

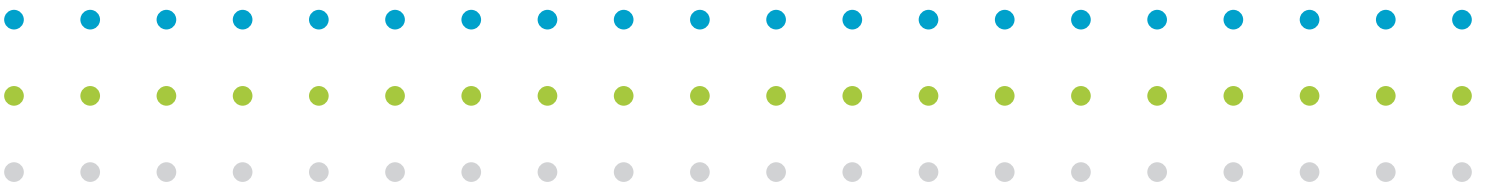


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PRODUCT CATALOG 2024



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# INSTRUMENTS FOR BIODEGRADATION MEASUREMENTS

SOLID / LIQUID / AEROBIC / ANAEROBIC

Respirometer is a device that measures respiration of living organisms. Respirometer determines aerobic or anaerobic biodegradability of solid, liquid and algae samples in various applications. The system measures O<sub>2</sub> and CO<sub>2</sub> concentration in flow through the sample under controlled conditions. Flow, temperature, pressure, humidity are also measured continuously. Software automatically calculates **CO<sub>2</sub> production** and **biodegradation %**. Additional gases can also be measured.

## Applications

- **ISO 14855-1, ASTM D 5338** - Aerobic biodegradability of plastics in compost;
- **ISO 14852** - Biodegradability of plastics in aqueous medium;
- **ISO 17556** - Biodegradability of plastic materials in soil;
- **ASTM D6691** (marine tests), **OECD 301 B**, etc;
- Sea and lake sediment biodegradability tests;
- Sludge measurements;
- Organic waste biodegradation measurements;
- Insects and small animals respirometry;
- Food respiration, R&D in plastics, biotechnology, ecology, pharmacy, packaging, etc;
- **C13 Isotope** measurements (with additional  $\delta^{13}\text{C}$  analyzer).

## Advantages

- Modular design (upgradable);
- On-line biodegradation measurements;
- Plug & Play system;
- Aerobic or anaerobic measurements;
- 12 / 24 / 36 / 48 / 60 channel systems;
- Laboratory or industrial use;
- MFC (mass flow controller) for each channel;
- Various flow configuration;
- Flow leakage alarm;
- Automatic humidification;
- Multitube cable connections;
- Customizable;
- O<sub>2</sub> and CO<sub>2</sub> sensors installed;
- Optional sensors: CH<sub>4</sub>, H<sub>2</sub>S, H<sub>2</sub>, NH<sub>3</sub>;
- Temperature range +3°C - +70°C;
- Air source (compressor) included;
- Internal air supply connection;
- Various sizes of vessels;
- Vessels with illumination;
- No special connections required;
- Remote control software;
- Data export in MS Excel;
- Calculation of CO<sub>2</sub> production;
- Calculation of biodegradation %.



12 channel Respirometer

# Technical specifications

- **Dimensions - Control units:**

- 12 channel respirometer: 60 x 60 x 60 cm;
- 24 channel respirometer: 60 x 60 x 120 cm;
- 36, 48 & 60 channel respirometer: 60 x 60 x 200 cm;

- **Dimensions - Thermostatic chambers:**

- 12 channel respirometer: 60 x 60 x 150 cm;
- 24 channel respirometer: 80 x 80 x 200 cm;
- 36 channel respirometer: 150 x 86 x 200 cm;
- 48 & 60 channel respirometer: 150 x 86 x 200 cm (2x);

- O<sub>2</sub> and CO<sub>2</sub> sensors (additional sensors on request);
- MFC +/- 1,5% FS: 0-200ml/min, 0-500ml/min or 0-1000ml/min;
- Connecting multicore cables;
- Vessels for solid samples - 2,8l;
- Vessels for liquid samples - 150ml - 1000ml;
- Vessels for algae samples (controlled LED lighting) - 1000ml.



