

# SiHuB Sensor Calibration System



## Calibrate your breath sensor with high accuracy VOC mixtures and humidity regulation

The SiHuB Sensor Calibration System is a cost-effective modular gas calibration system, that creates consistent and controllable mixtures of different gases, including volatile organic compounds (VOCs), in air.

SiHuB uses a flow controller (OFC-1), to combine inputs from one or more integrated vapor generators (V-OVG or OVG-4) and a humidity generator (OHG-4) to create a setup capable of generating mixtures of multiple gases (such as VOCs), with controllable humidity levels, in order to mimic the conditions in which breath sensors would be deployed.

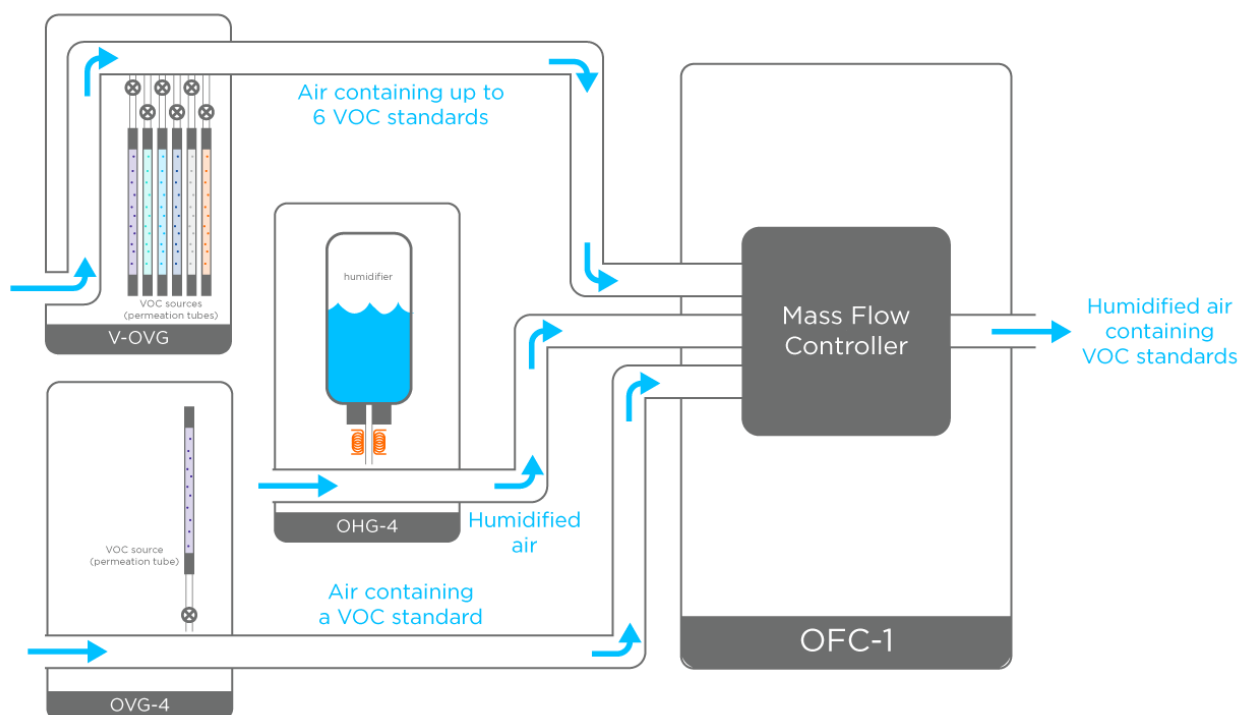
Using permeation tubes to provide the test compounds, SiHuB provides a simple and flexible alternative to using multiple gas cylinders to supply test gas mixtures, while offering greater control over precise gas mixing. SiHuB has been used extensively in combination with VOC analysis technology, such as FAIMS, and is trusted by researchers around the world, working at the cutting-edge of the breath sciences.



*An example SiHuB configuration consisting of an OFC-1, a single OVG-4 and an OHG-4.*

### Key Features:

- Precise and repeatable calibration gas mixes
- Traceable to primary standards
- Concentrations from part per billion to part per million levels



# V-OVG (Vertical Owlstone Vapor Generator) and OVG-4 (Owlstone Vapor Generator)

## Generate low ppb to high ppm gas standards using permeation and diffusion tube technology

V-OVG uses the properties of permeation tubes and/or diffusion tubes to provide controllable concentrations of calibration gases.

