from the chamber.
- Features a large 30 litre, integral airlock internal dimensions: 295 x 295 x 350mm (w x d x h).
- Colour touchscreen control for ease of use and visual display of parameters such as temperature and humidity.
- Ethernet-enabled for remote access.
- Gas mixing achieved instantly via a unique, fully integrated control system - rapidly create your selected environmental conditions and minimise bench space required.
- Option of 3 different types of single sample transfer system.
 Please see pages 11-12 for a full list of features and options.



Refrigeration Unit



H85 Touchscreen









H95 Porthole System



The Whitley H95 Hypoxystation has been designed specifically for researchers requiring the ability to accurately control O₂, CO₂, temperature and humidity. It allows the user to control O₃, in 0.1% increments from 0.1% up to 20%; control CO₂, in 0.1% increments from 0.1% to 15%; carry out straightforward calibration of the oxygen sensor; control temperature between 5°C above ambient and 45°C; and to control relative humidity at 80% RH or higher. The airlock is fitted with an automatic internal door and provides an easy and rapid method for the transfer of up to 133 x 96 well plates or 252 x T25 culture flasks from the laboratory to the workstation.

FEATURES

- The H95 has a chamber capacity of 600 litres and an airlock capacity of 30 litres
- Colour touchscreen interface allows easy monitoring of all parameters simultaneously
- Multifunctional porthole system with 2 pairs of ports so can be used by 2 users at the same time
- Each port acts as a mini airlock to transfer small items of lab ware
- Patented oval gloveports to allow bare handed or gloved operation and maximum comfort in use
- Automated de-humidification as standard
- Ethernet enabled for remote access to touchscreen
- A wide range of options and accessories to tailor the system to your particular working conditions.

O9 Whitley **H135** HEPA Hypoxystation

The H135 HEPA is the tallest, widest, deepest hypoxic chamber in the Whitley range. It has a usable internal volume of almost 600 litres and can accommodate a variety of items of equipment such as live cell imaging devices, microscopes, plate readers, etc. The generous internal height facilitates easy pipetting. All cell manipulations can be performed without removing them from your required hypoxic conditions. Providing precise environmental control whilst leaving plenty of room to work, incubate and conduct analysis.

FEATURES

- Large removable front fitted with either two or three ports.
- Fitted with the Whitley Internal HEPA Filtration System as standard.
- Optional Enhanced Biological Containment.
- Two optional 'chilling' systems: to remove heat created by instrumentation in the chamber or to cool the atmosphere to less than 10°C.
- 12 litre airlock no risk of compromising conditions inside the chamber (and it's flushed with nitrogen as an additional cost saving).
- As with some of our other Hypoxystations, the option of being connected to a Whitley i2 Instrument Workstation.
- Precise control of O₂, CO₂ and N₂.
- Automated O₂ calibration.
- · Bespoke trolley included.







Removable Front







Transfer Tunnel

Integral Incubator



The Whitley i2 Instrument Workstation enables scientists to use Seahorse Extracellular Flux (XF) Analysers in hypoxic conditions. The i2 has been developed specifically to meet the precise requirements of the XF Analyser. This workstation can be used as a stand-alone unit or connected to a Whitley Hypoxystation via the Whitley Transfer Tunnel, enabling preparation of cell lines under hypoxic conditions and their transfer directly into the i2 without exposure to air. Another unique feature is the integral incubator, which enables you to precondition cellware and incubate plates and media at 37°C under the same atmospheric conditions as the XF Analyser.

FEATURES

- Maintains an internal temperature no higher than 28°C, excludes carbon dioxide and provides precise oxygen control.
- Equipped with a generous working area in which to conduct preparatory work and supplied complete with removable front, internal mains sockets and a wireless footswitch to control the patented oval ports.
- 12 litre airlock, with a cycle time of just 60 seconds, accommodates up to 44 x 96 well plates or 84 x T25 tissue culture flasks plus numerous other flasks, pipettes and laboratory consumables.
- An integral 37°C incubator that can accommodate up to 8 x 96 well plates.
- The combination of a Whitley i2 Instrument Workstation and Seahorse XF Analyser permits simultaneous, real-time analysis of mitochondrial respiration and glycolysis in mammalian cells under precisely controlled hypoxic conditions.

