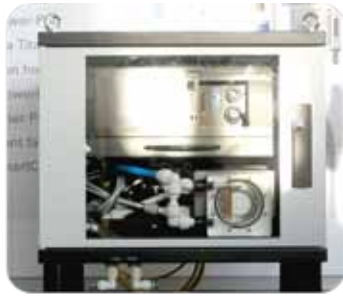


OceanPack MK-3

Mobile & Modular Flow-through / Underway System for precise Sea + Air pCO₂ measurements



the reference

- Reference LI-COR® analyze
- No calibration required
- Maintenance free
- Roughest environmental
- Highest available precision
- Low investment – no follow up costs
- Operates on small vessels



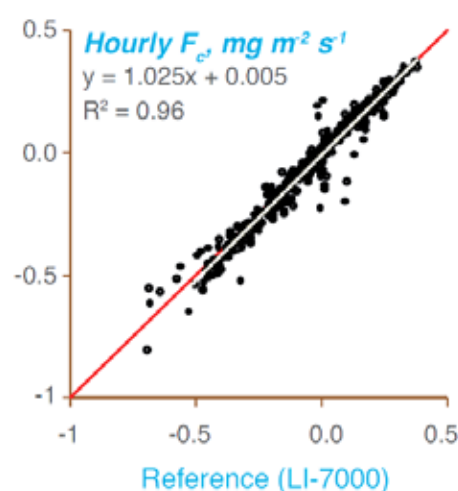
Features & Benefits:

- ⌋ Highest accuracy due to automatic temperature and pressure compensation
- ⌋ Robust, versatile and compact housing for ship + offshore applications
- ⌋ Complete, hand carry able and easy to maintain "Underway" or "Lab" System
- ⌋ Includes the BEST LI-COR® pCO₂ sensor, based on the LI-7xxx family, developed for high precision atmospheric measurements, adapted to sea - air exchange analyzing systems
- ⌋ Permanently checked with auto zeroing
- ⌋ "FerryBox" concept: easy integration of instrumentation through integrated "SmartDI" data management system, connected simultaneously by up to 36 serial interfaces (AADI Aanderaa Optode, BBE Algae Monitor, SBE Seabird CTD's and Thermosalinographs, Sea&Sun CTD's, SYSTEA Nutrient Analysers, TriOS, Turner, Seapoint; WetLabs Fluorimeters, Turbidity sensors or algae monitor etc.)
- ⌋ Optionally expandable through the RS-485 bus, e.g. to connect a Meteorology or sea water and waste water pumps
- ⌋ Optionally automatic cleaning procedure includes flagging of collected data
- ⌋ Automatic report for interferences and initiation of diagnostic routines
- ⌋ Optionally GPS geo references for all data and position event control
- ⌋ Optionally online telemetry data transfer and alarm services
- ⌋ Easy handling and intuitive overall design



The pCO₂ sensor unit:

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|----------------------------|--|
| Sensor Principle | High performance LI-COR [®] analyzer contains dual-wavelength NDIR detector for CO ₂ and H ₂ O • Chopper filter wheel with 9.000 rpm • Silicone flat membrane equilibrator |
| Range | Standard 0...3000 ppm CO ₂ • 0...60 ppt H ₂ O • Units selectable ppm, μmol/l, μAtm |
| Resolution | 0.01 ppm CO ₂ • 0.0001 ppt H ₂ O |
| Accuracy | Minimized drift • Correction for water vapour, pressure and temperature effects • uncorrected noise < 0.08ppm (5Hz output rate) • overall accuracy < 1% FS |
| Sample rate | Output rate typ. 1 Hz with average user configurable • Eddy covariance methods supported up to 20Hz sample rate • Storage rate configurable |
| Calibration | Calibration stored internally • Recalibration recommended every 12 months • Factory calibration with 15 traceable gases to WMO standards for CO ₂ . NIST traceable LI-610 portable dew point generator for H ₂ O • User correction supported |
| Auto Calibration | Auto offset zeroing check on programmed intervals • Zeroing reference included for >1 year operation time • Auto span gas calibration supported, but NOT required for normal operation |
| Lifetime | Estimated > 10 years |
| Air pCO₂ | Optionally air inlet(s) can be provided by using the same analyzer • Second independent analyzer is supported • 2 nd analyzer can be installed on deck – no tubes are needed in this case • Top-Box design allows the connection of meteorological sensors. |



The figure to the left show hourly CO₂ and H₂O fluxes measured with the LI-COR[®] Analyzer compared to fluxes measured with the LI-7000 analyzers, which was used as standard. Fluxes measured with the LI-72xx were within 2.5% of the standards for all field experiments. These data were collected in 3 deployments that took place over four seasons. Data were collected over a ryegrass field.



The Datalogger and FerryBox Design:

| | |
|-------------------------|---|
| Housing | 19" Industrial rack typ. 9 HE • Open side doors for maintenance • Front splash protected • Sensor unit IP66 • Consists of LI-COR [®] Sensor Unit and SmartDI Datalogger • All tubes and connectors can be handled from the front |
| Weight | 55 kg without optionally sensors or pumps |
| Size | 600 x 505 x 600 mm W x H x D includes 150mm spacer (pCO ₂ sensor only) 600 x 830 x 600 mm W x H x D (complete with Debubbler, SBE-45 TSG etc.) |
| Water support | Integrated flow-through system • access from all sides • ideal for ship applications • optionally CO ₂ tolerant Debubbler • optionally external inlet and outlet tanks • flow rate typ. 5 l/min • max. water pressure 3 Bar |
| Analogue output | 6 x 0...5V / 4...20mA • Range / full-scale can be configured |
| Data interface | RS-232C • Option RS -485 • ASCII NMEA -0183 • Easy integration into existing systems • Ethernet • Data + Backup on 2GB CF card |
| External devices | Example of optionally external sensors (up to 36 serial interfaces): SYSTEAM nutrient analyzers • Water sampler • GPS Receiver • FSI sensors • Sea&Sun CTD probes • Seapoint optical sensors • bbe MOLDAENKE algae online analyzer • RDI ADCP • Aanderaa Optode and sensors • Seabird – e.g. SBE45 Thermosalinograph • external meteorological instrumentation via RS-485 bus |
| Cleaning | Optionally integrated self-cleaning option available • Automatic flagging of the data for maintenance and error states • Cleaning (anti-fouling) for integrated sensors optionally provided |
| Controller Unit | SmartDI Touch-panel industrial PC • 8,4" touch TFT Display • Automatic messages for failures and diagnostic messages • 2x 2 GB CompactFlash for system and data storage • Programmable Soft-PLC (Programmable Logic Controller) • Expandable via RS485 modules for pumps, valves etc. |
| Analogue input | Optionally 24 Bit data acquisition 0/4-20 mA, ±10V etc. • Options for PT100 • Expandable via RS485 Bus for e.g. meteorology or in-situ measuring devices. |
| Power | 10..32 VDC or 90..240 VAC • typ. 25W (without external pumps) |



OceanView Software package included