60 channel Respirometer



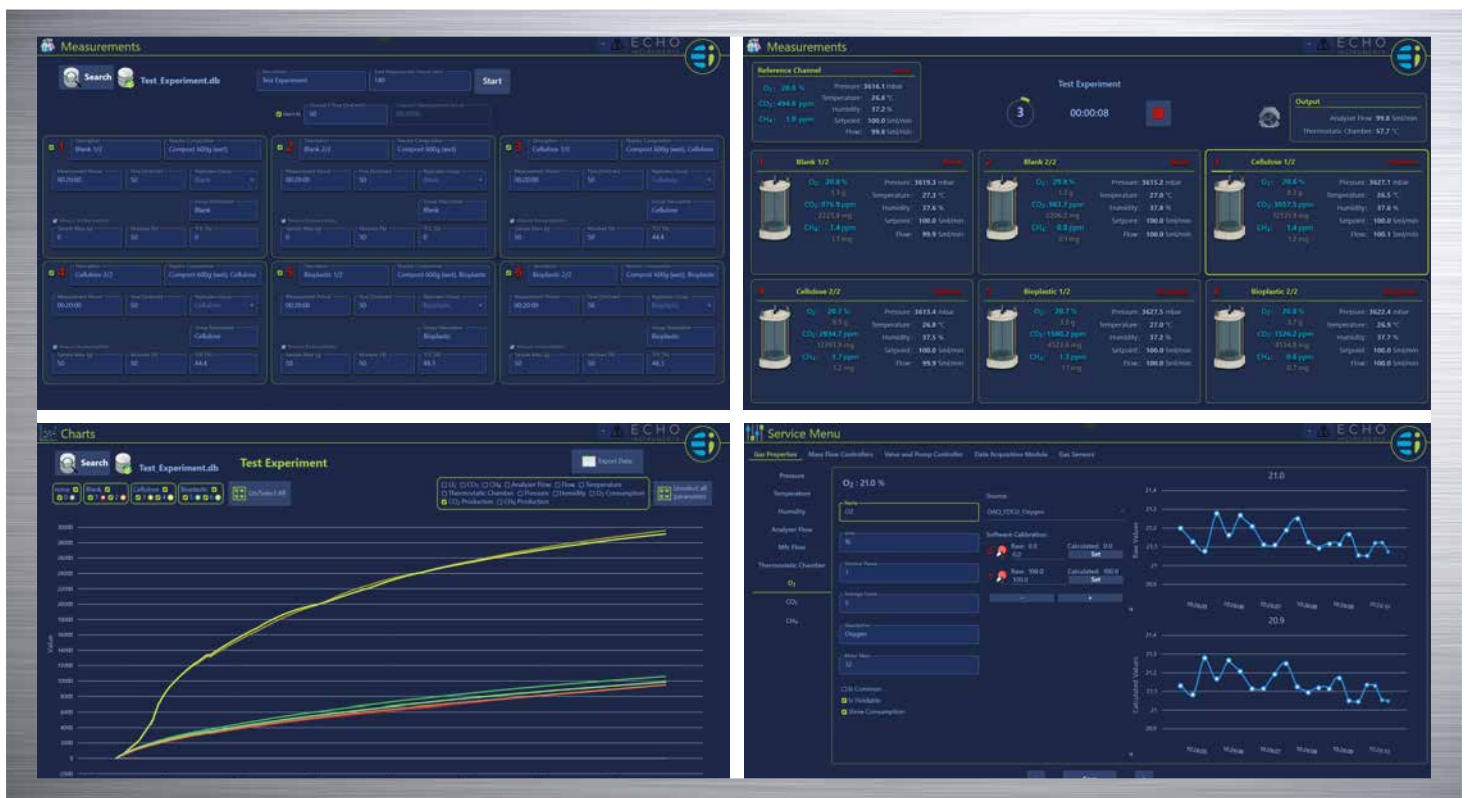
Vessel for solid samples



Vessel for liquid samples

Vessels

## ECHO Instruments ER respirometer software



# COMPACT - MODULAR XC RESPIROMETER

FOR SCREENING AND R&D MEASUREMENTS

COMPACT XC RESPIROMETER FOR SCREENING AND R&D MEASUREMENTS,  
CONNECTED TO EXISTING HARDWARE OR AS A COMPLETE SETUP

## Features:

- **STAND - ALONE CONTROLLER** for connection to existing hardware (vessels, cabinets, etc);
- **COMPLETE SETUP** with vessels, thermostatic cabinet, air source, PC, etc;
- **SUITABLE FOR R&D TESTS, SCREENING and RAPID TESTS;**
- **MODULAR DESIGN & UPGRADABLE;**
- **NEW** Software with additional features;
- Different mixing options.