Features	Whitley H25 Hypoxystation	Whitley H35 Hypoxystation	Whitley H45 Hypoxystation		
Chamber Volume	180 litres	300 litres	439 litres 12 litres 1 Instant Access + Manual CO2 / Air / N2 Wireless		
Port / Airlock Capacity	6 litres	12 litres			
Porthole System	Manual	Manual			
Gas Supplies	CO2 / Air / N2	CO2 / Air / N2			
Footswitch	Wireless	Wireless			
Auto Sleeve Gassing	0	0			
Internal Mains Socket	0	0	0		
Storage Trays	0	0	 ○ ○ ○ ○ - ○ 60 seconds ○ ○<!--</td-->		
Lighting	•	•			
Inspection Lamp	0	0			
Single Sample Entry	0	0			
O2 Profiling	0	0			
CO ₂ Monitoring	•	•			
Refrigeration					
Data Logging	0	0			
Airlock Cycle Time	20 seconds	60 seconds			
Extra Cable Glands	0	0			
HEPA Filtration		-			
Vacuum Take-off	0	0			
Automatic Dehumidifier	•	•	•		
Automatic Humidifier		0	0		
Chilled Incubation Compartment		0	0		
Removable Front		0	0		
Workstation Trolley		0	0		
Remote Access	•	•	•		
Dimensions w/d/h (mm)	790 / 720 / 710	1255 / 720 / 710	1660 / 720 / 710		
Weight (lbs/kg)	163 / 74	231 / 105	295 / 134		
KEY:	Fitted as standard	Option available	- Not applicable		

Whitley H85 Hypoxystation	Whitley H95 Hypoxystation	Whitley H135 HEPA Hypoxystation	Whitley i2 Instrument Workstation	Features
295 litres	600 litres	600 litres	600 litres	Chamber Volume
30 litres	30 litres	17 litres	12 litres	Port / Airlock Capacity
Manual	Manual	Manual	Manual	Porthole System
CO2 / Air / N2	CO2 / Air / N2	CO ₂ / Air / N ₂	Air / N2	Gas Supplies
Wireless	Wireless	Wireless	Wireless	Footswitch
0	0	0	0	Auto Sleeve Gassing
0	0	•	•	Internal Mains Socket
-	-	0		Storage Trays
•	•	•	•	Lighting
-	-	0	0	Inspection Lamp
0	0	0	0	Single Sample Entry
0	0	0		O2 Profiling
•	•	•		CO2 Monitoring
0	-	0	0	Refrigeration
0	0	0	0	Data Logging
3.5 minutes	3.5 minutes	60 seconds	60 seconds	Airlock Cycle Time
0	0	0	0	Extra Cable Glands
-	-	•		HEPA Filtration
0	0	0	0	Vacuum Take-off
•	•	•	-	Automatic Dehumidifier
-	-	0	-	Automatic Humidifier
-	-	0	-	Chilled Incubation Compartment
-	-	•	•	Removable Front
0	0	0	0	Workstation Trolley
•	•	•	•	Remote Access
1570 / 760 / 840	2415 / 760 / 840	1452 / 1056 / 993	1702 / 825 / 1863 (including trolley)	Dimensions w/d/h (mm)
330 / 150	507 / 230	386 / 175	286 / 130	Weight (lbs/kg)

13 The Fastest Oxygen Control on the Market

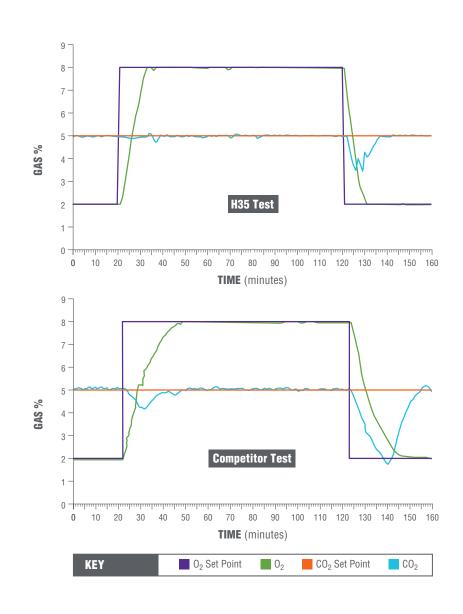
If you need a workstation that responds rapidly to changes in oxygen set point, read on. We have conducted tests that lead us to believe that no other manufacturer's hypoxic workstations are able to offer the same accuracy and speed of response to set point changes as those achievable in Whitley Workstations.

