

TRACE GAS CALIBRATION SYSTEMS

GAS CALIBRATION UNIT



GAS CALIBRATION

ZERO AIR GENERATION

- > Simple, automated calibration
 - > Built-in gas standard
 - > Portable, stand-alone device
 - > Particularly suited for use with PTR-MS

GAS CALIBRATION UNIT (GCU)

For most analytical detection systems, calibration is the standard practice to ensure accurate quantification of target substances. However, the generation of precise concentrations at trace gas levels can be a demanding task.

IONICON's Gas Calibration Unit (GCU) is a dynamic gas dilution system that provides defined, controllable concentrations of different VOCs in an ultra-clean carrier gas stream. This allows for accurate calibrations and also provides simple monitoring of the instrument's performance for quality control.

The GCU has been designed as a stand-alone device for use with all analytical VOC instruments but is especially suited to calibrate IONICON PTR-MS devices.

SPECIFICATIONS

- Calibration range 0.2 – 100 ppbv (with 1ppmv gas standard)
- Dilution range 1:5000 – 1:9 (standard gas flow : dilution flow)
- Zero-air flow 0.18 – 2.00 l min⁻¹
- Humidity range 25 – 95 % RH at ambient temp up to 100% at 37°C (advanced version)
- Calibration gas via an internal, refillable 6 l canister or via an external gas cylinder
- CO₂ admixing 0–10 % (advanced version only)
- Control Ethernet interface with GCU control software
- Full automation
- Dimensions 61 x 47 x 53 cm (W x H x D)
- Weight 40 kg

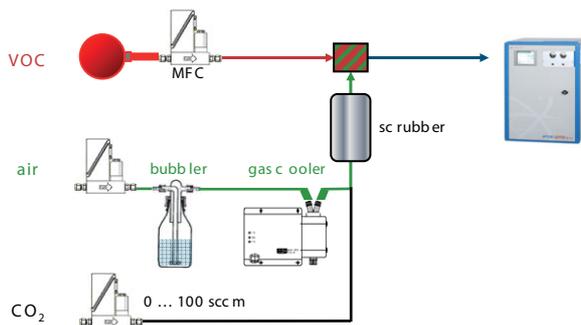
GCU
STANDARD

GCU
ADVANCED

GAS CALIBRATION UNIT

GAS CALIBRATION UNIT (GCU)

The IONICON Gas Calibration Unit (GCU) generates clean air mixed with defined flows of a standard gas. This results in a gas stream containing precisely defined trace concentrations of the volatile organic compounds (VOCs) required for calibration. Furthermore, the humidity and CO₂ content of the gas can be adjusted to resemble sample gas conditions.



CLEAN 0-AIR GENERATION

Ambient air (drawn in by an internal pump) or cylinder gas (e.g. synthetic air or N₂) may be used as the GCU carrier gas for dilution. The gas is regulated to a constant, known flow-rate and passes through an air-cleaning system (catalytic scrubber) that efficiently removes VOCs present in the carrier gas flow. Thus a VOC-free gas (0-air) is generated, which can also be used for background determination or rinsing.

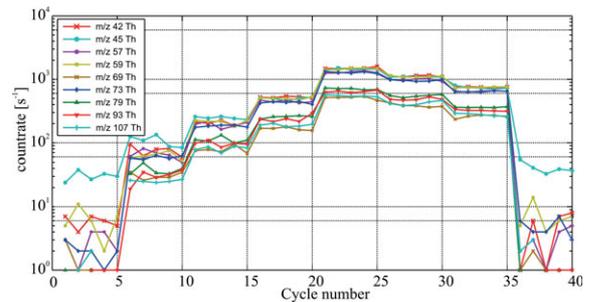
HUMIDITY & CO₂

To test the influence of the humidity of the gas sample onto the detection efficiency of the instrument, the GCU allows to adjust the humidity of the carrier gas by a combination of a water bubbler and a gas-cooler. Alternatively the humidification system can be bypassed for calibrations at ambient-air humidity.

To fully mimic the sample gas conditions of biological samples (such as exhaled breath or fermentor off-gas) up to 10% of CO₂ can be admixed to the carrier gas stream.

CALIBRATION MEASUREMENT

For calibration a VOC standard gas is mixed to the 0-air gas stream at a controlled flow-rate. By varying this flow, different concentrations of the target compounds can be established within the carrier gas stream.



Raw data of a typical calibration measurement.

VOC CALIBRATION GAS

The use of inert, passivated materials for gas-lines and flow controller of the GCU greatly reduces adhesion of organic compounds. Calibration gas may be taken either from any external gas standard connected to the GCU or from the internal gas canister (offered for purchase with the GCU). This makes the GCU a compact, portable solution for trace gas calibration.

IONICON provides a refillable gas standard which can be installed in the GCU. This mixture contains 18 VOCs with relevance in a broad range of PTR-MS applications: Formaldehyde, Methanol, Acetonitril, Acetaldehyde, Ethanol, Acrolein, Aceton, Isoprene, Crotonaldehyde, 2-Butanone (MEK), Benzene, Toluene, o-Xylene, Chlorbenzene, alpha-Pinene, 1,2-Dichlorbenzene, 1,2,4-Trichlorbenzene.

SOFTWARE CONTROL

The easy to use GCU Control software allows to set all parameters and to run automated calibrations. Users of IONICON PTR-MS systems benefit from completely automated calibration measurements including data evaluation.

The GCU offers several options for advanced users, such as the simple integration into custom software and composite calibration sequences, and also the realization of complex setups using an auxiliary external valve.