Vessels



Solid samples



Liquid samples

Compressor - AP03



CO<sub>2</sub> Scrubber



XC Controller

Complete setup XC Respirometer

# Advantages

- Multi - channel system: 6 / 12 / 18 / 24 /36, etc;
- Plug & Play design (easy to install, use and maintain);
- Suitable for screening and R&D measurements;
- O<sub>2</sub>, CO<sub>2</sub>, temperature, flow, pressure, humidity measurements;
- Various sizes of vessels;
- Remote desktop control;
- Various ranges of gas sensors;
- User friendly software with MS Excel export;

## Modularity:

XC RESPIROMETER CAN BE CONNECTED TO VARIOUS LABORATORY EQUIPMENT & BIOREACTORS. CONFIGURATION OF MULTIPLE UNITS IS POSSIBLE WITH ONE SOFTWARE. MEASUREMENTS DATA BASE CAN BE SYNCHRONIZED TO ANY CLOUD OR BACKUP SERVICE.



XC + Thermostatic cabinet



XC + Vessels



XC + Water bath

## ECHO Instruments XC respirometer software



# C13 ISOTOPE MEASUREMENTS WITH ER RESPIROMETER

## ER RESPIROMETER + $\delta^{13}\text{C}$ ISOTOPE ANALYZER

CONNECT  $\delta^{13}\text{C}$  ISOTOPE ANALYZER TO ER RESPIROMETER FOR PRECISE ON-LINE BIODEGRADATION MEASUREMENTS

### Features:



ER Respiriometer



$\delta^{13}\text{C}$  isotope analyzer e.g. 1



$\delta^{13}\text{C}$  isotope analyzer e.g. 2

- **MEASURING  $\delta^{13}\text{C}$  ISOTOPE ON-LINE;**
- Software integration between analyzers;
- Biodegradation in compost;
- Biodegradation in soil;
- Biodegradation in marine waters;
- Biodegradation in fresh waters;
- Biodegradation in waste waters;
- Biodegradation in sediments;
- Biodegradation in algae environment;
- **Certification** measurements;
- Modular and upgradable;
- Suitable for various applications;
- Customizable.

# RESPIROMETERS STANDARDS AND APPLICATIONS

## Applications:

- Biodegradation in compost;
- Biodegradation in soil;
- Biodegradation in marine waters;
- Biodegradation in fresh waters;
- Biodegradation in waste waters;
- Biodegradation in sediments;
- Biodegradation in activated sludge;
- Biodegradation in algae environment;
- Measuring  $\delta C^{13}$  Isotope ON-LINE;
- Organic waste biodegradation measurements;
- Insects and small animals respirometry;
- Food respiration, R&D in plastics, biotechnology,
- Aerobic and anaerobic conditions;
- And many more.

## Standards

- **ISO 14855 - 1 & ASTM D5338;** Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions;
- **ISO 17556:2019;** Determination of the ultimate aerobic biodegradability of plastic materials in soil by measuring the oxygen demand in a respirometer or the amount of carbon dioxide evolved;
- **ISO 14852:2021;** Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium. Method by analysis of evolved carbon dioxide;
- **ISO 16929:2021;** Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test;
- **ASTM D6691-17;** Standard Test Method for Determining Aerobic Biodegradation of Plastic Materials in the Marine Environment by a Defined Microbial Consortium or Natural Sea Water Inoculum;
- **OECD 301B;** biodegradability of the material by evaluating the production of CO<sub>2</sub> over a minimum of 28 days in a liquid environment;
- **ISO 23977, ISO 18830, ISO 19679, ISO 22403, ISO 22404** and many more;

# PLASTIC DISINTEGRATION RESPIROMETER - DT

## DISINTEGRATION PILOT SCALE TESTS

DETERMINATION OF THE DEGREE OF DISINTEGRATION OF PLASTIC MATERIALS UNDER DEFINED COMPOSTING CONDITIONS IN A PILOT-SCALE TEST

### Principles

The biological treatment of biodegradable plastic materials includes aerobic composting in well- operated, municipal or industrial biological waste treatment facilities. Determining the degree of disintegration of plastic materials in a pilot-scale plant is an important step within a test scheme to evaluate the industrial compostability of such materials.