The internal permeation oven controls the tube temperature to within 0.1°C over a range of temperatures from 30 to 100°C, ensuring accurate control of permeation rates. The internal mass flow controllers provide a calibrated flow of air or nitrogen through the permeation oven, for precise dilution of the permeating analyte.

Each V-OVG unit is able to simultaneously combine up to six gases, such as VOCs commonly found on breath.



### Key Features:

- High number of available compounds
- Generation of multiple gas mixtures
- Fast and easy sample replacement
- High accuracy and precision, even at low concentrations
- Can replace multiple expensive gas cylinders
- Reduced risk of exposure to dangerous chemicals due to small quantities used
- Elimination of hazards associated with high-pressure cylinders
- Adjustable concentration levels from ppm to ppb
- Superior long-term stability and repeatability

## OVG-4: Generate accurate, repeatable calibration gas standards using permeation tube technology

Looking to generate calibration mixtures using just a single gas? The OVG-4 has capacity for a single permeation tube and has all the other capabilities of the V-OVG.



## How Do Permeation and Diffusion Tubes Work?

Permeation tubes allow the generation of vapor from solid and liquid sources, as well as gases. A small amount of the chemical is sealed inside a short length of plastic tubing. The analyte will permeate very slowly through the walls of the tube, at a rate dependent on the temperature of the tube. A flow of air or nitrogen is then used to dilute and carry away the permeating analyte.

Diffusion tubes work in a similar temperature dependent way, but instead of permeating through plastic, the analyte diffuses straight out of the tube through a hole at the top (which may be covered with a membrane).



Figure 1 - Permeation Tube



Figure 2 - Diffusion Tube

# OHG-4 Humidity Generator

## Generate controlled and relative humidity from 1 - 90%

The OHG-4 is a versatile humidity generator that is used to produce a range of relative humidity concentrations from 1 to 90% ( $\pm 1\%$ ). When combined with other units as part of SiHuB, it can generate a wide range of vapor standards, suitable for calibration of sensors, especially gas sensors.

In the OHG-4, the airflow is controlled by a mass flow controller. A flow suitable for the application is set using the front panel Wet Air Flow control, this controls the mass flow controller (MFC). Downstream of the MFC the airflow is split into two flow paths, the first of which bubbles through the water reservoir. Downstream of the reservoir the two flows are recombined. The ratio of the two needle valve settings controls the humidity of the output air.



Technical Specification			
	<b>OVG-4</b>	<b>V-OVG</b>	<b>OHG-4</b>
Technology	Permeation Tubes	Permeation and diffusion tubes	
Available Analytes	>500 including VOCs, environmental gases, explosive and CW agents and simulants	>500 including VOCs, environmental gases, explosive and CW agents and simulants	
Computer Communications	RS-485 optional	RS-485 optional	
Dimensions	H 262mm, W 142mm, D 260mm	H 262mm, W 142mm, D 260mm	
Sample Outlet Connection	1/8" Swagelok compression fittings	1/8" Swagelok tube	1/8" Swagelok compression
Sample Outlet Flow Rate Range	50-500ml/min	20-250 ml/min	
Exhaust Connection	1/8" Swagelok tube	1/4" Swagelok Tube	
Exhaust Flow Range	0 ml/min to > 3000 ml/min	0-3000 ml/min	
Exhaust Pressure	< 30 psi	<30 psi	
Inlet Gas	Regulated Air / Nitrogen. Free from impurities, -35°C dew point	Regulated nitrogen/air, free from impurities, -35°C dew point	Air/nitrogen
Inlet Connection	1/4" Swagelok quick connect	1/4" Swagelok quick connect	1/4" Swagelok quick connect
Inlet Pressure	40 psi	40 psi	40psi
Output Concentrations	ppb-ppm	Low ppb/ppt - high ppm	
Oven Diameter	10mm	40mm	
Oven Temperature	35-100°C	30-100°C±1°C, in 0.1°C increments	
Current rating			0.5A
Fuse			T1AH250V
Humidity, lower limit			-1%rh, lower limit dependant on customer
Humidity, upper limit			No less than 90%rh
Wet gas outlet flow range			300-3000ml.min-1

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