The Whitley Hypoxic Workstations allow the control of oxygen concentration in 0.1% increments over the range 0 to 20% and the control of carbon dioxide concentration in 0.1% increments over the range 0 to 15%. Unlike workstations produced by some other manufacturers, the sophisticated control mechanisms used in Whitley H range workstations allow the selected gas mixture to be rapidly and accurately attained and adjusted.

To document the speed with which atmospheric oxygen concentrations can be changed in an H35 workstation, we conducted tests in our own laboratory and used the workstation's data logging facility to record the results during the test period.

These graphs demonstrate that the Whitley H35 Hypoxystation responds very rapidly to changes in oxygen set point. Due to the influx of gas (air or N_2) after a change in O_2 set point, there is an inevitable brief, temporary decrease in CO_2 concentration. However, the H35 control mechanisms ensure that this decrease is minimised and the original CO_2 set point is regained quickly. Furthermore, this accuracy is achieved over the full range of operating conditions, including very low oxygen concentrations (0.1 to 1.0%).

We recommend that anyone considering the purchase of an apparently similar workstation should request equivalent oxygen control data from the manufacturer for comparative purposes.



Whitley Media Conditioner 14





Dissolved oxygen levels in liquids are not necessarily the same as in the surrounding atmosphere. When a cell culture medium is taken from ambient air into any hypoxia workstation it can take a surprisingly long time for its dissolved gases to reach equilibrium with the surrounding modified atmosphere. It can be very frustrating for researchers to need to leave media to condition for up to 24 hours before use.

Scientists conduct their studies in hypoxia workstations to allow tight control of the conditions under which cells are cultured, and to avoid exposing their cells to elevated oxygen concentrations even briefly. However, these cells may be unintentionally exposed to excess oxygen during media changes, if the fresh media has not previously been equilibrated with the incubation atmosphere.

Now you can equilibrate media rapidly – and ensure even greater accuracy in your research.

The Whitley Media Conditioner can equilibrate up to 400 ml of liquid media in about 60 minutes*. The device fits perfectly into a Whitley Hypoxystation airlock. This allows easy transfer into the chamber environment.

This is a fast, flexible system that will save you considerable time – and is a new tool for improving outcomes in your research.

*Patent applied for

15 HEPA Filtration

Don Whitley Scientific (DWS) can now offer the unique Whitley Internal HEPA Filtration System to provide a high degree of product/sample protection on modified atmosphere workstations. HEPA fitted workstations are ideal for use as part of a pharmaceutical manufacturing process, for the cultivation of slow-growing anaerobes, or for applications requiring complex manipulations under anaerobic conditions (ie biochemical assays).

Using innovative circulation technology, all the atmosphere in the chamber passes through the filter every four seconds, quickly creating and maintaining a particle-free environment (tested down to $0.3\mu m$ – exceeding ISO 14644 Class 3, as referenced in the Cell Tissue Culture Directive, or Class 1 of US Federal Standard 209E).

Unlike some other systems, DWS integrates the filter within the workstation. Because the warm, moist atmosphere isn't pumped to an external filter, the filter does not become saturated with condensate and thus rendered ineffective.

Although DWS workstations are positive pressure devices, this HEPA filtration system provides the highest known level of atmospheric cleanliness of any positive pressure modified atmospheric workstation. Tests have determined that aerosols of bacterial cells and spores are trapped by the system, thereby preventing the contamination of any media present in the workstation.

POTENTIAL USES OF A WHITLEY HEPA FILTERED WORKSTATION:

Use of anaerobic culture as part of a pharmaceutical manufacturing process, which would ideally be conducted under "cleanroom" conditions, ie the growth or manipulation of anaerobes used to produce a vaccine or pharmaceutical preparation. Cultivation of slow-growing anaerobes: HEPA filtration would reduce the risk of contamination by faster growing strains.

Applications requiring complex manipulations under anaerobic conditions (for example, biochemical assays) where anaerobe cultures may be open to the ambient atmosphere for an extended period. HEPA filtration would reduce the risk of contamination under these conditions.