The disintegration test is performed under defined and standardized composting conditions on a pilot-scale level.

The test material is mixed with fresh bio waste in a precise concentration and introduced into a defined composting environment. A natural ubiquitous microbial population starts the composting process spontaneously and the temperature increases. The composting mass is regularly turned over and mixed. Temperature and O<sub>2</sub> concentration are regularly monitored.

### Applications

- **ISO 16929** - Plastics — Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test



16929 Respirometer



## Advantages

- Single or Multi - channel system: 1 / 3 / 6 / 12;
- Plug & Play design (easy to install, use and maintain);
- Integrated PC in the control unit;
- Cooling system for each reactor;
- Temperature, flow, measurements;
- Sensor O<sub>2</sub>: Range 0-25%, Accuracy: 2%;
- Various sizes of vessels;
- Remote desktop control;
- Air pump - compressor;
- User friendly software with excel export files.



## Technical specifications

- Dimensions - Control unit: 39 x 49 x 20 cm;
- Volume of vessels: 35 l, 64L, 140L, etc;

Bio reactor 64l

## ECHO Instruments DT respirometer software



# DYNAMIC RESPIRATION INDEX RESPIROMETER - DRI

## WASTE DEGRADATION TESTS

### Principles

DRI Respirometer measures  $O_2$  to determine the activity of microorganisms in degradable organic matter under defined continuous airflow and adiabatic conditions. The samples are measured in hermetically sealed vessels (adiabatic), which create controlled conditions determined by EU and other norms.



Multichannel DRI Respirometer

### Applications

- **UNI 11184** - Determination of biological stability by DRI;
- **EN 15590** - Determination of the current rate of aerobic microbial activity using DRI;
- Other applications for waste degradation.

### Advantages

- Single or multi - channel system: 1 / 3 / 6 / 12;
- Plug & Play design (easy to install, use and maintain);
- Temperature sensor in each vessel;
- Automatic condensate removal system;
- Temperature, flow, pressure, humidity measurements;
- Sensor  $O_2$ : Range 0-25%, Accuracy: 2%;
- Various sizes of vessels: 2l, 10l, 20l, 30l;
- User friendly software with MS Excel export files;
- Remote desktop control;
- Air source (compressor) included;
- No special connections required;
- Suitable for various applications in different fields;
- Rack (stand) for vessels, control unit and PC.

# Technical specifications

- **Dimensions - Control unit 3 / 6 channels:**
  - 48 x 40 x 28 cm; Weight: 17kg;
- **Dimensions - Rack for vessels:**
  - 140 x 60 x 150 cm; Weight: 50kg;
- **Dimensions - 10l vessel:**
  - 42 x 42 x 45 cm; Weight: 9kg;
- **Dimensions - 2l vessel:**
  - 33 x 33 x 28 cm; Weight: 5,5 kg.
- **Dimensions - 30l vessel:**
  - 50 x 50 x 55 cm; Weight: 24 kg.



1 channel DRI Respirometer



Adiabatic vessel 30l



Adiabatic vessels 2 & 10l

## ECHO Instruments DRI respirometer software



# HAND O2 & FOOD O2

## PORTABLE O<sub>2</sub> ANALYZERS

FOR MAP PACKAGING IN PHARMACEUTICAL AND FOOD & BEVERAGE INDUSTRY

Hand O<sub>2</sub> & Food O<sub>2</sub> devices are used for determination of oxygen concentration in headspace in various MAP packaging (MAP - modified atmosphere packaging). Micro - invasive measurements are enabled by optical sensor tips smaller than 140µm. Devices are compliant with pharmaceutical standards and **21 CFR Part 11**.

### Principles

Optical sensors with optical transmitter combined with intelligent software instantly measure the O<sub>2</sub> concentration in very small headspaces.

### Applications

- Pharmaceutical: O<sub>2</sub> concentration in blisters, vials, tubes, patches, sealed bags, etc;
- Food & Beverage: O<sub>2</sub> concentration in coffee, meat, dairy products, all of MAP packaging;
- Science: Biotechnology, Micro - respirometry, marine research, R & D.



