Ocean Monitoring

OceanPack™ & $p\text{CO}_2$ Analyzer

Modular, easy to use and reliable monitoring systems.
Water quality monitoring for: profiling, underway and mooring

www.subCtech.com
info@subctech.com
OceanPack™ Family

SubCtech presents a potent and cost efficient platform with its OceanPack™ measuring system. It consists of several high-end SubCtech products.

**Technology**
OceanPack™ flow-through systems (also known as FerryBox or Underway System) with NetDI® for manifold measurement platforms: research vessels, ships of opportunity, platforms, racing yachts

**Sensors**
Nearly any oceanographic sensor can be integrated into OceanPack™ (e.g. pCO₂, SST, SSS, D.O., algae). In addition, external devices can be included: nutrient analyzers, water samplers, meteorological stations, GPS, Air-CO₂ analyzers - up to 30 serial interfaces

**Calibration**
All provided sensors are mostly calibration free for approx. 1 year. The SubCtech analyzers incorporates a fully automatic self-calibration (e.g. for achieving SOCAT conform quality data)

**Storage**
Self-recording on 32 GB SD cards, data download via USB

**Pump**
Self-priming low-power sea water pump, corrosion free

**Debubbling**
Integrated Debubbler mBubbler® unit for gas-tolerant de-airing, works up to ± 30° roll angel

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**Classical "FerryBox"-design, flexible, expandable**
- Robust, versatile and standard 19" racks
- Water system fully removable for easy service
- CO₂ tolerant debubbler mBubbler® for gas analysis
- Built in NetDI® data logger
- The data logger marks data automatically with quality flags
- Auto-zeroing calibration for high-accuracy long-time operations
- Easy integration of instrumentation through NetDI® data management system connected simultaneously by up to 30 serial interfaces
- Expandable through the optionally RS485 bus

**Compact, versatile measurement system**
- 19-inch rack format allows the mounting of 19-inch standard frames
- Touch Screen: the new 7" touch screen enables an intuitive control of the device
- own flight-case for fast and safe shipping
- Internal sea-water pump for below or above the waterline installation
- NetDI® data logger, robust Flat-Membrane-Equilibrator

**Highly mobile, extremely robust**
- PCO₂ carbon ocean-lab + optional Air-CO₂
- 24V DC power supply, <30W operate, <14W standby
- 15 kg lightweight mechanical frame
- Up to 10 sensors/analyzer
- Sensors mostly calibration-free for approx. 1 year
- Integrated small debubbler mBubbler® for gas-tolerant de-airing
- Anti-Fouling design

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OceanPack™ RACK

OceanPack™ CUBE

OceanPack™ RACE

ISO 9001

www.subctech.com  ●  info@subCtech.com
Sensors / Analyzer

**Instruments for greenhouse gas measurements (CO₂ and/or CH₄) in water and air**

**Mobile flow-through analyzer for precise pCO₂ measurements**
- Premium optical NDIR LI-COR® analyzer Li-850x
- High precision
- Auto calibration, SOCAT-ready
- Simple Touch-screen operation via NetDI®
- Lowest maintenance
- Robust against sediments, fouling, shock & vibration
- Operates on small vessels or underway systems
- Optionally Top-Box contains GPS, AIR-CO₂ analyzer or meteo sensors

**Precise optical Subsea pCO₂ analyzer**
- Premium optical NDIR LI-COR® analyzer Li-850x
- Robust, versatile and compact submergible housing for buoy and subsea applications (e.g. monitoring Offshore Oil&Gas or CCS)
- ROV or AUV integration
- optional external Li-Ion PowerPack™

**Underway analyzer for precise pCO₂, H₂O and pCH₄ measurements**
- Los Gatos greenhouse gas analyzer
- High precision
- Simple Touch-screen operation to control the NetDI® controller and datalogger
- Second display to show Los Gatos analyzer interface
- 5 USB-ports

**Specification - LI-COR® sensor**

<table>
<thead>
<tr>
<th>Sensor Technology</th>
<th>High-performance LI-COR® Li-850x “MK-2” or LI-7200 “MK-3” ● exclusively produced by LI-COR® Biosciences for SubCtech ● Dual-wavelength NDIR detector for CO₂ and H₂O or CH₄</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equilibrator</td>
<td>Silicone flat membrane equilibrator ● Lifetime &gt;10 years ● Fast response time ● No sedimentation or fouling ● Fast exchange with membrane cassettes ● Patent pending</td>
</tr>
<tr>
<td>Range</td>
<td>Standard 0…3000 ppm CO₂ ● 0…80 ppt H₂O ● up to 10% CO₂ ● Selectable units</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.01 ppm CO₂ ● 0.001 ppt H₂O</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Overall accuracy &lt; 1% ● Compensation for water vapor, pressure and temperature effects With auto-calibration &lt; 1ppm ready for SOCAT database</td>
</tr>
<tr>
<td>Sample Rate</td>
<td>Configurable, typ. 1 Hz self-recording and real-time output ● Configurable data format</td>
</tr>
<tr>
<td>Calibration</td>
<td>Factory calibration with 15 traceable gases to WMO standards for CO₂ ● NIST traceable LI-610 portable dew point generator for H₂O ● User correction supported</td>
</tr>
<tr>
<td>Auto Calibration</td>
<td>Auto zeroing at programmed intervals ● Zeroing reference included for &gt;1 year operation time Manual span and optional full auto-span gas calibration, up to 3 gas inputs</td>
</tr>
<tr>
<td>Data Interface</td>
<td>RS-232 or RS-485 ● Simple standardized ASCII NMEA-0183 data protocol ● Easy integration with existing systems ● Optional usage of radio links, Ethernet, WLAN etc.</td>
</tr>
<tr>
<td>Analogue Output</td>
<td>0...2.5/5V or 4...20mA ● Range can be configured</td>
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</table>

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Solutions

Modular and flexible monitoring solutions for the marine environment

- Complete systems
- Lowest maintenance
- Robustness for harsh environments
- Long-term deployments
- Autonomous operation
- Fully integrated gas analyzer
- Automatic calibration and referencing
- Small and lightweight design
- Open design for a multitude of sensors
- OceanView™ Windows® software

Microplastic Sampler

Sailing meets Science™ - microplastic automatic sampler

- Robust, versatile and compact waterproof design
- Highest efficiency sampling, even for high speed boats with 30kn
- On board sampler: smallest size, low weight and low power (size like a shoebox)

Volvo Ocean Race: round the world 2018-19

© Volvo Ocean Race. Data source: Dr.-Ing. Sören Gutekunst and Dr. Toste Tanhua, GEOMAR Helmholtz Centre for Ocean Research Kiel

Racing Yacht "Malizia"

© Boris Herrmann Racing

North Sea data: 1.5 Mio. Datasets by NIOZ

OceanPack™ System addition to measure Air-CO₂

- The LI-COR® pCO₂ analyzer is already included and fully configured
- Complete, flexible and easy to maintain
- Handy design: small size and low weight, can be operated on small vessels
- No or little post-processing necessary
- Best accuracy and long-time stability
- Can be operated unattended

pCO₂ Top-Box™

Polarstern Data

Excellent comparison to GO-8050: data by NIOZ and AWI

AWI RV Polarstern 2013-2019+

comparing GO-8050 to OceanPack™

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