- Cancer Research
- Neurology
- Cardiovascular research
- Stem cell work and many other types of cell culture work



THE EVIDENCE

Tests were carried out in the DWS GLP compliant laboratories on the use of the Whitley HEPA Filtration System within an anaerobic chamber. Two Whitley Workstations were used - one fitted with HEPA filtration, one without HEPA. These tests demonstrated that the system produces a rapid and substantial reduction in bacterial contamination of the atmosphere. Atmoshpere was sampled from three locations - the chamber interior, the location adjacent to the pressure relief valve outlet, and the external atmosphere adjacent to the chamber (in the operator's position). The results confirmed that no bacterial colonies were recovered from any of the sampling points after 2 minutes of the introduction of bacteria by nebulization. The full results of these experiments are shown in the adjacent tables and the paper can be found on our website under Whitley A35 downloads.

https://www.dwscientific.com/whitley-anaerobic-workstations/whitley-a35-workstation

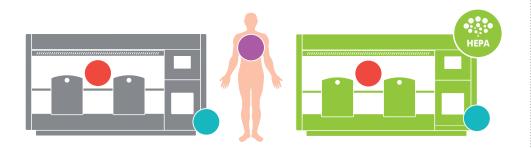


Table 1: Recovery of *K. rhizophila* colonies from standard anaerobic chamber (No HEPA)

	During nebulization (1.9x10° cfu / 5 min)	After nebulization						
Before nebulization		0	2 min	5 min	10 min	15 min	20 min	30 min
0	≥258	≥258	≥258	≥258	≥258	≥258	≥258	≥258
0	≥258	≥258	≥258	≥258	≥258	≥258	≥258	≥258
Before nebulization	During nebulization (1.2x10° cfu/	0	2 min	5 min	10 min	15 min	20 min	30 min
Hebulization	5 min)	After nebulization						

Table 2: Recovery of K. rhizophila colonies from HEPA filtered anaerobic chamber



Table 3: Recovery of C. beijerinckii colonies from HEPA filtered anaerobic chambe

	Before	During nebulization	After nebulization				НЕРА		
	nebulization (3.3)	(3.3x10 ^s cfu / 5 min)		2 min	5 min	10 min	15 min	20 min	30 min
	0	232	8	0	0	0	0	0	0



These complementary services support the design, manufacture and supply of Whitley Workstations.



IN-HOUSE LABORATORY

Scientific support services

It's not every laboratory equipment manufacturer that has its own in-house laboratory with experience in tissue and cell culture, food, water, environmental, pharmaceutical and clinical work.

As well as having developed a great deal of experience culturing in hypoxic conditions, the team of DWS scientists have a key role in new product development.

They are also on hand to help customers with the best practical, productive ways of using products supplied by DWS.

What Can We Do For You?



SERVICE AND MAINTENANCE

Comprehensive service plans

We offer UK customers comprehensive maintenance and repair contracts on a variety of laboratory equipment from many different manufacturers.

We are the only company able to take advantage of training from our in-house colleagues who design and manufacture Whitley products – and, of course, have their day-to-day support.

We also ensure all our engineers have been trained by the manufacturers of any equipment they service.

- Engineer coverage across the UK
- Fast response time
- Stock of parts carried to ensure a first time fix



WORKSTATION POSTER GRANT

You could be entitled to £250

If you have used a Whitley Hypoxystation in your work and can include a DWS logo and a photograph of your Hypoxystation on your scientific poster, let us know and you could be entitled to a grant of £250.

We have a series of travel grants available to those who mention how they use the Hypoxystation in their work. All we ask in return is a copy of your poster so we can use it to help promote the Hypoxystation to others.

If we have a trade stand at the event where you will be presenting your poster, we can provide copies to everyone who visits our stand.



TEMPERATURE MAPPING

On-going compliance

In today's increasingly regulated environment, the need to demonstrate on-going compliance with quality and safety standards is part of laboratory life.

DWS is UKAS accredited to provide temperature mapping of Whitley Workstations, other hypoxic chambers, incubators, ovens, fridges or freezers using up to 12 thermocouples. This is useful when you need to identify any temperature gradients that may be present and need to be avoided when carrying out particularly sensitive incubation tasks.

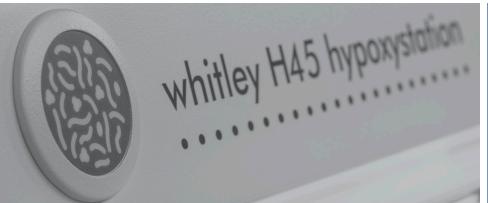
Our on-site service means the work can be carried out at your convenience with prompt supply of certification. If you have a DWS service contract, you can arrange for your temperature mapping to be done at the same time as a routine service or repair work for the most cost-effective price.













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