# Advantages

- Measurements in gas or liquid phase;
- No sample extraction;
- High accuracy;
- No O<sub>2</sub> consumption during measurements;
- Salinity factor input for different salinity samples in vials;
- IQ & OQ documentation;
- 2Sterilizable sensors;
- Calibration is fast and can be performed by the user;
- Battery or regular power supply;
- Measuring range: 0-25% or 0-100% O<sub>2</sub>;
- Accuracy: +/- 0,4 % at 20,9 % O<sub>2</sub> or +/- 0,05 % at 0,2 % O<sub>2</sub>;
- Temperature measurement range: 0-50 °C;
- Response time (t90)< 15 sec;
- Calibration: 2 - point calibration, using Nitrogen and Synthetic air;
- Dimensions: 180 x 90 x 270 mm, Weight: 1 kg;
- Interface: USB, RS485, Ethernet;
- Needles: 0,4 mm, 0,8mm, 1,2 mm diameter.

## ECHO Instruments HAND O2 & FOOD O2 software

Measurements :

**O2: 20.19 %** O2[avg]: 14.13 %  
**O2: 8.432 mg/l** O2[avg]: 5.90 mg/l  
**T: 19.98 °C** p: 979 mBar

Data logging:  ON  OFF

Location:  USB  SD card  
 File name: 06062022Log  
 Interval: 1  min  sec

Salinity: 0 ppt

Secondary units:  
 hPa  Torr  Air saturation %  
 mg/l  ppm  μmol/l  
 10 : measurements average

Status : Select next position

No.2 O2: 0.0 %	No.4 O2: 4.6 %	No.6 O2: 0.0 %	No.8 O2: 0.0 %	No.10 O2: 0.0 %
No.1 O2: 7.6 %	No.3 O2: 0.0 %	No.5 O2: 0.0 %	No.7 O2: 0.0 %	No.9 O2: 0.0 %

O2 : 0.00  
T : 20.0°C

Next blister  
Print report  
Exit

Status : Measurements in vial 1 in liquid are finished

Vial	O2 Current	O2[vial] Average
Headspace	0.0 %	0.0 %
Liquid	0.001 ppm	0.001 ppm

O2:0.00 % O2:0.001 mg/l  
T:20.2°C p:989mBar

Next  
Finish

Status : Measurements in tube 1 are finished

Tube	O2 Current	O2[tube] Average
Headspace	0.0 %	0.0 %
Liquid	0.010 mg/l	0.010 mg/l

O2:0.02 % O2:0.010 mg/l  
T:20.2°C p:988mBar

Next  
Finish

# AUTOMATIC OXYGEN ANALYZER FOR BLISTERS

## AUTOMATIC O<sub>2</sub> ANALYZER B-02

FOR MAP PACKAGING IN PHARMACEUTICAL AND FOOD & BEVERAGE APPLICATIONS

**B-02:** Fully automatic optical O<sub>2</sub> analyzer for determination of O<sub>2</sub> concentration in blister packs and other MAP packaging for pharmaceutical industry in quality control and production lines. The analyzer can analyze 1-6 blisters at once, with up to 72 measuring points in one serial measurement. Device is compliant to pharmaceutical standard, **21 CFR Part 11** and Industry 4.0.

### Applications

#### Applications B-02

- O<sub>2</sub> concentration in blister packs. Measuring 1-6 blisters at once, with up to 72 measuring points in one serial measurement.



# Principles

Optical sensors with optical transmitter installed combined with intelligent software instantly measure the O<sub>2</sub> concentration in very small headspaces.

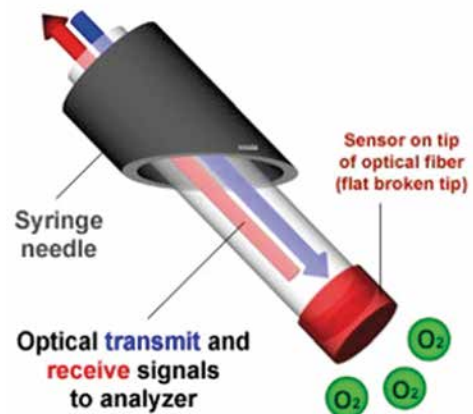
Devices provide reliable, accurate and reproducible analysis that eliminates possibility of human errors. The measuring procedure is simple, fast and efficient. The user interface is designed for easy operation. The operator selects the required type of analysis, i.e. single point analysis or serial measurements. Statistical analysis report is automatically generated by the software, compliant to **21 CFR Part 11**. Special designed cartridges enable fast and precise measurements of different types of blisters.

# Advantages

- Measurements in headspace;
- No sample extraction;
- High accuracy;
- No O<sub>2</sub> consumption during measurements;
- Automatic calibration;
- IQ & OQ documentation;
- **21 CFR Part 11 compliant;**

# Technical specifications

- Needles with  $\varnothing$ : 0,4 mm / 0,8mm;
- Measuring range: 0-25% O<sub>2</sub>;
- Accuracy: +/- 0,1 % O<sub>2</sub>;
- Limit of detection: 0,1% O<sub>2</sub>;
- Operating temperature range: 5-40 °C;
- High precision positioning: < 0,02 mm;
- Interface: USB, RS485, Ethernet.



Optical O<sub>2</sub> sensor

## ECHO Instruments B-O2 software



# CO<sub>2</sub> FLUX MEASUREMENTS

## PORTABLE AND AUTOMATIC SOIL FLUX ANALYZERS

Portable and automatic Soil flux devices are ideal for simultaneous measurements of gas flux CO<sub>2</sub>, O<sub>2</sub>, CH<sub>4</sub>, Radon, H<sub>2</sub>, H<sub>2</sub>S, SO<sub>2</sub>, VOC, Hydrocarbons, etc over a wide dynamic range on various surfaces. Devices are suitable for measurements in the fields, forests, landfills and other areas.



Portable Soil Flux



## Principles

Various gas sensors measure the gas concentration inside the measuring head. Software calculates the flux directly on site. Accurate GPS module determines the exact location of the measurements.

## Applications

- Flux CO<sub>2</sub> from soil;
- Flux CO<sub>2</sub> from compost;
- Flux CO<sub>2</sub> from landfills;
- Identifying ground and underground spills - pollution in ecological disasters;
- Agronomy;
- Post fire ground activity;
- Uranium mines mapping;
- Carbon fingerprint & greenhouse gases.
- Gas presence on playground areas;



Automatic Soil Flux



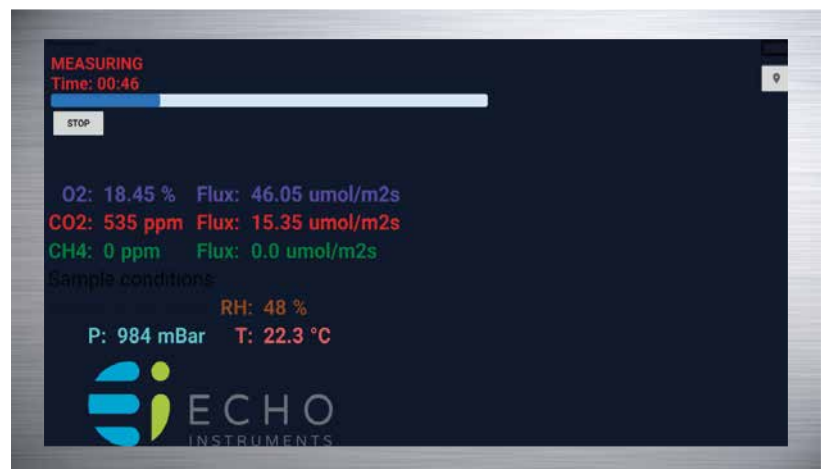
# Advantages

- Portable, or stationary (automatic);
- Map location (inbuilt GPS module);
- Up of 5 different gas sensors with different ranges;
- Operation via tablet, mobile phone or PC.

# Technical specifications

- Operating conditions; Portable version:  
5°C – 40 °C < 90% RH, non - condensing;
- Operating conditions automatic:  
-10° C – 40 °C < 90% RH, non - condensing;
- Storage conditions: -20 – 40 °C < 90% RH,  
non - condensing;
- Power supply: Li-ion battery;
- Gas sensors: O<sub>2</sub>, CO<sub>2</sub>, CH<sub>4</sub>, VOC, H<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, Rn, etc;
- Automatic system: 4 / 8 channels.

## ECHO Instruments Soil Flux software



# GAS MIXING DEVICE

## PORTABLE AND STATIONARY DEVICES

### FOR PRECISE GAS MIXTURES

Gas mixing devices are used for production of high precision gas mixtures in calibration procedures and preparation of gas mixtures for industrial or laboratory applications. Precise dilution of various gases enables the user to obtain the most accurate gas mixture for used application. User simply sets the target output concentration for desired gas. Actual concentrations based on flow measurements are displayed in real time during mixing procedure.



Portable gas mixing device

## Principles

Various gas sensors combined with high accurate mass flow controllers and sophisticated software mixes the gas mixture from 100% down to 1 ppm.

## Applications

- Gas mixtures for sensors calibration;
- Calibration of personal gas monitors;
- Calibration of emission & imission monitors;
- Gas mixtures for industrial, laboratory use;
- Applicable also in biotechnology, pharmacy, chemical and biological experiments.



Custom gas mixing device

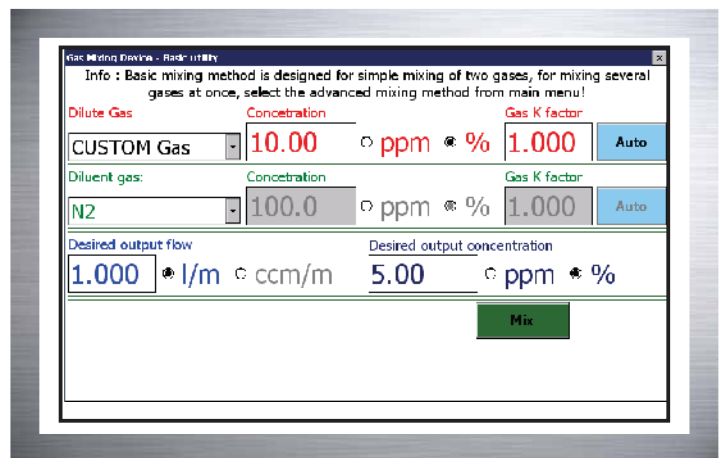
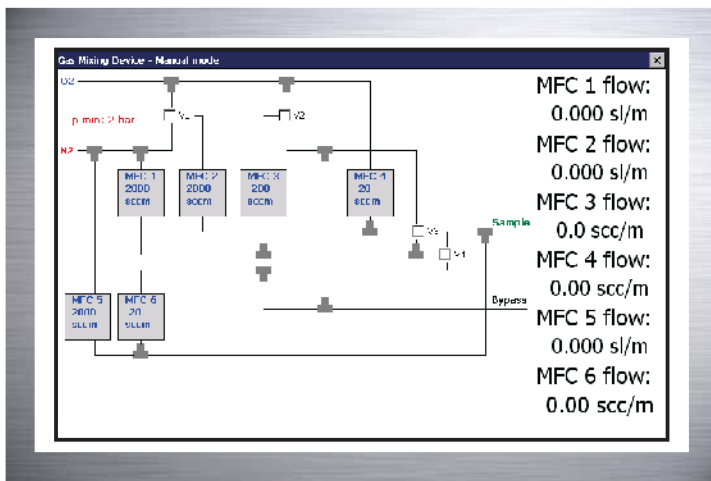
# Advantages

- Mixing non-corrosive and corrosive gases such as: SO<sub>2</sub>, NO, NO<sub>2</sub>, CL<sub>2</sub>, H<sub>2</sub>S, etc;
- 1 - 4 channels;
- High accuracy and repeatability;
- Stationary or portable;
- Mixtures from 100% to ppm;
- Suitable for accredited calibrations.

# Technical specifications

- Accuracy: +/- 1% of Full-Scale including linearity over 15°C to 25°C and 0.7 to 4 bar;
- +/- 2% of Full-Scale including linearity over 0°C to 50 °C and 0.3 to 10 bar;
- +/- 1 % of Full-Scale accuracy at a specific temperature and pressure is available with special calibration;
- Reproducibility: ± 0,25 % f.s. (± 0,15 % f.s. on demand);
- Response time: 300 ms;
- Flow range: 0 to 10 sccm to 0 to 50 slpm; flow ranges specified are for an equivalent flow of Nitrogen at 760 mm Hg and 21°C;
- Response time: 300 ms, 2 s average;
- Higher accuracy, repeatability, ranges, response time on demand.

## ECHO Instruments Gas mixing device software





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